SECTION 3
PUBLIC COMMENTS AND DOE RESPONSES

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This section presents a side-by-side display of the comments received by DOE during the public comment period on the *Draft TC & WM EIS* and the DOE response to each comment. Letters have been reproduced as they were received. To find a specific commentor or comment in the following pages, search the Index of Public Officials and Interest Groups or the List of Commentors that follows the Table of Contents to identify the page numbers on which the comments and DOE responses appear. In many cases, individual commentors submitted similar comments on a particular subject. DOE's responses to similar comments are the same.

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Commentor No. 1: Martin Bensky

From: Martin Bensky [mbensky@msn.com]
Sent: Monday, October 26, 2009 7:10 PM
To: tc&wmeis@saic.com
Cc: Alan Waltar; Darrell Fisher; Gary Troyer; Gerry Woodcock; Mike Fox; Wanda Munn; Tony Brooks; Ralph Johnson; John Boland; Fred Mann; Abe vLuik
Subject: Radiologic Risk

Perusing the TC&WM EIS, I am unable to judge whether the results shown in Figs. S-15 through S-22 are credible or not since I am not told what magnitude of radiation dose is related to the stated risk. Most knowledgeable scientists have long since rejected the Linear/No Threshold (LNT) Hypothesis since it has found no supporting data, and abundant conflicting data, in the 60 or so years since the hypothesis was proposed. If this hypothesis was used as the basis for estimating the indicated risk, I strongly object to its use. *1-1* Of great importance to selection of a closure mode is the fact that, based on your data and my estimate of logical adjustments to your use of the LNT, realistic relationships between dose and incidence of cancer would result in the selection of no-action as the logical choice in every instance. *1-2* This, of course, has enormous impact on the cost of tank closure and waste management. *1-3*

Martin Bensky
2121 Briarwood Ct.
Richland, WA 99354
(xxx) xxx-xxxx
mbensky@msn.com

1-1 Regarding the application of the Linear/No Threshold model, risk coefficients used in this *TC & WM EIS* are those recommended in Federal Guidance Report No. 13, *Cancer Risk Coefficients for Environmental Exposure to Radionuclides*, and that report employs the Linear/No Threshold model. In the report, the EPA notes that several expert panels have concluded that the Linear/No Threshold model is sufficiently consistent with current information on carcinogenic effects of radiation that its use is scientifically justifiable for the purpose of estimating risks from low-dose radiation.

1-2 DOE believes that long-term actions are required to permanently reduce the risk to human health and the environment posed by the waste in the tank systems.

1-3 DOE agrees that any path forward on tank closure and waste management will have substantial cost implications. The Summary, Section S.6, and Chapter 2, Section 2.11, of this *TC & WM EIS* summarize and compare the relative costs of the alternatives. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 2: Jeanne Raymond

From: Jeanne Raymond [raymondj@peak.org]
Sent: Monday, October 26, 2009 8:05 PM
To: tc&wmeis@saic.com
Subject: Closure of Hanford to all radioactive waste

DOE and interested parties,

As was agreed between Washington, Oregon, and the United States, Hanford should be cleaned and shut down permanently. No wastes should be coming into Hanford. Once the cleanup of past storage, spills, and waste left on the Hanford reservation, the site must be closed to future importation. Shut Down Hanford Forever. There must be no more threat to the Columbia River, upstream or downstream, upwind or downwind. *2-1* *2-2* *2-3*

Must we restate what has already been established? There should be no disposal of new radioactive wastes at Hanford. Protect the water, air, and soil, as was expected and agreed to by the three parties. *2-4* *2-5*

Sincerely,
Jeanne Raymond
Corvallis, OR
raymondj@peak.org

This is a message from the Department of Energy

DRAFT HANFORD TANK CLOSURE AND WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT AVAILABLE FOR PUBLIC REVIEW

The U.S. Department of Energy (DOE) today announced that the Draft Tank Closure and Waste Management Environmental Impact Statement (EIS) for the Hanford Site has been filed with the Environmental Protection Agency, and the Agency's Notice of Availability of the EIS is expected to appear in the Federal Register on October 30, 2009. This will initiate a public comment period extending to March 19, 2010. The Washington State Department of Ecology is a cooperating agency on the Draft EIS.

The National Environmental Policy Act and its implementing regulations require federal agencies to integrate environmental values into their decision-making process by considering the environmental impacts of their proposed actions and reasonable alternatives for implementing those actions. This Draft EIS analyzes alternatives for three types of actions: retrieving, and managing waste from 177 underground storage tanks at Hanford and closure of the single-shell tanks (SST); decommissioning of the Fast Flux Test Facility and its auxiliary facilities; and

2-1 Comment noted.

2-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

2-3 Comment noted.

2-4 See response to comment 2-2 for a discussion on the transport and disposal of offsite waste.

2-5 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 2 (cont'd): Jeanne Raymond

continued and expanded solid waste management operations on site, including the disposal of Hanford's low-level radioactive waste (LLW) and mixed low-level radioactive waste (MLLW) and limited volumes of LLW and MLLW from other DOE sites in an Integrated Disposal Facility at Hanford.

The Draft EIS includes several preferred alternatives for the actions analyzed, including:

Disposal of Hanford's LLW and MLLW onsite and deferral of the importation of offsite waste to Hanford at least until the Waste Treatment Plant is operational, consistent with DOE's proposed Settlement Agreement with the State of Washington; Retrieving waste from the 149 SSTs consistent with the Tri-Party Agreement and landfill closure of the tanks; The down-selection of a range of treatment alternatives that will provide for chemical separations and supplemental low-activity waste treatment capability; and Entombment of the Fast Flux Test Facility at Hanford, with some special case waste going to DOE's Idaho National Laboratory for treatment and return to Hanford for disposal.

The Hanford Site is located in southeastern Washington State along the Columbia River, and is approximately 586 square miles in size. From early 1940 through 1980's Hanford's mission included defense-related nuclear research, development, and weapons production. DOE's mission now is focused on the environmental cleanup of the Hanford Site.

Additional information about the Draft Tank Closure and Waste Management EIS can be found at

http://www.hanford.gov/orp/?page=146&parent=0. Information about the ongoing cleanup mission at the Hanford Site can be found at http://www.hanford.gov.

DOE will hold public hearings on the Draft EIS in Washington State, Oregon, Idaho and New Mexico during the public comment period and will announce dates, times and locations for the public hearings in the

Federal Register and in local news media at a later date. DOE will accept written and oral comments at the public hearings.

Written comments on the Draft EIS can also be mailed to Mary Beth Burandt, EIS Document Manager, DOE Draft TC&WM EIS Comments, Office of River Protection, P.O. Box 1178, Richland, Washington 99352. Comments can also be submitted via email at TC&WMEIS@saic.com, or by faxing to (1-888) 785-2865. In preparing the Final EIS, DOE will consider all comments received or postmarked by March 19, 2010 and will consider comments received after that date to the extent practicable.

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Commentor No. 3: Martin Bensky

From: Martin Bensky [mbensky@msn.com]
Sent: Tuesday, October 27, 2009 2:44 PM
To: tc&wmeis@saic.com
Cc: Alan Waltar; Darrell Fisher; Gary Troyer; Gerry Woodcock; John Boland; Mike Fox; Wanda Munn; Tony Brooks; Ralph Johnson
Subject: Comment

In view of the enormous expenditure of public funds needed to implement the selected courses of action, I believe the following questions should be answered:

How much cancer will be prevented by refusing to bring outside waste into Hanford for burial?

How much cancer will be prevented by retrieving 99% of waste rather than a much less challenging amount from Hanford tanks? *3-1*

Is there any basis other than response to public outcry from anti-nuclear activist groups for decisions that are irresponsibly extravagant? *3-2*

The U.S. Department of Energy conducted a risk assessment that clearly demonstrated that the modest risk to a nearby resident at some future time was overwhelmingly due to waste that had already leaked from the tanks. The contribution to risk from a tank suitably grouted with appropriate, inexpensive materials was negligible. A rational assessment of the analytical results would indicate clearly that retrieval and vitrification of tank waste is not warranted by any sensible cost/benefit criteria. *3-3*

I believe that no-action is the appropriate course of action for several activities for which very expensive, potentially hazardous courses of action have been selected. Worker safety has clearly not been considered in the decision-making process. Use of public money for waste management demands that real risk, not perceived risk, should be the basis for choosing courses of action. *3-4*

Martin Bensky
2121 Briarwood Ct.
Richland, WA 99354
(xxx)xxx-xxxx
mbensky@msn.com

3-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Please see Appendix D of this *TC & WM EIS* for a detailed discussion of waste retrieval.

3-2 Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*. Waste Management Alternatives 2 and 3 include disposal of offsite waste as part of the analysis. For more information on cancer risk associated with these Tank Closure and Waste Management alternatives, please see Chapter 5, Sections 5.1.2 and 5.3.2, and Appendix Q, Section Q.3, of this EIS.

3-3 The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedule commitments, including tank waste retrieval and vitrification milestones. As described in Chapter 2, Section 2.10, of this *TC & WM EIS*, retrieving and vitrifying tank waste would reduce long-term impacts on groundwater and human health. The importance of these-long term impacts is discussed at length in Chapter 5. Further, Chapter 2, Section 2.11, of this EIS summarizes and compares the relative costs of the alternatives, including the No Action Alternative for tank closure.

See response to comment 3-2 for a discussion of DOE's decisionmaking process.

3-4 Worker safety has been analyzed in the public and occupational health and safety sections throughout this EIS. This analysis will be considered, along with other environmental, technical, and economic factors, in DOE's decisions, which will be discussed in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 4: Mike Fox

From: Mike Fox [mike@foxreport.org]
Sent: Tuesday, October 27, 2009 3:07 PM
To: Martin Bensky; tc&wmeis@saic.com
Cc: Alan Waltar; Darrell Fisher; Gary Troyer; Gerry Woodcock; John Boland; Wanda Munn; Tony Brooks; Ralph Johnson
Subject: Re: Comment

Marty:

Those are some good questions. From our world of risk assessment and management we should also be asking:

1. What will be the estimated costs of saving a life (in dollars spent per life saved) around Hanford as a result of this multi-billion dollar safety activity and safety expenditures? Some estimates of the total are now more than $50 billion. *4-1*

2. How does this estimate compare with other state sponsored safety programs, (highway safety, home smoke detectors, school safety, street safety, etc.), as measured by the same factor, dollars spent per life saved. *4-2*

3. Can we make a list of such risks to the citizens of the state, and list the dollars spent per life saved for each risk, in descending order

4. I contend that the Washington State Health Department have their safety programs funded inversely to the actual harm being done in these activities.

5. We do know there are more than 40,000 deaths per year in the State, a nominal 8000 of them cancer deaths. There are statistically significant excesses of several types of cancer in King County, but the causes of these deaths are not related to Hanford activities and thus are somehow less dead and more acceptable than those who are. *4-3*

6. We need some answers from the state.

Mike

4-1 This *TC & WM EIS* analyzes potential impacts associated with DOE's proposed actions and alternatives to safely retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and upgrade/expand waste disposal capacity at Hanford to provide for disposal of on- and offsite DOE waste. Chapter 2, Section 2.11, of this EIS also summarizes and compares the relative estimated costs of the alternatives. However, any estimate of dollars spent per potential life saved would be highly speculative and is considered beyond the scope of this EIS. Decisions made by DOE on the proposed actions will be based on relevant factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations.

4-2 Costs of state-sponsored safety programs are out of scope (not included) in NEPA EISs and are, therefore, not analyzed in this *TC & WM EIS*.

4-3 This *TC & WM EIS* includes analyses of potential human health risks associated with the proposed actions and alternatives to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and expand waste disposal capacity at Hanford to provide for disposal of on- and offsite DOE waste. Cancer mortalities that are not directly, indirectly, or cumulatively attributable to Hanford activities are beyond the scope of this EIS.

Commentor No. 4 (cont'd): Mike Fox

----- Original Message -----

From: Martin Bensky [mbensky@msn.com]
Sent: Tuesday, October 27, 2009 2:44 PM
To: tc&wmeis@saic.com
Cc: Alan Waltar; Darrell Fisher; Gary Troyer; Gerry Woodcock; John Boland; Mike Fox; Wanda Munn; Tony Brooks; Ralph Johnson
Subject: Comment

In view of the enormous expenditure of public funds needed to implement the selected courses of action, I believe the following questions should be answered:

How much cancer will be prevented by refusing to bring outside waste into Hanford for burial?

How much cancer will be prevented by retrieving 99% of waste rather than a much less challenging amount from Hanford tanks?

Is there any basis other than response to public outcry from anti-nuclear activist groups for decisions that are irresponsibly extravagant?

The U.S. Department of Energy conducted a risk assessment that clearly demonstrated that the modest risk to a nearby resident at some future time was overwhelmingly due to waste that had already leaked from the tanks. The contribution to risk from a tank suitably grouted with appropriate, inexpensive materials was negligible. A rational assessment of the analytical results would indicate clearly that retrieval and vitrification of tank waste is not warranted by any sensible cost/benefit criteria.

I believe that no-action is the appropriate course of action for several activities for which very expensive, potentially hazardous courses of action have been selected. Worker safety has clearly not been considered in the decision-making process. Use of public money for waste management demands that real risk, not perceived risk, should be the basis for choosing courses of action.

Martin Bensky
2121 Briarwood Ct.
Richland, WA 99354
(xxx)xxx-xxxx
mbensky@msn.com

Response side of this page intentionally left blank.

Commentor No. 5: Martin Bensky

From: Martin Bensky [mbensky@msn.com]
Sent: Tuesday, October 27, 2009 4:06 PM
To: tc&wmeis@saic.com; Mike Fox
Cc: Alan Waltar; Darrell Fisher; Gary Troyer; Gerry Woodcock; John Boland; Wanda Munn; Tony Brooks; Ralph Johnson
Subject: Re: Comment

Of course it's sad that relative risk is never considered in this obscene waste of public money. DOE should at least consider absolute risk, and on that basis, much Hanford work and the decision to refuse outside waste cannot be justified. Which kinds of cancer are statistically significant in King County? I'd like that information as potentially useful back pocket trivia. Incidentally, my notes were submitted as formal comments about the EIS. I think DOE is required to respond, though not for quite a while. *5-1* *5-2* *5-3*

Marty

5-1 Human health risks and transportation risks associated with exposure to radiation are estimated for all of the alternatives evaluated in this *TC & WM EIS*. These risks are presented both in terms of radiation dose (using the unit roentgen equivalent man, or rem) and LCFs (the probability of incurring a future cancer that results in a death). Consistent assumptions are used to analyze the alternatives to allow a meaningful comparison of the associated risks. Such comparisons are considered relative; while the absolute risk for a single alternative could be in question due to lack of data, the uncertainty of future decisions, or other uncertainties, the risks associated with each of the alternatives can still be compared because the same assumptions are used for analysis.

The *TC & WM EIS* Summary shows the risks for each alternative; these risks are compared in relative terms in Section S.5.5 and related subsections. The Summary, Section S.5.5.3, Disposal of Offsite Waste, states, "…receipt of offsite waste streams that contain specified amounts of certain radionuclides, specifically, iodine-129 and technetium-99, could have an adverse impact on the environment. Comparison of human health impact estimates at the IDF-East barrier under Waste Management Alternative 2 for Tank Closure Alternative 2B, with and without offsite waste (see Figure S–22), illustrates this finding. Estimates of peak radiological risk for Waste Management Alternative 2, including disposal of offsite waste at IDF-East, are a factor of approximately six higher than those under Waste Management Alternative 2, with offsite waste removed." Based on this conclusion, DOE proposes, as part of the Preferred Alternative for waste management, that receipt and disposal of offsite waste be delayed, at least until the WTP is operational (74 FR 67189), except for certain limited exemptions.

DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

5-2 This *TC & WM EIS* includes analyses of potential human health risks associated with the proposed actions and alternatives to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and upgrade/expand waste disposal capacity at Hanford to provide for disposal of on- and offsite DOE waste. DOE is obligated to fulfill its responsibilities to protect the human and natural environment within the Hanford region, regardless of whether some might consider cancer incidences in King County, Washington, to have a

Commentor No. 5 (cont'd): Martin Bensky

higher statistical significance and warrant greater attention from public-policy decisionmakers. Analysis of cancer incidence in King County, Washington, is not within the scope of the analyses included in this *TC & WM EIS*.

5-3 Consistent with CEQ and DOE NEPA requirements (40 CFR 1503.410 and 10 CFR 1021.313(c), respectively), DOE's responses to comments received on the *Draft TC & WM EIS* are included in this CRD, a volume of this *Final TC & WM EIS*.

Commentor No. 6: Martin Bensky

From: Martin Bensky [mbensky@msn.com]
Sent: Friday, October 30, 2009 5:14 PM
To: tc&wmeis@saic.com
Cc: Bill Farris; Gary Troyer; Gerry Woodcock; Mike Fox; Wanda Munn; John Boland; Bob Schenter; Clinton Bastin; Jim Paglieri; Randy Brich; Sid and Marlene Sourani; Annette Cary
Subject: EIS Comment

The $12B cost estimate for the Waste Treatment Plant, which does not include retrieval of tank waste or ultimate disposal of vitrified waste, is, among other possibilities, sufficient to provide health insurance for approximately 300,000 children from birth until high school graduation. I recognize that it is not the Department of Energy's (USDOE) responsibility to assess whether resources allocated to them represents the best use of those resources. Does USDOE have the responsibility, however, to conduct risk assessments and feed results back to their resource provider to let them know that the minuscule benefit of this resource expenditure is unlikely to come anywhere near justifying the expenditure? *6-1*

Anyone familiar with the simplest principles of Systems Engineering understands the idea of generating information within one function and feeding it back to previous functions to assess whether proposed actions are appropriate. In the absence of credible risk assessments whose results have been clearly provided to appropriate decision-making functions, the selected courses of action outlined in this Environmental Impact Statement (EIS) have not been shown to have any legitimate, justifiable basis. Some organization, above and outside the USDOE, clearly has not exercised their responsibility and authority to determine the best use of America's finite resources. If the selected actions proposed in this EIS are implemented, I believe that USDOE and its oversight organizations have failed to meet their responsibilities. *6-2* *6-3*

Martin Bensky
2121 Briarwood Ct.
Richland, WA 99354
(xxx) xxx-xxxx
mbensky@msn.com

6-1 Risk analysis is provided throughout this *TC & WM EIS*. This analysis will be considered, along with other environmental, technical, and resource expenditure factors, in DOE's decisions, which will be discussed in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

6-2 All of the analyses in this EIS, including analysis of potential risks to human health and the environment, are available to, and used by, senior agency decisionmakers in making future decisions. Courses of action, however, have not yet been selected by DOE. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

6-3 DOE believes it has met its responsibilities under NEPA and CEQ implementing regulations to seriously consider the potential environmental consequences of its proposed actions and the full range of reasonable alternatives before making decisions about how to proceed.

Commentor No. 7: Clinton Bastin

From: Clinton Bastin [clintonbastin@bellsouth.net]
Sent: Saturday, October 31, 2009 1:22 PM
To: Martin Bensky; tc&wmeis@saic.com
Cc: Bill Farris; Gary Troyer; Gerry Woodcock; Mike Fox; Wanda Munn; John Boland; Bob Schenter; Jim Paglieri; Randy Brich; Sid and Marlene Sourani; Annette Cary
Subject: Re: EIS Comment

THE DOE HAS SPENT MORE THAN $1 TRILLION AND PROVIDED LITTLE OF VALUE. IT DELIBERATELY SUPPRESSED THE REPORT CORRECTING FALSE ALLEGATIONS BY ALVAREZ AND MAKHIJANI IN MIT'S *TECHNOLOGY REVIEW* AND *THE WASHINGTON POST* ABOUT DANGERS OF NUCLEAR WASTE IN ORDER TO OBTAIN $100 BILLION FOR JOBS, PROMOTIONS, ETC. *7-1*

I USED THE REPORT FOR MY LETTER PUBLISHED IN *TECHNOLOGY REVIEW* - BUT THE EDITORS ALSO PUBLISHED A LETTER FROM ALVAREZ

MISQUOTING MY LETTER IN ORDER TO SAY I WAS WRONG

DOE MAKES BERNIE MADOFF LOOK LIKE A SIDEWALK PICKPOCKET

SEE MY ARTICLE IN JUNE 2009 ISSUE OF *NUCLEAR ENGINEERING INTERNATIONAL*, BELOW

DITCH THE DOE

The United States is the only nation that relies on a large federal department to direct and manage energy and nuclear policies, programs, research, development and related activities. The U.S. Department of Energy (DOE) was formed in 1977 to direct national nuclear programs, help resolve energy challenges resulting from America's loss of ability in 1970 to recover enough oil to meet demands, and reduce atmospheric pollution from combustion of fossil fuels.

Instead it has spent about one trillion dollars and done virtually nothing to resolve energy and environmental challenges. It has lost the ability to produce nuclear materials needed for medicine, space exploration and defense and abandoned its responsibility to manage used nuclear power plant fuels and dispose of nuclear wastes. Major changes are needed to resolve energy and environmental challenges, produce nuclear materials, dispose of nuclear waste, while avoiding wasteful expenditures.

The process for change should begin with a decision by US President Barack Obama to follow President Harry S. Truman's example in 1950 when America was faced with the need for a strong nuclear deterrent against military aggression or a nuclear attack by the Soviet Union. President Truman listened to and accepted

7-1 DOE expenditures are beyond the scope of this *TC & WM EIS*.

Commentor No. 7 (cont'd): Clinton Bastin

recommendations from former Manhattan Project Corps of Engineers officers who had provided direction for first and imminently successful use of nuclear technology, by Dupont

President Obama, his energy advisors, energy leaders in Congress and government agencies and others would meet with the engineers and scientists who had provided direction for the safe, successful, well-managed programs and initiatives of the Atomic Energy Commission, Energy Research and Development Administration and Department of Energy.

THE GREATEST NEEDS ARE:

1. A national commitment

A national commitment must be made to a major increase in use of nuclear power to generate electricity and development of technology for more efficient use of nuclear materials. France uses nuclear power for 80% of its total generation of electricity, while the US uses nuclear power for 80% of its pollution-free and carbon-free generation of electricity but only 20% of its total electricity, and releases three times as much carbon dioxide and bio-fuel pollutants to the atmosphere, per person, as France.

Low-temperature, low-density energy sources such as solar, geothermal, wind, and tidal will always be inefficient, expensive and unreliable for generation of electricity for most industrial and domestic applications, and of limited availability in most areas. Batteries, transformers and smart grids and meters for increased reliability and availability will be complex, vulnerable, and add to the cost. The energy needed to build, maintain and operate systems for generation of electricity from so-called"renewable" sources (except hydropower)will approach and may exceed the amount generated, particularly if distributed over wide areas.

2, Corporate management

Competent corporate instead of government management to produce nuclear materials for national needs, manage and recycle used fuel from nuclear power plants and dispose of nuclear wastes. There have been great improvements in safety and performance of nuclear power plants in the US since the accident at Three Mile Island by the commitment to excellence and understanding of operations by plant operators, coordinated by the Institute of Nuclear Power Operations, with improved oversight by the US Nuclear Regulatory Commission.

The outstanding safety and success of Dupont research, development, design, construction and operations at the Savannah River Plant (SRP) were the result of corporate management by Dupont comparable to that for its commercial activities. The repository investigated and planned by Dupont for final disposal of nuclear waste at SRP was unique in the US in that formidable, measurable, geologic

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Commentor No. 7 (cont'd): Clinton Bastin

barriers provided full assurances of isolation for geologic periods of time and a committee of state political and technical leaders appointed by the state governor supported the investigation and plan.

In the 1960s, Dupont's reprocessing facilities were the best in the world due to their capability for remote, rapid replacement of failed equipment, rapid restart after shutdown, and containment of radioactivity under all conditions, including fires and explosion.

3. Better systems
Better systems are needed for development and direction of energy and nuclear policies. : Armed with better understanding of science, energy, and nuclear technology and the importance of competent corporate management, President Obama would announce the commitment to increased use of nuclear power to generate electricity, resume the downsizing of the DOE that was underway during the Clinton Administration, and form the US Energy and Nuclear Technology Policy Board

This nine-member board of experts would develop and direct national energy and nuclear policies and programs. Five members would be appointed by The President with the advice and consent of the Senate, two would be ex-officio, representing the majority and majority leaders of House and Senate energy committees, one would be appointed by the Edison Electric Institute and one by the Business Roundtable Appointed members would serve seven-year, overlapping terms and meet bimonthly or more often to review energy and nuclear policies and programs and make decisions or recommendations for changes as needed. A full-time staff of about 15 engineers and/or scientists with appropriate support would continually review energy and nuclear programs and inform the board. Two or three national laboratories under board direction and oversight would perform research and development in support of nuclear material production, reprocessing and related activities.

Clinton Bastin, Chemical Engineer/Nuclear Scientist US Department of Energy (retired)
clintonbastin@bellsouth.net

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Commentor No. 8: Jerry Johnson

October 27, 2009
6621 W. Victoria Ave.
Kennewick, WA 99336

Dear Ms Burandt:

I read the article in today's paper about the clean up activities at Hanford. With the words about tearing down FFTF I am certain the supporters will once again try to keep it going. I am convinced that this will never happen; the supporters fail to recognize some technical issues that might not be able to be solved. So I wanted to provide you with those issues for the record. *8-1*

In the 1980's I was heavily involved with FFTF. I had various management positions. Two of them are pertinent to restarting the reactor. I decided to check my concerns with a member of the ACRS (Advisory Committee on Reactor Safeguards) which is tied to the U.S. NRC. This member of the ACRS confirmed my views in phone conversation on June 25, 2009.

If FFTF were to be operated as a commercial facility it would have to be licensed by the NRC.

When we were in the process of getting FFTF built and approved to operate Westinghouse did considerable testing and analysis of potential reactor accidents. Two of these were the LOF, which is a loss of coolant flow and the HCDA (Hypothetical Core Disruptive Accident). The HCDA involved the analysis of various reactivity insertions. Results of analyses and tests were presented to the NRC. While NRC certification of FFTF via a full CFR report was not required we still went through all of the steps as if we were going to apply for a license.

The reactor accident analyses were based on a series of tests conducted at the TREAT facility in Idaho. If FFTF were to be reassembled such accident analyses would have to be done again and if there were any changes in the composition of the fuel or configuration of the pellets the NRC would require data to show that the accidents can be mitigated by the various control and shut-down systems. It may not be possible to do such tests today. So I feel that having an accepted reactor safety analysis will be a major hurdle.

My other technical concern is with the state of the reactor vessel. When the reactor was running there was a neutron flux gradient across the wall as well as a thermal gradient. Upon shutdown of the reactor these conditions would produce a state of tri-axial stress in various parts of the vessel. A restart, following a very long shutdown, could result in the formation of cracks because of the nature of that residual stress. We had a program to monitor the structural integrity of the vessel and other components. There were some assemblies that held surveillance samples of the materials used for the various components, including the reactor vessel. These samples were used to evaluate the mechanical properties of the steel; most notable being fracture mechanics tests.

8-1 Comment noted.

Commentor No. 8 (cont'd): Jerry Johnson

Now the ACRS would require the operator to show that the restart would not result in formation of any cracks. The only way to determine this would involve the testing of these surveillance samples. I am not certain that they still exist.

The ACRS member told me that the licensing process takes seven years. Without priority from the US President any new request for the licensing process goes to the bottom of the list.

So my main concerns are these technical issues with the safety tests and the material condition tests. I do feel that they could be "show-stoppers". The rest of my thoughts are only my opinions.

I feel that getting a fuel fabrication system would be difficult but doable. The real issue comes with the disposal of spent fuel and that remains a major issue in the US. Without a viable plan for disposal it may not be possible to restart the reactor.

I am of the opinion that the whole effort to get FFTF up and running would cost a number of billions of dollars. What company would spend billions before getting any payback?

Finally I do not think that the reactor would survive on a single mission. The cost of operating it might be prohibitive relative to the income from isotope production. Operating FFTF as a multi-purpose facility would lead to numerous issues.

My viewpoint is that the best thing to do is to dismantle the reactor and move on. **8-1 cont'd**

Yours truly,

Jerry Johnson

Jerry Johnson

xxx-xxx-xxxx

johnson66@charter.net

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Commentor No. 9: Don M. Hallum

Oct 31 2009

MARY Beth Burandt
EIS Document Manager
DOE of River Protection
P.O. BOX 1178, Richland, WA 99352

I am writing in response to the 150 page "BOOK" that wasn't home.

It came to our household & I am wondering how many other WA. households

received this large 150 page document?

I'm in agreement that the HANFORD site needs to be cleaned up

and I'm sure most people do — especially in the Tri-cities,

I would like to know how much our money was spent by DOE on this 9-1

book + mailing?

Sincerely,
DON M. HALLUM
5214 Maple St #203
Edmonds, WA 98020
[redacted]

PS; To me the figures at bottom of S113, S13 alternative is the most 9-2

cost efficient option. Others are way too expensive.

Also, hardly any of us read the information sent out, but it's too late.

9-1 Printing costs for hard copies of the draft EIS (and CDs) were approximately $330,789; shipping cost for copies was approximately $34,194. In total, approximately $364,983 was spent by DOE to print and mail copies, including CDs, of the draft EIS.

9-2 Summary, Table S–30, and Chapter 2, Table 2–51, present the cost estimates for only final-waste-form disposal under each of the Tank Closure alternatives. These disposal costs compose a portion of the projected total costs associated with each alternative, which are presented in Tables S–30 and 2–51.

Commentor No. 10: Joseph John Bevelacqua

Bevelacqua Resources

343 Adair Drive
Richland, WA 99352
www.bevelacquaresources.com
bevelresou@aol.com
xxx-xxx-xxxx

BR-RL-0509

Mary Beth Burandt
EIS Document Manager
DOE Office of River Protection
P.O. Box 1178
Richland, WA 99352

December 7, 2009

RE: DOE/EIS-0391, Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site

Dear Ms. Burandt:

Thank you for providing a copy of DOE/EIS-0391, Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site. The document represents a significant step forward in the Hanford cleanup, but omits essential elements of environmental protection advocated by the International Commission on Radiological Protection (ICRP). This is particularly puzzling since the draft EIS references ICRP 103, which contains new, explicit guidance for environmental protection.

ICRP 103, published in 2007, provided revised environmental guidance initially outlined in ICRP 91 (2003). Given the availability and publication dates of these documents and the international acceptance of the recommendations of the ICRP, not including the use of Reference Animals and Plants (RAAP) in the draft EIS is quite astonishing. In view of the care taken by DOE in addressing the cultural aspects of the cleanup and the importance of natural species in native cultures, not including RAAP in the assessment is a serious omission that requires correction. *10-1*

Correcting this omission would be relatively straightforward since ICRP 108 (2008) provides a set of dose conversion factors that allows the dose to be calculated to RAAP including organisms relevant to the Hanford Site. As defined in ICRP 108, these species include reference deer, reference duck, reference bee, and reference wild grass that are present at the Hanford site. Performing the requisite calculations would strengthen the draft EIS and bring it into compliance with current international guidance. Addressing these issues in a timely manner is in the best interest of the Hanford stakeholders.

1

10-1 This *TC & WM EIS* used the latest guidance from International Commission on Radiological Protection (ICRP) Publication 103 (Valentin 2007) and the benchmarks contained within are considered adequate for the purposes of this EIS. The reasons for selecting representative receptors for the risk analysis in support of this *TC & WM EIS* are given in Appendix P, Sections P.2.1, P.2.1.2, P.3.1.1.2, and P.3.2.1.2. Selected receptors are relevant to Hanford because they occur there, including species that are important to native cultures. In addition, some *TC & WM EIS* receptors were used in previous risk assessments at Hanford, such as the *Columbia River Comprehensive Impact Assessment*, and other EISs. The advantages of using Hanford-specific receptors were judged to exceed potential benefits of using international reference receptors, such as those in ICRP Publication 108, because those benefits do not contribute to the primary goals of the ecological risk analysis for this *TC & WM EIS*, namely the unbiased comparison of alternatives.

Commentor No. 10 (cont'd): Joseph John Bevelacqua

I look forward to receiving the revised, final EIS.

Regards,

Dr. Joseph John Bevelacqua, President
Bevelacqua Resources

JJB/tms

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Commentor No. 10 (cont'd): Joseph John Bevelacqua

establishes its own set of radiation standards. The various exposure limits set by DOE and EPA for radiation workers and members of the public are given in Table K–1.

Table K–1. Exposure Limits for Members of the Public and Radiation Workers

Guidance Criteria (Organization)	Public Exposure Limits at the Site Boundary	Worker Exposure Limits
10 CFR 835 (DOE)	–	5,000 millirem per year[a]
10 CFR 835.1002 (DOE)	–	1,000 millirem per year[b]
DOE Order 5400.5 (DOE)[c]	10 millirem per year (all air pathways) 4 millirem per year (drinking-water pathways) 100 millirem per year (all pathways)	–
40 CFR 61.90–61.97 (EPA)	10 millirem per year (all air pathways)	–
40 CFR 141 (EPA)	4 millirem per year (drinking-water pathways)	–

[a] Although this measurement is a limit (or level) that is enforced by DOE, worker doses must be managed in accordance with as low as is reasonably achievable principles. Refer to footnote b.

[b] This measurement is a control level. It was established by DOE to assist in achieving its goal to maintain radiological doses as low as is reasonably achievable. DOE recommends that facilities adopt a more-limiting 500 millirem per year Administrative Control Level (DOE Standard 1098-99). Reasonable attempts have to be made by the site to maintain individual worker doses below these levels.

[c] Derived from or consistent with 40 CFR 61.90–61.97; 40 CFR 141; and 10 CFR 20.

Key: CFR=*Code of Federal Regulations*; DOE=U.S. Department of Energy; EPA=U.S. Environmental Protection Agency.

K.1.1.3 Health Effects due to Exposure to Radiation

To provide the background for discussions of impacts, this section explains the basic concepts used in the evaluation of radiation effects. Radiation can cause a variety of damaging health effects in people. The most significant effects are induced cancer fatalities, called "latent cancer fatalities" (LCFs) because the onset of cancer may take many years to develop after the radiation dose is received. In this *TC & WM EIS*, LCFs are used to measure the estimated risk due to radiation exposure.

The National Research Council's BEIR Committee has prepared a series of reports to advise the Federal Government on the health consequences of radiation exposure. Based on its 1990 report, *Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V* (National Research Council 1990), the former Committee on Interagency Radiation Research and Policy Coordination recommended cancer risk factors of 0.0005 per rem for the public and 0.0004 per rem for working-age populations (CIRRPC 1992). In 2002, the Interagency Steering Committee on Radiation Standards (ISCORS) recommended that Federal agencies use conversion factors of 0.0006 fatal cancers per rem for mortality and 0.0008 cancers per rem for morbidity when making qualitative or semiquantitative estimates of risk from radiation exposure to members of the general public. No separate values were recommended for workers. The DOE Office of Environmental and Policy Guidance subsequently recommended that DOE personnel and contractors use the risk factors recommended by ISCORS, stating that, for most purposes, the value for the general population (0.0006 fatal cancers per rem) could be used for both workers and members of the public in National Environmental Policy Act (NEPA) analyses (DOE 2003).

Recent publications by both the BEIR Committee and the ICRP support the continued use of the ISCORS-recommended risk values. *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006) reported fatal cancer risk factors of 0.00048 per rem for males and 0.00066 per rem for females in a population with an age distribution similar to that of the entire U.S. population (average value of 0.00057 per rem for a population with equal numbers of males and females). ICRP Publication 103 (Valentin 2007) recommends nominal cancer risk coefficients of 0.00041 and 0.00055 per rem for adults and the general population, respectively, and estimates the risk from heritable effects to be about 3 to 4 percent of the nominal fatal cancer risk (see Table K–2).

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Commentor No. 10 (cont'd): Joseph John Bevelacqua

Table K–2. Nominal Health Risk Estimators Associated with Exposure to Ionizing Radiation[a]

Exposed Population	Cancer[b]	Genetic Effects	Total
Worker (Adult)[c]	0.00041	0.00001	0.00042
Whole	0.00055	0.00002	0.00057

[a] Risk per rem (individual dose) or person-rem (population dose). For individual doses equal to or greater than 20 rem, the health risk estimators are multiplied by 2.

[b] Risk of all cancers, adjusted for lethality and quality-of-life impacts.

[c] Ages 18–64 years.

Source: Valentin 2007, Table A.4.4.

Accordingly, a risk factor of 0.0006 LCFs per rem was used in this *TC & WM EIS* to estimate risk due to radiation doses from normal operations and accidents. For high individual doses (greater than or equal to 20 rem), the health risk factor was multiplied by 2. In addition, nuclide-specific risk coefficients were developed using techniques accounting for gender, age, and exposure pathway (Eckerman et al. 1999). These coefficients, documented in the Health Effects Assessment Summary Tables database, were adopted for use in evaluation of impacts occurring in the long-term period following stabilization or closure of the high-level radioactive waste (HLW) tanks.

Using the risk factors discussed above, a calculated dose can be used to provide an estimate of the risk of an LCF. For example, if each member of a population of 100,000 people were exposed to a one-time dose of 100 millirem (0.1 rem), the collective dose would be 10,000 person-rem (100,000 persons times 0.1 rem). Using the risk factor of 0.0006 LCFs per person-rem, this collective dose is expected to cause 6 additional LCFs in this population (10,000 person-rem times 0.0006 LCFs per person-rem).

Sometimes, calculations of the number of LCFs do not yield whole numbers, and may yield a number less than 1. For example, if each individual of a population of 100,000 people were to receive an annual dose of 1 millirem (0.001 rem), the collective dose would be 100 person-rem, and the corresponding risk of an LCF would be 0.06 (100,000 persons times 0.001 rem times 0.0006 LCFs per person-rem). A fractional result should be interpreted as a statistical estimate. That is, 0.06 is the average number of LCFs expected if many groups of 100,000 people were to experience the same radiation exposure situation. For most groups, no LCFs would occur; in a few groups, 1 LCF would occur; in a very small number of groups, 2 or more LCFs would occur. The average number of LCFs over all of the groups would be 0.06 (just like the average of 0, 0, 0, and 1 is 1 divided by 4, or 0.25). In the preceding example, the most likely outcome for any single group would be 0 LCFs. In this *TC & WM EIS*, LCFs calculated for a population are presented as both the rounded whole number, representing the most likely outcome for that population, and the calculated statistical estimate of risk, presented in parentheses.

The numerical estimates of LCFs presented in this environmental impact statement (EIS) were obtained using a linear extrapolation from the nominal risk estimated for lifetime total cancer mortality that results from a dose of 0.1 gray (10 rad). Other methods of extrapolation to the low-dose region could yield higher or lower numerical estimates of LCFs. Studies of human populations exposed to low doses are inadequate to demonstrate the actual level of risk. There is scientific uncertainty about cancer risk in the low-dose region below the range of epidemiologic observation. However, comprehensive review of available biological and biophysical data supports a "linear-no-threshold" risk model—in which the risk of cancer proceeds in a linear fashion at lower doses without a threshold—and that the smallest dose has the potential to cause a small increase in risk to humans (National Research Council 2006).

K.1.2 Chemicals

The reprocessing of nuclear fuels, the manufacture of nuclear materials, and the processing of fuel cycle waste entail the use of chemicals. Some of the more-hazardous chemicals could pose risks to human health, even to the point of being fatal, if they are accidentally released to the environment or if they come

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Commentor No. 11: Nancy Kroening

From: nancy newkirk [greeniefrost@yahoo.com]
Sent: Friday, November 20, 2009 2:34 PM
To: tc&wmeis@saic.com
Subject: Hanford Tank Waste

Madeleine Cadbury Brown
Washington State Department of Ecology
Nuclear Waste Program
(xxx) xxx-xxxx
madeleine.brown@ecy.wa.gov

I am commenting on the Hanford change EIS. I support the comments of the Washington State Department of Ecology's comments. They sound very reasonsble.

I am very concerned about the numbers of changes each year on the cleanup. Some of these changes are positive and will speed up cleanup. However, when changes slow down work and/or invite MORE waste into the Reservation, it is a big problem *11-1*

The reason I am so concerned is that our grandchildren spend at least a week in Richland each year. We want cleanup to be done quickly, carefully, and with science, not politics, as the basis for decision. We want wastes to be put in solid form and stored so they will not further contaminate the land and water. We want ground water to be protected as well as air. We remain surprised that there is still so much waste to processed. *11-2*

The people of Washington voted to keep new wastes out of the state. We hope this will be honored. And, we hope that the residents of Tri-Cities will be protected against exposure to radiation by being close to trucks carrying waste. *11-1 cont'd* *11-3*

Thank you for receiving my comments.

Nancy Kroening
123 East Calavar Road
Phoenix AZ 85022
greeniefrost@yahoo.com

11-1 Although beyond the scope of this *TC & WM EIS*, ongoing Hanford cleanup activities are of high priority to DOE and are conducted in accordance with the TPA. This agreement specifies milestones and schedules for cleanup of all parts of Hanford. DOE is fully committed to honoring this agreement.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

11-2 In general, this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, the cumulative impacts analysis in this EIS does consider the effects of reasonably foreseeable Hanford remedial activities (see Chapter 6 and Appendix U). DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Each Tank Closure alternative would produce a solid primary-waste form.

11-3 The transportation of radioactive materials and waste, both coming to and leaving Hanford, must comply with the U.S. Department of Transportation (DOT) and NRC regulations that promote the protection of human health and the environment. This includes requiring the use of certified packaging that minimizes the radiation dose rate outside the transportation package. As indicated in the *TC & WM EIS* Summary, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that transportation of radioactive waste would cause an additional fatality as a result of radiation from either incident-free transportation or postulated transportation accidents.

Commentor Number 12 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 10.

Commentor No. 13: Gerry Pollet, Executive Director, Heart of America Northwest

TO: TPA Agency Involvement Officers; DOE-ORP Manager Shirley Olinger: TCWMEIS Manager Mary Beth Burandt; Ecology Nuclear Waste Program Manager Jane Hedges; Melissa Nielson, Director, USDOE-HQ EM Office of Public and Intergovernmental Accountability

FR: Gerry Pollet, Director, Heart of America Northwest (gerry@hoanw.org / 206-382-1014 / xxx-xxx-xxxx cell)

Date: December 28, 2009

RE: Collaborative Planning Needed for Public Hearings on the Tank Closure and Waste Management EIS --- Date and location setting for hearings needs collaboration and needs to comply with 45 day notice provision of TPA Community Relations Plan --- Goals for public involvement not identified

CC: Ken Niles, State of Oregon Dept. of Energy; Hanford Advisory Board Public Involvement Committee (PIC); Hanford Public Interest Network organizations

The Tank Closure Waste Management Environmental Impact Statement (TCWMEIS) has been identified and anticipated for years as the most extensive environmental review for the Hanford site. Proposals for the most debated and long awaited decisions affecting every aspect of Hanford Clean-Up, are formally dependent upon the TCWMEIS. The EIS has been anticipated – and delayed for years. During this time, we have repeatedly urged that there be a dialogue regarding the strategic goals for public involvement to be served by the TCWMEIS for a strategic Public involvement plan for Hanford Clean-Up. There has been no effort to identify public involvement goals for the TCWMEIS and to ensure that it leaves a lasting legacy of an informed public for upcoming decisions.

We have repeatedly asked for collaborative planning for public hearings on the TCWMEIS. This has not happened. Time is running out and a collaborative planning effort is needed ASAP, starting with a conference call to identify:

- Hearing location and dates with 45 days advance notice;
- Pre-hearing workshops and information needs for various segments of the public in different areas of the region.

13-1

The Tri-Party Agreement (TPA) Public Involvement Plan calls for collaboration in planning the public hearings and involvement effort with a 45 day advance notice of the hearing dates and locations. For the TCWMEIS, this 45 day period is vital given the need to adequately plan and encourage public involvement, to allow ample time for drafting, publishing and mailing materials; and, for a comment period of this great importance, huge scope (covering scores of major decisions) and complexity – to allow time to plan and schedule pre-hearing workshops to give the public meaningful opportunity to comment.

At the December 15 workshop in Richland for the HAB, I was disturbed that there was no discussion of public involvement planning. At the end of the workshop, I asked EIS Manager Mary Beth Burandt and TPA PIO staff to set up such a discussion. Ms. Burandt informed me that USDOE management was setting dates for February – with no public or other input.

This is not acceptable.

13-1 DOE's public involvement process for this EIS was based on CEQ and DOE regulations for implementing NEPA; DOE Order 451.1B requirements; and applicable DOE NEPA guidance (available at http://energy.gov/nepa). While DOE is not bound by the terms of the TPA Public Involvement Plan in conducting NEPA processes at Hanford, DOE nevertheless considered the TPA Public Involvement Plan in developing the public involvement plan for the *Draft TC & WM EIS* jointly with Ecology as a cooperating agency.

In response to the commentor's request for more-extensive collaboration in the *TC & WM EIS* public hearing planning process, as well as DOE's desire to communicate with and involve the public in this process, a Hanford Advisory Board (HAB) workshop was held on December 15, 2009, and DOE stakeholder teleconferences were held on December 30, 2009, and January 5 and 6, 2010. Public hearing dates and locations were identified and discussed, and it was agreed that additional public hearings would be held in Spokane, Washington, and La Grande and Eugene, Oregon. Pre-hearing workshops were also discussed. In addition, DOE held a 1-hour open house prior to each public hearing to allow the public to meet informally with members of the *TC & WM EIS* team, ask questions, and learn more about this EIS. Informative factsheets were provided at these open houses.

A suggestion was made during one of the teleconferences to move the planned January 26, 2010, public hearing in Richland, Washington, to meet the 30- to 45-day notification goal under the TPA Community Relations Plan (the January/February timeframe for public hearings was announced at the December 15, 2009, HAB meeting). During the call, the Hanford communities indicated their support for the January 26 public hearing date and their opposition to changing it. In response to a request that the Seattle public hearing not be scheduled for a week when schools were out, the hearing date was moved to March 8, 2010.

Only one hearing location, in Portland, had paid parking available. However, parking fees were waived by the hotel for hearing attendees, and DOE held hearings in locations that encouraged university student attendance and participation, such as Eastern Oregon University.

DOE mailed a copy of the draft EIS via Federal Express to every individual who requested one. For those individuals who requested a printed copy of the Summary, a CD containing the complete draft EIS and a Reader's Guide also

Commentor No. 13 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

If the TCWMEIS is to be used for TPA and state RCRA permit decisions, it must meet TPA public involvement standards. Regardless of legal requirements, we expect that USDOE would make every effort to meet the minimum expectations of the TPA Community Relations Plan and engage stakeholders and the regulators in a collaborative effort to plan for meaningful public involvement in the TCWMEIS comment period, starting with a collaborative effort to identify suitable locations and dates with 45 day of advance notice for the hearings.

We ask that USDOE stop attempting to schedule the hearings without collaboration and discussion. Please set up a conference call with stakeholder groups from around the region and members of the HAB PIC to start the collaborative process envisioned in the TPA Community Relations Plan.

Secondly, ensure that there will be a full 45 days of notice for the location and time of hearings.

Thirdly, use the HAB PIC to plan for a discussion setting strategic goals and objectives for public involvement in the TCWMEIS, including, for example, how information regarding the identified impacts from proposed actions and alternatives will be communicated both for public comment on the TCWMEIS and for long-term use of this information in enabling the public to understand and comment on future proposed actions which will rely on the TCWMEIS (e.g., the decisions on tank closure, TPA and Central Plateau Strategy decisions; the Hanford RCRA permit…). This effort should include pre-hearing workshops in various locations.[1]

We propose a conference call with citizen groups, PIC and TPA PIOs, States and Tribes during the first week of January to discuss how many hearings will be held, where they will be held (e.g., including Spokane and Eastern Oregon)[2] and when; to be followed by discussions regarding the information needed to be given to the public and whether USDOE will commit to pre-hearing workshops, and whether the agencies will prepare focus sheets on proposed actions and identified impacts.

Forty five days of notice will mean that the hearings – if identified collaboratively by January 11th, would start the hearings in late February.[3] If this seems like an extended period of time, we point out that USDOE had years of delay before issuing the EIS[4]; and, months during which we sought to have this discussion to no avail. After spending millions on the TCWMEIS, it is not too much to ask to have USDOE actually plan collaboratively for public hearings and how the public would be informed to offer comment.
We urge that the collaborative process begin ASAP to select dates and locations of hearings and identify how public involvement goals for the TCWMEIS will be met.

13-1 cont'd

[1] There was disappointment with the one workshop held by USDOE on December 15, for which there was no apparent use of input for the agenda, no discussion of impacts, and no discussion of public involvement.
[2] In addition to hearings in locations used for scoping (Portland, Hood River, Tri-Cities, Seattle), we believe there should be a hearing in Spokane and on the CTUIR Reservation or Pendleton or LaGrande, OR along the proposed transport route for USDOE's preferred alternative to utilize Hanford as a national radioactive waste dump.
[3] E.g., we would ask that hearings not be slated for the week schools are out in Seattle in February.
USDOE recently was in charge of selecting venues for TPA change hearings, and did so without the collaboration required. This led to hearings where the public had to pay for parking, overcrowded venues and failure to use lower cost meeting spaces that would have allowed increased attendance by university students (after the agencies identified increased accessibility for university students as an objective).
[4] People who requested full printed copies of the EIS have not received them. Publication and availability of the CD version is not a substitute for the full printed version for people or organizations seeking in-depth review. Ironically, USDOE has prepared a "Readers' Guide" to the EIS which is available on the CD, but was not mailed as a readable document to people who asked for the Summary.

was attached to the inside cover. The Reader's Guide was developed to assist the reader in understanding and navigating through the full *Draft TC & WM EIS*, not the Summary.

Commentor No. 14: Edward Fredenburg, Washington State Department of Ecology

From: Fredenburg, Edward (ECY) [mailto:Efre461@ecy.wa.gov]
Sent: Wednesday, December 09, 2009 12:23 PM
To: Burandt, Mary E
Subject: errors in EIS

Mary Beth, a couple of errors for SAIC to fix in the final:

Page 5-302, Section 5.1.11—last sentence refers to Section 5.1.3. Correct reference is 5.1.1.3. *14-1*

Page 2-100, Figure 2-56: New DSTs are shown in Figure. Paragraph on Storage on page 2-99 says no new DSTs would be required. *14-2*

14-1 The reference to Chapter 5, Section 5.1.1.3, has been corrected.

14-2 The figure illustrating the primary components of Tank Closure Alternative 6B has been revised to indicate that no new double-shell tanks (DSTs) would be required.

Commentor No. 15: Ken Niles, Assistant Director, Oregon Department of Energy

From: Ken Niles [mailto:ken.niles@state.or.us]
Sent: Monday, January 04, 2010 1:53 PM
To: Burandt, Mary E; Olinger, Shirley J
Cc: Gamache, Lori M; Olds, Theodore E (Erik); Lutz, Karen
Subject: TC & WM EIS - Preliminary Comments
Attachments: TC&WM-EIS-OR_Alternative.pdf

Attached are some preliminary comments on the Tank Closure and Waste Management draft EIS, focused on the tank waste treatment/closure alternatives.

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Commentor No. 15 (cont'd): Ken Niles, Assistant Director, Oregon Department of Energy

Oregon
Theodore R. Kulongoski, Governor

OREGON DEPARTMENT OF ENERGY
625 Marion St. NE
Salem, OR 97301-3737
Phone: (503) 378-4040
Toll Free: 1-800-221-8035
FAX: (503) 373-7806
www.Oregon.gov/ENERGY

January 4, 2010

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
Post Office Box 1178
Richland, WA 99352

Dear Ms. Burandt:

The Oregon Department of Energy has completed a preliminary analysis of the draft Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS). In our initial review, we have focused in large part on the 11 Tank Closure alternatives that are analyzed in the EIS. We reviewed each against the following criteria:

- Long-term protectiveness of the Columbia River, primarily associated with preventing additional migration of contaminants into Hanford's groundwater
- Compliance with the Tri-Party Agreement; meeting schedules for waste treatment and requirements for quality of the final waste form
- Permanence of the actions (for example, durability of the waste form so as to prevent future releases)
- Minimizing natural resource injury liability
- Protectiveness of human health and the environment

While the various proposed alternatives provide useful information by analyzing and comparing potential impacts and differences among the alternatives, to our concern we found that perhaps only one of the Tank Closure alternatives satisfied all of these criteria. Many failed most or all of the criteria (see Attachment 1).

The U.S. Department of Energy's (DOE) recent decision not to pursue treating and sending some waste to the Waste Isolation Pilot Plant eliminates alternatives 3A, 3B, 3C, 4 and 5. Notwithstanding that decision, each of these alternatives, along with five of the remaining six alternatives, had one or more fatal flaws that prevented each from meeting our criteria.

There are elements scattered within the range of many of the alternatives which, if combined in a new alternative, would likely provide a preferable long-term approach for

15-1

15-1 Regarding the adequacy of the Tank Closure alternatives analyzed in the *Draft TC & WM EIS* and the suggestion that the proposal put forth by the Oregon Department of Energy be evaluated as a distinct alternative in this EIS, DOE has determined that implementation of such an alternative would be technically infeasible as defined. Accordingly, the Oregon proposal cannot be considered a reasonable alternative and was not analyzed in detail in this *TC & WM EIS*. For a more comprehensive discussion of this issue, see Section 2.6 of this CRD.

Commentor No. 15 (cont'd): Ken Niles, Assistant Director, Oregon Department of Energy

successfully immobilizing Hanford's tank waste, closing the tank farms, and protecting the public and the environment.

Therefore, we propose and strongly encourage DOE to analyze the potential impacts of the following new alternative:

Alternative 7 – (the Oregon Proposal)

Tank Waste Storage. Continue current waste management operations using existing tank storage facilities. No new double-shell tanks would be required, *unless* there is a delay in getting the Waste Treatment Plant (WTP) operational. New Waste Receiver Facility tanks would be constructed. These tanks should be sized so that all necessary waste transfers will be possible, and to ease retrieval operations.

Tank Waste Retrieval. Retrieve a *minimum* 99 percent of the waste from each of the tanks. Determine on a tank-by-tank basis whether a final chemical wash, mechanical removal step, or other additional retrieval is necessary.

Tank Waste Treatment. Construct and operate the existing WTP as currently configured (two high-level waste melters and two low-activity waste [LAW] melters). Supplement the existing WTP by expanding LAW vitrification capacity to the extent necessary to complete LAW treatment no later than 2040. Do not use supplemental technologies such as bulk vitrification, cast stone or steam reforming. Pre-treat all waste streams routed to the WTP, and include technetium 99 removal in the pre-treatment process so that technetium is routed to the high-level waste melter. Assume that no waste will qualify as transuranic for disposal at the Waste Isolation Pilot Plant, but programmatically continue to pursue that as an option for the near future for a limited amount of waste.

As a sub-option, DOE should analyze the value of using iron phosphate glass in the second LAW treatment facility to determine whether that would provide useful flexibility in treating some waste streams and also whether it would result in a more durable glass form for those waste streams.

DOE should also analyze the impacts and benefits of using fractional crystallization to remove the bulk of the non-radioactive waste from the tank waste streams, in order to potentially reduce the volume of the glass waste form destined for the deep repository. The separated sodium wastes should be treated to destroy any RCRA hazards and to produce a waste form meeting the land disposal restrictions under RCRA, the Atomic Energy Act and Nuclear Regulatory Commission requirements for near-surface land disposal of mildly radioactive wastes.

Cesium and Strontium Capsules. Do not include the cesium and strontium capsules in the WTP waste stream. Instead, convert from pool storage to dry

15-1 cont'd

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Commentor No. 15 (cont'd): Ken Niles, Assistant Director, Oregon Department of Energy

storage and continue to pursue ultimate disposal into a geologic repository in a form suitable to meet the waste acceptance criteria for the facility as an alternative secondary waste form.

Tank Waste Disposal. Store immobilized high-level waste canisters on site in interim storage facilities until a national disposal facility is available. Assuming shallow burial of the immobilized LAW will be allowed, dispose of vitrified LAW on site. Since vitrified LAW may remain classified as high-level waste, flexibility will be required for planning for its permanent disposal.

Tank Farm Closure. Characterize leaked tank wastes in and beneath the tank farms, along with waste trapped between the steel and concrete tank structures and in pipelines and ancillary equipment. Use that information to make a risk-based decision on which tanks, pipelines and ancillary equipment have leaked and whether contamination may have spread beneath non-leaking tanks. As appropriate, exhume tanks to provide access to contaminated soils. This may include leaking tanks, adjacent (clean) tanks in contact with contaminated soil, and possibly some additional clean tanks that block access to heavily contaminated soil. Sample and characterize the below-tank contaminated soils and remediate soils as deeply as necessary. Build and operate a facility to treat contaminated soils as described in Alternatives 6A and 6B. Replace removed, contaminated material with clean soil from onsite sources.

After waste retrieval of at least 99 percent from tanks, pipelines and ancillary equipment, fill remaining (clean) tanks and ancillary equipment with a highly durable fill material to immobilize the residual waste, prevent future tank subsidence, and discourage intruder access. Close these remaining tanks using a landfill barrier designed to ensure long term permanence and isolation of the remaining wastes. It may be necessary first to remove some soil and ancillary equipment if there have been leaks from pipelines and other equipment.

Dispose of treated contaminated soils, tank shells and ancillary equipment on site in a new disposal facility. Monitor the site using post-closure care.

Tank Farm Cribs and Trenches Closure. As single-shell tank farm closure operations are completed, sample and characterize the associated cribs and trenches (ditches) disposal sites. Remove-treat-dispose of the contaminated materials and soils that exceed protectiveness criteria. Close the cribs and trenches (ditches) using a landfill barrier.

15-1 cont'd

We won't know whether the proposed Alternative 7 will meet the criteria that we have identified until and unless DOE analyzes each of these actions individually and collectively. We hope that DOE will agree to conduct that analysis.

We will provide additional written comments prior to the comment deadline that will address additional details related to tank waste treatment and tank closure. We will

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Commentor No. 15 (cont'd): Ken Niles, Assistant Director, Oregon Department of Energy

also provide comments on the Waste Management and Fast Flux Test Facility alternatives.

If you have questions or comments on Oregon's proposed alternative, please contact me at 503-378-4906.

Sincerely,

Ken Niles
Assistant Director

c.c. Jane Hedges, Washington Department of Ecology
Dennis Faulk, U.S. Environmental Protection Agency
Shirley Olinger, U.S. Department of Energy Office of River Protection
Dave Brockman, U.S. Department of Energy Richland Office
Stuart Harris, Confederated Tribes of the Umatilla Indian Reservation
Gabriel Bohnee, Nez Perce Tribe
Russell Jim, Yakama Indian Nation
Oregon Hanford Cleanup Board
Hanford Advisory Board
Hanford Natural Resource Trustee Council

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Commentor No. 15 (cont'd): Ken Niles, Assistant Director, Oregon Department of Energy

ATTACHMENT 1

Why Existing Tank Closure Alternatives Are Not Acceptable

Alternative 1 – No Action. Leaving the waste in Hanford's tanks for 100 years and canceling the planned waste treatment program would result in wide-spread environmental contamination. Moreover, the "No Action" alternative need not be a stop action alternative. It can and usually is presumed to continue the actions in progress as the basis for which further actions are contrasted.

Alternative 1 is not protective of the Columbia River; does not comply with the Tri-Party Agreement; there are no actions taken that would have a positive permanent affect; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 2A – Existing WTP Vitrification; No Closure. Treatment capacity must be expanded beyond the 2 + 2 configuration of the WTP in order to accomplish immobilization of Hanford's tank waste in a somewhat reasonable time frame. Treating waste until 2093 would likely result in extensive tank leaks during that period and additional wide-spread environmental contamination. Eventually ceasing administrative control of the tank farms without closure would also likely have significant adverse environmental impacts. Prolonging the treatment mission so as to have to replace the WTP, the double-shell tanks, and other major facilities is not reasonable. This alternative also excludes technetium 99 from pre-treatment. As technetium is one of the primary radionuclides in terms of projected long-term impacts, we believe a robust system must be in place to ensure that technetium 99 is diverted to the high-level vitrification waste stream. Alternative 2A is a step backward from the existing plans.

Alternative 2A is not protective of the Columbia River; does not comply with the Tri-Party Agreement schedules; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 2B – Expanded WTP Vitrification; Landfill Closure. Our major objection with this alternative is closing the entire tank farm system using a landfill barrier. That does nothing to deal with leaked waste beneath the tanks farms that is currently in the vadose zone – much of which will likely eventually reach the groundwater and potentially the Columbia River. This alternative does include removing soil and tank infrastructure down to 15 feet from two tank farms. We believe this is a concept that should be expanded to include other tanks farms, but the 15 foot limit does not adequately address contamination existing at greater depth in many if not all of the single-shell tank farms. This alternative does include technetium 99 removal in the pre-

15-2

15-2 Tank Closure Alternative 1 (No Action) -- DOE developed the No Action Alternative consistent with CEQ guidance. As described in CEQ guidance "Forty Most Asked Questions Concerning NEPA Regulations" (46 FR 18026), there are two types of No Action Alternatives allowed; one case where work is stopped and impacts are evaluated, and another case where ongoing activities are evaluated as a "no change" and continuation of the present course of action. In 2003, during scoping of the "Tank Closure EIS," the No Action Alternative at that time reflected the implementation of the *TWRS EIS* ROD. Based on comments received during scoping in 2003, an additional alternative was added that, also consistent with CEQ guidance, reflected that work at WTP would end and the waste would not be treated. This alternative is the current Tank Closure No Action Alternative and the present course of action (i.e., implementation of the *TWRS EIS* ROD) became Tank Closure Alternative 2A. See Chapter 1, Section 1.6.2.2, Issues Identified During the "Tank Closure EIS" Scoping Process, for more information on changes made as a result of scoping.

Tank Closure Alternative 2A -- Since 2003, one of the key treatment questions related to WTP treatment has been associated with the treatment timeframe. As explained above, Tank Closure Alternative 2A retains implementation of the *TWRS EIS* ROD to address the current vitrification capacity presently under construction. Alternative 2B was developed to address an expansion of LAW capacity for the existing WTP. One of the key differences between Alternative 2A and 2B with respect to treatment is for DOE to evaluate the impacts of shortening the mission timeframe from 2093 to 2043 and resource areas impacted by this difference. See Chapter 2, Section 2.5.2.2.1, Tank Closure Alternative 2A: Existing WTP Vitrification; No Closure and Section 2.5.2.2.2, Tank Closure Alternative 2B: Expanded WTP Vitrification; Landfill Closure, for more-detailed information on the specific aspects of the alternatives.

Tank Closure Alternative 2B -- One aspect evaluated between Tank Closure Alternatives 2A and 2B is technetium-99 removal in the WTP, which is a pretreatment activity that separates technetium-99 and sends it for immobilization into IHLW glass. Under Tank Closure Alternative 2A, the technetium-99 removal is included, whereas under Alternative 2B, it is not. In comparing the estimates of impacts at the IDF-East disposal barrier under the Waste Management alternative that includes Tank Closure Alternative 2A waste with those under Tank Closure Alternative 2B, it indicates that ILAW glass has similar potential impacts, both short- and long-term, to ILAW glass without technetium-99. The analysis further indicates that removal of technetium-99 and its disposal

Commentor No. 15 (cont'd): Ken Niles, Assistant Director, Oregon Department of Energy

treatment process, which would help get one of the longer-lived radionuclides into the high-level glass.

Alternative 2B is not protective of the Columbia River; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 3A – Existing WTP Vitrification with Supplemental Treatment (Bulk Vitrification); Landfill Closure.

Alternative 3B – Existing WTP Vitrification with Supplemental Treatment (Cast Stone); Landfill Closure.

Alternative 3C – Existing WTP Vitrification with Supplemental Treatment (Steam Reforming); Landfill Closure.

None of these supplemental treatment technologies are demonstrated to be effective at safely immobilizing the waste once disposed in Hanford's soils. Bulk vitrification has been demonstrated to not meet the "good as glass" criteria for the final waste form. Cast stone as a waste form is greatly inferior to bulk vitrified waste. Steam reforming as a waste form is greatly inferior to bulk vitrified waste and cast stone. Two of the three alternatives also exclude technetium 99 from pre-treatment. All three of these options have complete landfill closure of the single-shell tank farms, which we have already indicated is not protective. DOE has also ruled out treating and sending some waste to the Waste Isolation Pilot Plant, which effectively eliminates these alternatives, as they were presented in the draft EIS, from further consideration.

Alternatives 3A, 3B, and 3C are not protective of the Columbia River; supplemental technologies are not protective because the waste form will not sufficiently hold the waste over time (fails the permanence criteria) and does not meet Tri-Party Agreement requirements for the quality of the final waste form; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 4 – Existing WTP Vitrification with Supplemental Treatment Technologies; Selective Clean Closure/Landfill Closure. This alternative calls for supplementing the WTP with a combination of cast stone and bulk vitrification, which we indicated above is not a protective form of treatment. This alternative also excludes technetium 99 from pre-treatment. The closure combination of mixing selective clean closure with landfill closure is the most reasonable closure alternative – although it would need to be based on actual conditions in the vadose zone within and beneath the various tank farms. The BX and SX tank farms may or may not be appropriate for clean closure. Certainly other tank farms would need clean or partial clean closure. DOE has also ruled out treating and sending some waste to the Waste Isolation Pilot Plant.

15-2 cont'd

off site as IHLW glass would provide little reduction in the concentrations of technetium-99 compared with disposal as ILAW glass at either the Core Zone Boundary or the Columbia River nearshore. This is because the release rate of technetium-99 from ILAW glass is much lower than that from other sources, such as ETF-generated secondary waste and tank closure secondary waste from WTP operations. Thus, technetium-99 removal under Tank Closure Alternative 2B would provide little benefit.

As for the removal of soil and tank ancillary equipment, the Preferred Alternative (see Chapter 2, Section 2.12) describes how the landfill closure can be implemented. Additional sensitivity analysis has been completed in Chapter 7, Section 7.5, that evaluates soil remediation. DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. In addition, Chapter 7, Section 7.1, describes the closure process related to the tank. In this section, DOE clarifies that, following completion of the mitigation action plan and before implementing any closure actions, DOE will develop a tank farm system closure plan that will be implemented for each of the waste management areas. The State of Washington "Dangerous Waste Regulations" (WAC 173-303) implement the Hazardous Waste Management Act of 1976, as amended. These regulations provide the requirements for decisionmaking regarding the cleanup and permitting of dangerous wastes. The regulations define the state closure standards for the owners and operators of all dangerous waste facilities (WAC 173-303-610(2)) and include references to requirements for tank systems (WAC 173-303-640). Requirements for a response to a leak or spill and unfit-for-use tank systems are also described (WAC 173-303-640(7)). The regulations describe specific requirements for closure of the tank system (WAC 173-303-640(8)(a) and (b)). This part of the regulations provides a requirement for DOE to "remove or decontaminate all wastes residues, contaminated soils, and structures and equipment contaminated with waste" for the tank system. If DOE "demonstrates that not all contaminated soils can be practically removed or decontaminated," then closure is required (WAC 173-303-640(7)). The closure plan will include a preliminary performance assessment. The plan will be reviewed to ensure regulatory compliance by Ecology and presented for public comment before approval as a permit

Commentor No. 15 (cont'd): Ken Niles, Assistant Director, Oregon Department of Energy

Alternative 4 is not protective of the Columbia River; supplemental technologies are not acceptable because the waste form will not sufficiently hold the waste over time (fails the permanence criteria) and does not meet Tri-Party Agreement requirements for the quality of the final waste form; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 5 – Expanded WTP Vitrification with Supplemental Treatment Technologies; Landfill Closure. Tank waste retrieval to only 90 percent would leave an amount of waste within the tanks that would likely eventually cause significant adverse environmental impacts. This alternative also calls for use of cast stone and bulk vitrification, which we have already indicated would not sufficiently immobilize the waste for disposal in Hanford soils. This option also excludes technetium 99 from the pre-treatment process. We do support the idea of further exploring sulfate removal after pre-treatment to reduce the amount of vitrified low-activity waste. This alternative also includes landfill closure of the single-shell tank farms, which we have indicated is not protective. DOE has also ruled out treating and sending some waste to the Waste Isolation Pilot Plant.

Alternative 5 is not protective of the Columbia River; supplemental technologies are not acceptable because the waste form will not sufficiently hold the waste over time (fails the permanence criteria) and does not meet Tri-Party Agreement requirements for the quality of the final waste form; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 6A – All Vitrification/No Separations; Clean Closure. The WTP is currently being constructed to include pre-treatment and LAW vitrification melters. We support pre-treatment to separate the waste streams and believe it is unnecessary to treat all the waste as high-level waste. It also would unnecessarily prolong the treatment mission to 2163, requiring eventual replacement of the double-shell tanks and construction of two replacement Waste Treatment Plants. We also believe that clean closure of all of the 149 single-shell tanks is probably not necessary.

Alternative 6A may offer the best long-term protectiveness of the Columbia River over any of the other alternatives as all the tank waste is vitrified and disposed off-site. However, the increased time to vitrify all the wastes increases the chances of additional tank leaks during the treatment mission, which could pose an increased threat to the Columbia River and would not be protective of human health and the environment. It also does not comply with Tri-Party Agreement schedules.

15-2 cont'd

modification to the Hanford sitewide permit. This process is described in Appendix I of the TPA. A closure plan will be submitted for each waste management area that meets the TPA compliance schedule and requirements, as well as those of the state closure standards (WAC 173-303-610(2)) and the *TC & WM EIS* ROD. Ecology will consider all EIS mitigation information and any additional, relevant information when developing the closure plan. As an example of the current process, the TPA has milestones for the completion of a soil investigation for Waste Management Area C (Milestone M-45-61), submittal of a closure plan (Milestone M-45-82), and completion of Waste Management Area C closure (Milestone M-45-83). DOE will complete the soil investigation to determine the nature and extent of the contamination. To inform the decision process for closure, DOE will complete a Waste Management Area C performance assessment and risk assessment. Following completion of the tank waste retrieval and data collection activities for residuals in the pipelines, ancillary equipment, and soil, the performance assessment will be revised to include all data. This revised performance assessment and closure plan will be presented for public review and comment, and the Waste Management Area C closure plan will be modified and incorporated into the Hanford sitewide permit.

Tank Closure Alternatives 3A, 3B, and 3C -- NEPA is completed early in the process and therefore information can develop during the process. Appendix E of this EIS describes the uncertainties related to all of the supplemental treatment technologies. In addition, Appendix E, Section E.1.2.3.5.1, describes the process used for the supplemental treatment technologies evaluated in this EIS.

Tank Closure Alternative 4 -- In 2003, during the scoping of the "Tank Closure EIS," Alternative 4 was included to represent selective clean closure of the BX and SX tank farms as representative tank farms with landfill closure applied to other tank farms. The rationale for selection of BX and SX is included in Appendix E, Section E.1.2.5.3. Under the treatment component of Tank Closure Alternative 4, DOE wanted to evaluate the impacts related to the implementation of more than one supplemental treatment technology (i.e., bulk vitrification and cast stone).

Tank Closure Alternative 5 – Tank Closure Alternative 5 evaluates whether putting a more robust barrier (i.e., Hanford barrier) on the tank farms can mitigate the impact of not being able to retrieve all the waste from the tanks (i.e., 90 percent retrieval of the waste). In addition, the analysis of 90 percent removal of the tank farm waste evaluates the potential impacts if the TPA retrieval goal of 99 percent cannot be met. Similar to Tank Closure Alternative 4,

Commentor No. 15 (cont'd): Ken Niles, Assistant Director, Oregon Department of Energy

Alternative 6B – All Vitrification with Separations; Clean Closure. This alternative may meet all of our criteria. It would depend in large part on the ultimate disposition of the immobilized LAW canisters. Since there would not be pre-treatment to ensure that the technetium 99 ended up in the immobilized high-level glass, if the immobilized LAW were to end up in shallow burial at Hanford, the disposal environment may not sufficiently contain the technetium. This could eventually lead to spread of technetium into Hanford's groundwater. In addition, this alternative presumes landfill barrier of the cribs and trenches, which may not be protective. This alternative also proposes complete clean closure of all of the 149 single-shell tanks, which is probably not necessary.

Alternative 6B may meet all of our criteria, but not if the technetium ends up in shallow burial at Hanford.

Alternative 6C – All Vitrification with Separations; Landfill Closure. This alternative includes landfill closure of the single-shell tank farms, which we have indicated is not protective.

Alternative 6C is not protective of the Columbia River and is not protective of human health and the environment.

15-2 cont'd

DOE chose to evaluate a suite of supplemental technologies for potential implementation. DOE also believes evaluation of technologies like sulfate removal, which reduces the amount of ILAW glass produced in the WTP and, therefore, allows earlier completion of treatment of tank waste, is a reasonable alternative and meets the agencies' objectives.

Tank Closure Alternative 6A – DOE notes the commentor's support for pretreatment of the waste into the HLW and LAW fractions.

Tank Closure Alternative 6B – DOE notes the commentor's support for Tank Closure Alternative 6B.

Tank Closure Alternative 6C – DOE notes the commentor's opposition to Tank Closure Alternative 6C.

Commentor No. 16: Valerie Shubert

From: Valerie Shubert [treraia@gmail.com]
Sent: Thursday, January 21, 2010 5:31 AM
To: tc&wmeis@saic.com
Subject: Draft TC&WM EIS Comments; pt 1

This is very preliminary, since I'm still slogging through the EIS, but I wanted to get started while things were still fresh in my mind.

First, I don't think the comment period is long enough. This is a large document, and there's not time to read the whole thing with attention. *16-1*

Second, I note that there's an assumption that workers will be working the same type of schedules during clean closure operations as they would be during landfill closure operations. I think it would be worth considering hiring more people, and setting up the same sort of team planning and choreography that NASA uses for spacewalks. In this way, individuals would be exposed for less time, while their expertise and experience could be shared with others. *16-2*

Third, as regards vitrification: It should be noted that glass is a supercooled liquid, and over time it flows. In glass windows over a hundred years old, the glass at the bottom is measurably thicker than the glass at the top. When glass contains materials which will be dangerous for thousands of years, there needs to be some facility for (at least), turning the things over every hundred years or so, lest the thickening at the bottom become severe enough that it may break out of any containers. *16-3*

There will be more comments later, but this is the beginning. Please send any reply to this email address, as my SCN address has limited storage space.

Valerie Shubert
1420 Western, #409
Seattle, WA 98101

16-1 DOE extended the *Draft TC & WM EIS* public comment period for another 45 days, for a total comment period of 185 days.

16-2 Appendix K provides information regarding the assumptions for determining worker exposures and notes that they are based on full-time equivalent workers; the actual number of workers engaged to implement an action could be different. As stated in Appendix K, Section K.2, DOE and its contractors would implement controls to limit the exposure of individual workers for all activities in accordance with regulations and guidance (10 CFR 835; DOE Standard 1098-2008). Site procedures and job control plans would incorporate the type of planning and information sharing alluded to in the comment to maintain radiation doses as low as is reasonably achievable (ALARA), using techniques such as planning work to reduce time of exposure, increasing the number of workers, using shielding, and employing remote operations. Chapter 7, Section 7.1.10, contains additional information regarding methods to protect workers.

16-3 Vitrification of radioactive waste into glass is an attractive and technically proven option because it atomistically bonds the species in a solid glassy matrix. Because radioactive constituents are bonded within the glass structure, the waste forms produced are very durable and environmentally stable over long time durations; however, they remain toxic. EPA has declared vitrification the best-demonstrated available technology for HLW disposal.

Commentor No. 17: Mike Conlan

From: Mike Conlan [mikeconlan@hotmail.com]
Sent: Friday, January 22, 2010 3:19 PM
To: tc&wmeis@saic.com
Subject: Comment Draft Closure & WMEIS for the Hanford Site

D.O.E.:

1) 99.9 retrieval rate of tank waste! *17-1*

Clean the area as clean as scientifically possible, allow no further radioactive debris in Hanford until the area is clean, and the Hanford facility has the capability to clean any waste that is brought to WA. *17-2*

Mike Conlan
Redmond WA

17-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

17-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 18: Tom A. Williams

From: Tom Williams [wdhr@bmi.net]
Sent: Sunday, January 24, 2010 4:06 PM
To: tc&wmeis@saic.com
Subject: Written Comments for January 26, 2010 Hearing.

Mary Beth Burandt, NEPA Document Manager
U.S Department of Energy, Office of River Protection.

Please ad my comments to the record for the hearing on the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland Washington.

The Columbia River is the lifeblood of the Pacific Northwest. Assuring its health is a high duty. Every effort should be made to contain and remediate contaminants on the Hanford Reservation from polluting the Columbia River. It should be recognized that preemptively acting on this contamination before it is widely dispersed is more cost effective than doing so after it is spread out. Containing radioactive contamination still in buried steel drums is easier than containing this contamination in the ground water. And containing contamination that has reached the ground water, but that is not yet widely dispersed is less costly to remediate than when it is further dispersed. Thus to meet safe clean-water standards and to do so cost effectively, it is necessary to properly do this work now, sooner rather than later, before significantly more dispersion occurs. *18-1*

This is a health safety issue and an economic issue. The Reservation's original mission provided for our national defense. This mission must now be continued to protect our citizens from the after effects of this mission and it must be done quickly to control total remediation costs.

Respectfully Submitted,

Tom A. Williams

18-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 19: Larry Gadbois, U.S. Environmental Protection Agency

From: Gadbois.Larry@epamail.epa.gov
Sent: Monday, January 25, 2010 11:51 AM
To: Mary_E_Burandt@RL.gov; tc&wmeis@saic.com
Subject: EIS Question

Can someone please define "where necessary" as used in the EIS?
See below for more information. Thanks.

--Larry—

----- Forwarded by Larry Gadbois/R10/USEPA/US on 01/25/2010 08:43 AM-----

From: Larry Gadbois/R10/USEPA/US
To: "Burandt, Mary E" <Mary_E_Burandt@RL.gov>
Date: 01/13/2010 08:17 AM
Subject: Re: Copy of the EPA presentation

Thanks for providing support to EPA during our review of the EIS.
I have one question which I have searched and searched for the answer and can't find it. Maybe you or someone on your team can help.

In multiple places in the EIS where clean closure of the tanks are discussed, it states that "Where necessary, deep soil excavation would also be conducted to remove contamination plumes within the soil column."

I can't find the criteria which trigger "where necessary."

I'd guess it means something like when contamination is greater than some concentration but I can't find that definition/threshold.

Can you tell me, where this this is detailed?

To get to the core of one of the issues I am struggling with: *19-1*

I work on CERCLA cleanups. All our cleanup RODs which address soil cleanup have two sets of cleanup concentrations.

One set, which applies to the top 15 feet of the vadose, is set at concentrations which protect for direct exposure to humans and eco receptors. The other set of cleanup numbers is designed to protect groundwater to MCLs and surface water quality standards when the groundwater reaches the Columbia River. That is mandated by the first two criteria of a CERCLA action, i.e. #1 protect human health and the environment, and #2 comply with ARARs (laws/regulations). So when I read "where necessary" I can't help operate from my framework of "necessary to protect groundwater to ARARs like MCLs", but I can't find an explanation anything like that in this huge document. Hoping you can help.....

Thanks Mary Beth.
--Larry Gadbois--

19-1 Not all of the HLW tanks have leaked or have suspected plumes; therefore, deep soil excavation would be done only where plumes have occurred and clean closure is necessary. This is the meaning of the term "where necessary" in the sentence "Where necessary, deep soil excavation would be conducted to remove contamination plumes within the soil column." The definition of "clean closure" is provided in this *TC & WM EIS* in Chapter 9, "Glossary," and in a text box in Chapter 2. The tank farms are regulated under RCRA, so the RCRA definition for "clean closure" is used, as defined in Chapter 9 as follows: "clean closure – The premise of clean closure is that all hazardous waste has been removed from a given RCRA-regulated unit and any releases at or from the unit have been remediated so that further regulatory control under RCRA Subtitle C is not necessary to protect human health and the environment. Under State of Washington requirements (WAC 173-303-64) for closure of a tank system, the owner or operator must remove or decontaminate all waste residues, contaminated containment system components (e.g., liners), contaminated soils, and structures and equipment contaminated with waste and must manage them as dangerous waste as required."

Commentor No. 20: John Ritter

From: John Ritter [ritter@gorge.net]
Sent: Tuesday, January 26, 2010 8:53 AM
To: tc&wmeis@saic.com
Subject: Hanford

PLEASE, Do not allow Hanford to become a dumping spot for Nuclear waste..... *20-1*
It has been PROMISED for years to be cleaned -up. The Columbia flows into our Nation's greatest & largest National Scenic Area, THE COLUMBIA RIVER GORGE *20-2*
.....Please , let's clean this spot up, and preserve this beautiful area.

Sincerely, John Ritter, Hood River, Oregon

20-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

20-2 With respect to the Columbia River Gorge, none of the alternatives would impact the scenic aspect of the gorge or its status as a National Scenic Area.

Commentor Number 21 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 15.

Commentor No. 22: Gary L. Troyer

PUBLIC COMMENT
January 26, 2010
Richland WA

Draft TC&WM EIS which includes FFTF Decommission Decision

The subject EIS recommendations do not properly address emerging information and needs of the nuclear energy industry. This is a requirement of an EIS in bringing forth new information to the process.

Today, we find that the US nuclear industry is still needing fast neutron spectrum research and development data. This was true when the Fast Flux Test Facility was stopped in mid program in 1992. The need for data has only gotten worse since then. On a daily basis we are seeing the US private sector being driven overseas to gather information and embark on new innovations in those countries. Disallowing encouragement and internal use makes for a long term loss of technology advantage and employment.

Over time, several private and joint private/government proposals have been made for utilizing the FFTF. All have been stopped for other than technical merit. It seems wholly logical that based on US DOE actions, this property is excess. As such, the private sector or local government entities should be encouraged to have first option on its future. This alternative is not addressed in the EIS. *22-1*

The recent dropping of activation funding for Yuca Mtn makes fast reactor research important. It is becoming more evident with this new direction that such is necessary fully utilizing this treasure trove of clean energy. If allowed, the FFTF fits this need.

Finally, due to our lackadaisical attitude and desire to unilaterally control proliferation, we have emasculated a key ability to provide medical isotopes used extensively in the US. Avoidance of using HEU for making the medical isotope ^{99m}Tc has not stopped proliferation. It has merely caused loss of availability, generating less efficient methods that require new development. Our reliance on foreign support is now hampering the medical profession and public health. The FFTF has huge potential to resolve these needs and has been proposed many times in that role.

As Energy Secretary Chu has stated regarding nuclear energy, we need to preserve this resource "... to provide options for future policymakers."

Sincerely

Gary L. Troyer
614 Cottonwood
Richland WA 99352
[redacted]

22-1 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *Programmatic Environmental Impact Statement for Accomplishing Expanded Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, Including the Role of the Fast Flux Test Facility (Nuclear Infrastructure PEIS)* (*NI PEIS*) (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. As discussed in Chapter 1 of this *TC & WM EIS*, Section 1.4.2, Decisions Not to Be Made, DOE is not considering restarting FFTF. The scope of this EIS is to address the final decommissioning of FFTF.

Commentor No. 23: Claude L. Oliver

US DOE FFTF Decommission Hearings
Richland, Washington January 26, 2010

UNITED STATES DOE POLICY STEEPED IN "POLITICS" COSTING BILLIONS FOR TAX PAYERS AND UTILIITES and THOUSANDS OF JOBS GOING OVERSEAS

Testimony By Claude L. Oliver
Former Benton County Commissioner

One of the true regrets of my 30 years of public service for the people of Benton County, is the continued action by the United States Department of Energy to destroy the Fast Flux Test Facility (FFTF) and now abandonment of Yucca Mountain in Nevada with out compliance of Federal National Environmental Protection Law. Both FFTF and Yucca Mountain are technically connected and will cost tax payers, States, US DOE host communities and utilities billions for decisions that are currently steeped in "politics" rather than science. *23-1*

President Bill Clinton's Energy Secretary Bill Richardson on the last day of the Administration signed off on the Record of Decision for the Fast Flux Test Facility establishing a decision of "permanent deactivation" of the fast flux. Mind you, this decision was steeped in anti-nuclear politics with nearly all world scientists in the nuclear field offering shocked concern that nuclear science had been ignored at the expense of the worlds most capable and newest multi billion dollar fast test reactor.

On June 5, 2002, a Blue Ribbon delegation coordinated by me with lead presentation from Dr. Alan Waltar the head of Texas A & M Nuclear Science Department along with Entergy Corporation made presentation to the President George Bush White House. Among group accomplishments, Entergy Corporation, had just the day before, received the most prestigious recognition, the "Thomas Edison Award", for being the nations best nuclear power provider. The case based on real science was made with superlatives to the White House.

Quick reaction by the George Bush Administration was determined through a July 15, 2002, Under Secretary of Energy Kyle McSlarrow communication to the United States Department of Energy, Richland Operation (RL). Mr. McSlarrow wrote that Secretary of Energy had directed him to advise RL to proceed with "immediate decommission destruction" of the multi-billion dollar fast flux test facility.

Strange, under freedom of information it was discovered that no such authority detailed in the July 15 US DOE HQ memo had been officially given by Bush Energy Secretary Spencer Abraham to start the destruction of US DOE, FFTF. As one might expect, Richland DOE contractor Flour Hanford immediately hired Cleg Crawford under CERCLA contract to carry out the illegal McSlarrow July 15, 2002, destruct memo. Crawford had a trade reputation of getting the job done and if anyone got in his way they would be sorry.

US DOE repeatedly failed to embrace the spirit of the NEPA EIS process instead choosing the CERCLA environmental process followed by it's contractor Flour. CERCLA is intended to be used in an environmental disaster like Exxon Valdez spilling hundreds of thousands of barrels of oil. Due to the urgency of the environmental disaster, the federal agency in lead is not required to obtain any public input or factor any new critical information in the decision making process, thus going CERCLA. Clearly, US DOE HQ by following CERCLA violated the National Environmental Policy Law. that would have open the door for Nuclear

Tuesday, January 26, 2010 AOL: ClaudeOliver

23-1 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. As discussed in Chapter 1 of this *TC & WM EIS*, Section 1.4.2, Decisions Not to Be Made, DOE is not considering restarting FFTF. The scope of this *TC & WM EIS* is to address the final decommissioning of FFTF.

Commentor No. 23 (cont'd): Claude L. Oliver

scientists, the public and the energy research development to express issues needing address by the United States DOE and others.

It was obvious, by the fall of 2002, that the Bush administration was Hell bent to destroy the Washington State facilities with active support from Washington State's two Democrat US Senators, Patty Murray, Maria Cantwell, plus all members of the Washington Congressional Delegation and US Senator Ron Wyden from Oregon.

US DOE ignored responsibility under the National Environmental Policy Act and with all the political help and guidance it needed, drew up the largest small business award contract in the history of the US Department of Energy to expedite destruction of the Fast Flux Test Facility. So what about Federal NEPA law?

Nuclear scientists and the people of Benton County, Washington State watched as no federal elected officials came to their aid as the Flour Hanford Contractor proceeded with advancing the Fast Flux tear down project. So in desperation, Benton County took the United States Department of Energy to Federal Court in November 2002, with Federal Judge Edward F.Shea presiding.

Washington State's US DOE FFTF decommission process under CERCLA pretense was a clear violation of National Environmental Policy Law designed to leave Nuclear scientists, the public and the energy research development needs of the United States out of consideration by US DOE and our federal elected officials.Federal Judge Edward F. Shea's February 28, 2003, ruled that,

"Prior to committing any resources to any one of the options for decommissioning, the DOE must prepare an EIS. {NEPA} 40 CFR 1502.2 (f). This ensures the opportunity for public comment."

Even with Judge Shea's ruling the people of Benton County were ignored as US DOE and it's elected federal officials issued CERCLA contract B-294910 for FFTF tear down was issued in early 2005. On August 31, 2005, I asked federal regulators, Government Accounting Office and US DOE Inspector General, to review what Contract Issue authority US DOE had to issued the FFTF tear down procurement contract B-294910 valued at $260 Million dollars. Result - US DOE lacked authority and the contract was withdrawn. (Attachment #1)

US DOE's willful disregard of Federal Judge Shea's ruling was truly one of the low points of my public service career only surpassed by our elected Senators and Congressman watching with apparent approval. Sad commentary, Benton and Franklin County jails are full of citizens with no real violation of law that compared to what US DOE and our Federal Representatives have done to advance destruction of this incredible United States energy resource capability.

As the Obama Administration rushes to destroy the Washington State Fast Flux Test Facility and abandon Yucca Mountain without required NEPA compliance, the United States will loose the near term nuclear fuels recycle demonstration capability that the FFTF, multi-billion dollar complex, offers which could preclude the very need for Yucca Mountain 10,000 year storage. The national impacts for President Obama's political decision are in the billions with glass vitrification from Hanford that was to go to Nevada being orphaned (See Attachment #2 Claude Oliver Energy Communities Alliance 8-18-09 letter).

Tuesday, January 26, 2010 AOL: ClaudeOliver

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Commentor No. 23 (cont'd): Claude L. Oliver

President Barack Obama stated on October 15, 2009, in New Orleans:

"There is no reason why technologically we can't employ nuclear energy in a safe and effective way. Japan does it and France does, and it doesn't have greenhouse gas emissions, so it would be stupid for us not to do that in a much more effective way." (Attachment #3)

So in closing, your answers are requested to the following unanswered issues that will be directly affected by the US DOE decision on the proposed FFTF decommission:

1. Do any of you know what President Barack Obama meant with his comment "that it would be stupid for us not to do that (employ nuclear energy) in a much more effective way." (Attachment #3)? If you do not, then what does President Obama's statement mean in the context of the US DOE current plan to do away with a vital FFTF nuclear R&D facility?

2. If President Obama is serious about his New Orleans, "employ nuclear energy" statement, does President Obama understands the need for nuclear research and development that the FFTF could do for the United States to advance his embrace of nuclear energy employment?

3. Why did US DOE ignore Federal Judge Shea's ruling to do the FFTF NEPA EIS public process to the point of defying US DOE's court statements given to Judge Shea that US DOE was only, "Planning to Plan" US DOE FFTF decommission which became the basis of Judge Shea's acceptance of the US DOE policy position; yet US DOE then proceed to issue US DOE procurement contract B-294910 prior to doing the required NEPA EIS public process ordered by Judge Shea? (ATTACHED #1)

4. How is US DOE complying with required NEPA EIS environmental impact issues by abandoning Yucca Mountain Nevada without consideration of FFTF for a nuclear fuels materials waste recycle demonstration that could offer major scientific mitigation plus time and cost savings for which US DOE has legal obligations to address for Washington State, host communities and commercial utilities of the United States (See attachments #2)?

Options for Re-start of Fast Flux Test Facility must immediately be explored in context of national energy policy decisions being faced by US DOE, President Obama, Washington State, Washington Congressional Delegation, Nevada, commercial utilities and host US DOE communities. Protracted delay of address of our nations critical nuclear energy options means we are rapidly declining from being the world's nuclear power R&D leader as all major industrial nations go forward; with thousands of good paying jobs being lost overseas.

Please provide answers to these questions as quickly as you can. Thank you.

Claude L. Oliver

Claude L. Oliver
Former Benton County Commissioner

Tuesday, January 26, 2010 AOL: ClaudeOliver

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Commentor No. 23 (cont'd): Claude L. Oliver

Attachment #1

Board of County Commissioners
BENTON COUNTY
P.O. Box 190 • Prosser, WA 99350-0190
Phone (509) 786-5600 or (509) 736-3080
Fax (509) 786-5625

Claude L. Oliver
DISTRICT 3

August 31, 2005

Mr. David A. Asben
Government Accountability Office
441 G. Street, N.W.
Washington DC

Mr. Gregory Friedman, Investigator General
US Department of Energy
Washington DC 20585

Determination of US DOE Authority to Contract the FFTF Closure Project,
Procurement B-294910

Mr. Asben & Mr. Friedman

The Richland Office of the United States Department of Energy (US DOE RL) has publicly stated their intention to let a procurement contract for the teardown of the Fast Flux Test Facility and support facilities (FFTF) located at Richland, Washington. **Does US DOE-RL have legal authority for issuance of this contract? Your review is requested.**

The FFTF Closure Project was before U.S. District Court Judge Edward F. Shea in Benton County v. US DOE in November 2002. Judge Shea ruled on February 28, 2003. [CT-02-5100-EFS]

The FFTF Closure Project Plan was first issued in July 2002. This plan for Decontamination and Decommission of the FFTF to an entombment end-state, was to be performed in accordance with requirements of Superfund, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). [Fluor Hanford, DE-AC06-96RL13200, Modification M172, page C-89, December 19, 2002]. This CERCLA plan was contested by Benton County as being beyond the scope of deactivation and outside of the authority the National Environmental Policy Act (NEPA). The authorizing NEPA FFTF documents are: 1995 Environmental Assessment (95RA/FONSI), and in the NEPA NI-FEIS Record of Decision (Richardson ROD), January 19, 2001. [Fluor Hanford, DE-AC06-96RL13200, Modification M172, page C-89, December 19, 2002]

In response to the Benton County law suit, the US Justice Department offered *Exhibit D* to Judge Shea. Exhibit D is a December 10, 2002, letter from US DOE Secretary Abraham to HHS Secretary Thompson which states, *"Regarding the Fast Flux Test Facility, the Department considered the possibility of restarting this reactor to help meet future medical isotope needs. However, after an exhaustive review, we concluded that the only proposal made to us to restart the facility was not viable and have therefore decided to proceed with the permanent deactivation of this facility...."*

In the Shea ORDER, *"The DOE acknowledges that it will have to prepare an EIS prior to deciding on a decommission plan. 10 CFR Pt. 1021 (d) App. D (d) (4). As of yet, DOE has not decided what the "end state" for the FFTF facility should be. The DOE personnel communications the County has pointed to is evidence that the DOE is only currently engaging in planning, and that no final decommissioning approach has been selected. **Prior to committing any resources to any one of the options for decommissioning, the DOE must prepare an EIS.** [NEPA] 40 CFR 1502.2 (f). This ensures the opportunity for public comment. Upon completion of the EIS, DOE will have made a final decision on decommissioning that can be the subject of a lawsuit seeking court review."* [ORDER, p.14, line 2-12]

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Commentor No. 23 (cont'd): Claude L. Oliver

Judge Shea upheld the deactivation authority in the 1995 Environmental Assessment (95EA/FONSI), and in the NI-PEIS Record of Decision (Richardson ROD), January 19, 2001 *"... this PEIS incorporated the 1995 EA concerning deactivation by reference, and stated that decommissioning was not addressed due to the uncertainty regarding the timing of such action and that an EIS would be completed prior to decommissioning.* [ORDER, p 3, line 22-25].

"The Court finds that both deactivation and decommissioning have independent utility. Deactivation's independent utility is placing the FFTF into a radiologically and industrially safe shutdown condition suitable for long-term surveillance and maintenance before final decontamination and decommissioning. This would allow the DOE to save approximately 30 million dollars per year. Decommissioning's independent utility is the ability to remove the FFTF from service and ensure that no long-term unacceptable risks exist to persons or the environment. As a result, the Court finds that it is not "unwise" or "irrational" to undertake deactivation without decommissioning until five, ten, thirty years, or never, given the financial savings of deactivating the FFTF..." [ORDER, p. 11, line 9-23]

On August 13, 2004, US DOE published in the Federal Register, a Notice to prepare an EIS for the Proposed Decommission of the FFTF (DOE/EIS-0364). Public Scoping meetings were held where oral and written comments were taken. Spring 2005 was the estimated issuance date of the Draft EIS. This schedule has now been "pushed" more that one year, now expecting a completion date of December 2006.

Procurement Rule 216 dictates that a contract cannot be awarded prior to the completion of the EIS and ROD. Any FFTF Closure Project contract must await completion of the NEPA EIS with a signed Secretarial Record of Decision. [Sec. 1021.216].

Washington State Department of Ecology and the US Environmental Protection Agency write letter, January 19, 2005,[ii] *"Competing demands for increasingly scarce cleanup resources compel us to focus on those projects that have the greatest potential to address environmental risk; FFTF D&D is not one of those projects."* Why is this disputed procurement with questionable authority still going forward?

The FFTF Closure Project procurement contract, anticipated to be awarded, appears to be in violation of Judge Shea's ruling, 2-28-03. It appears that DOE's attempt to ignore Judge Shea's ruling should be stopped. Please review this concern, and provide your determination.

Very truly yours,

Claude L. Oliver
Benton County Commissioner

cc: Andy Miller, Benton County Prosecuting Attorney
Michael A. Wilson, NWP, Ecology
Nicholas Cato, Hanford Project Office, EPA

Attachments:
1. Exhibit D. Letter, Secretary Abraham to HHS Thompson, December 10, 2001.
2. Ecology and EPA Joint Letter, January 19, 2005.

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Commentor No. 23 (cont'd): Claude L. Oliver

Attachment # 1-A

THE SECRETARY OF HEALTH AND HUMAN SERVICES
WASHINGTON, D.C. 20201

OCT 0 8 2002

The Honorable Spencer Abraham
Secretary of Energy
Washington, D.C. 20585

Dear Secretary Abraham:

I am writing to follow up on our recent exchange of correspondence concerning the Department of Energy (DOE) isotope production program. Your letter informed the Department of Health and Human Services that under your new policy, DOE will no longer subsidize production of isotopes. In response, I asked the Director of the National Institutes of Health, Elias Zerhouni, M.D., to undertake a full assessment of the impact of these changes on high-priority research initiatives. Dr. Zerhouni's staff has been working with Mr. William D. Magwood, IV on your staff to complete this assessment.

While our staffs are working toward ensuring that radioisotopes will be available for research purposes, I remain concerned that there may be insufficient quantities of radioisotopes for treatment and diagnostic purposes in the larger community. It was brought to my attention that the demand for medical isotopes may exceed the supply in the near future. As I understand it, as much as 90 percent of approved medical isotopes used in the United States are produced abroad, primarily in Canada, but also in Europe (including Russia), Israel, and South Africa. In addition, many U.S. radiopharmaceutical firms are owned by foreign parent companies. Thus, the United States may be unduly dependent on radioisotopes produced overseas. The U.S. medical radioisotope supply depends on production that we cannot control, and we cannot assure that radioisotopes can be reliably and securely imported.

Nuclear medicine has become a prominent modality and is certain to increase in use in future years as additional diagnostic and treatment uses are created. I understand that shortages of radioisotopes have occurred in the recent past. I am aware of and encouraged by DOE's recently announced initiative to convert uranium stored at Oak Ridge National Laboratory to medical isotopes for use in cancer research. I am also aware that DOE is currently considering a proposal by the Community ReUse Agency (CRA) to redeploy the Fast Flux Test Facility at Hanford. The CRA plan includes production of radioisotopes for research and medical diagnostic and treatment purposes. The Department of Health and Human Services is not in a position to make a judgement on the technical merits and economic feasibility of the CRA proposal; but given that one of its intentions is to increase the supply of radioisotopes for medical treatment and reduce the nation's dependence on foreign sources, I ask you to give the proposal every consideration.

Sincerely,

Tommy G. Thompson

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Commentor No. 23 (cont'd): Claude L. Oliver

Medical-Isotopes Sector Faces Another Supply Shortfall - WSJ.com

Attachment # 1-B

1/13/10 1:25 PM

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Supply Woes Hit Isotopes Sector

Overlapping reactor outages will soon rattle the supply chain for medical-scanning isotopes, causing fresh headaches for patients, doctors and companies that have dealt with repeated shortages in recent years.

This time, companies including Cardinal Health Inc. and Covidien PLC say advanced warning about a key cobalt plant outage helped them prepare. But the isotopes' very short lifespan means no one can stockpile supplies, and more than half the world's production capacity will be shuttered for about a month starting in mid-February.

Covidien told customers in a recent letter that it is using a "multifaceted" approach, but that "periods of significant shortages will still occur."

One of the top producers of material used to make isotopes, a reactor in Canada, has been sidelined since last May to fix a heavy-water leak, and the latest estimate is for a return by late March.

That is delayed from earlier estimates, which means the outage will overlap with a planned maintenance shutdown at the other major producer, in the Netherlands, which is slated to begin Feb. 19 and last six months.

The reactors produce material called molybdenum-99 that decays into technetium-99m, which is the world's most commonly used medical isotope. It is frequently used in scans to check for heart problems and cancer; there are an estimated 20 million nuclear medicine procedures in the U.S. each year.

The Canadian and Dutch plants are crucial global suppliers and particularly important for the U.S., where they are used to make nearly all isotopes. But both aging facilities have had issues and outages in recent years that have forced the industry to scramble for alternatives.

The supply chain is complex. In North America, MDS Inc.'s Nordion unit performs additional processing of material from the Canadian facility and then two companies—Covidien and privately held Lantheus Medical Imaging—make generators that produce the medical isotope.

These are distributed to hospitals and through radiopharmacies, where Cardinal has the biggest business.

Covidien, which gets most resources from the Dutch plant, is managing the looming shortfall by readying supplies of thallium, which is an older isotope used in heart scans, leasing molybdenum from other European reactors and working with customers on efficiently using the isotopes they have.

The company announced plans last month to sell its radiopharmacy business to Triad Isotopes, Inc. for undisclosed terms in a deal expected to close in the second quarter.

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Commentor No. 23 (cont'd): Claude L. Oliver

(Attach. # 10)

The Secretary of Energy
Washington, DC 20585

December 10, 2002

2002-017662

The Honorable Tommy G. Thompson
Secretary of Health and Human Services
Washington, D.C. 20201

Dear Secretary Thompson:

Thank you for your continued interest in isotope availability. I am confident that Dr. Elias Zerhouni and Mr. William D. Magwood, IV and their respective staffs will come to a timely completion of their assessment of the impact of policy and funding changes on the availability of isotopes to support important research activities.

I am concerned about the future availability of radionuclides needed for treatment and diagnostic purposes. For this reason, the Department of Energy is committed to assuring the maintenance of a viable U.S. capability to produce important research isotopes. As an example, we are investing in a new Isotope Production Facility, a new production capability at the Los Alamos Neutron Science Center that will enable near year-round production of a range of short-lived isotopes vital to many research efforts. The Isotope Production Facility will be operational in late 2003. In addition, a conceptual design has been developed for a new 70 million electron volt cyclotron dedicated to the production of many important medical isotopes. These activities, together with ongoing production of isotopes at research reactors operated by the Department and various universities will enable key medical research to continue.

The Department is not in a position to support commercial-scale production of future isotopes. We will continue to make our facilities available for private sector production initiatives and will continue our work with overseas producers to make their isotopes available for use in the United States. We believe that as successful research reveals the need for future isotopes, the private sector will be able to respond to the Nation's requirements.

Regarding the Fast Flux Test Facility, the Department considered the possibility of restarting this reactor to help meet future medical isotope needs. However, after an exhaustive review, we concluded that the only proposal made to us to restart the facility was not viable and have therefore decided to proceed with the permanent deactivation of this facility. In addition, to support this facility for commercial isotope production is inconsistent with the Department's

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EXHIBIT
D

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Commentor No. 23 (cont'd): Claude L. Oliver

2

position. Work is now underway to permanently shut down the Fast Flux Test Facility, and we do not expect to revisit this issue in the future.

The assessments being conducted by our organizations will serve as a basis for future investments by the Department in facilities to meet research isotope requirements. The Department will maintain an enduring role in the production and distribution of isotopes needed to support important research into advanced diagnostic and therapeutic procedures. We welcome continued collaboration with the National Institutes of Health on this effort.

Please feel free to contact me or have a member of your staff contact Mr. William D. Magwood, IV, Director of the Office of Nuclear Energy, Science and Technology, at 202-586-6630 to discuss any of these items.

Sincerely,

Spencer Abraham

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Commentor No. 23 (cont'd): Claude L. Oliver

(Attach #10)

Central Files _____
File Stamp _____
Cross Reference _____

WASHINGTON STATE DEPARTMENT OF ECOLOGY

EPA

January 19, 2005

Keith A. Klein, Manager
Richland Operations Office
U.S. Department of Energy
PO Box 550, MS A7-50
Richland, Washington 99352

Dear Mr. Klein: Keith

Re: Fast Flux Test Facility (FFTF) Decommissioning

The purpose of this letter is to ask you to consider deferring portions of the Fast Flux Test Facility Decommissioning and Demolition (D&D) project until after higher priority cleanup projects at Hanford have been completed. While we support defueling, removal of liquid sodium, and other actions required to place the facility in a mini-safe configuration, the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) believe that it may be appropriate to defer final D&D actions, given the reality of increasingly tight cleanup budgets at Hanford. We were recently briefed by your staff on the final FY 2005 budget; it is increasingly apparent to us that budgets are tight and will get tighter. We understand that in 2006, resources devoted to cleanup at Hanford are anticipated to decrease from 2005 levels.

Competing demands for increasingly scarce cleanup resources compel us to focus on those projects that have the greatest potential to address environmental risk; FFTF D&D is not one of those projects. The $45,714,000 FY 2005 budget allocation for FFTF represents a significant portion of the Hanford EM cleanup budget. It is our view that FFTF work should proceed only until it can be placed in a mini-safe configuration, at which point those funds projected to support FFTF D&D should be shifted to higher priority cleanup projects.

We look forward to discussing this proposal with you at your earliest convenience.

Sincerely,

Michael A. Wilson,
NWP, Program Manager

Nicholas Ceto, Program Manager
Hanford Project Office

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Commentor No. 23 (cont'd): Claude L. Oliver

ATTACHMENT #2

Subj: **(no subject)**
Date: 1/26/2010 3:58:16 A.M. Pacific Standard Time
From: ClaudeOliver@aol.com
To: claudeoliver@aol.com

Sent: Tue, Aug 18, 2009 4:31 pm
Subject: Political Decision to drop Yucca Mountain requires NEPA analysis

Mr. Seth Kirshenberg, Executive Director
Energy Communities Alliance
Washington, DC 20036-4374

Dear Seth,
Do you know how folks around the various sites are accepting President Barack Obama's decision to abandon Yucca Mountain long term nuclear materials storage option without any National Environmental Policy Act (NEPA) compliance supplement being factored by the United States Department of Energy? While we all can respect that President Obama can make such a decision, we also as a Nation must pay for each decision that our President makes. The decision to abandon Yucca Mountain has billions of dollars of additional costs and significant environmental impacts to the federal government that have yet to be evaluated.

From a scientific point of view, I strongly believe that 25 years ago the US DOE decision on long term storage at Yucca Mountain without a national reprocess waste reduction option was impractical. Aside from nuclear science not being continued in this process, Yucca Mountain was the call of the day for highly radioactive waste long term storage. $15 Billion later we have a $15 Billion Dollar hole in the ground. Regardless of the outcome, we now have several decades of decisionmaking made by the US, States, local governments, Native American Tribes, utilities and rate payers that have paid for, planned and counted on that Yucca Mountain to be be open and accepting nuclear wastes. Areas that US DOE would have to evaluate before abandoning Yucca Mountain:

1. Large amounts of US Defense spent nuclear materials and fuels at US DOE sites across the Nation
2. Glass Logs from the Hanford Tank Waste Vilification Process sometime around 2020 that have no home
3. Spend Nuclear Fuel generated and temporarily stored at the 102 active Nuclear Utilities in the United States
4. Various State and Native compliance agreements that US DOE will violate if Yucca Mountain is not available
5. States' ratepayers have paid $ billions for waste disposition that is being lost.
6. Failure to accept the waste that they have title for and have collected money to handle.

In December 2002, nearly all arguments that our community posed successfully challenging the US DOE to do a National Environmental Policy Act (NEPA) compliance regarding the Fast Flux Test Facility deactivation or decommission process are the same for a Yucca Mountain challenge. I would greatly appreciate if you would poll our folks around the country to see what interest levels they might express to legally challenge US DOE to enforce NEPA compliance and do a NEPA Supplemental EIS before abandoning the Yucca Mountain long term storage option.

Very Best Regards,
Claude L. Oliver
Former Benton County Commissioner

Tuesday, January 26, 2010 America Online

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Commentor No. 23 (cont'd): Claude L. Oliver

ATTACHMENT # 2-A

Subj: **Pay Back Time - U.S. Court of Appeals - Nuclear Waste Fund**
Date: 1/25/2010 9:11:50 A.M. Pacific Standard Time
From: holdercarl@hotmail.com
To: claudeoliver@aol.com, tamaranoraholder@gmail.com

The federal government better get ready to start paying out billions to electric utilities across the country, judging by the recent court ruling favoring the Nebraska Public Power District.
It's only fair.
The ruling by the U.S. Court of Appeals for the federal circuit in Washington, D.C., struck down the federal government's excuse for not paying back $159 million NPPD gave the government over many years to build a permanent storage site for nuclear waste.
The federal government argued that delays in the 20-year process were unavoidable. Not so said the court.
The argument that the federal government was moving as fast as it could to build the site at Yucca Mountain, Nev., was always flimsy. Now it's preposterous. President Barack Obama effectively killed the project shortly after taking office.
Obama took the action despite a Department of Energy statement that "After over 20 years of research and billions of dollars of carefully planned and reviewed scientific fieldwork, the (DOE) has found that a repository at Yucca Mountain brings together the location, natural barriers and design elements most likely to protect the health and safety of the public, including those Americans living in the immediate vicinity, now and long into the future."
The Obama administration tried to dodge the possibility of repayment by not officially withdrawing the license application for the Yucca Mountain site. Instead it cut back funding to virtually nothing, bringing the project to a standstill.
Theoretically the government should have no problem repaying the money, since it ostensibly had been placed in a Nuclear Waste Fund with a purported balance of $22 billion.
But as the U.S. Chamber of Commerce noted in a report last year, "The NWF is largely a budgetary gimmick."
The chamber said, "It is a widely known secret that there really is not an account at the Treasury Department with $22 billion waiting to be spent on the project. Much like the country's Social Security program, the surplus collected annually is generally used for other purposes, namely to offset deficit spending."
Obama's decision to kill the project meant that more casks of nuclear waste were put in storage at Nebraska's Cooper Nuclear Station near Brownville and the Fort Calhoun Station near Omaha at considerable expense. Similar actions were taken at other nuclear power plants all around the country.
Given the federal government's failure to live up to its responsibility under the law to build a permanent storage site, it's a matter of simple justice that NPPD and other utilities be repaid. Ratepayers in Nebraska, who own their electric utilities, handed over the money in good faith. Now they should get it back.
The federal government better get ready to start paying out billions to electric utilities across the country, judging by the recent court ruling favoring the Nebraska Public Power District.
It's only fair.
The ruling by the U.S. Court of Appeals for the federal circuit in Washington, D.C., struck down the federal government's excuse for not paying back $159 million NPPD gave the government over many years to build a permanent storage site for nuclear waste.
The federal government argued that delays in the 20-year process were unavoidable. Not so said the court.
The argument that the federal government was moving as fast as it could to build the site at Yucca Mountain, Nev., was always flimsy. Now it's preposterous. President Barack Obama effectively killed the project shortly after taking office.
Obama took the action despite a Department of Energy statement that "After over 20 years of research and billions of dollars of carefully planned and reviewed scientific fieldwork, the (DOE) has found that a repository at Yucca Mountain brings together the location, natural barriers and design elements most likely to protect the health and safety of the public, including those Americans living in the immediate vicinity, now and long into the future."
The Obama administration tried to dodge the possibility of repayment by not officially withdrawing the license application for the Yucca Mountain site. Instead it cut back funding to virtually nothing, bringing the project to a standstill.

Monday, January 25, 2010 AOL: ClaudeOliver

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Commentor No. 23 (cont'd): Claude L. Oliver

Theoretically the government should have no problem repaying the money, since it ostensibly had been placed in a Nuclear Waste Fund with a purported balance of $22 billion.
But as the U.S. Chamber of Commerce noted in a report last year, "The NWF is largely a budgetary gimmick."
The chamber said, "It is a widely known secret that there really is not an account at the Treasury Department with $22 billion waiting to be spent on the project. Much like the country's Social Security program, the surplus collected annually is generally used for other purposes, namely to offset deficit spending."
Obama's decision to kill the project meant that more casks of nuclear waste were put in storage at Nebraska's Cooper Nuclear Station near Brownville and the Fort Calhoun Station near Omaha at considerable expense. Similar actions were taken at other nuclear power plants all around the country.
Given the federal government's failure to live up to its responsibility under the law to build a permanent storage site, it's a matter of simple justice that NPPD and other utilities be repaid. Ratepayers in Nebraska, who own their electric utilities, handed over the money in good faith. Now they should get it back.

Monday, January 25, 2010 AOL: ClaudeOliver

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Commentor No. 23 (cont'd): Claude L. Oliver

ATTACHMENT #3

October 21, 2009
614 Cottonwood Drive
Richland WA 99352

The President of the United States
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Dear Mr. President

I could not agree more with your comments of October 15, 2009 in New Orleans:

> ... "There's no reason why technologically we can't employ nuclear energy in a safe and effective way. Japan does it and France doesn't and it doesn't have greenhouse gas emissions, so it would be stupid for us not to do that in a much more effective way." ...

The US has demonstrated many times that we can safely and effectively deploy nuclear energy. US nuclear energy has an industrial safety record better than office workers. Our policies on not reprocessing used fuel have been a failure related to proliferation issues, therefore it needs reversal like France and others. Such reversal will solve the used fuel inventory in relation to the Yucca Mountain repository. Energy production costs are better than coal. Reliability exceeds 90%, better than any other source except perhaps hydro. Let's get on with it!

But, we have a major impediment on enabling advanced designs. China has approved and is going forward with US designs while our NRC stalls. China has approved and is building fast spectrum reactor models based on Russian examples. Our needed testing programs formerly using our world class similar technology test reactor are shutdown. The next US designed and US patented fast reactor will likely be built and certified in China because of regulatory approval uncertainty. Our NRC needs to be renewed with advanced reactor talent and regulations revised in concert with what the rest of the world is accomplishing such as adoption of IAEA standards. Let's get on with it!

We are 30 years behind. But, we can do it.

Sincerely

Gary L. Troyer
Nuclear Chemist, retired
gary@kandg.org
509-946-3425

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Commentor No. 23 (cont'd): Claude L. Oliver

ATTACHMENT #3A

THE WHITE HOUSE
WASHINGTON

December 9, 2009

Dear Friend:

Thank you for writing me. I appreciate hearing from you, and I share the vision of millions of Americans who want to make our country the world leader in developing new sources of clean energy. This is a challenge that has gone unaddressed for too long, and it is time to take steps to create millions of clean energy jobs, move towards energy independence, and reduce pollution and the effects of global warming.

Together with Congress and private industries, we are making critical investments to grow an American clean energy economy and achieve energy independence. The American Recovery and Reinvestment Act puts Americans to work weatherizing homes and buildings, doubling our supply of renewable energy, and advancing scientific research in clean energy solutions. We are working to develop and deploy technologies like wind and solar power, advanced biofuels, clean coal, and more fuel-efficient cars and trucks built here in the United States. In addition, my Administration is pursuing comprehensive legislation to move toward energy independence and prevent the worst consequences of global warming, while creating incentives to make clean energy profitable in America.

Achieving these goals will require a sustained and shared effort by government, business, labor, and your community. A sound energy policy is a long-term investment in our national security, economic prosperity, and natural inheritance.

Thank you again for writing. I encourage you to read more about my energy agenda and share your views at: www.whitehouse.gov/agenda/energy_and_environment. For more information on government grants, please visit e-center.doe.gov.

Sincerely,

Response side of this page intentionally left blank.

Commentor No. 23 (cont'd): Claude L. Oliver

Attachment 3-8

Subj: **US, India inch "closer to nuclear fuel reprocessing agreement"**
Date: 1/28/2010 3:01:51 A.M. Pacific Standard Time
From: ClaudeOliver@aol.com
To: claudeoliver@aol.com

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US, India inch 'closer to nuclear deal'

(AFP) – Nov 29, 2009

NEW DELHI — India and the United States are close to signing a nuclear fuel reprocessing agreement, one of the last requirements to finalise last year's landmark civilian nuclear deal, an official said Sunday.

Indian National Security Adviser M.K. Narayanan told reporters "we have arrived at almost the very last stage" of negotiations.

Narayanan was speaking on board Prime Minister Manmohan Singh's plane as he returned from a Commonwealth summit in Trinidad and Tobago.

The establishment of nuclear reprocessing facilities under International Atomic Energy Agency (IAEA) safeguards is a critical component of the implementation of the Indo-US nuclear deal, sealed in 2008 with former US president George W. Bush.

The agreement allows India access to civilian nuclear energy despite its refusal to sign the Non-Proliferation Treaty.

Singh said on an official visit to Washington last week that he was confident US President Barack Obama would "operationalise the nuclear deal as early as possible."

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Indian National Security Adviser M. K. Narayanan
Map

Tuesday, January 26, 2010 AOL: ClaudeOliver

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Commentor No. 23 (cont'd): Claude L. Oliver

Attachment #3-C

Private capital awaits "long-term signal" on carbon – Chu

By Ben Geman - 11/29/09
The Hill Newspaper

A couple tidbits from Energy Secretary Steven Chu's appearance on C-SPAN's Newsmakers program that aired today:

Chu made the case that a U.S. greenhouse gas emissions cap will help bring private capital into energy projects.

The stimulus law and other recent policies are pouring billions in federal assistance into low-carbon technologies. But that's just part of the equation, Chu warned.

More certainty about future carbon policy will influence decisions about multi-billion dollar investments in projects expected to operate for 60 years or more, he said.

"That long-term signal is very important," Chu said. "There is a lot of capital right now staying on the sidelines, wanting to know what is the signal, what is it going to be."

Elsewhere, he said the "blue-ribbon" commission he is forming to explore long-term solutions to nuclear waste management will be announced soon.

The Obama administration has abandoned federal plans launched in the 1980s to build a high-level waste dump inside Yucca Mountain in Nevada. "We want this blue-ribbon panel to step back and make some reasonable assumptions about what do we know today that we didn't know 25 years ago," Chu said.

Overall, he sees a glass that's half-full when it comes to working with Congress. The administration and congressional Democrats face a major challenge to win 60 Senate votes for a climate and energy bill that includes an emissions cap.

"There are certain people who have just decided they are not going to come around, and so that is life. I am not so wildly optimistic that I think I can convince everyone," Chu said. But, he added, "A large bipartisan group is willing to listen."

He also surveyed the lay of the land internationally heading into the Copenhagen climate talks. Chu lauded what he calls China's growing recognition of threats from climate change, and increasing efforts to deploy renewable energy and efficient coal-fired power plants.

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Commentor No. 23 (cont'd): Claude L. Oliver

Attachment # 3-D

Nevadans 4 Carbon-Free Energy (NV4CFE)
Founders of the Nevada Energy Trust Fund

Mission
Our mission is to enlighten Nevadans about the economic benefits of an energy park at Yucca Mt.

Our objective is to operate a nuclear repository, to research and develop carbon-free energy technologies, recycle spent fuel, and generate carbon-free power, all to the direct economic benefit of Nevadans.

Goals

- Develop the Yucca Energy Park that will store spent fuel at Yucca Mt.
- Develop a facility that will research and develop carbon-free energy technologies
- Charge for the storage of spent fuel
- Build a facility to recycle spent fuel to power a generation facility and sell to other facilities
- Create a trust fund that will provide direct financial benefit to Nevadans

Organizational Structure

Form a non-profit corporation that will operate Yucca Energy Park
Contractors will operate the storage facility, the research facility, and power generation facility. Create a permanent trust fund, similar to Alaska, where the profits from the Energy Park will be paid directly to qualified Nevadans.

Background
Our idea is to form a non-profit corporation that would manage the Yucca Energy Park. It would not operate the repository, as that is a federal contract.

We envision forming a non-profit business entity that would develop the energy park and seek contractors to build a recycling facility and a power generation facility contiguous to the repository. The project is proposed as a commercialized operation under a non-profit entity, similar to what Claude Oliver is proposing at Hanford.

Revenue will come primarily from recycling of used nuclear fuels and revenue from electricity sales generated by the commercial scale. Since it seems likely that other recycling centers will be built in the country, we also see the sale of spent fuel to them as another income source.

The profits would be placed in a trust fund that will be distributed annually to qualified Nevadans, similar to Alaska. Creation of a trust fund will likely take State legislation.

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Commentor No. 24: John Swanson

From: JohnLSwanson@verizon.net
Sent: Thursday, January 28, 2010 11:34 AM
To: tc&wmeis@saic.com
Subject: Draft TC&WM EIS Comments
Attachments: EIS.docx

Here are some comments for you to consider and address. Hopefully, they will help to improve the final version.

John Swanson

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Commentor No. 24 (cont'd): John Swanson

1-28-10

Comments on

Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site

John L. Swanson
1318 Cottonwood Dr.
Richland, WA 99354
xxx-xxx-xxxx
JohnLSwanson@verizon.net

) These comments are based on my review of only the EIS Summary and Appendix E. I imagine that many of my comments apply to elsewhere in the EIS, as well – where the same subjects are being discussed.

) I have limited my review and comments to the area in which I have had some experience – which is in dealing with the tank wastes.

) No comments will be made here about the idea of disposing of some tank wastes at WIPP – in light of DOE's recent decision not to pursue that option.

) I think that this EIS should be modified so that it states "early and often" that the alternatives that are examined were selected to provide "bounding environmental results", and that the technologies that are included in the alternatives may well not be implemented even if the general alternative is implemented. While this fact is likely a "given" to the writers of the EIS, I don't believe that is obvious to the general public. By "early", I suggest that the concept should be clearly stated in Section S.1 (perhaps in the box on S-1?); by "often", I think it would be good to use a simple term (maybe "example technology", or "bounding technology", or ??; I see "representative technology" on E-37 [I like that]) throughout the report.

- There is a pretty good sentence on E-1 about this; "In many cases, those technologies were selected to provide bounding environmental consequences and do not necessarily represent the exact technologies or processes that could be implemented to achieve the desired outcome."
    - The paragraph in the middle of E-69 is also good in this regard.
- While I saw the term "representative technology" on E-37, that's one of the few places that I saw it; it would have been beneficial to use it many times in this appendix.

1

24-1

24-1 The following paragraph was added to the Summary, Section S.2, and Chapter 2, Section 2.5.1, of this *TC & WM EIS*:

"Each alternative relies on a combination of technologies, processes, and facilities that could accomplish the desired outcome for that alternative. In many cases, those technologies were selected to provide bounding environmental consequences and do not necessarily represent the exact technologies or processes that could be implemented to achieve the desired outcome. This *TC & WM EIS* does not attempt to analyze all possible permutations of the alternatives (the alternatives analyzed in this EIS represent the range of reasonable approaches) using available technologies and processes, but instead attempts to group activities logically into reasonable alternatives for analysis. The technologies, processes, and facilities analyzed in detail in this EIS have sufficient performance data to make conservative assumptions regarding construction, operations, and decommissioning impacts. However, comprehensive and specific engineering designs may still have to be developed once a series of technologies is selected for implementation."

Commentor No. 24 (cont'd): John Swanson

) The cover sheet (also S-2) says "Hanford's mission --- included defense-related nuclear research, development, and weapons production activities." I have several problems with that sentence:

- No weapons were produced at Hanford (production and purification of plutonium for use in weapons [which were produced elsewhere] was the reason for Hanford's existence).
- Research and development were "secondary missions"; most of these efforts were directed towards improvements in plutonium production and purification.

Similarly, S-2 says "At the reprocessing plants, ---- plutonium was separated from the remaining uranium and byproducts and used for nuclear weapons production." Really, that sentence should end with "byproducts" and another sentence should be added along the lines of "The purified plutonium product of the reprocessing plants was shipped offsite to be included in nuclear weapons." *24-2*

) The cover sheet provides a reference for the definition of HLW, but not for TRW waste or LLW. Why not re-word the sentence so that the same reference covers all the waste types? Also, point out that the definition of TRU waste includes an exclusion for HLW? *24-3*

) The cover sheet uses, but does NOT define, the term "LAW". Shouldn't that be done here, especially to explain how LAW differs from LLW? *24-4*

- LAW is defined on S-2

) Disposal of LLW is mentioned on S-1 (also on S-21), but not disposal of LAW (disposal of which was mentioned in the cover sheet). Consistency? *24-5*

) The second paragraph on S-2 would be a good place to mention that three different purification/separation processes were used at Hanford. The first two (bismuth phosphate and REDOX) had large impacts on the kinds and quantities of chemicals that ended up in the waste tanks. *24-6*

) The last paragraph on S-2 speaks of "new chemicals" being introduced to the tanks when uranium was extracted from some of the wastes – but doesn't make the same comment about the B Plant processes that were removed to extract cesium and strontium. "New chemicals" such as organic complexing agents were added at B Plant during strontium extraction; such chemicals have had important effects on tank waste chemistry – and, thus, might be worthy of mention here. *24-7*

) Page S-6 says "--- in light of reviews of technetium-99 in ILAW glass, DOE and Ecology agreed to delete technetium removal from the WTP permit ---". Specify what was reviewed; behavior, performance, retention, leachability? *24-8*

2

24-2 DOE's proposed actions as discussed in this *TC & WM EIS* are based on the purpose and need for agency action (see Chapter 1), which helps DOE to accomplish its current primary mission of cleaning up Hanford.

24-3 The abstract provided on the cover sheet is intended to provide a very brief overview of the proposed actions discussed in this EIS. The waste-type definitions are not all drawn from the same source or reference, and a detailed definition of each waste type is not appropriate for this overview. However, full definitions of the waste types analyzed in this EIS are provided in Chapter 9, "Glossary," as well as in other chapters of this EIS, where applicable (e.g., the Summary, Section S.1, and Chapter 2, Section 2.2).

24-4 Because many other terms that a reader may not understand are used in the cover sheet, a glossary is provided in both the Summary, Section S.9, and Chapter 9 of this *TC & WM EIS*.

24-5 The text box entitled, "Waste Types Analyzed in This Environmental Impact Statement," in the Summary, Section S.1.1, page S-2, of the *Draft* and this *Final TC & WM EIS*, as well as Section S.9, Glossary, defines LAW as follows: "Waste that remains after as much radioactivity as technically and economically practical has been separated from HLW that, when solidified, may be disposed of as LLW in a near-surface facility."

To address the commentor's consistency concern and clarify the text, the cover sheet (item 1 under the abstract) of this *Final TC & WM EIS* was changed to read: "LAW would be treated in the WTP and disposed of as LLW at Hanford as decided in DOE's ROD issued in 1997 (62 FR 8693), pursuant to the *Tank Waste Remediation System, Hanford Site, Richland, Washington, Final Environmental Impact Statement* (DOE/EIS-0189, August 1996)."

24-6 This level of detail is not appropriate for the Summary of this *TC & WM EIS*. More information on the composition of the tank waste is found in Chapter 2, Section 2.2.

24-7 This section of the *TC & WM EIS* Summary, History of the Hanford Site, is only a one-page summary and is not meant to be an all-inclusive history.

24-8 Appendix E, Section E.1.2.3.10, includes additional information on the decision to remove this capability from the WTP, as well as a reference: Hedges 2008 (Ecology letter to S.J. Olinger [DOE-ORP], et. al., dated October 15, 2008; subject: "Draft Waste Treatment and Immobilization Plant (WTP) Dangerous Waste Permit"). Included in this referenced letter is Ecology's Statement of

Commentor No. 24 (cont'd): John Swanson

- The discussion on S-91 suggests that the deletion of technetium removal was "justified" because of the existence of other sources of technetium that give a higher release rate than ILAW glass. If that's the case, you should say so here.

Also, this sentence is surprising in light of what is said in Ecology's January 2010 hand-out "Focus on Technetium-99 Removal" – that "Ecology supports sending more of the Tc-99 offsite to a deep geologic repository ---."

24-8 cont'd

) Doesn't deletion of technetium removal from the WTP place in jeopardy the ability to classify the waste as LAW? I believe that a large fraction of the technetium is present in the tanks as pertechnetate ion, which can be removed fairly easily. Thus, I believe that it could now be argued that much of the treated waste could NOT be called "ILAW" because it will NOT be true that "as much radioactivity as technically and economically practical has been separated from HLW" (definition of LAW as given on S-2).

24-9

) Why isn't disposition of the cesium and strontium capsules included in the EIS (per S-13)?

- After reading further (S-23), where de-encapsulation and treatment is discussed, I wonder if better wording here wouldn't be along the lines of "---- disposition of the cesium and strontium **that is currently in the capsules** will be determined ---"?

24-10

) Shouldn't you change the construction cut-off date for Alternative 1 to something later than 2008 (S-23)?

24-11

) S-24 refers to bulk vitrification of a portion of the LAW in the 200-West Area. It wasn't till I read Appendix E that I realized that you have determined that tank waste containing less than a certain concentration of cesium-137 could be consider to be LAW "as is". I think that fact should be made clear in the summary, too.

24-12

) On S-24, is "--- cast stone treatment ---" with no explanation of what that is. Ditto for "steam reforming treatment".

- Explanations are on S-37. . It would be helpful if the explanation would come the first time the term is used.

24-13

) On S-25, Alternatives 6A and 6B (disposal). What is "clean closure"?

- Explanation is on S-26. It would be helpful if the explanation would come the first time the term is used.

24-14

) S-33 mentions vacuum-based retrieval. I hope that the materials to be retrieved will not be dry (or dry out during retrieval), or contamination control will be much more difficult.

24-15

3

Basis, Proposed Modification of the Waste Treatment and Immobilization Plant Conditions in the Dangerous Waste Portion of the Hanford Facility Resource Conservation and Recovery Act Permit, which clarifies Ecology's decision. In summary, it states: "Ecology wants to ensure that any of the waste forms resulting from WTP unit treatment will meet the exposure and ground water performance criteria. The proposed permit conditions require that any waste forms from the WTP treatment process meet performance assessment groundwater and exposure limits, not result in a substantial groundwater impact for any significant mobile contaminant of concern, and not approach the Federal drinking water standard. These conditions are intended to ensure that, if the performance assessment shows any contaminant of concern, such as Tc-99, in any waste form may pose a threat to human health or the environment, additional treatment of the waste will be required."

24-9 As discussed in Chapter 8, Section 8.1.5, according to DOE Order 435.1, the LLW and MLLW disposal facilities (and the waste disposed in these facilities) that are analyzed in this EIS would be subject to the appropriate DOE Manual 435.1-1 requirements, including requirements for waste incidental to reprocessing. DOE fully intends to meet these requirements.

24-10 Cesium and strontium capsule treatment is described in detail in Appendix E, Section E.1.2.3.4, of this *TC & WM EIS*. At this time, DOE has not made final disposition decisions about the cesium and strontium capsules and will not make these decisions based on this EIS.

24-11 The WTP is currently being constructed at Hanford. As discussed in Chapter 4, Section 4.1, of this EIS, DOE assumed for analysis purposes that construction of the WTP would be terminated in 2008 under Tank Closure Alternative 1.

24-12 The suggested addition is at a level of detail that is not appropriate for the Summary of this *TC & WM EIS*. The Summary is intended to provide a brief overview of the material contained in this EIS and, by nature, cannot include specific details from the appendices. Recognizing that many people may not read beyond the Summary, DOE attempted to strike a balance between those readers interested in the technical details regarding DOE's proposed actions and alternatives and readers seeking a simple overview.

24-13 Because there are many terms used throughout this *TC & WM EIS* that a reader may not intuitively understand, a glossary was provided in both the Summary, Section S.9, and Chapter 9 of the main body of this EIS.

Commentor No. 24 (cont'd): John Swanson

) S-36 contains some examples of inconsistent usages, which it would be nice to avoid:

a) The box says that there is a High Level Radioactive Waste Vitrification Facility; the text description omits the word "Radioactive".
b) The text says "--- treat waste, and convert treated waste into a glass form ---." Per the usage back when I was working (and, apparently, when the facilities within the WTP were named), "treat" referred to the immobilization step (e.g., vitrification, grouting, steam reforming) and "pretreat" referred to steps taken prior to immobilization (e.g., radionuclide removal, solids removal). The wordings on this page indicate that "treatment" will take place in a "pretreatment facility"; this adds unnecessary confusion. *24-16*

) S-37 says "--- electrodes would be inserted into the waste." Shouldn't that be "--- inserted into the waste/soil mixture"? *24-17*

) S-37 says "--- LAW retrieved from the tanks ---." Per the definition of LAW (S-2), that means that some in-tank radionuclide separation processing is planned. Is that really the case? (I've seen no mention of it)

- Maybe the Solid-Liquid Separations Processes description on the next page is implied here? It's not clear whether the settling and decanting process would be done within the storage tank or elsewhere.
- In reading Appendix E, I see that some of the tank wastes have already been classified as LAW – which makes the statement on S-37 okay. HOWEVER, shouldn't the Summary discuss (at least, state) this fact? I think so.
    - In my second time through the Summary, I do find on S-38 "--- waste that may contain low cesium-137 concentrations ---.", BUT it doesn't say there that it is considered to be "LAW". *24-18*

) S-38, Sulfate Removal, says "--- then the tank waste would be filtered and solidified using grout-forming additives." Isn't it the filtered solids that are grouted rather than the tank waste itself? *24-19*

) S-38, Technetium, "Under all other Tank Closure alternatives, technetium-99 would remain in the LAW stream." I thought there were data showing that a fraction of the Tc was present in the waste in insoluble form(s); that fraction would go to the HLW stream. *24-20*

) S-50, Section S.4.1.3 lists four "treatment and pretreatment technologies" that were initially considered but were eliminated from detailed consideration in this EIS. Shouldn't some "consideration time frame" be provided here – or the list of considered technologies be expanded appreciably? *24-21*

- I'm sure that other technologies were considered at the time of the initial TPA, and in subsequent years. One example is "grouting" (I guess it's now being called "cast

4

24-14 A text box has been added to the *TC & WM EIS* Summary, Section S.2.1.5, to clarify the different closure scenarios evaluated in this EIS.

24-15 As discussed in Appendix E, Section E.1.2.2.2, the mobile retrieval systems (MRSs) use mostly air and a small amount of water to retrieve the tank waste. In addition, as discussed in Section E.1.2.2.2.3, a ventilation system within the tank maintains a negative tank pressure to ensure the airflow is pulled into the tank at all times and airborne contamination is not released from the tank.

24-16 The term is not spelled out in the text as it is in the text box. Rather, the acronym "HLW," meaning "high-level radioactive waste," is used. This acronym is defined in the list of abbreviations and acronyms provided in the front of the Summary, as well as in the text box explaining the various waste types on page S–2 and in the text on the same page. To address the commentor's concern and confusion, the wording on page S–36 of the *Draft TC & WM EIS* has been changed to "...pretreat waste, and convert the pretreated waste into a glass form..." (page S–55 of this *Final TC & WM EIS*).

24-17 The text in this *Final TC & WM EIS* was revised to read, "...inserted into the waste and sand/soil mixture."

24-18 In the *Draft TC & WM EIS* Summary, Section S.3.1.4, under the heading "Steam Reforming," the use of the phrase "LAW retrieved from the tanks" is correct. This phrase refers to the retrieval of LAW from one or more of the LAW tanks identified in Appendix E, Table E–8, in the final EIS. For analysis purposes, this EIS assumes that the waste from these tanks is LAW due to the low concentration of cesium-137, as discussed in Section E.1.2.3.5.2. The Solid-Liquid Separations Facility, located in the 200-West Area, provides a settling and decanting operation that would result in strontium and TRU waste precipitation. This precipitated solid-waste stream would be forwarded to the WTP, while the decant solution would be forwarded to a supplemental treatment technology facility. In the referenced section within the Summary, this would be the steam reforming supplemental treatment facility. However, the following clarification was made to the referenced sentence in this section: "Pretreated waste or LAW retrieved from the tanks (i.e., waste retrieved from the designated LAW stream) would be diluted with water so it could be pumped into a vessel."

24-19 The commentor is correct. The following revision was made in this *Final TC & WM EIS* to the referenced sentence in the Summary, Section S.3.1.4: "First, strontium nitrate would be added to the tank waste, causing sulfate to separate out

Commentor No. 24 (cont'd): John Swanson

stone" instead of "grout") of all the LAW (this is being done at other DOE sites). Another example is dissolving the sludge so that contained radionuclides could be separated from the inert elements – thus allowing a large reduction in the volume of HLW glass to be produced and disposed of).

- Why wasn't separation of cesium from salt waste by solvent extraction (instead of ion exchange), as is being implemented at Savannah River, considered here? (I imagine that the response might be along the lines that it was felt that the design of the WTP had proceeded too far to be changed; if so, that should be so stated).
- Section E.1.2.3.5.1 (E-67) describes how "Supplemental Waste Treatment Options" were evaluated and down-selected. I haven't seen similar discussion regarding the technologies listed in Section S.4.1.3.

24-21 cont'd

) S-51 says "---the HLW melters would be stored on site. Thus, onsite disposal was eliminated from further consideration in this EIS."

- I don't follow the reasoning that onsite storage eliminates consideration of onsite disposal.
- I thought I read earlier (somewhere in this Summary) that the HLW melters would be disposed of as HLW. (It's in the Ecology contribution).

24-22

) I think you should delete the "and in Europe" from the sentence on S-55 regarding separation of waste into HLW and LAW streams. I know of no such activity in Europe – with (alkaline) wastes similar to those at Hanford, anyway.

24-23

) S-55 says "Full-scale production of ILAW using the bulk vitrification, cast stone, and steam reforming processes has not been conducted anywhere within the DOE complex."

- Shouldn't the vitrification technology planned for the WTP be included in this list (of things that haven't been operated on full-scale anywhere)? I don't know of any full-scale production of ILAW glass, and I'm pretty sure that there hasn't been any – given that Hanford is the only site planning to use that technology.
- I think (but am not sure) that Savannah River has done full-scale grouting (stone casting or cast stoning) of some of their salt wastes (but they use a different term for the process).

24-24

) S-87 says that the envioronmental findings discussed here are only for the drinking-water well user because "--- estimates of human health impacts for all types of receptors increase or decrease in proportion to those estimated for the drinking-water well user." Please say also how these estimated impacts compare in magnitude to those estimated for the impacts to the well user (are they "comparable to", "greater than", or "less than"?).

- A better reason to discuss only the well-water case would be if it were the (upper) bounding case? If it is, say so?

24-25

5

as a strontium sulfate precipitate, then this resulting strontium sulfate precipitate would be immobilized in a grout waste form."

24-20 The commentor is correct, a small fraction of the technetium-99, approximately 0.5–0.9 percent of the BBI, was estimated to remain within the HLW stream under Tank Closure Alternatives 2A; 3A; 3C; 4; 5; 6B, Base and Option Cases; and 6C. The referenced sentence in the *TC & WM EIS* Summary, Section S.3.1.4, was revised to read as follows: "Under Tank Closure Alternatives 2A; 3A; 3C; 4; 5; 6B, Base and Option Cases; and 6C, the majority of the technetium-99 would remain in the LAW stream."

24-21 Section S.4.1.3 of the Summary was intended to summarize the waste treatment technologies initially considered but not analyzed in detail in this EIS. Appendix E, Section E.1.3.3, provides a more detailed discussion on the supplemental LAW treatment technologies identified for analysis in this EIS, as well as a summary of the Technology Readiness Assessment conducted by DOE in 2007.

In Appendix E, Section E.1.3.3.3.2, of this final EIS, a discussion was added concerning implementation of a cesium ion exchange process as an equipment option for the WTP. In summary, the design and construction of the WTP Pretreatment Facility had progressed too far for implementation of cesium separation by caustic-side solvent extraction when this technology was proven viable at the Savannah River Site. However, as described in Section E.1.3.3.3.2, it was considered as a potential supplemental pretreatment process in the 200-West Area for medium-curie tank waste. Continuation of the Pretreatment Testing and Demonstration Program in 2006 through 2008 resulted in the selection of ion exchange for cesium separation over caustic-side solvent extraction for pretreatment of the 200-West Area SSTs. Implementation schedules showed that a pretreatment system could be implemented approximately 2 years earlier if the ion exchange technology process was selected over the caustic-side solvent extraction process. Furthermore, the ion exchange capital and life-cycle costs were estimated to be significantly lower than the solvent extraction system costs.

24-22 The commentor is correct. This EIS assumes the HLW melters, as well as the IHLW, would be managed and disposed of as HLW and would be stored on site at Hanford until HLW disposition decisions are made and implemented.

The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for

Commentor No. 24 (cont'd): John Swanson

) Beginning with Figure S-14 (page S-88), there is a series of figures with the legend on the ordinate labeled "Radiological Risk (unitless)" – and the caption states that it is the risk to a "drinking-water well user". However, in the box on the same page, "radiological risk" for an individual is "--- expressed as the probability over a lifetime of developing cancer." There is an inconsistency here; if the values in the figures are indeed probabilities of developing cancers (as described in the box), the legend on the ordinate should so state; if the values in the figures are indeed unitless, description should be given as to how the unitless values were calculated.

- Discussions with officials during the "poster session" on January 26 led to agreement that the "unitless" label is incorrect.

24-26

) I believe that there should be some discussion here to compare the risks indicated in these figures to other risks – to put them in perspective (life is full of risks).

- It would help to put things in perspective by comparing the probabilities shown in these figures with the probability of developing cancer in the absence of the effect of the radionuclides. I don't know what the probability of developing cancer "normally" is, but I'm sure that it's MUCH greater that the ~2% probability shown in Figure S-14 as the highest risk to a well-water drinker from Hanford radionuclides.
  - If, for example, the average American has a 50% probability of developing cancer in his/her lifetime, then one could say that the assumed well-water drinker would be 25-times more likely to develop cancer during his/her lifetime from "other sources" than from the radionuclides in the well water under tank closure Alternative 1. I believe it would be very helpful to put a statement such as that in the EIS.
    - Inclusion of a statement such as this might hopefully counteract some statements (e.g., "devastating impacts" and "severe cancer risks") that were made during the "question period" at the January 26 meeting.

24-27

) Also, I don't think it's proper to say in the EIS, as is done on S-87, that continued storage would have "significant long-term impacts" – without describing what you consider to be "significant". One value can be "significantly larger" than another without being "significant" (e.g., a debt of $1 is significantly larger than a debt of $0.01, but I don't think that many people would consider that a debt of $1 is significant).

24-28

) Along the same lines as the preceding comment(s), I don't understand why "The analysis suggests that additional treatment or waste form development may be needed for secondary waste." (S-90) when the maximum radiological risk shown in Figure S-15 would lead to a probability of only 0.001(0.1%) that a Hanford well-water drinker would develop cancer (from the Hanford radionuclides) in his/her lifetime – while the probability of that person developing cancer from other sources is perhaps 0.5(50%).

24-29

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a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Additional information regarding onsite storage of the HLW melters is included in Appendix E, Section E.1.2.4.4. For analysis purposes, this final EIS analyzes the impacts of safely storing the HLW melters and IHLW through the estimated operational timeframe for the WTP under each of the Tank Closure alternatives. See the foreword to this *TC & WM EIS* for Ecology's discussion of melters.

24-23 The phrase "and in Europe" was deleted in this final EIS from the Summary and Chapter 2.

24-24 The commentor is correct. Treatment of LAW using a LAW melter has not been conducted on a full-scale production basis. In the *TC & WM EIS* Summary, Section S.5.2.1.3, as well as in Chapter 2, Section 2.7.4, the referenced sentence has been revised to read: "Full-scale production of ILAW using the LAW melter, bulk vitrification, cast stone, and steam reforming processes has...."

24-25 Additional text has been added to the *Final TC & WM EIS* Summary, Section S.5.5, explaining why the drinking-water well user was chosen for the key environmental findings.

24-26 The discussion of the units of risk has been clarified, as necessary, and consistent usage has been applied throughout this final EIS. The term "unitless" has been deleted from the figures in the Summary, Section S.5.5, Key Environmental Findings.

24-27 A discussion on risks associated with everyday life has been added to Appendix K, Section K.1.1.6, of this final EIS.

24-28 The "significant long-term impacts" referred to in the text are described in the rest of the section on Tank Farm Waste Retrieval, which has been edited for clarification.

24-29 Agencies regulate a much lower level of risk when a member of the public has no choice to accept risk. Protectiveness for carcinogens under CERCLA is set at levels that represent an upper-bound lifetime cancer risk to an individual of between 10-4 and 10-6; this level is deemed acceptable by EPA.

Commentor No. 24 (cont'd): John Swanson

) I am troubled by the sentence "The analysis indicates that ILAW glass with or without technetium-99 has similar potential short-term and long-term impacts." (S-91); I'm quite sure that the estimated long-term impacts of ILAW glass leachates are quite different with or without technetium-99.

- I think what is meant is that the systems analyzed here, with and without technetium in the ILAW glass, show similar impacts – not a comparison of ILAW glass alone.
- The last sentence of this section contains a qualifying statement (that other sources of technetium swamp the glass leachate source), but the structure of that sentence indicates that that qualification applies to the sentence following the one I object to.
    - It would help some if the last sentence were to begin "These indications result because the rate ---." (as opposed to "This is because the rate ---."), but it would be better if the troubling sentence ("The analysis indicates --.") were re-done so that it says what is meant.

24-30

) S-91 says "--- sulfate removal technology is evaluated after WTP pretreatment to ---." I would consider sulfate removal to BE a pretreatment step. I'm not sure what is meant here – maybe something like " --- sulfate removal is included as an added pretreatment technology to ---."?

- E-68 says "--- one pretreatment option, sulfate removal, ---."
- E-69 says "--- sulfate removal is also included --- as a pretreatment process outside the WTP." Combining this thought with that on E-91 indicates that the waste will be pretreated in the WTP, then sent outside the WTP for additional pretreatment, then sent back to the WTP for LAW immobilization; is that really the plan?

24-31

) The data in Figure S-18 appear to be identical to those in Figure S-14 – so why is S-18 included?

24-32

) I doubt the accuracy of the last sentence on S-96. What radiological constituents are thought to be orders of magnitude (which means more than a factor of 100) higher at Hanford than at other DOE sites (where fuel reprocessing was done)? Maybe you're comparing Hanford to sites that didn't do reprocessing (and thus wouldn't have large quantities of fission products)? Clarify the meaning/intent?

24-33

) Based on what is said on S-111("Offsite disposal costs for IHLW are not included in the cost data."), the title of Table S-13("--- Costs for Final Waste Form Disposal") should be changed – because offsite disposal costs for IHLW are most certainly final disposal costs.

- This also raises the question of why offsite disposal costs for IHLW were not included in the EIS? I know that some estimates were made years ago (and may well have been updated); they could be included here in this EIS "for comparative purposes", at least.

24-34

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24-30 The text in Section S.5.5.1 of the Summary has been revised in this final EIS to clarify that ILAW glass with and without technetium has similar impacts.

24-31 The commentor is correct. As discussed in Appendix E, Section E.1.2.3.9, the sulfate removal process would follow tank waste pretreatment in the WTP Pretreatment Facility. The sulfate-depleted LAW solution would then be returned to the WTP for evaporation and subsequent LAW vitrification. The discussion in the Summary is consistent with the text in Appendix E.

24-32 The purpose of Figure S–18 is to compare the impacts of the closure assumptions of the Tank Closure alternatives with the magnitude of long-term human health impacts. The purpose of Figure S–14 is to compare the degree of retrieval with the magnitude of long-term human health impacts.

24-33 Regarding the statement that select radioactive constituents at Hanford exist in amounts that are orders of magnitude higher than those at other DOE sites, the intent was to clarify that Hanford's waste releases from tank leaks and intentional discharges to the soil column far exceed waste releases to the environment at the three other DOE fuel-reprocessing sites: the West Valley Demonstration Project, the Savannah River Site, and Idaho National Laboratory (INL).

24-34 Please see response to comment 24-22 for information.

Commentor No. 24 (cont'd): John Swanson

- A rough "rule of thumb" used ~20 years ago was 0.5 million dollars per IHLW canister disposed of in a geologic repository. I doubt that that estimate has decreased in the intervening years; final disposal costs for IHLW could run into many billions of dollars – and would vary widely among the alternatives examined in the EIS. Shouldn't that be discussed in the EIS? *24-34 cont'd*

) S-119 says that this EIS describes the INL environment. Why? *24-35*

) E-42 says "HLW solids, strontium, TRU waste compounds, and cesium would be separated --." Saying "TRU waste compounds" implies (to me, anyway) that the TRUs are present as (a) solids, and (b) relatively pure materials – and I don't think the waste TRUs fit that description any more than does strontium. Why not say "--- strontium, transuranics (or, TRUs), and cesium ---."?

On E-44 is "TRU waste components"; that is better than "TRU waste compounds". Still, why not just "TRUs"? *24-36*

Also on E-44, the term "TRU waste" is used to describe soluble TRUs. That is a very unfortunate choice of words, as "TRU waste" is commonly used to describe solid wastes that contain >10 nanocuries per gram of TRU alpha activity.

- I see "TRU waste" in this incorrect usage on E-69 and -71, too. More later, also.

) Also on E-42 is "The pretreated supernatant and permeate from the separations process ---." Isn't pretreated supernatant in fact permeate? *24-37*

) I question the accuracy of saying (as on E-44) that evaporation of dilute feeds or dilution of concentrated feeds would dissolve soluble salts. Aren't the soluble salts already dissolved? *24-38*

) I don't think you should use the term "entrained solids" to describe the feed to HLW vitrification – as is done on E-44 (under description for Envelope A and B feeds). *24-39*

) E-46 says "---silver mordenite column (removes iodine-129 and volatile compounds) ---.", which indicates that ALL volatile compounds are removed by silver mordenite – which isn't true. Say instead "--- (removes volatile iodine compounds) ---."? *24-40*

Also, I'm surprised that there is provision for removal of iodine from the HLW melter offgas; I wouldn't expect much iodine to be present there.

) E-47 says "--- glass formers would be added and blended to maintain the solids in suspension." Shouldn't it be something like "--- glass formers are added and the mixture is agitated to keep the solids in suspension."? *24-41*

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24-35 Chapter 3, Section 3.3, of this *TC & WM EIS* describes the existing environment at INL because FFTF Decommissioning Alternatives 2 (Entombment) and 3 (Removal) both include INL options for disposition of remote-handled (RH) special components (RH-SCs) and/or bulk sodium.

24-36 DOE agrees with the comment. Appendix E, Section E.1.2.3.1, page E–42, fourth paragraph, second sentence of the draft EIS, was revised to read: "HLW solids, strontium, transuranics, and cesium ...." On page E–44, the first bullet was revised. Also, on pages E–44, E–69, and E–71, the multiple uses of "TRU waste" were revised to read "transuranics."

24-37 Pretreated supernatant could be permeate from the separations process. Both terms were used in this description to capture the general processes included in the WTP complex.

24-38 As used in Appendix E, page E-45, the term "soluble salts" describes salts that can be dissolved, not salts that are already dissolved (salts that cannot be dissolved are called "insoluble salts"). No change to this EIS is required.

24-39 The term "entrained solids" was quoted from a referenceable and reliable source (BNI 2005). This term generally describes solids that are carried along with liquid waste streams. No revision of this EIS is required.

24-40 As stated in the referenced document (BNI 2005), the silver mordenite columns would remove both elemental and organic iodine and other halogens (such as chlorides and fluorides) in the form of hydrochloric acid and hydrofluoric acid. Therefore, the referenced sentence in the draft EIS was revised in this final EIS by replacing the term "volatile compounds" with the term "other halogens."

24-41 In this final EIS, the referenced sentence in Appendix E, Section E.1.2.3.1.3, was revised to read: "Batches of concentrated LAW feed would be transferred from these vessels to melter feed preparation vessels, where glass formers would be added and blended to form a uniform batch for the LAW melter."

Commentor No. 24 (cont'd): John Swanson

) One of the paragraphs on E-47 is structured strangely; it speaks of the canisters being sealed and decontaminated before it speaks of sampling and filling if necessary. Delete the first sentence? **24-42**

) Another confusing paragraph on E-47 regards offgas treatment. Among other things, it speaks of removing nitrogen oxides, carbon monoxide, and VOCs – and then speaks of oxidizing or reducing those materials. Re-work it? **24-43**

) E-50 speaks of "--- dewatering (using ion exchange resins) ---." I think that should be "used", not "using". **24-44**

) E-51 speaks of secondary solid waste from the HLW vitrification facility as being RH. I think that some/much of this waste will also be TRU, and thus, would not be "disposable" in an IDF. Will WIPP accept RH-TRU by then? Will additional storage facilities be needed at Hanford? Won't the waste have to be assayed to see if it's TRU? Address these points? **24-45**

) E-52 says "--- some of the select radionuclides to emit offgas ---." That's very poor. Say something like "--- volatilization of portions of some radionuclides ---."? **24-46**

) E-53 says "The amount of sodium processed influences --- the amount of IHLW and ILAW product." That may not be a completely incorrect statement, but it is certainly misleading – as the "influences" are very different. While increases in sodium usage will increase the amount of ILAW, they can decrease the amount of IHLW (till a limiting value, below which additional leaching is ineffective, is reached). **24-47**

) Several comments on the first "bullet" on E-54: **24-48**

- Now says "Sodium is added ---to solubilize aluminum." Should say 'Sodium hydroxide is added ---."
- Now says "--- disposed of as LLW." Shouldn't that be LAW?
- Sodium hydroxide recycle is mentioned as a possible technology to minimize the impact of added sodium. That technology was being investigated for this purpose 10-15 years ago; why was it dropped?
- I don't understand how "treating or separating the aluminum within the tank waste prior to sending it to the WTP." will decrease the amount of sodium – unless the leach solutions would then not pass through the WTP (if that is the case, say so).
    - I'm assuming you mean "within the waste tank" instead of "within the tank waste".

) Second bullet on E-54: **24-49**

- Says "--- more sodium may be required to limit the number of IHLW glass canisters produced." Better to say something like "--- to give an acceptably low number of IHLW glass canisters."?

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24-42 DOE reviewed the subject paragraph in the draft EIS, Appendix E, Section E.1.2.3.1.3, and sees no need to restructure the paragraph.

24-43 DOE reviewed the subject paragraph in the draft EIS, Appendix E, Section E.1.2.3.1.3, which was quoted from BNI 2005, and believes it to be technically correct.

24-44 The commentor is correct. In this final EIS, the word "using" was changed to "used" in Appendix E, Section E.1.2.3.1.5, Secondary Solid Waste.

24-45 For analysis purposes, this *TC & WM EIS* assumed that no TRU waste would be generated by WTP operations. While a small inventory of TRU solid secondary waste may be generated during WTP operations, this EIS assumed that none would be generated. The reasons for this assumption include: (1) DOE has no operational experience with the WTP HLW Vitrification Facility; (2) operational experience at other DOE vitrification sites indicates little or no TRU waste generation; and (3) for analysis purposes, it was necessary to cap the potential environmental impacts in this EIS by assuming the maximum radioactive and chemical inventories in the IDF(s). Therefore, for analysis purposes, DOE assumed that all solid secondary waste generated from the WTP would meet the *Hanford Site Solid Waste Acceptance Criteria* for LLW or MLLW and would be disposed of in an IDF. As discussed in Appendix E, Section E.1.2.3.1.5, any secondary TRU waste generated would be managed by existing or modified Hanford TRU waste facilities (e.g., the Waste Receiving and Processing Facility). In such cases, the waste would be examined and its waste type confirmed according to established procedures. If the waste were TRU waste, it would be disposed of at WIPP, which is currently accepting RH-TRU waste.

24-46 The referenced sentence in Appendix E, Section E.1.2.3.1.7, was revised in this final EIS to read: "The high temperatures associated with the ILAW process would cause volatilization of some of the select radionuclides, emitting offgases that would ultimately be captured in secondary-waste streams."

24-47 DOE reviewed the referenced sentence in the draft EIS, Appendix E, Section E.1.2.3.1.7, and sees no reason to revise it. It is technically correct and is not considered misleading.

24-48 The following revisions were made in this final EIS, Appendix E, Section E.1.2.3.1.7, to the fourth bullet: (1) third sentence: "hydroxide" was added after "Sodium"; (2) fifth sentence: "LLW" replaced with "LAW"; (3) sixth sentence: "LLW" replaced with "LAW"; (4) eighth (last) sentence: "LLW" replaced with "LAW," and changed "tank waste" to "waste tank."

Commentor No. 24 (cont'd): John Swanson

- What is the basis for the 90,000 MT value? That apparently must result from additions of 42,000 MT during pretreatment, which is a factor of 3.5 greater than is currently assumed. Is the "design basis flowsheet" really that uncertain??? A sad commentary if it is. **24-49 cont'd**

) Fourth bullet on E-54: I don't understand how allowing an increase in viscosity ensures that the glass will flow better. (I would think the opposite, but I'm not expert in this area.) **24-50**

) Some of the information in Section E.1.2.3.5.2 came as a surprise to me; I don't believe it was mentioned in the Summary, and feel that it should be. For example:

- The concurrence of the NRC that "--- the recovery of waste containing <0.05 curies per liter of cesium-137 was not economically practical ---." **24-51**
  - I don't think that "recovery" should be the operative word here. "Removal of cesium from waste containing ---" instead?
  - I remember the Summary discussing the decision that technetium removal wasn't necessary, but I don't remember any discussion there about cesium removal not being necessary if the concentration in the feed is below a certain level.

) E-69 says "At this concentration of cesium, no more that 5 million curies of cesium137 would be disposed of in the ILAW glass." I feel that this can be misleading (it can be taken to mean that the total amount of ILAW glass will contain no more than 5 million curies of cesium). What is meant, I think, is that not separating cesium from the sodium that is in these 35 tanks would result in the addition of no more than 5 million curies of cesium-137 to the ILAW glass. **24-52**

) E-83 says "Temporary storage of a 5-molar sodium cast stone feed solution at maximum throughput rates for 5 months would require the use of two DSTs." – BUT E-85 says that the tanks used for this purpose would be 30,000-gallon tanks. Aren't the existing DSTs 1,000,000-gallon tanks? Using the term "DSTs" to describe 30,000-gallon tanks is misleading. **24-53**

) E-89 says "--- sodium molarity of 2.9 molar, or approximately 50 percent water content." That is poor wording; I'm sure that a 2.9 molar sodium nitrate/hydroxide solution contains more than 50% water (A 3 molar sodium nitrate solution contains 78% water).

- This incorrect statement is also present in many other places in this section. **24-54**

Also, the next sentence says that this dilution is required to transform the feed into a pumpable liquid. Other technology descriptions have talked of much more concentrated feed solutions; weren't they pumped? Give some other reason for this 2.9 molar concentration?

) E-90 uses the term "soluble carbon reductant (sucrose)"; that strikes me as being a bad term. For one thing, it can be taken to mean that carbon is the thing that is being reduced (which isn't the case). How about saying something like "--- including a soluble carbon-containing reducing **24-55**

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DOE continues to review the benefits and costs of implementing sodium hydroxide recycling. For example, in 2009, DOE reviewed the feasibility of constructing an Aluminum Removal Facility, which would use a lithium hydrotalcite process and would provide caustic leaching and sodium hydroxide recycling in a standalone facility. Processing in such a facility would occur before waste processing in the WTP Pretreatment Facility, which would reduce the demand on the WTP. More recently, DOE has been evaluating other options to effectively blend and characterize tank waste prior to transfer to the WTP, such as the addition of an Enhanced Waste Receiver Facility. This process, along with the cesium ion exchange process, could allow a 40 percent waste oxide loading into ILAW glass.

24-49 DOE reviewed the referenced sentence in Appendix E, Section E.1.2.3.1.7, the fifth bullet, and determined that no revision is necessary. The estimate of 90,000 metric tons was evaluated by DOE during preparation of this EIS and was presented to show a range of the potential impacts that the additional sodium may have on the ILAW volume. As presented in the second bullet in this same section, this EIS assumes that the WTP would process 60,000 metric tons of sodium, including approximately 48,000 metric tons within the tank waste and 12,000 metric tons that would be added during pretreatment. Thus, if the total sodium processed reached 90,000 metric tons, the 12,000 metric tons added during pretreatment would increase by 30,000 metric tons to 42,000 metric tons.

24-50 The increase in the allowable viscosity from 5.5 to 10 pascal-seconds supports better control of the HLW melter by lessening excessive convection currents, which decreases corrosion/erosion of the melter materials of construction (the refractory and electrodes). In contrast, a high viscosity can reduce canister quality by causing voids in the final glass waste form. The referenced sentence was revised in this final EIS to read as follows: "The maximum allowable viscosity of the IHLW glass was increased from 5.5 pascal-seconds to 10 pascal-seconds to reduce excessive convection currents during melting operations, thereby reducing corrosion/erosion of the melter materials and achieving better overall control of the HLW melter."

24-51 A review of the use of the word "recovery" determined that it should not be replaced, but the sentence should be revised to clarify its meaning. The sentence was revised in this final EIS as follows: "The designation of the contents of the 35 tanks listed in Table E–8 as LAW is based on the analysis found in the *Technical Basis for Classification of Low-Activity Waste Fraction from Hanford*

Commentor No. 24 (cont'd): John Swanson

agent (sucrose), referred to here as "carbon reductant", and a ---- "? Then it would be clear what "carbon reductant" means.

Same problem is in the next paragraph, where I see "carbon reduction reformer" and "carbon reduction fluid bed" (the upper part of which is run under oxidizing conditions to oxidize residual "carbon reductants and organics" [note that the so-called "carbon reductant" IS an organic compound; it would be better to say "waste-contained organics"). **24-55 cont'd**

- Also see "residual carbon reductants and organics" on E-94.

There seems to me to be a lot of "engineering jargon" in this section. I assume/hope that it makes sense to the people who are familiar with this technology – but it's not really technically accurate, which makes it confusing to others.

) E-91 says "--- oxygen would be injected to oxidize the gaseous constituents more fully." That implies that some oxidation of gaseous constituents occurs earlier, which I don't believe is the case. Also, it's not the reason given on E-90 for the oxidizing zone. **24-56**

) On E-100, why would the filtrate from the sulfate precipitation step be neutralized (thereby adding sodium – and increasing the volume of ILAW)? **24-57**

) Are the fractions of TRUs that are present in the sulfate precipitate large enough to make the precipitate a "TRU waste"? If so, wouldn't it have to go to WIPP (vs EDF)? **24-58**

) I don't believe that "--- reducing the sodium content of the waste stream being directed back to the WTP process." would "--- increase the waste loading in the WTP LAW melters." – as is said on E-169. Reducing the amount of sodium being directed back to the LAW melters would decrease the load on the melters, though. **24-59**

) E-169 says "The fractional crystallization process was not evaluated in detail because of the lack of available data demonstrating the process on actual tank wastes." I think a "double standard" is being applied here; I believe that there are technologies included in the proposed WTP process that are based on fewer "data demonstrating the process on actual tank wastes" than are available for fractional crystallization. **24-60**

) Page E-171 says "The key problem identified would be achieving an immobilized waste form for the crystallized sodium nitrate ---." How about adding water and "cast stoning" it? (That should make the problem equivalent to that in the "cast stone" alternative) **24-61**

11

Site Tanks, which stated that waste containing less than 0.05 curies per liter of cesium-137 was not economically practical for recovery."

24-52 DOE has reviewed the text in question and agrees with the commentor regarding the need for clarification. In this final EIS, the second sentence in the second paragraph in Appendix E, Section E.1.2.3.5.2, was revised to read as follows: "At this concentration, not separating additional cesium-137 from the waste in the 35 tanks would result in the addition of no more than 5 million curies of cesium-137 in the ILAW glass."

24-53 Appendix E, Section E.1.2.3.7.2, describes the dissolved salt storage tanks and the temporary storage requirements for use of two DSTs. These are not the same tanks; the first set of tanks includes the two 30,000-gallon receipt tanks, depicted as "Receipt storage" tanks in Figure E–18. The second set consists of DSTs (1 million- to 1.16 million-gallon tanks) that may be used for temporary storage of the cast stone feed. Appendix E, Section E.1.2.3.7.4, Low-Activity Waste Receipt, Conditioning, and Storage Systems, describes only the two 30,000-gallon dissolved salt cake storage tanks that are part of the Cast Stone Facility. The DSTs are not described as 30,000-gallon tanks. No change in this EIS is deemed necessary.

24-54 DOE has rechecked the references cited in Appendix E, page E–89, of the draft EIS and confirmed that the wording used in this EIS correctly reflects the wording in the references. Therefore, no revisions were made to the text in this final EIS.

24-55 To clarify the first use of the term "soluble carbon reductant (sucrose)," on page E–94 of Appendix E, Section E.1.2.3.8.2, of this final EIS, "soluble carbon reductant (sucrose)" was revised to read "soluble, carbon-containing reducing agent (sucrose), referred to in this EIS as a 'carbon reductant.'" The additional uses of "carbon reduction" or "carbon reductants," as mentioned by the commentor, are considered standard terms within the industry and their use was continued in this EIS.

24-56 DOE sees no inconsistency between the fifth bullet in Appendix E, Section E.1.2.3.8.2, and the discussion in the previous paragraph. The second paragraph of this section states that oxygen is injected into the upper zone of the carbon reduction reformer to complete the destruction of nitrogen compounds, which was partially achieved in the denitration and mineralization reformer vessel. The fifth bullet states that oxygen would be injected into the carbon reduction reformer to oxidize the gaseous constituents more fully (and to

complete the destruction of nitrogen compounds). The purpose of oxidizing this zone would be to convert residual carbon reductants and organics into carbon dioxide and water vapor.

24-57 The filtrate from the sulfate precipitation step is acidic and needs to be neutralized prior to its transfer to the WTP for vitrification in the LAW process. As discussed in Appendix E, Section E.1.2.3.9.1, prior to the precipitation process, the solution is adjusted to a pH of 1.0 by adding nitric acid.

24-58 Based on available testing data, this EIS assumes that the strontium sulfate precipitate is an LLW or MLLW form that would comply with IDF waste acceptance criteria. However, this assumption is based on limited information, as discussed in Appendix E, Section E.1.2.3.9.4. If the concentrations of TRU radionuclides meet the TRU waste definition, then the commentor is correct—the waste would be packaged to meet the WIPP Waste Acceptance Criteria and would be disposed of at WIPP. As stated in Section E.1.2.3.9.4, significant amounts of select radionuclides (e.g., TRU waste, cesium) would be removed within the WTP Pretreatment Facility prior to the waste being introduced into the Sulfate Removal Facility. This is expected to reduce the amount of radionuclides that could be of concern during the sulfate removal process.

24-59 The statement as written is correct. Reducing the sodium concentration in the waste stream would allow a higher waste load in the LAW melters and, therefore, a higher waste load in the final (ILAW) waste form. A discussion of the potential effects of sodium on IHLW and ILAW volumes is included in Appendix E, Section E.1.2.3.1.7, of this EIS.

24-60 As noted by the commentor, Appendix E, Section E.1.3.3.3.2, states that the fractional crystallization process was not evaluated in detail due to a lack of available data demonstrating this process on actual tank waste at the time of this EIS's preparation. DOE recognizes the commentor's concern, however, and this technology remains under study. Section E.1.3.3.3.2 of this final EIS includes an update of the latest information on fractional crystallization. In summary, based on the testing data available as of 2008, DOE selected ion exchange for cesium separation instead of caustic-side solvent extraction and fractional crystallization because the earliest possible deployment of this pretreatment system could be achieved using the ion exchange technology. Additionally, ion exchange capital and life-cycle costs were estimated to be significantly lower than those of fractional crystallization. Therefore, only limited testing of fractional

Commentor No. 24 (cont'd): John Swanson

crystallization will continue for the purpose of ensuring an alternate cesium removal technology that can provide a waste feed supply to the WTP.

24-61 As the commentor suggests, the addition of water may be a solution to meeting disposal requirements; however, additional flowsheet and waste characterization data are not available at this time. Therefore, this technology was not analyzed further in this EIS.

Commentor No. 25: Deanne Belinoff

From: Deanne Belinoff [deanne@xprt.net]
Sent: Friday, January 29, 2010 1:30 PM
To: tc&wmeis@saic.com
Subject: dumpstie -pacific northwest

NO RADIACTIVE DUMPSITE AT HANFORD....will to work this issue. *25-1*

deanne belinoff

25-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 26: Mary Duvall

From: Mary Duvall [rover@clatskanie.com]
Sent: Friday, January 29, 2010 8:28 PM
To: tc&wmeis@saic.com
Subject: Clean up Hanford, Please

Mary Beth Burandt
Document Manager
U.S. Department of Energy
Office of River Protection
P.O. Box 1178
Richland,WA 99352
Fax: 888-785-2865
Email:TC&WMEIS@saic.com

Dear Ms. Burandt:
I live downriver from Hanford, in the lower Columbia area, Clatskanie specifically. I urge DOE to :

1) Clean up all 55-million-gallons of radioactive + hazardous tank waste with over 99% retrieval *26-1*

2) Drop the proposal to ship radioactive wastes, and any other hazardous wastes, from across the nation to Hanford *26-2*

3) Clean up the millions of gallons of nuclear waste that has already leaked + is reaching the Columbia

The Columbia is an amazing, huge waterway, connected to Canada and the ocean. It is the habitat of the great salmon, as well as the habitat of fishermen, elk, the ancient sturgeon, deer, raptors, frogs, an irreplaceable diversity of life, already damaged by pollution of many kinds, including leaching nuclear waste. Humans have no right to destroy the environment, to foul the nest in the quest for money, power, and the unremitting replication of their own offspring. We must understand the limits of nature to adapt to the concept of "waste". We must learn how to use and recycle or not use, if we cannot figure out how to detoxify leftovers. We must push back against the forces that would destroy all that is good and healthy and beautiful in their lust for More, more, more, bigger, faster, and MORE. *26-3*

26-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. DOE's preferred retrieval option (i.e., to retrieve at least 99 percent of the tank waste) is consistent with the TPA goal of residual waste not exceeding 10.2 cubic meters (360 cubic feet) for 100-series tanks or 0.85 cubic meters (30 cubic feet) for the smaller 200-series tanks, corresponding to 99 percent retrieval.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

26-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

26-3 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms in order to prevent further contamination from entering the environment. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 26 (cont'd): Mary Duvall

The river is a great flowing goddess who can give life, joy, hope----a future---or she can be destroyed because she is vulnerable---she is just there, awesome, beauty beyond beauty. It is our job to love her and protect her, keep her clear, clean, alive, and safe. ***26-3 cont'd***

Please help.
Thank you.
Mary Duvall
73151 Lost Creek Road
Clatskanie, Oregon
97016

Response side of this page intentionally left blank.

Commentor No. 27: Don Stephens

From: shreddad [shreddad@gmail.com]
Sent: Sunday, January 31, 2010 8:54 PM
To: tc&wmeis@saic.com
Subject: Clean up Hanford - Don't make it a national waste dump

Dear Decision Makers:

I am writing to urge you to stop use of Hanford as a national waste dump. Also, *27-1*
I oppose USDOE's plan to abandon the contamination that has leaked from
the High-Level Nuclear Waste Tanks even as it is spreading rapidly towards the *27-2*
Columbia River.

Thank You.

Don Stephens
908 SE Cora
Portland, OR 97202

27-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Although different aspects of the Hanford environment (e.g., vadose zone or groundwater) may be regulated under different state and Federal statutes, the TPA agencies (DOE, Ecology, and EPA) coordinate their respective activities. Further, DOE included ongoing and planned remediation actions regarding existing contamination in the cumulative impacts analysis of this final EIS.

27-2 This contamination has not been abandoned. Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 28: Valerie Shubert

From: Valerie Shubert [treraia@gmail.com]
Sent: Monday, February 01, 2010 4:00 AM
To: tc&wmeis@saic.com
Subject: Draft TC&WMEIS Comments, pt II

Some additional comments, after having read part of the summary:

First, a grammatical quibble. The plural of 'right-of-way' is 'rights-of-way, not 'right-of-ways'. Please correct this wherever it occurs. *28-1*

Second, it appears that there're plans afoot to keep several facilities open 24 hours. To make this functional, several steps have to be taken: {(a) Seek out and hire (where possible) people who are naturally nocturnal. Such people exist, and will work better in these shifts. This means things like holding interviews, meetings, etc when nocturnal people can make them, not during 'business hours'. (b) Provide accommodations for employees working at night. This includes (but is not limited to): Adequate lighting which is not dazzlingly bright; mass transit that runs all night; break rooms, food service, bathrooms, etc that are available 24 hours; etc. It should go without saying that emergency services, medical services, at least some contact with administrators, etc would also be available 24 hrs/day, but my experience is that it does not go without saying, so I'm saying it.} *28-2*

Third, I've pointed out before that surveys of things like archaeological sites can be done via aerial and/or satellite photos. If no current photos exist, old photos are adequate, unless they have faded over time. *28-3*

This is all for the present: I will have more comments later. I repeat the caveat that the comment period is too short: but I will try to get comments in when and as I can. *28-4*

Valerie Shubert
1420 Western, #409
Seattle, WA 98101

28-1 The grammatical error in the text box in the draft Summary, Section S.5.5.1, page S–108, has been corrected to "rights-of-way." A global search has been performed in this final EIS, and any additional occurrences have been corrected.

28-2 Throughout Hanford's history, there have been operations requiring 24-hour-per-day work. DOE would ensure that future shift work continued to comply with applicable labor regulations for providing a safe work environment, such as those of Occupational Safety and Health Administration (OSHA) and the Washington State Department of Labor and Industries. Safety and ergonomic considerations specific to night shift work would be based on Hanford's past operational experience and worker input.

28-3 Archaeological site surveys referenced in this EIS contain data from various research documents. Many of these surveys do contain photos of the sites. While aerial photos are a part of the surveys, cultural resource specialists directly surveyed the areas potentially affected by proposed project activities.

28-4 The public comment period was extended by another 45 days, for a total comment period of 180 days.

Commentor No. 29: John Wood

From: John Wood [unclebob@gorge.net]
Sent: Monday, February 01, 2010 4:38 PM
To: tc&wmeis@saic.com
Cc: Columbia Riverkeeper
Subject: Hanford Cleanup: You cannot store waste in a bucket with a hole in the bottom.

Mary Beth Burandt
Document Manager
U.S. Department of Energy
Office of River Protection
P.O. Box 1178
Richland,WA 99352
Fax: 888-785-2865
Email: TC&WMEIS@saic.com

Dear Ms. Burandt,

My opinion and my desires on the Hanford cleanup are exactly what is proposed by Columbia Riverkeeper. You have no business trying to "store" waste in a bucket with a hole in the bottom. Especially if that waste is radioactive and draining into an enormous river headed for irrigation users and cities and the ocean. It is like peeing in a sock over a precious carpet. Nobody decent does it. *29-1*

1) Clean up all 55-million-gallons of radioactive and hazardous tank waste with over 99% retrieval. *29-2*

2) Drop the proposal to ship radioactive wastes from across the nation to Hanford. *29-3*

3) Clean up the plume of millions of gallons of nuclear waste that has already leaked and is reaching the Columbia River. *29-4*

It is true that man may "need" to resort to nuclear power in the future, but even coal is cleaner in the long run than spent but still radioactive nuclear fuel. Coal will spontaneously REFORM before nuclear waste emissions recede to background levels.

Thanks for your time,

John Wood
Hood River, Oregon

29-1 All 29 SSTs have now been interim-stabilized, and all work required to be performed under the Interim Stabilization Consent Decree (No. CT-99-5076-EFS, September 30, 1999, as amended) has been completed and confirmed. As a result, the court granted the joint motion to terminate the Consent Decree on March 8, 2011.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

29-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

29-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

29-4 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones.

Commentor No. 30: Sheryl Paglieri

1-31-10

To: Mary Beth Burandt, EIS Document Manager

Dear Mary Beth,

The No action alternative should be the Preferred alternative for the FFTF in the Draft Tank Closure and Waste Management EIS. Entombing the FFTF would be a huge waste of taxpayer money. The FFTF should be kept for possible future use. 30-1

Yours truly
Sheryl D. Paglieri, retired teacher

Mead

30-1 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. As discussed in Chapter 1, Section 1.4.2, Decisions Not to Be Made, DOE is not considering restarting FFTF, only decommissioning it. Thus, regardless of the alternative selected (including No Action), FFTF would not be available for future use.

Commentor No. 31: James Paglieri

Jan. 30, 2010

Mary Beth Burandt, EIS Document Manager
DOE Draft TC&WM EIS Comments
Office of River Protection
PO Box 1178
Richland, WA 99352

Dear Mary Beth Burandt, EIS Document Manager,

The No Action Alternative should be the preferred alternative for the FFTF. The investment in the FFTF physical plant exceeds one billion dollars. The FFTF should not be entombed but should be preserved for various possible future missions, including restart. Since shutdown of the FFTF there has been increasing needs for fast neutron testing of materials (as noted by the present head of the DOE), for transmutation of nuclear waste (with the decision to not use Yucca Mountain), increased demand for medical isotopes (e.g. the recent crisis with Molybdenum-99 supply), and the inadequate supply situation for Plutonium-238 fuel in space missions. *31-1*

If FFTF restart does not materialize, the facility should be preserved for other reasons. For example, future nuclear or non-nuclear work that needs a containment building or that would use the tallest hot cell outside of Russia could be utilized. If no future use arises, the FFTF should become a nuclear museum and library, emphasizing the history of fast reactors and covering the development of nuclear power. For example, the museum could cover the number of awards that the FFTF received and the number of records that FFTF set, including a world record for the maximum amount of nuclear fuel exposure. FFTF could preserve fast reactor related documents/information and could become a favorate stopping place for the numerous visitors to the B-Reactor Museum. *31-2*

In conclusion, the No Action Alternative for the FFTF is very highly recommended. *31-1 cont'd*

Sincerely,
James N. Paglieri, Retired Nuclear Safety Engineer
James N. Paglieri
1734 Horn Ave.
Richland, WA 99354-2314

31-1 Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

31-2 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. As discussed in Chapter 1 of this *TC & WM EIS*, Section 1.4.2, Decisions Not to Be Made, DOE is not considering restarting FFTF. The scope of this *TC & WM EIS* is to address the final decommissioning of FFTF. As addressed in Chapter 2, Section 2.6, DOE does not consider use of FFTF as a museum a reasonable alternative due to the radiological and unique chemical hazards associated with the facility, the age of the buildings, and the lack of a financial sponsor.

Commentor No. 32: Fred Mann

From: Fred Mann [FredMMann@charter.net]
Sent: Thursday, February 04, 2010 4:18 PM
To: tc&wmeis@saic.com
Subject: Comments on the Draft TC & WM EIS
Attachments: Comments on Tank Closure EIS.docx

For more information, contact Fred Mann
email: FredMMann@charter.net
phone: (xxx)xxx-xxxx.

Response side of this page intentionally left blank.

Commentor No. 32 (cont'd): Fred Mann

Comments on Tank Closure, FFTF, and Waste Management EIS - Fred Mann
Dec. 10, 2009

Key Comments

1. Purpose of comments
   - A. Improve information for decision makers
   - B. Correct standard for Hanford
   - C. Improve readability

2.(A) Data/methods used are briefly described, but there is no discussion of why such data/methods are appropriate. Need to explain why they are appropriate. An example is inventory where the BBI is described as the official estimate. **Suggested change: Describe why data/methods used are appropriate.** *32-1*

3.(A) As most data come from 2002/2003, explain how newer data/methodology would affect results. For example, the discussion on updated Best Basis Inventory showed the large change in inventory. **Suggested change: Present a discussion on how more recent data would qualitatively affect the analysis performed.** *32-2*

4.(A) Separate cases that do not change from those cases where alternatives are given (e.g., off site waste, releases from near-by facilities). Because the impacts of the non-changing cases are much larger the cases having alternatives, the impacts of the alternatives cannot not be inferred by the reader. **Suggested change: Present the non-changing cases separately from the non-changing cases.**

   i. Most significant sources in many alternatives are cribs/trenches. past leaks. and offsite waste. Yet there are no alternatives no these sources. Thus, alternatives show large impacts as major sources are not reduced. **Suggested change: Provide alternatives for Cribs/trenches, past leaks, and offsite waste.** *32-3*

   ii. Cribs/trenches. These facilities are separate from the tank farms and are managed by a different office. Although they may be covered by a barrier that also covers tank farms, they may not. **Suggested change: include cribs/trenches as part of cumulative analyses (as obviously they will have a large impact) but not in alternatives analysis. If cribs/trenches are kept as part of the alternatives analysis, include two alternatives: 1) clean closure (in analog with clean closure of tank farms) and 2) pump and treat groundwater (which is the current plan being implemented by DOE Richland Operations Office).**

   iii. Past leaks. An alternative is presented (clean closure). However, Hanford DOE's plan (and is presently being implemented around the T, TX, and TY Tank Farms) is pump and treat of groundwater. **Suggested change: The pump and treat** *32-4*

32-1 This *TC & WM EIS* was prepared in accordance with NEPA, as amended (42 U.S.C. 4321 et seq.); DOE implementing procedures for NEPA (10 CFR 1021); and CEQ "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act" (40 CFR 1500–1508). Methods for assessing environmental impacts for each resource area are discussed in Appendix F of this EIS. Inventory development is discussed in Appendices D (alternatives) and S (cumulative impacts). The 2002 BBI estimate was reviewed by ORP; DOE-RL; DOE Office of Health, Safety, and Security; DOE-EM; DOE Office of the General Counsel; and Ecology in 2005. The conclusion then, and now, is that the 2002 BBI is appropriate for the analysis in this *TC & WM EIS*.

32-2 DOE's decision to use the 2002 BBI for tank waste inventory data is based, on part, the results of a 2005 ORP; DOE-RL; DOE Office of Health, Safety, and Security; DOE-EM; DOE Office of the General Counsel; and Ecology review of the 2002 BBI estimates. Regarding the commentor's concern as to the usage of older data when newer data are available, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

32-3 The agency does not agree with the suggested approach for organizing the alternatives. DOE believes that the impacts of cribs and trenches (ditches), past leaks, and offsite waste can be distinguished among the alternatives as presented. To provide additional clarification on the potential impacts of past leaks, cribs and trenches (ditches), and offsite waste under each of the alternatives, DOE has revised the key environmental findings sections of the *TC & WM EIS* Summary (Section S.5.5) and Chapter 2 (Section 2.10) to provide more description and discussion of these impacts.

32-4 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture the

Commentor No. 32 (cont'd): Fred Mann

alternative being implemented by Hanford DOE should be considered as part of the EIS. *32-4 cont'd*

iv. Off-site waste. The only case analyzed in the EIS is for the disposal site to start receiving waste in 2009. However, the preferred alternative is not to receive offsite waste until the Waste Treatment Plant (WTP) is operational (~2020). Given the discussion of inventory in the text, at least half of the off-site waste will be disposed prior to this time. **Suggested change: Add alternatives of 1) waste disposal starting after WTP is operational and 2) no offsite waste.** *32-5*

5.(A) Impacts from Tank Farm Closure and Waste Disposal are provided separately. Yet the alternatives have them as part of the same alternative. Moreover, the points and times of impacts overlap. Because some sources will overwhelm other sources, it is important that each source be individually calculated and explained. **Suggested change: Provide impacts from key sources (as well as a discussion). Then merge the impacts (and create new discussion) to address each of the alternatives.** *32-6*

Detailed Comments

Page S-87 The beginning discussion on Tank Closure Alternatives (S.5.4.1) and particularly Figure S-14 only present alternatives for residual waste (i.e., different retrieval fractions). However, the main text makes clear that past releases have much more of an impact as do waste near, but outside the tank farms. **Suggested change: At the beginning of S.5.4.1 include a new paragraph that list the subheadings with a short description of peak environment impacts. A side box describing the alternatives would also be useful. For each figure S-14, S-15, S-16, and S-18, note the figures where the impacts from other sources can be found.** *32-7*

Page S-96: The intent of Figure S-18 and the associated text on pages S-94 through S-96 seems to be to summarize the environmental impacts for closure of the SST system. Thus, to understand the environment impact from each alternative, the reader needs the environmental impact from each of the sources for each alternative. Figure S-18 should have the impacts from past leaks as they are part of closure. Whether one includes the impacts from near-by sources should be considered (However, as these are not part of the closure of the SST System, I would urge not to include nearby sources - see above). **Suggested change: Include all sources for each alternative (i.e., past leaks as well as residual waste and retrieval leaks) in Figure S-18 and in the associated text.** *32-8*

Page S-99 and S-100 (Figures S-20 and S-21). The point(s) of calculation are general at the Core Zone Boundary. However, the point(s) of calculation for Figures S-20 and S-21 are at the 200 East Area Integrated Disposal facility Barrier. There is no explanation why the change is made. **Suggested change: Be consistent. Present data for the same** *32-9*

contaminants that may have already reached the water table due to past practices, i.e., past leaks and infiltration from contiguous cribs and trenches (ditches).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

32-5 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

32-6 DOE believes that both the individual alternatives (i.e., Tank Closure alternatives and Waste Management alternatives) and the combinations of the alternatives are discussed and explained. Chapters 4 and 5 of this *TC & WM EIS* provide individual results for short- and long-term impacts, respectively, for each resource area and the combinations of the Tank Closure and Waste Management alternatives are provided at the end of Chapters 4 and 5 (i.e., Section 4.4, Combination of Alternatives, and Section 5.4, Combination of Alternatives).

32-7 The commentor's suggestions were considered during the preparation of the Summary for this *Final TC & WM EIS* and DOE has taken efforts to try to provide more clarifying information as needed.

32-8 The Summary presents an overview of key environmental findings. To see all sources for each alternative, please see Chapter 5 of this EIS. Please see the Summary for discussion regarding closure of the SST system past leaks.

32-9 IDF barriers were used as the point of calculation in the figures because they are the permitted points of interest for the Waste Management alternatives chosen by Ecology to meet State Environmental Policy Act (SEPA) and permit requirements. The permitted points of interest for the Tank Closure alternatives are the tank farm barriers and the Core Zone Boundary, which is used for multiple sources, including the tank farms.

Commentor No. 32 (cont'd): Fred Mann

point(s) of calculation (so that comparisons can be made). If additional point(s) of calculation are presented, make sure that the reader is clearly informed that a change has been made. *32-9 cont'd*

Page S-106. Table S-11 uses floating point notation, making comparisons difficult. Moreover, the layreader understands better fixed point notation. **Suggested change: Use fixed notational rather than scientific notation as space is not a problem and would by more understandable for the lay reader. (thus 0.246 million -> 246,000 and $1.07x10^4$ -> 10,700.** *32-10*

Pages S-112 to S-115 The costs are presented in a variety of units and in scientific notation, making understanding by the layreader difficult. **Suggested change: Use millions of dollars for cost (not 10^6 and 10^9). Not only would this be more understandable for lay reader, but would allow easier comparison as reader would not need to convert superscripts 6 and 9.** *32-11*

Page 5-5 and others. Figure 5-2 and other figures used the phrase "other sources". All the alternatives deal with these other sources. This seems to be tank farm residuals. **Suggested change: Clearly state what are the other sources.** *32-12*

Page 5-8 states that only 3% of the tritium in the groundwater reaches the Columbia River. This implies that the amount of tritium is reduced by a factor of 33 or by $\sim 2^5$. As the half-life of tritium is ~13 years. Calculated groundwater travel time would by ~65 years. Given past estimates of much faster travel time, an explanation is needed. **Suggested change: Have a section comparing calculated values with measurements.** *32-13*

Page 5-9, the text states "Therefore, attempts to apply classic transport theory to these results can, in general, result in misleading conclusions." Yet it was classical transport theory that generated the results. Simply interpolating or extrapolated results can be misleading because of the multiple sources. **Suggested change: change sentence to read: " Therefore, attempts to simply interpolate or extrapolate these results can, in general, result in misleading conclusions."** *32-14*

Figures 5-8 through 5-12 provide calculated values covering 1940 to the present. Yet there is no discussion on how these calculated values compare with measured values. Without such a comparison, it is impossible for the reader to judge the quality of the calculations, particularly as the input data were not necessarily selected to present the best available data. **Suggested change: add a many page section comparing the results to the extensive Hanford Site measurement data base.** *32-15*

Page 5-11. Beside the extensive Hanford Site measurement data base, there have been many previous calculations. **Suggested change: To provide reader knowledgable of such** *32-16*

32-10 Table S–11 in the *Draft TC & WM EIS* Summary and Table 6–37 in Chapter 6 of the draft EIS have been revised in this final EIS to put the carbon dioxide emission data in decimal format, as suggested by the commentor.

32-11 Because of the wide range of potential costs, the higher Tank Closure alternatives costs are presented in this *TC & WM EIS* in billions of 2008 dollars, whereas the lower FFTF Decommissioning and Waste Management alternatives costs are presented in millions of 2008 dollars. These units are specified in the title of each cost table in Chapter 2, Section 2.11, and the Summary, Section S.6. However, no cost figures are presented in these sections using scientific notation. Cost figures are typically not listed in scientific notation, but rather are presented in dollar amounts consistent with the format used in this *TC & WM EIS*.

32-12 The term "other tank farm sources" includes tank residuals, retrieval leaks, and ancillary equipment. These sources were analyzed together. Clarification has been provided in Chapter 5 of this *Final TC & WM EIS*.

32-13 The purpose of Chapters 5 and 6 is to provide information that compares the impacts of various alternatives. By design, results in Chapter 5 are comparable to each other, because they are based on the specifics of individual alternatives or alternative combinations. The results in Chapter 5 do not include contributions from cumulative impact sources, which are currently a contributor to the contamination in the aquifer. The comparison between modeled and measured results is presented in Appendix U, which includes all sources; in response to similar comments, this discussion has been expanded in this *Final TC & WM EIS*.

As a point of clarification, DOE notes that peak hydrogen-3 (tritium) concentrations in calendar years 1980, 1990, 2000, and 2010 compare favorably (well within an order of magnitude) with observed field measurements. First arrival times of the tritium plume at the nearshore of the Columbia River also compare favorably with field observations. DOE notes that first arrival times of tritium at the nearshore of the Columbia River on the order of 60 to 70 years are consistent with a finding that the majority of tritium (from all disposal sites) undergoes radioactive decay while transiting the vadose zone and groundwater system.

32-14 The sentence has been revised accordingly.

32-15 Please see response to comment 32-13 regarding the purpose of Chapters 5 and 6 and their relationship to Appendix U. Except for a few specific sources discussed in Appendix U, the agreement between modeled results and measured conditions

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previous work, such earlier work should be referenced and compared to the present calculations. *32-16 cont'd*

Page 5-11. The text states "Releases from cribs and trenches ... . Releases from other tank farm sources ...". However, cribs and trenches have not been managed as tank form sources since the establishment of the Office of River Protection and for many years prior to that. **Suggested change: change text to "Releases from tank farm sources ...".** *32-17*

Figures 5-8 through 5-12 show very large spikes and dips. Some spikes exceed 10^3; some dips exceed 10^5. For example, if smooth over 10 years, then Figure 5-8 would look quite different. **Suggested change: The text should explain the origin of such departures from smooth behavior. If the spikes are the results of calculations but not of reality, then replot data over a suitable period.** *32-18*

Figures 5-15 and 5-16 show the calculated groundwater spatial distribution of tritium and iodine-129 in the year 2005. However data are not given for techneitum-99 and uranium, the major contaminants of concern in the analysis. More importantly, the calculated values are not compared to measurements**. Suggested change: Show the calculated and measured groundwater spatial distribution of tritium, technetium-99, iodine-129, and uranium in the year 2005.** *32-19*

Page 5-16. The phrases "T barrier", "B Barrier, and "A Barrier" have not been defined in Chapter 5. **Suggested change: Define the "T barrier", "B Barrier, and "A Barrier" here.** *32-20*

Page 5-16. The text states "... as a result of other tank farm sources ...". It is unclear what sources are meant. **Suggested change: Instead of using "other tank farm sources", state what sources are included.** *32-21*

Page 5-35. The text states "The retrieval period was assumed to start in 2008 and end in CY 2193." Current plans are to close the tank farms (including retrieval) prior to 2050. No one has suggested a retrieval period of ~200 years. **Suggested change: Change "retrieval period" to "operational period" or another phrase.** *32-22*

Page 5-38. Figure 5-39 has the release (curies) from U-238 as ~1.0 Curie (cribs and trenches), ~3 Curies (past leaks), and ~1.0 Curies (other sources). However, Figure 5-40 has the release (kilograms) for uranium as ~0.3 Mg (cribs and trenches, ~3 Mg (past leaks), and ~1 Mg (other sources). However, the uranium is depleted of isotopes other than U-238, thus the ratio for the 2 between the figures for each source should be the same (not 3, 1, 1 Curies/Mg). **Suggested change: look at data and replot.** *32-23*

Page 5-69. Section 5.1.1.3.1 present summaries of the proposed action and timelines for Tank Closure Alternative 2B. The similar summary for Alterative 2A is 34 pages earlier in *32-24*

is generally within a close order of magnitude. This overall agreement suggests that differences in long-term groundwater impacts that are greater than an order of magnitude should be considered significant in comparing the alternatives.

32-16 In response to this and similar comments, Appendices N and O have been expanded to include discussions of previous studies having a bearing on this NEPA evaluation.

32-17 Releases from other tank farm sources include releases from HLW tanks, including tank residuals, retrieval leaks, and ancillary equipment. In response to this and similar comments, the discussion in Chapter 5 of this *Final TC & WM EIS* has been clarified.

32-18 In response to this and similar comments, an expanded discussion of the causes of variability in the concentration versus time plots has been added to Chapter 5 of this *Final TC & WM EIS*.

32-19 Please see response to comment 32-13 regarding the purpose of Chapters 5 and 6 and their relationship to Appendix U.

32-20 A reference to the barrier boundaries used for the analysis was mentioned in the introductory text of Chapter 5. However, to provide more clarity, this language has been expanded.

32-21 Releases from other tank farm sources are releases from HLW tanks, including tank residuals, retrieval leaks, and ancillary equipment. In response to this and similar comments, the discussion in Chapter 5 of this *Final TC & WM EIS* has been clarified.

32-22 Chapter 5, Section 5.1.1.2.1, has been revised to clarify that the retrieval period under Tank Closure Alternative 2A includes retrieval, WTP pretreatment and treatment, and 100 years of administrative and institutional control. For clarification, this change is applicable to Alternative 2A, not Alternative 2B.

32-23 DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication. None of the reviewed documents included a total uranium inventory estimate for many of the burial grounds or some liquid-waste sites. However, in response to this and similar comments, DOE reviewed the data again and revised the inventories to include a calculated total uranium inventory. This revised inventory was analyzed in this *Final TC & WM EIS*; specifically, Appendix S was revised to include these inventories for each of the affected sites.

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Section 5.1.1.2.1. **Suggested change: Add a paragraph summarizes the differences between Alternatives 2A and 2B. Also (per comment above), change "retrieval period" to "operational period" or another phrase.** *32-24 cont'd*

Page 5-172, the text states "For the conservative tracers, concentrations at the Core Zone Boundary exceed benchmark standards by two to three orders of magnitude during most of the periods of analysis." Yet the corresponding figures (Figures 5-153, 5-154, 5-155, 5-156, and 5-157) show that except for near the beginning of the analysis, the concentrations are at most an order of magnitude over the benchmark (except for Tc-99 where the margin is 1 1/2 orders of magnitude from 3700 to 5000). **Suggested change: Make the text consistent with the figures with the calculated impacts.** *32-25*

Page 5-172, the text states "Concentrations at the Columbia River are about two orders of magnitude smaller." ." Yet the corresponding figures (Figures 5-153, 5-154, 5-155, 5-156, and 5-157) show that the impacts at the Columbia River at one magnitude smaller, except for I-129 which is about a factor of 30 smaller and impacts for Tc-99, Cr, and nitrate at around the year 4000 that is also a factor of 30. It is unclear why I-129 behaves differently. **Suggested change: Make the text consistent with the figures with the calculated impacts. Explain the different ratio for I-129 and around the year 4000.** *32-26*

Page 5-310. In Figure 5-325 the blue curve disappears under the tan. **Suggested change: State in the caption that after Year 2500 "other sources are not significantly different from the total." A similar sentence can be used for other figures.** *32-27*

Page 5-316. The text states "The dose standard", but this phrase is not defined in particular for the American Indian resident farmer. Similarly for "hazard index guidance". **Suggested change: define phrase and give numerical value.** *32-28*

Page 5-318 and on. Tables 5-22 and so on provide peak impacts. However, the corresponding figures show that the peak impacts occur shortly after 1940. **Suggested change: As the purpose of an EIS is do decide among future alternatives, peak impacts should be provided for years after the data of publication (2009).** *32-29*

Page 5-318 and on. Tables 5-22 and so on include the impacts from cribs and trenches. These impacts according to the figures drive peak impact levels (because of the very high values early on). Therefore, differences among the alternatives are lost**. Suggested change: Do not include the impacts from cribs and trenches, particularly as they are not managed as tank waste.** *32-30*

Page 5-422 and on. Figures 5-376 and on provide releases. However, the releases are only for the first 10,000 years. **Suggested change: For all release figures, but particularly for those involving sources having long-term releases, add the phrase "during the 10,000 year time of analysis."** *32-31*

32-24 The information the commentor is requesting is presented earlier in this *TC & WM EIS*. Specifically, summaries of the proposed action and timelines for Tank Closure alternatives are presented comparatively in Chapter 2, Section 2.5.

32-25 DOE agrees with the commentor's characterization of these ratios and has revised the text in this *Final TC & WM EIS* accordingly.

32-26 DOE agrees with the commentor's analysis with respect to the ratio between Core Zone Boundary and Columbia River concentrations and has revised the text accordingly in this *Final TC & WM EIS*. Under Tank Closure Alternative 5, differences in the ratio for iodine-129 around year 4000 are attributed to the release from tank farm residuals that starts about this time, as tank farm residuals are a grouted waste form (note that Tank Closure Alternative 5 has only 90 percent retrieval, and, thus, a larger portion of the total inventory for each tank farm is available for release than under other Tank Closure alternatives). The discussion of this result has been expanded in this *Final TC & WM EIS*.

32-27 In response to this and similar comments, the data presentation in Chapters 5 and 6 has been revised in this *Final TC & WM EIS*. Specifically, in cases where there is a superposition of curves that obscures part or all of the information, the accompanying text contains a discussion of the obscured information.

32-28 Please see Appendix Q for the dose standard used in this *TC & WM EIS*. Please see Chapter 9 for the definition and numerical value of the Hazard Index.

32-29 As described on page 5–317 of the *Draft TC & WM EIS*, Tables 5–22 and 5–23 show the impacts from cribs and trenches (ditches) after calendar year 1940; and Tables 5–24 and 5–25 show the impacts from the past leaks after calendar year 1940. However, Tables 5–26 and 5–27 show the impacts from the combination of cribs and trenches (ditches), past leaks, and other tank farm sources after calendar year 2050. Appendix Q provides more detail and explanation for using the calendar date 2050.

32-30 The impacts of six sets of cribs and trenches (ditches) cannot be removed from the analysis because they are contiguous to the SSTs and would fall under the barriers placed over the SSTs during closure. These cribs and trenches (ditches) are CERCLA past-practice units and are evaluated in this EIS as part of a connected action because they would be influenced by barrier placement. Please see Chapter 1, Section 1.4, Decisions and Regulatory Framework, for more information on cribs and trenches (ditches). DOE disagrees that differences among the alternatives would be lost, because the same assumptions about the cribs and trenches were used for all alternatives.

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Page 5-428 and on. Impacts from Integrated Disposal Facility exceed benchmarks because of the inclusion of off-site waste, which is very conservatively estimated. There is only one case analyzed for off-site waste and that case is inconsistent (much higher) than the preferred alternative. **Suggested change: Redo the Integrated Disposal Facility Alternatives calculations with the inventory corresponding to the preferred alternative.** *32-32*

Appendix C. A key document used in the EIS is the "EIS Technical Guidance Document TC EIS Vadose Zone and Groundwater Revised Analyses**". Suggested change: Include entire document in Appendix B or C.** *32-33*

Page D-2. The text states that information after December 1, 2002 are not included. However, section D.1.1.5 does describe new information and shows significant changes in Tc-99 and I-129 inventories. **Suggested change: Include a reference to Section D.1.1.5 for newer information.** *32-34*

Page D-15 states "Three levels of retrieval were considered for the TC & WM EIS analysis: 90, 99, and 99.9 percent retrieval of current inventory of radioactive and nonradioactive constituents." as well as "Nine-nine percent retrieval is in the TPA." However, The ninety-nine percent retrieval in the TPA refers to capacity, not current inventory. Thus, the text misleads the reader into assuming that the inventory used in the EIS is comparable to the TPA, rather than being on average about a factor of 2 lower, and in some cases an order of magnitude lower. **Suggested change: replace "Nine-nine percent retrieval is in the TPA." with "The TPA requires on average 99. % retrieval based on capacity, not on inventory as of 2002. Thus, TPA-compliant inventories may be twice as high as used in the EIS 99% case."** *32-35*

Page D-16 states the decision to use volume retrieval method. However, 7 tanks have been retrieved with the composition of the residual waste actually measured. **Suggested change: Add a short discussion of the reliability of the volume retrieval method with actual experience.** *32-36*

Page D-24 discusses historical leaks. However, much information has been obtained since December. **Suggested change: Just as for the Best Basis Inventory (discussed in Section D.1.1.5), there should be a discussion on how new data affects inventory data.** *32-37*

Page D-26 states that inventories for cribs and trenches, which are outside of tank farms, come from 2005 source. However, data for inventories inside tank farms (one of the main focuses of the EIS) are from 2002 sources. **Suggested change: Tank farm inventories should come from the same date or more recent dates than for non-tank farm sources.** *32-38*

32-31 The first sentence in each section describing the "analysis of release and mass balance" clarifies that the section presents the impacts in terms of release during the 10,000-year period of analysis.

32-32 In response to this and similar comments, additional analyses of IDF performance have been conducted and are presented in Chapter 7, Section 7.5, of this *Final TC & WM EIS*. The additional analyses consider changes in predicted impacts as a function of the inventory of LLW and MLLW imported from off site.

32-33 The *Technical Guidance Document* (DOE 2005) and other document sources are referenced where applicable in both the main document chapters and in the appendices, and are available on the Hanford website (http://www.hanford.gov). Specifically, the *Technical Guidance Document* can be found under the Scoping heading on the Tank Farm Closure & Waste Management Environmental Impact Statement page, which is listed in the NEPA – Environmental Impact Statements subsection of the Official Documents page.

32-34 A reference to the BBI comparison in Appendix D, Section D.1.1.5, is not considered necessary as it is a subsection of Section D.1.1, follows within a reasonable number of pages, and doing so may be confusing to the reader.

32-35 Concerning the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks, residual waste, and surrounding waste in the soil, requires preparation of detailed performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

32-36 DOE notes the commentor's recommendation to add a discussion on the reliability of using the volume retrieval method in lieu of actual experience. Appendix D, Section D.1.3, concludes that the volume retrieval method for estimating the tank residual waste after retrieval is appropriate. Currently, retrieval has been completed on seven tanks, of which three were 100-series tanks and four were 200-series tanks. For the three 100-series tanks (C-103, C-106, and S-112), a review of the estimated residual technetium-99 inventory compared

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Page D-26 states "Recent field investigations conducted by Bechtel Hanford at the B-38 trench". However, Bechtel Hanford never did investigations at the B-38. Bechtel Hanford Company had responsibility for investigations near the Columbia River. CH2M HILL Hanford Group did such investigations. **Suggested change: Change "Bechtel Hanford" with "CH2M HILL Hanford Group".** *32-39*

Page D-33 states that 2007 data are used for waste streams produced by the Waste Treatment Plant (WTP). However, tank farm data comes from 2002. Moreover the input to the 2007 flowsheet was not based on 2002 tank farm data (Best Basis Inventory) much much more current data. Thus tank farm data and WTP data will not be consistent **Suggested change: Tank farm inventories should come from the same date or more recent dates than for WTP sources.** *32-40*

Page D-33 does not discuss Tc-99 not captured in the glass matrix, but is retained in the glass canister. The presence of such Tc-99 has been seen in WTP testing and the quantity has been estimated. Such Tc-99 for bulk vitrification waste forms is shown in the EIS to be more important that the Tc in the matrix. **Suggested change: Add a discussion on the amount of Tc-99 in WTP glass canisters that are not captured in glass matrix. Include such inventory in the WTP glass calculations.** *32-41*

Page D-126. The text states that the inventory for off-site waste is from a 2006 report, but tank waste is from 2002. **Suggested change: Make inventory estimates from references of a similar date.** *32-42*

Page D-127. The text states "Therefore, there are significant uncertainties in [off-site waste] waste volume projections ..." Moreover, from the analysis conducted, it is off-site waste that has the largest impacts. However, only one case is analyzed and it is not the prefered alternatives case. **Suggested change: Perform sensitivity cases to the amount of off-site waste.** *32-43*

Page D-127 on. The text assumes operation of the Integrated Disposal Facility (IDF) starts in 2009. It is now 2009 and the facility is nowhere near operation. Moreover, DOE has agreed with the State of Washington that no offsite waste will be disposed in IDF until after the Waste Treatment Plan is operation (~2022) and this is part of the preferred alternative of this EIS. As discussed in the text, much (at least half) of the off-site waste assumed for disposal in IDF must be disposed prior to 2022. **Suggested change: Have preferred alternative as one of the off-site waste cases analyzed.** *32-44*

Page L-5. The text states "Previously compiled data were used ... . When compiled date were unavailable or inadequate for the development methodology used, historical primary data were obtained and processed for use or additional data were collected." However, no references were provided. **Suggested change: provide references for previously compiled data, for historical primary data, and for additional data.** *32-45*

with the expected inventory found inconsistencies between the three tanks and a wide range in the ratio of final curies to expected curies. From this review, DOE concluded that it currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval, and not much is known about the behavior of, or ability to remove, small volumes of residual waste.

As suggested, this discussion was added to Appendix D in this final EIS. It is also noted that the tank closure process, if implemented, would require detailed examinations of the tanks and residual waste, as well as preparation of site-specific radiological performance assessments and closure plans. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

32-37 DOE is not aware of any new historical leak data becoming available since December 2009. Thus, a comparison similar to the discussion regarding the BBI data was not included in this EIS.

32-38 To address this specific comment on the draft EIS questioning DOE's use of the 2002 BBI for tank waste inventory data, in 2005, ORP; DOE-RL; DOE Office of Health, Safety, and Security; DOE-EM; DOE Office of the General Counsel; and Ecology reviewed the 2002 BBI estimates. The conclusion then, and now, is that the 2002 BBI is appropriate for the analyses in this *TC & WM EIS*. This conclusion is supported in Section 4.0, Assumptions, in the *Technical Guidance Document* (DOE 2005), dated March 25, 2005, which was approved by DOE and Ecology. In summary, DOE and Ecology concluded that the 2002 BBI includes inventory values for both technetium-99 and iodine-129, two risk-driving radionuclides, that are at the higher end of the range of numbers based on the inherent uncertainty in the way the BBI is formulated. This use of some

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Page L-5. The text describes the methodology of developing the groundwater, but nowhere is the underlying physical conceptual model provided. It is implied by the choice of MODFLOW, but should be made explicit for the (lay) reader. **Suggested change: provide the underlying physical conceptual model for the groundwater model.** *32-46*

Page M-1. The text states "Although best available data and models are used to develop the analysis described in this appendix, ..." However, this is not true. Just one example (see below) is release of contaminants from glass matrix. The model used is a one-dimensional model that is now known to miss important processes (most contaminants flow around the glass matrix rather than through it) and the data are based on a glass formulation developed by the Pacific Northwest National Laboratory rather than for glass formulations developed by the Waste Treatment Plant. **Suggested change: Replace sentence with "Because of uncertainties in the data and models used, uncertainty in the results remain."** *32-47*

Page M-14. Section M.1.3.1 provides inventories for past releases. Although it can be thought of a release mechanicism, normally most readers would treat it as inventory. **Suggested change: Discuss in the inventory appendix and provide a link to that section here in the release section.** *32-48*

Page M-16. The text describes the release rate methodology for salt cake, but not for sludges. For the tanks that have been retrieved (all of which contain sludges), there are measured release rates. **Suggested change: Discuss methodology for sludges.** *32-49*

Page M-18. The text states (twice) "detailed analysis using the STORM Model (Mann et al. 2003). Mann et al. 2003 is not a detailed analysis. The executive summary of that document states "However, because of budget, schedule, and technical limitations, this report is acknowledged to be less rigorous and detailed than a performance assessment, ...". **Suggested change: See new paragraph below.**

Page M-18. Mann et al. 2003 used a one-dimensional analysis forcing all contaminant through the glass matrix. Newer analyses by Diana Bacon and Pete McGrail (PNNL-15198) have used two-dimensional analyses which allow most of the contaminants to move around the glass matrix. Both the details of local environment parameters and the release results are much different. **Suggested change: See new paragraph below.** *32-50*

Page M-18. The basis for much of the technical analysis (including release) is the "EIS Technical Guidance Document TC EIS Vadose Zone and Groundwater Revised Analyses". That document specifies 0.9 mm/year recharge rate. However, Mann et al used a recharge rate of 4.2 mm/yr. According to Mann et al. 2003, the release rate varies as $(\text{recharge})^6$. Thus, using the EIS guidance document and the methodology of Mann et al. 2003, the release rate should be reduced by $(0.9/4.2)^6$ or `10^{-4}. However, the use of

conservatism by using the higher number for two risk drivers is still considered appropriate for this EIS analysis. Regarding the use of the SIM [Hanford Soil Inventory Model], Revision 1, data for analysis of the cribs and trenches (ditches), dated 2005, as explained in Appendix D, Section D.1.5, DOE reviewed the available data and concluded these data are appropriate for the analysis in this *TC & WM EIS*.

32-39 The text was revised from "Bechtel Hanford" to "CH2M HILL Hanford Group" in this final EIS.

32-40 The only "2007 data" reference noted in Appendix D of the draft EIS is "CEES 2007b," which is a mass balance calculation that analyzes the 2002 BBI, not a newer source of inventory. The 2002 BBI estimate was reviewed by DOE, which concluded that it best represents the inventories of the SSTs and DSTs. Use of the 2002 BBI was agreed to by DOE and Ecology representatives in the *Technical Guidance Document* (DOE 2005) for this EIS. DOE believes consistent use of the 2002 BBI has been maintained throughout this EIS. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

32-41 DOE is not aware that technetium-99 is retained on the ILAW glass canister walls. This EIS utilized the Hanford Tank Waste Operations Simulator model partitioning factors and assumptions to develop the Tank Closure alternatives mass balances.

32-42 The 2002 BBI estimate was reviewed by DOE, which concluded that it best represents the inventories of the SSTs and DSTs. Use of the 2002 BBI was agreed to by DOE and Ecology representatives in the *Technical Guidance Document* (DOE 2005) for this EIS. The offsite waste inventory was prepared in 2006 to support the draft EIS following DOE's January 6, 2006, Settlement Agreement with the State of Washington (as amended on June 5, 2008) regarding *State of Washington v. Bodman* (Civil No. 2:03-cv-05018-AAM), signed by DOE, Ecology, the Washington State Attorney General's Office, and DOJ. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

32-43 The impacts of offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5, and Chapter 2, Section 2.10, Key Environmental Findings. These sections illustrate the radiological risk differences between including and not including offsite waste disposal at IDF-East. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99,

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one-dimensional methodology in Mann et al. 2003 is not known to be incorrect. . **Suggested change: See new paragraph below.**

Page M-18. Mann et al 2003 used LAWABP1 as the glass composition. However, this composition is much different from the glass compositions planned to be used in the Waste Treatment Plant. . **Suggested change: See new paragraph below.**

Suggested change for above comments: A key guidance document for this EIS is the "EIS Technical Guidance Document TC EIS Vadose Zone and Groundwater Revised Analyses". This guidance document states "Waste sources to be evaluated for release functions in the TCEIS will include primary and secondary grouted waste, tank residual salt cake, liquid releases, and vitrified waste forms. Information on release rates from salt cake, grouted waste forms, and vitrified waste forms are available in *Risk Assessment Supporting the Decision in Initial Selection of Supplemental ILAW Technologies* (RPP-17675) and *Annual Summary of Immobilized Low Activity Waste Performance Assessment for 2003, Incorporating the Integrated Disposal Facility Concept*, (DOE/ORP-2000-19)." For this analysis, the glass release for WTP glass is taken as 2.8 x 10^{-8} (gram per gram) and 1.0 x10^{-8} for bulk vitrification glass based on the Annual Summary (here referenced as Mann et. al 2003). These values are consistent with newer data and methodology (Bacon and McGrail 2005). During the production of glass, a portion of the feed technetium is volatilized ..." *32-50 cont'd*

Page M-18. Peer review is given as the reference for the upper limit for technetium in the castable block. This is not a reference. **Suggested change: provide a literature reference.** *32-51*

Page M-18. Technetium not in the glass matrix is included for bulk vitrification (BV), but not for Waste Treatment Plant (WTP) glass. However, just as in bulk vitrification, Tc will evaporate from the glass melt from ~250 to ~500° in WTP containers. Such white powder has indeed been seen in WTP tests. Moreover, because of the physical conditions, it can be expected that more Tc not in the matrix would be present in WTP product than in BV product. **Suggested change: include non-matrix Technetium in WTP glass.** *32-52*

Page M-80. The text describes the effects of recharge on past leaks. However, nowhere is there a discussion of thermal effects. As shown by Steve Yabusaki in the SX Field Investigation Report (Knepp 2001), these thermal effects are very important (many orders of magnitude) if the modeling starts at the tank source. **Suggested change: The importance of such thermal effects should be acknowledged and quantified.** *32-53*

Page N-2. The text presents a discussions of why alternatives on vadose zone flow and transport were not chosen. **Suggested change: such discussions should occur whenever the EIS Team made a decision on data or methodology.** *32-54*

Pages N-2 and on. The comparisons between measurements and calculations are presented for sources having very high discharge or recharge rates. Yet the bulk of the alternatives *32-55*

could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

32-44 For the purpose of analysis, Waste Management Alternatives 2 and 3 were revised in the *Final TC & WM EIS* to reflect the receipt of offsite waste starting in 2022.

32-45 In response to this comment, Appendix L of this *Final TC & WM EIS* has been modified to provide references to previously compiled data, historical primary data, and other data sources.

32-46 Appendix L, Section L.2, of this *Final TC & WM EIS*, has been revised to include a simple diagram and a brief description of the groundwater pathway conceptual model.

32-47 DOE does believe that the best-available data and models were used to develop the analysis for the *Draft TC & WM EIS* and disagrees that this sentence needs to be revised as suggested.

32-48 DOE disagrees with the commentor's interpretation of this section of Appendix M. Appendix M, Section M.3.1, provides a description of the volume estimates and dates for past leaks and refers the reader to Appendix D for the estimates of quantities of constituents involved in past leaks (i.e., inventories).

32-49 For alternatives involving abandonment of the tanks (Tank Closure Alternatives 1 and 2A), sludge phases were assumed to be encapsulated in salt cake and to be released by dissolution of the salt cake. Given the uncertainty in specification of tank failure and the large adverse impact of any release from an unstabilized tank, refinement of the release models for Alternatives 1 and 2A is not warranted. Stabilization of tanks occurs for all alternatives except Alternatives 1 and 2A. For those alternatives, residual salt cake and sludge were assumed to be diluted and mixed into the lower layer of grout placed in the tank.

32-50 The text of Appendix M, Section M.3.1, has been revised by removing the reference to level of detail in the analysis of the *Risk Assessment Supporting the Decision on the Initial Selection of Supplemental ILAW Technologies* (Mann et al. 2003) and stating that conditions used in that analysis, such as the rate of recharge at IDF-East, differ from the *TC & WM EIS* Base Case conditions, with expectedly conservative implications for predicted impacts.

Commentor No. 32 (cont'd): Fred Mann

analysis are for sources (residual tank waste or disposal facility waste) having low recharge rates. **Suggested change: Note that comparisons are for high discharge rates. Add comparisons for low discharge rates.** *32-55 cont'd*

Page N-6. The text states that a travel time sensitivity shows that movement of water and solute through the vadose zone is largely controlled by the Hanford gravel, Hanford sand, and Ringold Gravel soil types. However, measurements at TY and U Tank Farms have show that the Cold Creek Unit is much more important. **Suggested change: Acknowledge the presence of measurements that show the importance of the Cold Creek Unit.** *32-56*

Page N-6 and elsewhere. The Plio-Pleistocene unit is now know as the Cold Creek Unit. **Suggested change: make a global change so that readers are not confused.** *32-57*

Page N-7. The text states that the measurements and calculations are in general agreement. However, Figure N-6 (Predicted concentrations" show less than 2 orders of magnitude drop from the peak. Yet Figure N-5 (measured gross beta) shows over 4 orders of magnitude drop. **Suggested change: Explain why calculations are so far from measurements and what are the key parameter changes that would be needed to reduce this difference (including lateral flow).**

Page N-8. The x-axis for Figure N-6 is years after some undefined time. **Suggested change: Place 0 year at the date of the start of discharges, so that direct comparison can be made to Figure N-5.** *32-58*

Pages N-12 and N-13. Figure N-9 (measurements) and Figure N-10 (calculations) are plotted to different scales and orientation. **Suggested change: Figure N-9 (measurements) and Figure N-10 (calculations) should be plotted to the same scale and the same orientation to help the reader.**

Pages N-18. Figures N-15 and N-16 show that the TX Tank Farm had larger releases than T Tank Farm, even though T-106 was by far the largest tank farm leak. TX tank releases are mainly thought to be metal (i.e. uranium) waste and are relatively small. **Suggested change: Look at data and replot.**

Page N-90 and N-91. The referenced figures start on page N-95, but the discussion ends on page N-91. **Suggested change: move the figures closer to the location where they are called out in the text.** *32-59*

Pages N-104 and 105. Figures N-151 and 152 do not present sensitivity case 1**. Suggested change: Have sensitivity case 1 in the legend, but note the vales are the same as for the EIS case.** *32-60*

32-51 This *Final TC & WM EIS* has been revised to provide the appropriate reference.

32-52 DOE disagrees with the commentor's suggested revision. There has not been sufficient product demonstration to support this conclusion.

32-53 As suggested in the comment, Section 7 (Simulation of Multiphase Fluid Flow and Reactive Transport at the SX Tank Farm) of the *Field Investigation Report for Waste Management Area S-SX* (CH2M HILL 2002) was reviewed. In particular, the descriptions of simulations of vadose zone conditions established by early year elevated tank temperatures for a tank leak (Section D.7.1) and for measured vadose zone concentrations (Section D.7.2) have been reviewed. DOE agrees that local moisture content, water and vapor flow, and solute transport are strongly influenced by the transient elevated temperatures. DOE also notes that the *Field Investigation Report for Waste Management Area S-SX* analysis reports that, for the tank leak simulation, "thermal effects on aggregated tracer migration are generally modest" (CH2M HILL 2002:page D-267) and that, for the measured concentration case, the time series of dissolved technetium concentrations at the Waste Management Area S-SX boundary (CH2M HILL 2002:Figure D.7.2.39) for isothermal and non-isothermal simulations are very similar in peak magnitudes and overall shape with a displacement in time on the order of a few years. Because the *TC & WM EIS* analysis is focused on larger scale and longer timeframe analysis supporting comparison of alternatives rather than investigation of local site conditions, DOE concludes that analysis based on isothermal conditions is sufficient for use in this EIS.

32-54 In response to this and similar comments, Appendices N and O have been expanded to include discussions of different modeling approaches in the context of this NEPA evaluation.

32-55 Further description and clarification have been provided to address this and other comments on the presentation of material in Appendix N.

32-56 Appendix N, Section N.3.6.1, was revised in this *Final TC & WM EIS* to clarify the importance of the Plio-Pleistocene Unit (part of the Cold Creek Formation) in the vadose zone flow and transport.

32-57 The stratigraphic column shown in Chapter 3, Figure 3–9, of this *TC & WM EIS* depicts the Cold Creek Unit relative to the Hanford and Ringold Formations and reflects the names of these and other geologic formations and member units recognized at Hanford. Chapter 3, Section 3.2.5.1.2, also presents a detailed description of each geologic unit, recognizing that the Cold Creek Unit

Commentor No. 32 (cont'd): Fred Mann

encompasses various deposits known informally as the Plio-Pleistocene Unit or pre-Missoula gravels, and by other terms.

As stated above, for purposes of developing the *TC & WM EIS* groundwater flow model, detailed hydrogeologic data were compiled in part from review of approximately 5,000 Hanford boring logs, as described in Appendix L, Section L.4, of this EIS. This review was conducted to discern textural differences between layers of mud, silt, sand, and gravel and associated differences in hydraulic characteristics for development of the geologic layers for the groundwater model flow field. In this scheme, the Plio-Pleistocene Unit was retained as a separate unit and individual layers within it and the Hanford and Ringold Formations and Cold Creek Unit were further assigned to 1 of 13 material types. The assigned names for these material types are used throughout the discussion of the vadose zone analysis presented in Appendices M and N and the groundwater transport analysis in Appendix O of this EIS.

32-58 With respect to this comment, the predicted concentrations of technetium-99 (Table N–6 from the *Draft TC & WM EIS*) have been overlaid on the observed gross beta and technetium-99 groundwater concentrations (Table N–5 from the *Draft TC & WM EIS*). The observed gross beta concentrations represent concentrations of technetium-99 and other activation products. The observed concentrations were used as a qualitative comparison to the predicted technetium-99 concentrations, indicating a sharp peak of technetium-99 between 1955 and 1960, decreasing to a concentration plateau between 1965 and 1975 and then decreasing to 3×10^4 picocuries per liter through the present.

For further clarification, Figures N–9 and N–10 comparing the observed versus the predicted concentrations of tritium from the Reduction-Oxidation (REDOX) Facility have been plotted on similar scales for comparisons.

DOE agrees with the commentor's interpretation of the results, with the exception of the assertion that a single tank drives the analysis. The inventories for past leaks from tank farms is discussed in Appendix D, Section D.1.4. The data indicate that the leak inventory from TX tank farm is greater than T tank farm, which leads to the results shown in Figures N–15 and N–16 from the *Draft TC & WM EIS*.

32-59 The callouts and placement of figures in Appendix N have been revised to address the commentor's concern.

32-60 Text has been added to the cited section to explain why data for Sensitivity Case 1 are not presented on the cited figure.

Commentor No. 33: Karen Mitzner

From: Karen [co-create@comcast.net]
Sent: Thursday, February 11, 2010 10:04 AM
To: tc&wmeis@saic.com
Subject: Hanford

Making Hanford a nuclear dump for the nation is unacceptable to me, as a Portland resident and cancer survivor, and, if the facts were known nationally, would be unacceptable across the nation. Trucking nuclear waste makes an accident a near inevitability, "dirty bombs" waiting to explode. *33-1*

Moreoever, the Hanford Nuclear Reservation is already the most contaminated site in the Western Hemisphere. Even vitrification, our best alternative to other storage options at Hanford, is not a good solution--glass is not able to endure the millennia necessary to prevent the escape of extremely toxic waste into the biosphere. *33-2*

We've had it with Hanford and nuclear power and nuclear waste dumping in this region! Clean up Hanford! *33-3*

Karen Mitzner
co-create@comcast.net
136 SE 63rd Ave
PD, OR 97215

33-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

33-2 Vitrification of radioactive waste into glass is an attractive option because it atomistically bonds the species in a solid glassy matrix. Because the radioactive constituents are bonded within the glass structure, the waste forms produced are very durable and environmentally stable over long time periods; however, they remain toxic. EPA has declared vitrification to be the best-demonstrated available treatment technology for HLW that exhibits the characteristic of toxicity for metals and corrosivity (Land-Disposal-Restriction Requirements [40 CFR 268]). The tank waste is considered to be mixed waste and must be treated to meet the applicable treatment standards. While borosilicate glass (vitrified glass) is the most durable and stable material currently known, as the commentor states, the waste in the glass would remain toxic and eventually be released.

33-3 The use of nuclear power in the United States is beyond the scope of this *TC & WM EIS*.

Commentor No. 34: Kris Gann

U.S. DEPARTMENT OF ENERGY

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Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 2/9/10

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*?
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*?

Do what you originally agreed to do.

1. Clean up Hanford to 99.9% retrieval level and stop trying to get out of it. 34-1

2. Do not transport any additional radioactive material and waste. It is unconscionable to jeopardize our health and well being now and future generations by doing this. 34-2

3. Clean up and remediate the site for all hazardous waste and contamination. The Columbia River should be safe for salmon and humans. 34-3

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Kris Gann

Address/Dirección: 907 Cascade

City, State, Zip Code/Ciudad, Estado, Zona Postal: Hood River, OR 97031

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NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

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TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

34-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

34-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

34-3 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Commentor No. 35: Elaine Johnson

U.S. DEPARTMENT OF ENERGY

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Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 02/09/10

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*?
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*?

I demand that DOE cleans up all 53 million gallons of buried nuclear waste to 99.9% retrieval
I am a senior but have grandchildren who love to play & fish in the Columbia
I want it to be safer for them & for other children's children to enjoy the beauty & the health of the Columbia river all the way to the Pacific Ocean. 35-1

I want you to DROP the proposal to ship radioactive waste from across the nation to Hanford. That is a potential disaster. Please DO NOT DO THIS to the beautiful NW!!! 35-2

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Elaine Johnson
Address/Dirección: 1201 Cascade Ave
City, State, Zip Code/Ciudad, Estado, Zona Postal: Hood River Or 97031

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@adic.com

35-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

35-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 36: Scott Johnson

U.S. DEPARTMENT OF ENERGY

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Thank you for your input
Gracias por su participación

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Date/Fecha: 2/9/2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

MAKE IT MADATORY THAT DOE CLEAN UP ALL THE 53 MILLION GALLONS OF WASTE **36-1**

DO NOT SHIP MORE RADIOACTIVE WASTE TO HANFORD. DOE CAN'T HANDEL THE ON GOING RESPONSIBILITY. **36-2**

CLEAN UP THE MILLIONS OF GALLONS OF NUCLEAR WASTE AS IT IS LEAKING INTO THE COLUMBIA. I AM A FISHERMAN AND ARE CONCERNED ABOUT EATING THE FISH THAT I CATCH. **36-3**

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: SCOTT JOHNSON

Address/Dirección: 1201 CASCADE AVE, HOOD RIVER, OR 97031

City, State, Zip Code/Ciudad, Estado, Zona Postal:

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

36-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all of the SST system, which would effectively remove 100 percent of the waste. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

36-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

36-3 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Commentor No. 37: Linda Short

U.S. DEPARTMENT OF ENERGY

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Thank you for your input
Gracias por su participación

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Date/Fecha: 2/10/10

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS?)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS?)*

I have been following this concern for decades now and it's shameful that this pollution + dangerous situation has yet to be dealt with. Clean it up already! And NO new waste!!!

37-1

37-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Linda Short
Address/Dirección: 2115 Avalon Way
City, State, Zip Code/Ciudad, Estado, Zona Postal: Hood River, OR 97031

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E-mail: TC&WMEIS@adic.com

Commentor No. 38: Rich McBride

U.S. DEPARTMENT OF ENERGY

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Thank you for your input
Gracias por su participación

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Date/Fecha: _____

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¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS?)*

WHY HAS IT TAKEN SO LONG?

1) - FAST TRACK - LOW ACTIVITY WASTE START LAW VITRIFICATION SOONER THAN 2019 & FUND A 2nd LAW FACILITY BY 2012. 38-1

DELETE, SUPPLEMENTAL TREATMENT of LAW,

2) A) ADD NO MORE WASTE TO HANFORD 38-2

B) LIMIT & ELIMINATE COMMERCIAL WASTE TRENCH DEPOSITS. 38-3

C) CLEAN UP TRANSURANIC WASTE IN UNLINED SITES & LEAKING TANKS. 38-4

* STOP DUMPING IN UNLINED PITS.

3) A) US DOE MUST REMOVE 99.9% OF TANK WASTES

B) US DOE MUST REMOVE TANKS & CONTAMINATED SOIL. 38-5

** CONTINUE O
** CONTINUAR A

WHAT IS THE COST OF A NUCLEAR TRANSPORT ACCIDENT? WHO WILL PAY? 38-6

Name/Nombre: RICH MCBRIDE

Address/Dirección: 813 MARIAN

City, State, Zip Code/Ciudad, Estado, Zona Postal: HOOD RIVER, OR 97031

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMBS@saic.com

38-1 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies, including supplemental treatment waste-form performance (durability) for long-term groundwater protection.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision for WTP Project Transition to Operations (2020 Vision)* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, and the balance of facilities (BOF), as well as the Pretreatment Facility and the HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

38-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 38 (cont'd): Rich McBride

38-3 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. Commercial LLW disposal is not within the scope of this EIS.

38-4 In general, the scope of this *TC & WM EIS* does not include (nor will the potential NEPA ROD) remediation of waste that has been previously disposed of, including the TRU waste that was disposed of in the low-level radioactive waste burial grounds (LLBGs), as part of the proposed actions evaluated.

Previous use of unlined trenches for disposal was a big concern to stakeholders and Washington and Oregon States; DOE heard and addressed those concerns and is using lined trenches.

38-5 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all of the SST system.

38-6 Performing a cost analysis for transportation accidents is not within the scope of this EIS. The Price-Anderson Act of 1957 (revised in 1967, 1975, and 1988 and extended by the Energy Policy Act of 2005) requires all NRC licensees and DOE contractors to enter into agreements of indemnification for personal injury and property damage due to any nuclear or radiological incident regardless of who may be liable. Section 604 of the act limits the indemnity provided by DOE for its contractors to $10 billion for each nuclear incident, including legal costs, subject to adjustment for inflation.

Commentor No. 39: Theresa North

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

Date/Fecha: 9 Feb 2010

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1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

The inhabitants of the communities along the Columbia River have said again + again that we want Hanford cleaned up. We want it cleaned up — 99.99% retrieval. We want a clean closure. Take out the tanks, contaminated soil + ancillary equipment. Do not put any new waste at Hanford!! Stop wasting our time with these meetings. We have said over + over that we want Hanford taken care of.

39-1
39-2
39-3
39-4

**** CONTINUE ON BACK FOR MORE SPACE ****
**** CONTINUAR AL DORSO PARA MÁS ESPACIO ****

Name/Nombre: Theresa North

Address/Dirección: 693 Frankton

City, State, Zip Code/Ciudad, Estado, Zona Postal: Hood River, OR 97031

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For more information contact: Mary Beth Burandt, Document Manager,
TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

39-1 DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates. Although not within the scope of this EIS, the projected results of the cleanup efforts are included in the cumulative impacts analysis.

39-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all of the SST system, which would effectively remove 100 percent of the waste. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

39-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

39-4 DOE conducted public hearings on the *Draft TC & WM EIS* as required under DOE's NEPA regulations to give the public an opportunity to learn more about the draft EIS and provide comments on it. DOE has considered all comments received during the public comment period, including those from the hearings, in preparing this *Final TC & WM EIS*.

Commentor No. 40: Barbara Pereira

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 2/10/2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*?
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Congress, other people, think it is so safe, why do we have to worry about groundwater contamination that has been going on for many years? If nuclear plants are so safe why is workers' risk mentioned? What about the contamination of Columbia River? The surfers unaware — the fishermen eating the contaminated fish — the contaminated well waters — the radiation going through Oregon downwind? *40-1*

Department of Energy Secretary, Mr. Shive, has a moral, moral, obligation to clean up the site — no half baked cleanup of capping but a ~~thor~~ thorough cleanup. If there needs to be more spending — do it as this nuclear waste — leaking into the ground has been here too long. Mr Shive, come live at Hanford for a year or live in Oregon in Eastern Oregon. Just hope you don't get thyroid cancer. *40-2*

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Barbara Pereira

Address/Dirección: 1213 S E Umatilla

City, State, Zip Code/Ciudad, Estado, Zona Postal: Portland, OR 97202

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

40-1 As specified in Chapter 1, Section 1.1, this *TC & WM EIS* was prepared in accordance with NEPA regulations. NEPA requires that impacts on the human environment be evaluated (40 CFR 1508.14). Because radiation hazards are associated with the activities described in this EIS, the risk to workers of such hazards are evaluated. Worker health and safety, both radiological and nonradiological aspects, are managed and monitored at Hanford. Radioactive contamination from Hanford has been detected in the Columbia River. DOE monitors the river and publishes annual site environmental reports (Poston, Duncan, and Dirkes 2011) so that the public is aware of environmental impacts resulting from ongoing operations. As presented in Chapter 3, Table 3–13 of this *TC & WM EIS*, the estimated dose from liquid releases from Hanford to the maximally exposed individual (MEI) in 2010 was 0.056 millirem. The risk of a fatal cancer from this dose is about 1 in 35 million.

This EIS evaluates potential doses to receptors (i.e., different members of the public) who would be exposed through water pathways, that is, to contaminants in groundwater, surface water, or both. The groundwater receptors are a drinking-water well user; a resident farmer; an American Indian resident farmer on the site, at the site boundary, or at the Columbia River; and an American Indian hunter-gatherer along the Columbia River. The surface-water receptors include a resident farmer, and doses to the downstream population are conservatively assumed to be the same as those to this resident farmer. Impacts on these receptors are summarized in the Summary, Tables S–5, S–6, and S–7, and Chapter 2, Tables 2–9, 2–10, and 2–11.

40-2 Funding for Hanford is beyond the scope of this *TC & WM EIS*.

Commentor No. 41: Becca and Hazel LeTourneau

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

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Date/Fecha: 2/10/10

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Hanford should be completely cleaned up. All tanks should be replaced. All waste should be cleaned from soil and groundwater. No new waste should be brought to Hanford. No waste should be transported through Portland or the surrounding area. 41-1 41-2

No clean-up plan is safe. No storage is permanent. My 3-year old daughter is with me tonight to represent the burden on future generations. If we cannot clean up what has already spilled - we cannot process new waste. 41-3

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Becca and Hazel LeTourneau

Address/Dirección: 301 SE 143rd Ave

City, State, Zip Code/Ciudad, Estado, Zona Postal: Portland, OR 97233

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TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

41-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*. However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

41-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

41-3 DOE agrees with the need to protect the health of future generations. To this end, DOE is sponsoring extensive programs to clean up waste from past practices and prevent more waste such as that in the tanks from entering the environment.

Commentor No. 41 (cont'd): Becca and Hazel LeTourneau

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 42: John Marks

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

Date/Fecha: _____

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Hanford is already overburdened. Don't make it worse
No additional nuclear waste. 42-1

Clean up present tank leakage. Remove tanks, Decontaminate
soil. Dispose of tanks. Work until you have 42-2
certification from unquestioned outside authority: IAEA? 42-3

Learn from your mistakes, Resolve to correct them.
You'll feel better if you do.

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: John Marks
Address/Dirección: 1400 NE 2nd Ave Apt 802
City, State, Zip Code/Ciudad, Estado, Zona Postal: Portland 97232

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@adic.com

42-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

42-2 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or are suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks; treat and dispose of this waste; and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

42-3 DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; and the *Washington Administrative Code* (WAC) regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE order requirements that must be met for DOE to implement Tank Closure alternatives. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter. However, the International Atomic Energy Agency does not have authority over Hanford.

Commentor No. 43: Kathy Krisinski

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 2/10/10

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I am against Federal plans to use Hanford as a National Radioactive Waste Dump and abandon existing contamination. To do so would be to abandon our future generation, wildlife and current health of the people. You can not tell me that Tritium, Uranium, ect can be stored safely without eventual leaks and wear. To have Hanford as 43-1 43-2

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Kathy Krisinski

Address/Dirección: 11745 SE Cora St Portland, OR 97266

City, State, Zip Code/Ciudad, Estado, Zona Postal:

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

43-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

43-2 Decisions regarding the long-term storage of mercury are outside the scope of this *TC & WM EIS*. DOE evaluated the adequacy of 7 potential sites for the storage of elemental mercury in the *Final Long-Term Management and Storage of Elemental Mercury Environmental Impact Statement* (DOE 2011b); details of how DOE established the alternatives sites to be analyzed are presented in Chapter 1, Section 1.5.1, of that document. DOE further identifies in that EIS the Waste Control Specialists site near Andrews, Texas, as the Preferred Alternative for conducting the proposed mercury management and storage activities. DOE has not made any decision with regard to the *Final Long-Term Management and Storage of Elemental Mercury Environmental Impact Statement*.

Commentor No. 43 (cont'd): Kathy Krisinski

a "Candidate" site for long term mercury storage is ludicrous. With risks of impacts on developing fetus, impaired motor and cognitive skills. The impact on our rivers and oceans and drinking water with these contaminants leaking in to our water is a crime not a solution.

43-2 cont'd

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Commentor No. 44: Thomas Clark

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: _____

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(1) Contents of Tanks are not inert — 44-1

Will Dept release videos of prior investigations? — 44-2

(2) What amount of escaped liquid mixture (chemical and nuclear) has been detected, measured, and recovered? — 44-3

(3) What percentage of the total created is this?

(4) Will the US Government pay for present and future damages including medical, mental and healthcare? — 44-4

(5) Where are the environmental Sensors? — 44-5

(6) What training and support exists for Washington and Oregon Healthcare Personnel

(7) Information, training, protection for Citizens and Residents — 44-6

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Thomas Clark

Address/Dirección: 10490 SW Meier Drive, Tualatin, OR 97062

City, State, Zip Code/Ciudad, Estado, Zona Postal: ([redacted]) [redacted] - [redacted]

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

44-1 DOE agrees the tanks are not inert.

44-2 DOE believes the commentor is referring to videos of tank retrievals or tank inspections related to the SSTs. These videos are posted on the Hanford website (http://www.hanford.gov, in the "Video Library" section). Videos of older tank inspections that are no longer on the website can be requested from the ORP Office of Communication by phone at 509-372-8656.

44-3 The commentor is referred to Appendix D, Section D.1, as well as Appendix S. These appendices and their accompanying tables provide the best-available estimates of the liquid waste volumes and constituents that have been released to the environment at Hanford. Calculating a percentage of liquid waste that has been released to the environment from the volume of liquid waste generated is not possible because many of the liquid waste streams were either concentrated or further treated prior to release.

44-4 The role of the U.S. Government in paying for present and future health care issues is not within the scope of this EIS. This *TC & WM EIS* addresses proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites.

44-5 Regarding the location of environmental sensors, DOE surmises that the commentor is concerned about measures and equipment such as ambient air quality monitors, groundwater monitoring wells, and similar collection devices to detect contaminants that could impact human health and the environment. DOE performs environmental monitoring and surveillance for radioactive and nonradioactive constituents in air and liquid effluent emissions from Hanford facilities and for potentially affected environmental media on Hanford and in offsite locations for analysis and comparison with regulatory standards. Media surveyed on a regular basis include ambient air, soils, sediments, surface water, drinking water, and groundwater. DOE also monitors vegetation, fish, and wildlife for Hanford-produced contaminants. Sampling locations, numbers, and distribution and their analysis results are detailed in publicly available documents, such as the annual Hanford Site environmental report (Poston, Duncan, and Dirkes 2011). Chapter 3 of this *TC & WM EIS* summarizes the results of monitoring and surveillance activities relevant to selected environmental resources.

Commentor No. 44 (cont'd): Thomas Clark

44-6 DOE uses DOE Order 151.1C, *Comprehensive Emergency Management System*, as a basis to establish a comprehensive emergency management program that provides detailed, hazard-specific planning and preparedness measures to minimize the health impacts of accidents involving loss of control over radioactive material or toxic chemicals, as discussed in this *TC & WM EIS*, in Chapter 3, Sections 3.2.10.5 and 3.3.10.5, emergency preparedness at Hanford and INL, respectively. DOE provides technical assistance to other Federal agencies and to state and local governments. Hanford contractors are responsible for maintaining emergency plans and response procedures for all facilities, operations, and activities under their jurisdiction and for implementing those plans and procedures during emergencies. Plans and procedures are reviewed and approved by DOE in accordance with DOE Order 151.1C. The DOE, contractor, and state and local government plans are fully coordinated and integrated. The Transportation Emergency Preparedness Program was established by DOE to ensure its operating contractors and state, tribal, and local emergency responders are prepared to respond promptly, efficiently, and effectively to accidents involving DOE shipments of radioactive material. This program is a component of the overall emergency management system established by DOE Order 151.1C.

Commentor No. 45: Richard Piland

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 2-10-10

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1. HANFORD MUST BE CLEANED UP! CONTAMINATING THE COLUMBIA RIVER FOR THOUSANDS OF YEARS IS NOT ACCEPTABLE. HOW ARROGANT CAN WE BE TO CONTEMPLATE DOING THAT? *45-1*

2. NO NUCLEAR WASTE TO BE TRANSPORTED TO AND STORED IN THE NORTHWEST. *45-2*

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: RICHARD PILAND

Address/Dirección: 10465 SW MILLER CT.

City, State, Zip Code/Ciudad, Estado, Zona Postal: TUALATIN, OR 97062

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

45-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

45-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 46: Richard F. Till

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

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Gracias por su participación

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The Final EIS should explicitly preclude the ~~shipment~~ treatment of offsite nuclear waste at the proposed vitrification plant. Allowing waste to be shipped to Hanford is ~~an~~ creates an unreasonable risk to the public and the environment. If ~~offsite~~ waste from other locations needs to be processed, the Department of Energy should construct new vitrification facilities at those sites. To guarantee the residents of and visitors to Washington and Oregon are not put at risk from the ~~shipment~~ of waste, the Final EIS must include strict conditions requiring the closure of the Hanford vitrification plant when all Hanford waste is treated.

The ~~[illegible]~~ Dept. of Energy's long history of reckless mismanagement at Hanford must come to an end. The sad history of environmental degredation and harm to human health must come to a close.

I submit these comments as a native of Washington State ~~and~~, a current resident of Oregon and a boater that uses the Columbia River.

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Richard F. Till

Address/Dirección: 2515 SE 51st #15

City, State, Zip Code/Ciudad, Estado, Zona Postal: Portland OR 97206

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@wcic.com

46-1 46-2 46-3 46-4 46-5

46-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Although waste from other DOE sites may be packaged (including solidification) at Hanford for shipment elsewhere, offsite waste will not be vitrified at Hanford. This *TC & WM EIS* analyzes the disposal of offsite LLW and MLLW waste from other DOE facilities, but the waste would be treated at the generating DOE site prior to shipment to Hanford for disposal.

46-2 See response to comment 46-1 regarding the transport and disposal of offsite waste.

46-3 See response to comment 46-1 regarding the transport and disposal of offsite waste.

46-4 The WTP is currently under construction in the 200-East Area of Hanford. As such, construction (and subsequent operations and deactivation) of the WTP was analyzed under each Tank Closure alternative to establish a common reference point for use in comparing alternatives. However, closure of the WTP is not part of the proposed actions in this *TC & WM EIS* because the WTP is needed to complete waste treatment activities. See Chapter 1, Section 1.4.2, Decisions Not to be Made, for more information. Closure of the WTP will be addressed at a later date and will be subject to appropriate future NEPA review.

46-5 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called

Commentor No. 46 (cont'd): Richard F. Till

milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 47: David Moen

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: Feb. 10, 2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*?
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I consider radioactive waste the biggest environmental terrorist threat to our homeland security we have ever faced. In light of this I expect a permanent sollution to cleaning up Hanford quickly + 100% thourongly. This means I expect: *47-1*

- Recind the prefered alternative to turn Hanford into a national radioactive waste dump; Bringing more nuclear waste to Hanford is not acceptable under any conditions! *47-2*
- clean up all of the waste that currently exists!! (on site) It is legally, morally, + ethically reprehensible to do anything less. *47-3*
- Honor the state + federal trust responsibilities to the tribal nations by consulting with them + doing what they recomend is the responsible Sollution in their homelands. *47-4*
- clean up the ground water + seal the "leaker" tanks, no matter what. *47-3 cont'd*

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Mr. David Moen
Address/Dirección: 16751 S. McCubbin Rd.
City, State, Zip Code/Ciudad, Estado, Zona Postal: Oregon City, OR 97045

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

47-1 Comment noted.

47-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

47-3 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

47-4 DOE actively engages in government-to-government consultations with tribes in the vicinity of Hanford. These consultations offer the opportunity for tribes to engage in meaningful dialogue in advance of DOE decisionmaking.

Commentor No. 48: Anonymous

U.S. DEPARTMENT OF ENERGY

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Thank you for your input
Gracias por su participación

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Date/Fecha: 2/10/10

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Anything to decrease leakage into the Columbia River → keep moving ward to minimize waste → I wish I knew the answers → your work is so astronomical to the 7th generation. The responsibility is so huge. Actions = everything → What can I do to help? We are all so sad. This is such a condition to tackle. Keep the faith & pray – I'm praying for your work & straight mind in this burden. May God heal this tragedy. *48-1*

Moving more waste to Hanford doesn't make sense. *48-2*

Autism is on the rise. 10 years ago 1 out of 10,000 kids had autism – Now 1 out of 150 have autism. I believe immunizations (some) & toxic waste are a big reason for this increase.

Keep the Faith!

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

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E-mail: TC&WMEIS@saic.com

48-1 Since 2004, DOE has buried all LLW in lined trenches. DOE continues to have strict limits for the amount of waste Hanford can accept, and ensures that disposal activities are protective of the environment and meet regulatory requirements. See Chapter 1, Section 1.4, for more on DOE's commitment to using lined trenches.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

At all DOE sites, including Hanford, the Site Pollution Prevention Program is a comprehensive, continual effort to reduce the quantity and toxicity of hazardous, radioactive, mixed, and sanitary wastes; and prevent or minimize pollutant releases to all environmental media from all operations and site cleanup activities. The Site Pollution Prevention Program reflects Federal and DOE policies to reduce, reuse, and/or recycle wastes as asserted by the Pollution Prevention Act of 1990. See Chapter 3, Sections 3.2.12.2 (Hanford) and 3.3.12.2 (INL), and Chapter 4, Section 4.1, for more details of waste minimization activities.

48-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 49: Gray Moen

U. S. DEPARTMENT OF ENERGY

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Formulario para comentarios

Thank you for your input
Gracias por su participación

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Date/Fecha: 2/10/2010

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I object to the energy department's plans! 49-1
Clean up your mess before you dump more!
100% clean up + nothing less, do it + do it now!! No capping; empty every tank + vitrify + dismantle the facility w/o entombing it! Don't enshrine this embarrassment! 49-2
Unlined ditches are not acceptible, clean up whats in them. For the river, for the fish, for the children — no compromise w/ this environmental disaster — time to wake up!
* No shipping more fuel, clean up all of it **NOW.** 49-3

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Gray Moen, PDX

Address/Dirección:

City, State, Zip Code/Ciudad, Estado, Zona Postal:

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E-mail: TC&WMEIS@saic.com

49-1 DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates. Although such cleanup activities are not within the scope of this EIS, DOE included remediation activities in the present cumulative impacts analysis. These activities encompass existing contamination from past tank leaks and past waste management practices. DOE also recognizes stakeholders' concerns about cleaning up the site before bringing more waste from other DOE sites for disposal. To this end, in a *Federal Register* notice published on December 18, 2009 (74 FR 67189), DOE modified its Preferred Alternative for waste management and extended the duration of the moratorium until the WTP is operational. DOE also included GTCC waste as part of that moratorium. DOE has not changed its Preferred Alternative in this final EIS concerning this extended moratorium. DOE's inclusion of the moratorium in its ROD following issuance of this final EIS would result in its enforceability.

49-2 The clean closure alternatives considered for the SST system are represented by Tank Closure Alternatives 6A and 6B, Base and Option Cases. For both Tank Closure Alternatives 6A and 6B, Base Cases, the assumption is that the SST system would be cleaned to levels that would allow unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone does not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

Since 2004, DOE has buried all LLW in lined trenches (see Appendix E, Section E.3.3, for the evolution of past disposal practices). DOE continues to have strict limits for the amount of waste Hanford can accept and ensures that disposal activities are protective of the environment and meet regulatory requirements. Previous use of unlined trenches for disposal was a big concern to stakeholders and Washington and Oregon States; DOE heard and addressed those concerns and is using lined trenches.

Commentor No. 49 (cont'd): Gray Moen

The remediation of burial grounds is not within the scope of this EIS. However, Appendix S includes DOE's inventory estimates for the burial grounds and Appendix U provides supporting information on the long-term cumulative impact analyses that includes the burial ground inventories.

49-3 DOE assumes that the commentor is referring to SNF when referring to the shipment of "fuel" to Hanford.

Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 50: Susan O. Moen

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

Date/Fecha: 2-10-2010

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- Hanford must be cleaned up entirely, 100%, ground water and all. *50-1*
- No new nuclear waste should be allowed to come to Hanford. *50-2*
- "Decommission" not "Entombment". *50-3*
- This is expensive, but it is the true cost of nuclear production + should be entered into the equation from the begining... lets pay what it takes to do the job right: 99.9% clean up. *50-1 cont'd*

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Susan O. Moen, Portland

Address/Dirección: [redacted]

City, State, Zip Code/Ciudad, Estado, Zona Postal:

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50-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

50-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

50-3 Three alternatives for decommissioning FFTF are presented in this *TC & WM EIS*. These alternatives are No Action, Entombment, and Removal. DOE has selected FFTF Decommissioning Alternative 2: Entombment, as its Preferred Alternative. This alternative would remove all above-grade structures, including the reactor building. Below-grade structures, the reactor vessel, piping, and other components would remain in place and be filled with grout to immobilize the remaining and hazardous constituents. Waste generated from these activities would be disposed of in an IDF, and a modified RCRA

Commentor No. 50 (cont'd): Susan O. Moen

Subtitle C barrier would be constructed over the filled area. The RH-SCs would be processed at INL, but bulk sodium inventories would be processed at Hanford (see Chapter 2, Section 2.12.2).

Commentor No. 51: Allen Evans

U.S. DEPARTMENT OF ENERGY

Comment Form
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Thank you for your input
Gracias por su participación

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Date/Fecha: 2/10/10

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Hanford was selected as a location for production of radioactive materials for reasons that overwhelmed concerns regarding the geology and groundwater characteristics of the area. Wartime hysteria required a quick decision be made. Hanford was remote - facilitating security and secrecy. There was a low population density, abundant water from the Columbia River, and abundant electricity from newly completed dams on that river. Waste management was a secondary concern. The result is the set of problems with contamination we are dealing with now. These demonstrate that Hanford is an inappropriate place for the storage of nuclear waste, especially long term. No more offsite waste should be shipped there.
The best solution would be to stop production of nuclear materials to begin with. Thank you.

51-1

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Allen Evans

Address/Dirección: 3926 S.E. Nehalem St

City, State, Zip Code/Ciudad, Estado, Zona Postal: Portland, OR 97202

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51-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

The production of nuclear materials is not within the scope of this *TC & WM EIS*. This EIS addresses proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites.

Commentor No. 52: Lynn Ford

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

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1. Do Not ADD ANY MORE WASTE OF ANY KIND TO HANFORD. USE STIMULUS MONEY TO TREAT IT ALL "IN SITU." THAT WOULD GET SUPPORT FROM MANY CONGRESSIONAL REPS. 52-1 52-2
2. START UP L.A.W. VITRIFICATION PART OF WTP by 2019. START FUNDING 2ND L.A.W. IN 2012 TO have it start operations by 2022 52-3
3. Follow WASH. State standard for FFTF waste Removal + site restoration 52-4
4. Perform true "clean closure" for single shell tanks Follow WASH. State Law. Remove 99.9% of Tank wastes 52-5

Get more funding for clean up from stimulus Money; Provide employment doing something useful. 52-2 cont'd
Also, give Iranian officials a Tour. Maybe they won't like nukes after that

**** CONTINUE ON BACK FOR MORE SPACE ****
**** CONTINUAR AL DORSO PARA MÁS ESPACIO ****

Name/Nombre: LYNN FORD

Address/Dirección: 401 N. Blandena St, Portland, OR 97217

City, State, Zip Code/Ciudad, Estado, Zona Postal: Portland, OR 97217

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52-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

52-2 The use of stimulus funds to treat waste and clean up Hanford is beyond the scope of this *TC & WM EIS*.

52-3 This EIS analyzed supplemental LAW treatment capability by building new treatment facilities that are either part of (expanded LAW capacity) or separate (bulk vitrification, steam reforming, or cast stone) from the WTP. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

52-4 DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; Section 1.2.7 discusses the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE order requirements that must be met for DOE to implement Tank Closure and FFTF Decommissioning alternatives. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter.

52-5 Comment noted.

Commentor No. 53: Lang Davison

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 2-10-10

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

we want and demand:

(1) Closure of 99.9 % of the waste already at Hanford
Clean
Immediate
- Empty all ~~[illegible]~~ tanks, all 53 million gallons
- Clean the soil beneath tanks
- Remove the tanks

53-1

(2) No new GTCC waste into Hanford. No more Radioactive waste from other sites into Hanford, Not a national waste dump. Drop the proposale

53-2

(3) Clean up what's already leaking into the groundwater through the soil — the millions of gallons of nuclear waste, [and/OR failing to clean up what's already there] Adding more waste is legally, morally, and ethically unacceptable!

53-3

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Lang Davison

Address/Dirección: 1739 SE Lexington St.

City, State, Zip Code/Ciudad, Estado, Zona Postal: Portland, OR 97202

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

53-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*. DOE is implementing an extensive, ongoing cleanup program at Hanford as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

53-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Section 2.12 of this CRD.

53-3 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Commentor No. 53 (cont'd): Lang Davison

See response to comment 53-2 for a discussion on the transport and disposal of offsite waste.

Commentor No. 54: Martin Mijal

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 2.10.10

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*?

Nuclear waste AFFECTS our descendents & other Life-forms for 100,000 plus years. This is POISON. IT KILLS. Cancer is an ugly way to die. This is not a trivial decision. 54-1

This problem should never have occurred. Genius scientists needed vast intelligence & a huge budget to make this poison for weapons of mass destruction. Lack of long-term planning now gives us extremely serious hazards to current workers to de-contaminate this 54-2 & also the 1,000,000 gallons leaking to our Glorious Columbia River. 54-3

The theory of Capitalism is that if incompetence happens — the Boss is FIRED. D.O.E. is a FAILURE! You all should be fired!

Clean up the poison from our weapons of mass destruction. I want: 1) USDOE must remove 99.9% of tank wastes.
2) USDOE must remove tanks. Do "clean closure." Remediate the soil & clean it. Leaving the bottom 1% of poison is the heaviest, hardest to remove AND the MOST POISONOUS! This is essential to remove 99.9%! 54-4
3) Remove FFTF & restore the site. Treat the FFTF waste at Hanford. 54-5
4) START UP the LAW VITRIFICATION portion of WTP PRIOR to 2019. Fund & complete a second LAW facility in 2012 → 54-6

Continued →

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: MARTIN MIJAL

Address/Dirección: 4527 NE SUMNER ST.

City, State, Zip Code/Ciudad, Estado, Zona Postal: Pdx OR 97218

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

54-1 This EIS addresses the environmental impacts of retrieval, treatment, and disposal of tank waste and final closure of the SST system. It also evaluates the impacts of FFTF decommissioning, including management of waste generated by the decommissioning process. Finally, this *TC & WM EIS* evaluates the potential environmental impacts of ongoing solid-waste management operations at Hanford, as well as the proposed disposal of Hanford LLW and MLLW and a limited volume of offsite LLW and MLLW.

54-2 The actions proposed in this *TC & WM EIS* include the retrieval and treatment of highly radioactive waste from defense plutonium production that was placed into underground SSTs for storage. The pressing need for a strong national defense capability during World War II led to the development of Hanford to produce plutonium for weapons production. In the ensuing decades, Hanford continued to be part of DOE's Defense Complex as well as being engaged in efforts to develop nuclear power for peaceful purposes. During these early decades, the nation did not have the environmental awareness, laws, and regulations that exist today. Nevertheless, it was recognized that HLW from plutonium production should be managed as safely as possible, and DOE's predecessor agencies constructed large facilities, including the underground tanks, to manage the waste produced as a result of Hanford's national defense mission. In implementing its programs, including the cleanup activities evaluated in this EIS, ensuring worker safety is a matter of DOE policy and primary concern. DOE works and will continue work to minimize risks to workers through site procedures and job control plans aimed at maintaining radiation doses ALARA. Worker doses will be controlled by techniques such as planning work to reduce time of exposure, increasing the number of workers, using shielding, and employing remote operations.

54-3 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

54-4 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include

Commentor No. 54 (cont'd): Martin Mijal

So it will operate by 2022.

54-6 cont'd

@ NO NO more waste - poison - cancer - causes added to Hanford.

54-7

President Bush signed an executive order putting DOE in charge of the cleanup. President OBAMA could review the failure of ~~DOA~~ DOE & sign an executive order that EPA is in charge. MAYbe then some energy, funding, genius, passion, & creativity could be used to CLEAN UP HANFORD — 99.9% !

54-8

Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

54-5 Comment noted.

54-6 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies, including supplemental treatment waste-form performance (durability) for long-term groundwater protection.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, and the BOF, as well as the Pretreatment Facility and

Commentor No. 54 (cont'd): Martin Mijal

the HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

54-7 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

54-8 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 55: Sheila Nyhus

2/9/2010

Ms. Burandt,

I am writing because I am concerned about the proposal to ship more radioactive waste to the banks of the Columbia and to delay the clean up at Hanford.

Hanford needs to be cleaned up now. We need to address this ongoing long term problem which is a threat to the environment and potentially all of us living in this region. The idea that we would bring in more radioactive waste is ludicrous. 55-1

My hope is that cleaning up Hanford will become the priority. No more radioactive waste. Let's take care of what is already here.

Sincerely,

Sheila Nyhus
2112 SE Yamhill St.
Portland, OR 97214

55-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 56: Bob Severson, Mayor, City of Hermiston, Oregon

city of Hermiston Oregon
incorporated 1907

Administrative Offices
180 N.E. 2nd Street
Hermiston, OR 97838-1860
Phone (541) 567-5521 • Fax (541) 567-5530
E-mail: bseverson@hermiston.or.us

Mary Beth Burandt
DOE Draft TC&WM EIS Comments
Office of River Protection
Richland, WA 99685

Dear Ms. Burandt:

The City of Hermiston is extremely concerned with potential plans by the US Department of Energy to allow the Hanford Nuclear Reservation near Richland, Washington as a permanent nuclear waste disposal site for waste from across the United States.

As a community that lies down stream from the Hanford site, as a community that relies on water withdrawals from the Columbia River system for domestic use in our municipal water system, as a region that is driven economically by agricultural production of irrigated food crops with water drawn from the Columbia River and with Oregon's plan to pump Columbia River water during the winter months into local aquifiers we are strongly opposed to plans for storage of off site waste to this site and the further threat of groundwater contamination.

Because the EIS shows "persistent contamination in Hanford's groundwater for thousands of years"and the likelihood that much of this contaminated groundwater would likely reach the Columbia River, the long term impacts on the groundwater will be significant and we ask that this plan be stopped. *56-1*

Our citizens have lived under the shadow of this facility for many years and just as they are beginning to hope that significant advances may be made in mitigating this contamination now they want to store more waste and threaten further environmental liabilities to an already endangered site. This is not an acceptable solution or alternative. Our citizens expected clean-up, not new hazardous disposals.

Please oppose any plan to use Hanford as a national depository for nuclear waste.

Sincerely,

Bob Severson

Bob Severson
Mayor

cc: Hermiston City Council
Ed Brookshier, City Manager.

RECEIVED
FEB 09 2010
DOE-ORP/ORPCC

56-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Commentor No. 57: Jeffrey Weih

From: Jeffrey Weih [jweih@yahoo.com]
Sent: Thursday, February 11, 2010 4:18 PM
To: tc&wmeis@saic.com
Subject: hanford mess

Clean up Hanford completely! *57-1*

No more acceptance of waste until this is done! *57-2*

57-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

57-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 58: Keeley Harding

From: Keeley Harding [createbeautyexposetruth@yahoo.com]
Sent: Thursday, February 11, 2010 5:56 PM
To: tc&wmeis@saic.com
Subject: NONE of the public wants more waste at Hanford especially since it's own has not been 100% cleaned up!

Our answers will never change for as long as Hanford-people keep coming, going and asking. If I asked everyone I know and everyone they know and on and on, no one would say, "I don't want Hanford cleaned up because it costs too much money. Our health, salmon and groundwater are not worth it. I would love to be exposed to highly toxic waste alongside me on the freeway. I think the exponentially increased cancer and other health risks would be an exciting challenge, especially for my children! I think the whole country's nuclear waste should be stored on the banks of a major river near a volcano."

Most people I hear who say they've been coming to Hanford hearings for 20 years are in their 50s or 60s. Not me, I'm 23. I've been attending with my parents and brother in Hood River since I was a little kid. I have vivid images in my memory of the variety of hearings over the years, accompanied by the DeBrulers and the many other heroes who always show up. Meanwhile the USDOE panelists come and go. Buses of Richlanders used to come crash, but I think they gave up on convincing Hood Riverites that radiation is good for health.

I, we all, demand that USDOE thoroughly clean up all 53 million gallons of buried nuclear waste as well as the millions of gallons that have already leaked and begun reaching the Columbia River. We must always clean up first, as a rule. And of course disassemble the FFTF. Nuclear energy is not the future. It has been a horrible disaster and should never be pursued anywhere again. *58-1* *58-2*

I, we all, demand that USDOE forget once and for all the proposal to ship radioactive waste from across the country to Hanford along I-5, I-84 and all the other interstates this proposal would effect. USDOE's own analysis admits that shipping waste would lead to as many as 816 fatal radiation-induced cancers in adults from the trucks en route, barring accidents or terrorist attacks. Further, children are 3 to 10 times more susceptible to cancer. And the USDOE analysis must include the effects on threatened and endangered species. *58-3* *58-4* *58-5*

Our government DOES have enough money to clean up Hanford. Money just needs to be reallocated. It doesn't matter the cost, Hanford must be cleaned up, before everyone who has any connection to the perceived success of nuclear power is dead. We cannot leave this mess for our children when they will be so far beyond the idea of nuclear power... onto actual safe, renewable energies. *58-6*

58-1 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or are suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on the Columbia River.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

58-2 Comment noted.

58-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

58-4 The value of 816 LCFs is from the results provided in the *GNEP PEIS* (DOE 2008b). This value represents the maximum impacts associated with 50 years of transportation activities supporting the operations of all existing U.S. commercial light-water reactors if they all were replaced with high-temperature, gas-cooled reactors. The *GNEP PEIS* was canceled by DOE on June 29, 2009 (74 FR 31017). As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

There is no existing guidance that recommends dose coefficients for children's exposure to external radiation. DOE acknowledges that children have an elevated sensitivity to radiation exposure. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) is used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult,

but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance that provides this information has yet to be developed.

As stated in the National Research Council's Report in Brief on Biological Effects of Ionizing Radiation (BEIR) VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths for the sex and age distribution of the U.S. population in terms of the number of excess deaths per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing LCFs (DOE 2003a). The National Research Council report also shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose, compared with about 42 out of 100 individuals who are expected to develop solid cancer or leukemia from other causes, assuming a sex and age distribution similar to that of the entire U.S. population. The BEIR VII dose-to-risk conversion factor is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the *Draft* and *Final TC & WM EIS* transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs.

58-5 This *TC & WM EIS* does analyze the impacts of the various alternatives on threatened and endangered species. With respect to tank closure, this discussion is presented in Chapter 4, Sections 4.1.7.1 (Alternative 1: No Action), 4.1.7.2.4 (Alternative 2A), 4.1.7.3.4 (Alternative 2B), 4.1.7.4.4 (Alternative 3A), 4.1.7.5.4 (Alternative 3B), 4.1.7.6.4 (Alternative 3C), 4.1.7.7.4 (Alternative 4), 4.1.7.8.4 (Alternative 5), 4.1.7.9.4 (Alternative 6A), 4.1.7.10.4 (Alternative 6B), and 4.1.7.11.4 (Alternative 6C). FFTF decommissioning impacts on threatened and endangered species are addressed in Chapter 4, Sections 4.2.7.1 (Alternative 1: No Action), 4.2.7.2.4 (Alternative 2: Entombment), and 4.2.7.3.4 (Alternative 3: Removal [this was Section 4.2.7.3.3 in the *Draft TC & WM EIS*]). Waste management impacts on threatened and endangered species are addressed in Chapter 4, Sections 4.3.7.1 (Alternative 1: No Action), 4.3.7.2.3 (Alternative 2: Disposal in IDF, 200-East Area Only), and 4.3.7.3.3 (Alternative 3: Disposal in IDF, 200-East and 200-West Areas). Threatened and endangered species are further addressed in Chapter 4, Section 4.4.6.3 (Combination of Alternatives),

Commentor No. 58 (cont'd): Keeley Harding

Chapter 6, Section 6.3.7.2 (Short-Term Cumulative Impacts), and Chapter 7, Sections 7.1.7 (Mitigation) and 7.2.7 (Unavoidable Adverse Environmental Impacts). Long-term ecological risk is addressed in Chapter 5, Sections 5.1.3 (Tank Closure Alternatives), 5.2.3 (FFTF Decommissioning Alternatives), and 5.3.3 (Waste Management Alternatives). While these Chapter 5 sections do not specifically address threatened and endangered species, the analysis presented generally would be applicable to this group of species.

58-6 Comment noted.

Commentor No. 59: Timothy Henwood

From: Timothy Henwood [henfez@gmail.com]
Sent: Thursday, February 11, 2010 6:13 PM
To: tc&wmeis@saic.com
Subject: Comment on Hanford Site Draft Tank Closure

We need to find a better way to boil water than one that leaves thousands of years of deadly byproducts. *59-1*

You are the Department of Energy, not the Department of Big Energy Companies.

This country is founded on the principle of "we the people".

Never forget that and you will make the right decisions.

Regards,

Timothy Henwood
Portland, Oregon

59-1 Nuclear power generation is not within the scope of this *TC & WM EIS*. This EIS addresses proposed actions to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and expand waste disposal capacity at Hanford to provide for disposal of on- and offsite DOE waste. The disposal of other waste, including waste associated with commercial nuclear power generation, is beyond the scope of this EIS.

Commentor No. 60: Ineke Deruyter

From: ineke deruyter [ideruyter@hotmail.com]
Sent: Friday, February 12, 2010 1:32 AM
To: tc&wmeis@saic.com; ken.niles@state.or.us
Subject: Clean up Hanford Now.

No new nuclear waste to the site!! Don't make the dump worse than it already is. CLEAN IT UP NOW! Thank you, *60-1*

Ineke Deruyter-9322 N. Oswego Ave, Portland, OR 97203

60-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 61: Phyllis Weih

From: pbweih@comcast.net
Sent: Friday, February 12, 2010 7:45 PM
To: tc&wmeis@saic.com
Subject: TC & WM EIS (Tank Closure & Waste Management Environmental Impact Statement)

Dear Ms Durant,

You ask for comments; here they are:

I think about your children, and my grandchildren, and your great-grandchildren, and all the children to come and the increase in cancer that exposure to radiation is known to cause. *61-1*

And then I think of accidents, or equipment failures, or deliberate acts of terrorism. One or more of them will eventually happen. Complex systems theory explains why this is true. *61-2*

I think about the plume of radioactivity coming from Hanford that is already contaminating the soil and groundwater around the site and the elevated levels of radioactive thorium along the Columbia River, and I realize that the radioactive contamination from Hanford has never been contained. NEVER been thoroughly contained! Think about that! And your want me/us to believe that you can bring MORE nuclear waste from around the entire country, and that you will NOW contain this new waste too? I don't believe you will do it. Nor do I believe that you can safely ship thousands of truckloads of the most toxic materials on the planet across thousands of miles safely. *61-3* *61-4*

So I say, I beg, I demand that you save our water, save our salmon, and save generation after generation of people and animals from heartache and death.

Do not bring in off site nuclear waste. Keep it where it is and "contain" it there.

Clean up the existing contamination at Hanford to 99.9% of what is there or is possible, and spend the money to protect the workers. We spend money to go to war; we spend money to bail out institutions that have failed us and yet are "too big to fail"; I don't understand why we can't do this clean up. *61-5* *61-6*

Sincerely,

Phyllis Weih
Portland, OR

61-1 Scientific data indicate that health effects from radiation exposure are more pronounced in children than adults. As discussed in Appendix K, Section K.1.1.6, of this *TC & WM EIS*, a number of authoritative studies provide guidance on risk factors relating health effects to dose. Section K.1.1.6 discusses the scientific evidence relating radiation dose to incidence of cancers, both fatal and nonfatal. The discussion indicates that the fatal cancer risk factor of 0.0006 reflects an age distribution that includes children and is generally regarded as conservative. Appendix Q, Section Q.2.4.2, explains that nuclide-specific risk coefficients, developed using techniques that account for gender and age, were used for the long-term human health impacts analysis.

61-2 Hanford facility operations and security are intended to prevent such incidents from occurring; nevertheless, this *TC & WM EIS* includes analyses of the potential impacts on members of the public resulting from accidents and intentional acts of destruction. The results of these analyses are presented in Chapter 4, Sections 4.1.11, 4.2.11, and 4.3.11. More-detailed descriptions of the accident scenarios and the methods of analysis are presented in Appendix K, Section K.3.

61-3 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

61-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

61-5 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD

Commentor No. 61 (cont'd): Phyllis Weih

issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

61-6 Funding to clean up Hanford is beyond the scope of this *TC & WM EIS*.

Commentor No. 62: John Galle

From: John Galle [john.galle.pe@gmail.com]
Sent: Saturday, February 13, 2010 12:42 AM
To: tc&wmeis@saic.com
Subject: Hanford Tank Closure EIS Hearing Comments...

Hello Ms. Burandt-

I attended the public hearing in Portland on the Hanford Tank Closure EIS. I stayed through the initial presentations and listened to a few of the public comment speakers. The hearing was informative. But, I was surprised the DOE only sent one person to fend off what could have almost certainly could have been predicted to be a hostile crowd. I have worked in the nuclear industry for over 20 years, so I feel your pain. I was at the hearing to learn about the cleanup effort since I may seek to work on the project sometime in the future.

I did listen to Mr. Colette speak across the hall before the hearing. And, he repeated some of the same info in the public meeting. Frankly, some of what he said even scared me and I've worked a lot around radioactive material. Anyway, the reason I am writing you is that there are a few issues that he brought up that really need to be addressed head on so that people aren't stirred up into a frenzy:

1 847 people will die from cancer as a result of being exposed to radiation from shipments along the transport route. Mr. Colette said he got this from DOE documents. Having worked in the nuclear industry for so long, I am virtually certain that that number represents some non-credible worst case scenario. Someone from DOE has to refute his assertion and explain how that number was arrived at and what the realistic expected consequences would be. *62-1*

2 Mr. Colette asserted that the DOE finds truck drivers who just aren't smart enough to realize the health hazard from what they are hauling. I am virtually certain, if these people are receiving dose (and they must get some even though you said they did not) that they are subject to the Federal radworker radiation limits. People should know this. *62-2*

3 Mr. Colette asserted that a single accident during transport through Portland, would kill thousands of people and make much of the city unlivable. Again, I am virtually certain that the consequences he stated were from some non-credible worst case scenario. Someone from DOE has to clarify the assumptions made and state the most probable accident consequences. *62-3*

4 Why isn't the DOE recommending removal of the in-ground tanks and the contaminated earth? Now, I am assuming that the following is true. People need to be told that the DOE has investigated all viable methodologies and *62-4*

62-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

62-2 DOE's *Radioactive Material Transportation Practices Manual for Use with DOE O 460.2A* (DOE M 460.2-1A) stipulates carrier/driver requirements for radioactive material and waste shipments. All Federal and contractor entities subject to this manual must perform transportation activities in a manner that meets or exceeds those requirements, except as otherwise specified by the manual. Although DOE has processes and programs in place to monitor carrier performance and safety, it is ultimately the responsibility of the carrier to follow applicable regulations.

Regarding occupational exposure limits, as stated in Appendix H, "Transportation," of this *TC & WM EIS*, DOE Standard 1098-2008 requires that the maximum annual dose to a worker be no more than 100 millirem per year unless the individual is a trained radiation worker, in which case the dose would be administratively limited to 2 rem per year. If an escort is required, the exposure to each individual escort would be administratively limited to 2 rem per year. Note that the maximum annual dose to a transportation worker would be 100 millirem per year unless the individual is a trained radiation worker. For the latter, DOE has processes and programs in place to monitor carrier performance and safety to ensure that carriers are providing proper training and guidance to transportation workers.

62-3 Because radioactive waste analyzed in this *TC & WM EIS* would originate from DOE sites to the east and southeast of Hanford, no waste shipments are expected to pass through or near Portland, Oregon. Appendix H shows the specific routes that were analyzed. Further, Appendix H summarizes the impacts resulting from the most severe reasonably foreseeable potential accident. Based on the results, the risk of an additional LCF from such an accident would be very small.

62-4 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. As required by NEPA, this *TC & WM EIS* addresses the impacts on both the short- and long-term

Commentor No. 62 (cont'd): John Galle

there just is no way to do the work without endangering the workers (stress the importance of this…the folks in the audience didn't seem overly concerned about worker safety), that extensive excavation may potentially cause new or bigger problems, and that a potential delay of the cleanup of X years could result from the expanded scope which in turn would have its own consequences. You could mention added cost, but the audience wasn't really interested in hearing about what would have to be spent. *62-4 cont'd*

5 That the contamination entering the Columbia River is (or will be??) 1500 times the drinking water limits. The DOE needs to state why this is okay. I am assuming that, as in most cases, the solution to pollution is dilution. *62-5*

I hope you find my comments useful and thank you for your presentation at the hearing.

John Galle
2530 Hillcrest Drive
West Linn, OR 97068

human environment. Workers related to the activities being analyzed are part of the human environment, and impacts on workers are presented in Appendix K and Chapter 4, Sections 4.1.10, 4.2.10, and 4.3.10, of this EIS. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

62-5 As discussed in Chapter 5 of this *TC & WM EIS*, DOE acknowledges that benchmark standards could be exceeded in groundwater at the Core Zone Boundary and/or at the Columbia River nearshore at various dates. The term "benchmark standards" as used in this *TC & WM EIS* represents dose or concentration levels that correspond to established human health effects. For groundwater, the benchmark is the MCL, provided that an MCL is available. Ecology may impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA.

In reference to the commentor's statement that "contaminants are currently entering the Columbia River at levels greater than 1,500 times the drinking water standard," the location along the Columbia River, the timing, and the constituents to which the commentor refers are not clear. Additional information has been added to this *Final TC & WM EIS* to further describe the groundwater conditions at Hanford. Specifically, the commentor is referred to figures in Appendix U depicting maximum concentrations of several contaminants at various Columbia River nearshore locations, as follows: Figures U–18 and U–19 show chromium concentrations of about 61 and 380 micrograms per liter, respectively (relative to the benchmark standard of 100 micrograms per liter), and most concentrations are below 20 micrograms per liter; Figure U–20 shows a chromium concentration of about 5 micrograms per liter; Figures U–21 through U–23 show similar nitrate concentrations; Figures U–25 and U–26 show strontium concentrations near 320 picocuries per liter (relative to the benchmark standard of 8 picocuries per liter); Figure U–28 shows tritium concentrations of about 14,000 picocuries per liter (relative to the benchmark standard of 20,000 picocuries per liter); and Figure U–34 shows uranium isotope concentrations near 145 picocuries per liter (relative to the benchmark standard of 15 picocuries per liter).

Commentor No. 62 (cont'd): John Galle

DOE believes it is more accurate to say that there are several areas of nearshore groundwater contamination that exceed benchmark standards by one to two orders of magnitude (as opposed to more than three), but that these areas are narrowly confined; that groundwater contamination in the vicinity of operable units is more typically near or below the benchmark; and that groundwater contamination away from operable units (i.e., the bulk of the shoreline) is more than several orders of magnitude below benchmarks.

Commentor No. 63: Ester McGinnis

From: bmcginnis [bmcginn@pacifier.com]
Sent: Saturday, February 13, 2010 4:20 PM
To: tc&wmeis@saic.com
Subject: Hanford

Ester McGinnis, 8331 SW 59th Ave., Portland, OR 97219

I was unable to attend the Feb. 10 public hearing, so I am taking this way of speaking my piece about Hanford.

My complaint about nuclear use, whether for war or peace, is that it is unfinished research. When any new technology becomes available , BEFORE IT IS PRESENTED TO THE PUBLIC FOR GENERAL USE, THE DISCOVERERS AND / OR DEVELOPERS MUST BE HELD ACCOUNTABLE FOR RETURNING THE OBJECT TO THE ELEMENTS IT BEGAN WITH , OR TO A NON-TOXIC SUBSTANCE THAT CAN BE USED FOR ANOTHER PURPOSE.

63-1 In the case of nuclear waste this has not been done, is still not a subject of research (or so it seems--over 60 years of research/use) and we still have no solution for the ever mounting waste. Waste that is known to cause cancer and other serious health problems. Those who have power in this enterprise still disregard the public GOOD in making decisions about places like Hanford, and propose actions that are known to do damage to the vulnerable.

I have hoped that in my lifetime I would know that people of conscience would understand what I am saying ---and at last I have had the opportunity to observe a small step in that direction---a man who has developed a process to turn oil derived plastics back into a usable oil !! Halleluiah !!!

63-1 One of the purposes of this *TC & WM EIS* is to analyze the range of reasonable alternatives to safely retrieve and treat radioactive, hazardous, and mixed waste from the tank systems; close the SST system; and store and/or dispose of the waste generated from these activities at Hanford. DOE acknowledges that long-term actions are required to permanently reduce the risk to human health and the environment posed by the waste in the tank systems.

Commentor No. 64: Bobbie Morgan

From: Bobbie Morgan [morgan.bobbie@gmail.com]
Sent: Sunday, February 14, 2010 1:26 PM
To: tc&wmeis@saic.com
Subject: Draft Tank Closure and Waste Management EIS/Hanford

Dear Department of Energy Staff:

I object to the proposed "preferred alternative" TCWMEIS that would use Hanford as a national radioactive waste dump for nuclear weapons and power programs. Importing radioactive and hazardous waste to Hanford, when the current tanks are leaking into the Columbia, and spreading into local groundwater, is unconscionable. Instead, we need to clean up the awful, radioactive mess that is already at Hanford (tanks, barrels, unlined trenches, FFTF reactor). *64-1*

The groundwater impacts of the current contaminated waste are already treacherous. Carbon tetrachoride, as an example, is a known carcinogen and is leaking into groundwater at Hanford, right now, as I write this, at levels 50 times safe drinking water standards. This contaminant alone would therefore be responsible for the deaths of 5 of every 1,000 adults who drink this water. *64-2*

Your duty, as a government official working for the citizens of this country, is to create the very best policies to ensure public safety. Your duty is NOT to write "expedient" policies or to make life easier for the Department of Defense and their very troublesome weapons or for the nuclear power industry, whose energy production is not economically or ethically viable. *64-3*

Please go back to the drawing board and write a TCWMEIS that actually cleans up Hanford.

Thank you.

Bobbie Morgan
978 Aaron Avenue
Bainbridge Island, WA
xxx-xxx-xxxx

64-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone to help prevent further contamination from entering the environment.

64-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

64-3 This *TC & WM EIS* analyzes proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms; decommission FFTF; and upgrade/expand waste management capabilities at Hanford to better support ongoing cleanup actions occurring under the TPA.

Commentor No. 65: Brooke Thompson

From: Brooke [brooke@raincity.com]
Sent: Sunday, February 14, 2010 8:17 PM
To: tc&wmeis@saic.com
Subject: Public Comment

Dear Department of Energy Staff:

I am writing this on Valentine¹s Day, as a valentine to my children and grandchildren. I urge you to find another way to dispose of the nuclear waste that TCWNEIS deems a ³preferred alternative². *65-1*

The Hanford site is already in jeopardy. Its FFTF reactor, its unlined trenches, its barrels and tanks NOW leaking radioactive waste into the groundwater and into the Columbia River‹these need to be cleaned up. To add more hazardous waste to the site compounds and befouls an existing morass of toxins. *65-2* *65-3*

A fool is a person who keeps on doing the same thing and expects different results.

- Albert Einstein

I urge you to respond to the problem of the military and power industry by standing firm: public safety and environmental protection is a priority.
Do not sweep this kind of hazard under the public policy carpet for another generation of cancer victims to try to clean up. *65-4*

Please use wisdom and foresight in fashioning a TCWNEIS that addresses the source of nuclear waste and removes the threat that already exists at Hanford and other sites across the country. *65-5*

Thank you,

Brooke Thompson
611 Winslow Way West
Bainbridge Island, WA 98110
xxx-xxx-xxxx

65-1 Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

65-2 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

65-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Commentor No. 65 (cont'd): Brooke Thompson

65-4 Nuclear energy and military weapons production, as well as the management of their resulting waste, are not within the scope of this *TC & WM EIS*. The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

65-5 Comment noted.

Commentor No. 66: Kyle Cleys

From: KYLE A CLEYS [kcleys@q.com]
Sent: Monday, February 15, 2010 7:44 PM
To: tc&wmeis@saic.com
Subject: Comments on the Draft TC & WM EIS

Dear Mary Beth Burandt and U.S. Department of Energy,

I wish to make the following comments on the Hanford Draft Tank Closure and Waste Management Environmental Impact Statement:

1. Regarding retrieval of high-level nuclear waste from underground tanks, I would like to see 99.9% of the tank wastes removed or at least to the maximum amount technically possible. *66-1*
2. A second Low-Activity Waste Vitrification Facility should be pursued now so that waste treatment can be completed as soon as possible. *66-2* The supplemental treatment options of steam reforming, grout and bulk vitrification should be abandoned since they are not as effective. *66-3*
3. After removing waste from the Single-shell tanks the tanks themselves should be removed along with contaminated soil and ancillary equipment (the "clean closure" alternative). *66-4*
4. The Fast Flux Test Facility should be removed and the site restored. Entombment is not an acceptable solution. In addition, special components should be treated at Hanford to the greatest extent possible rather than shipping these wastes to the Idaho National Laboratory. *66-5*
5. Waste generated from on-site cleanup should be stored in Hanford landfills only to the extent that they won't ever endanger groundwater or the Columbia River. In addition, existing waste in unlined soil trenches and from tank leaks should be treated and appropriately disposed of. *66-6*
6. Under no circumstances should additional waste be brought to Hanford. The focus should remain on cleaning up what is already there rather than adding more waste. *66-7*

I have to question what sort of people would leave these highly toxic wastes in the environment to endanger future generations. It is our responsibility as a society to clean these wastes up to the best of our ability since we generated them. Cost should not even be a factor in these considerations. This cleanup has been going on for decades now and it is past time to quit stalling and to do the right thing. *66-8*

Sincerely,

Kyle Cleys
3959 NE 40th Avenue
Portland, OR 97212

66-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

66-2 This EIS analyzed supplemental LAW treatment capability by building new treatment facilities that are either part of (expanded LAW capacity) or separate (bulk vitrification, steam reforming, or cast stone) from the WTP. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

66-3 Comment noted.

66-4 Tank Closure Alternatives 4, 6A, and 6B involve selective or complete clean closure of the SST system. As described in Chapter 2, Section 2.5, Alternative 4 would involve selective clean closure of the BX and SX tank farms by removing the tanks and excavating soil to a depth of 3 meters (10 feet) below these tanks; all other SST systems would be closed in place. As described in Section 2.5, Alternative 6A would involve clean closure by removing all SST systems and excavating all contaminated soil to a maximum depth of groundwater. As described in Section 2.5, Alternative 6B would involve clean closure by removing all SST systems, but would only excavate soil to a depth of 3 meters (10 feet) under the tanks.

66-5 Comment noted.

66-6 Chapter 1, Section 1.4, states that DOE has committed to disposing of LLW at Hanford in lined trenches, a change from the past disposal practice of using unlined trenches. DOE ensures that disposal activities are protective of the environment and meet regulatory requirements (see Appendix E, Section E.3.3, for a description of the evolution of past disposal practices). All LLW generated by the tank closure or FFTF decommissioning activities would be disposed of in

Commentor No. 66 (cont'd): Kyle Cleys

lined trenches. Currently, Hanford's solid LLW is sent to the LLBGs; or, if the waste is from CERCLA cleanup activities, the waste is sent to the Environmental Restoration Disposal Facility (ERDF) (see Chapter 3, Section 3.2.12.1.4).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

66-7 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

66-8 Chapter 2, Section 2.11, of this EIS summarizes and compares the relative costs of the alternatives. See response to comment 66-1 regarding future DOE decisions.

Commentor No. 67: Barry F. Anderson

Submit Comments by March 19, 2010

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

To: Mary Beth Burandt
Office of River Protection
US Dept. of Energy
TC&WM EIS
PO Box 1178
Richland, WA 99352

Thank you for your input
Gracias por su participación

Date/Fecha: _____

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

Dietfried Winterfeldt and some other world-class decision analysts did a decision analysis some years ago to rank order nuclear waste disposal sites in the U.S. Hanford came out at the bottom of the list.

You can get more information from
Professor Dietfried Winterfeldt, Director
International Institute for Applied Systems Analysis
Schlossplatz 1
A-2361 Laxenburg
Austria

67-1

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Barry F. Anderson
Address/Dirección: Dept. of Psychology, Portland State U. PO Box 751
City, State, Zip Code/Ciudad, Estado, Zona Postal: Portland, OR 97207

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

67-1 The study of nuclear waste disposal sites in the United States is not within the scope of this *TC & WM EIS*. The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites.

Commentor No. 68: Robert G. Aungier

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 2-10-2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

Dear Mary Beth Burandt, Document Manager,
U.S. Department of Energy, 2-10-2010
P.O. Box 1178 Richland, WA 99352

This evening I attended the EIS forum at the Double Tree Hotel in Portland, OR.

I admit that I have followed the DOE's clean up efforts at the Hanford nuclear site from a distance over the last five to ten years.

Tonight I greatly appreciated the opportunity from the DOE to understand what is being proposed. In keeping with all the speakers who provided comments at the Hearing Tonight, these are my conclusions.

First, Clean up all 53 million gallons of buried nuclear WASte to the 99.9% level. All the tanks must be pulled from the ground and the ground underneath the tanks must be ex cavated and treated as well. Certainly, there is high health Risk to workers, exposed in the process. I encourage the DOE to explore and ~~[illegible]~~ use of Robotics and drones to do the most hazardous aspects of this clean up. The technology of the drone/robotic efforts may be used at other nuclear sites across the U.S., potentially saving human lives in these efforts (over)

68-1

68-2

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Robert G. Aungier

Address/Dirección: 467 8th Street

City, State, Zip Code/Ciudad, Estado, Zona Postal: Lake Oswego, Oregon 97034-2908

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@rdc.com

68-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

68-2 Many of the technologies that DOE anticipates using allow work to be accomplished with low exposure of workers. For example, as described in Appendix E, the various tank waste retrieval technologies would involve the use of remotely controlled and robotic equipment, and many of the waste treatment operations at the WTP would be performed remotely. As discussed in Appendix K, Section K.2, DOE and its contractors would implement controls to limit the exposure of individual workers for all activities in accordance with applicable regulations and guidance (10 CFR 835; DOE Standard 1098-2008). Site procedures and job control plans would incorporate ALARA techniques such as reducing time of exposure, increasing the number of workers and/or shielding, or using remote operations. DOE uses robotics when practical as a means of limiting worker exposure. As individual projects proceeded, DOE and its contractors would continue to look for ways to reduce worker doses. Chapter 7, Section 7.1.10, contains additional information regarding methods of protecting workers.

Commentor No. 68 (cont'd): Robert G. Aungier

Hanford is not to receive any more radioactive, hazardous wastes from other sites in the U.S. It is absolutely insane and ridulous that DOE is proposing shipping ~~waste~~ radioactive waste by rail and truck throughout the United States. There is way too much risk in this proposal. DOE, take it off the table, do not transport nuclear waste from site to site now, next year or ever. 68-3

Clean up Hanford now. The miles of trenches and ditches that contain radioactive waste must be cleaned up at Hanford now. 68-4

As a concerned citizen, it makes the most sense to proceed with the 99.9% waste removal from the Hanford tanks. Do everything, with the aid of technology (drones/robotics, etc) to deactivate the radioactive waste now at Hanford. Bring NO more nuclear waste to Hanford – NO trucking/no rail shipping of nuclear waste in my United States. OR

Respectfully,
Robert G. Aungier
467 8th St. Lake Oswego, 97034

68-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

68-4 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 69: Roger Cole

TC & WM EIS
P.O. Box 1178
Richland, WA 99352

February 11, 2010

Greetings:

I was at the Portland hearing tonight and did not stay until my name was called to testify as it ran kind of late. I did get a sense that folks present were not happy about the EIS under consideration. There was a lot of anger and frustration.

The biggest thing that I am concerned about was covered a number of times in testimony and that is bringing in new waste from other parts of the country. That just won't fly. Citizens of Washington approved an initiative in 2004 banning the importation of radioactive waste, but it was overturned in court. We have a radioactive stew brewing in Hanford. It makes no sense to truck in more waste. That waste would go through big Northwest cities. That is a big safety risk. Don't bring in more waste until you get the existing mess cleaned up. *69-1*

Leaky tanks have contaminated the ground water that is finding its way into the Columbia River which people swim in and get their water from. Something must be done about these tanks. They need to be 99.9% cleaned up. To leave 1% of the liquid in the ground is to leave the worst part. *69-2*

If the Fast Flux Test Facility is no longer being used, it should be removed, not entombed. *69-3*

I care about the Columbia River. I swim in it. I sail on it. I used to fish on it. I care about the salmon in the river. I don't want radioactive waste left over from a weapons program before I was born in my river. We've to fix the problems of Hanford. We've got to do it right. We can't walk away from Hanford with the job only partially finished. We need to clean up this mess. The current EIS doesn't go far enough. *69-4*

Sincerely,

Roger Cole
5505 E. Evergreen Blvd
Vancouver, WA 98661

69-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs. No shipments analyzed in this EIS would pass around or through large West Coast cities such as Portland, Oregon, and Seattle, Washington.

69-2 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or are suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the SSTs, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

The decision to leave 0.1 percent, 1 percent, or more of the waste in the SSTs is one of the decisions supported by this *TC & WM EIS* (see Section S.1.3.1 of the *TC & WM EIS* Summary and Chapter 1, Section 1.4.1). With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed on only a small number of SSTs and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks and residual waste, will require preparation of a performance assessment and a closure plan. These required documents will provide the information and analysis necessary for DOE and the

Commentor No. 69 (cont'd): Roger Cole

regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

69-3 The commentor's preference for removal of FFTF (FFTF Decommissioning Alternative 3) is noted. However, although nearly all elements of FFTF and the two adjacent support facilities would be removed under this alternative, the lower portion of the Reactor Containment Building (RCB) concrete shell would remain. This would be backfilled with either soil or grout to minimize void space. The area would be regraded and revegetated, with no need for a barrier. DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated.

69-4 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 70: Krista Thie and Daryl Hoyt

From: Krista & Daryl [krista@gorge.net]
Sent: Friday, February 19, 2010 11:38 PM
To: tc&wmeis@saic.com
Subject: Comment Hanford

Dear EIS team -

If the USA is going to produce radioactive waste - it also must contain it. Why is there still any question that DOE has cleaned up thoroughly the Hanford Nuclear Site? Any amount of high level waste reaching the Columbia River is unacceptable. If we are creating a technological/scientific approach, we need to keep a clear scientific approach and have zero measurable amounts of this stuff reaching any place where it could contaminate US. All must be contained and treated. *70-1*

Our grandchildren depend on our accountability.

Thank you for coming to Hood River - I was unable to attend but glad my friends and community was able to.

Regards,

Krista Thie & Daryl Hoyt
POB 2046
White Salmon WA
98672-2046

70-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 71: Pat Hazlett

From: Pat Hazlett [hazlettp@gmail.com]
Sent: Saturday, February 20, 2010 11:35 AM
To: tc&wmeis@saic.com
Subject: Hanford
Attachments: Hanford.rtf

7215 SW 8th Ave
Portland, OR 97219
February 9, 2010

TC & WM EIS
P.O. Box 1178
Richland, WA 99352

To Whom It May Concern:

I am outraged that after so many years and setbacks Hanford is still not being cleaned up to the degree necessary for the environment and people living in the Columbia River area. If this isn't bad enough it is being proposed that it be a storage facility for more nuclear wastes. *71-1*

I am in favor of no more waste added to Hanford. I am saying "No" to Hanford being a national radioactive and radioactive-hazardous waste dump. We need to limit wastes in Hanford landfills to amounts and types of Hanford clean-up wastes which won't cause future leakage and violate cancer risk and other standards. And finally we need to dig up plutonium and other "Transuranic" wastes in unlined soil disposal ditches and tank leaks, treat the wastes and dispose of them in deep geologic repositories. We need to dig up other wastes from unlined soil ditches and tank leaks, treat them, and dispose of them in a regulated commercial radioactive waste facility which is not above drinkable groundwater or next to a river. *71-2*

I am also concerned about the increased risks of cancer from transportation of radioactive wastes. I live very close to Interstate 5 and the thought of this added exposure is not acceptable to me. *71-3*

I would appreciate a response to this letter. *71-4*

Pat Hazlett

71-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

71-2 TRU waste, including waste contaminated with plutonium, in unlined soil disposal trenches is not within the scope of this EIS. However, information on this waste is included in Appendix S, "Waste Inventories for Cumulative Impact Analyses." The scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and closure of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). Any LLW generated by the tank closure or FFTF decommissioning activities would be disposed of in the LLBGs, in one of the two active trenches (31 and 34); an IDF; and/or the River Protection Project Disposal Facility (RPPDF), all of which would have liners.

71-3 As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs. Because radioactive waste analyzed in this *TC & WM EIS* would originate from DOE sites to the east and southeast of Hanford, Interstate 5 would not be used.

71-4 The comments made in the letter, along with a response to each comment, are included in this CRD, which is a volume of this *Final TC & WM EIS*.

Commentor No. 72: Eileen Garvin

From: Eileen Garvin [eileengarvin@gmail.com]
Sent: Saturday, February 20, 2010 2:41 PM
To: tc&wmeis@saic.com
Subject: Hanford Tank Closure and Waste Management Environmental Impact Statement

Dear Ms. Burandt,

Please clean up the existing pollution at Hanford before you consider shipping more radioactive waste to the area.

I grew up in eastern Washington and have lived with this mess my entire life. *72-1*

It seems a pretty simple situation for a complex problem — clean up the mess you already made, that everyone agrees is a problem, before adding to it.

(If my cracked milk glass is leaking all over the table, do I keep pouring milk into it?)

I urge you to stick to the problems at hand:

Clean up the 55-million gallons of buried radioactive waste *72-2*

Do not ship any more radioactive waste from across the county to handford *72-1 cont'd*

Clean up the nuclear waste that has already leaked into the Columbia River. *72-3*

Future generations will thank you!

Best,

Eileen Garvin

72-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

72-2 The scope of this *TC & WM EIS* includes analysis of the environmental impacts of storage, retrieval, treatment, and disposal of tank waste and closure of the SST system. With regard to other cleanup actions, DOE is implementing an extensive, ongoing cleanup program at Hanford under the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies recently completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates. As noted in Chapter 1, Section 1.4.2, the six sets of cribs and trenches (ditches) that are contiguous to the SSTs are CERCLA past-practice units. These would fall under the barriers placed over the SSTs during closure. They are evaluated in this EIS as part of a connected action because they would be influenced by barrier placement. However, closure of these CERCLA past-practice units is not part of the proposed actions for this EIS. Closure of these units would be addressed at a later date, using the best-available information for technologies that are feasible and appropriate to address these units.

72-3 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 73: Joe Mitchell

From: Joe Mitchell [jjmit@comcast.net]
Sent: Sunday, February 21, 2010 1:58 AM
To: tc&wmeis@saic.com
Subject: Hanford Cleanup

February 20, 2010

Dear USDOE,

I am very much in favor of a TOTAL clean-up of the Hanford site and very much against transporting nuclear and/or toxic waste to the Hanford site. No more! *73-1*

It is our responsibility to neutralize this threat to our wellbeing for ourselves and future generations.

We have amazing creative capacities. We need to use them. We need to fund them.

We need to more than adequately fund research into solving the problem of radioactive waste; and, in the mean time, use the technologies we now possess to clean up this mess. *73-2*

This is a project not unlike the space program. It is important. We need total clean-up. We need to fund it.

Sincerely,

Joe Mitchell
5232 SE Madison St.
Portland, OR 97215-2667

73-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

73-2 This EIS analyzed supplemental LAW treatment capability by building new treatment facilities that are either part of (expanded LAW capacity) or separate (bulk vitrification, steam reforming, or cast stone) from the WTP. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, and the BOF, as well as the Pretreatment Facility and the HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

Commentor No. 74: Katharine Kremer and Stephen Young

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 15 Feb 2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

Dear Friends,

We are very much in favor of a TOTAL clean-up of the Hanford site and very much against transporting nuclear and/or toxic waste to the Hanford site. 74-1

It is our responsibility to neutralize this threat to our well being for ourselves and future generations.

We have amazing creative capacities and need to more than adequately fund research into solving the problem of radioactive waste and, in the meantime, apply the technologies we now possess to clean up this mess! This is a project not unlike the space program or the defense program tied to the end of WW II and, ironically, the problem we now are facing. 74-2

Cleaning up part of the mess is not good enough in this case.

Thank you!

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Katharine Kremer and Stephen Young

Address/Dirección: 1040 Oak Terrace

City, State, Zip Code/Ciudad, Estado, Zona Postal: Lake Oswego OR 97034

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager,
TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

74-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

74-2 One of the decisions to be based on this *TC & WM EIS* is the selection of additional waste treatment capability, which could include a second LAW vitrification facility. The timing of the startup of the WTP LAW Vitrification Facility and a facility for additional waste treatment capability would depend on a number of factors, such as availability of funding and priorities within DOE.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, and the BOF, as well as the Pretreatment Facility and the HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

Commentor No. 74 (cont'd): Katharine Kremer and Stephen Young

Mary Beth,
Thank you for doing this difficult job. I was at the Portland hearing. I am convinced that part measures are not enough in this case.
All the best to you,
Kathy Kremer

Response side of this page intentionally left blank.

Commentor No. 75: Rebecca Durr

Feb. 15, 2010

USDOE
P.O. BOX 1178
Richland, WA 99352

Dear USDOE,

I would like to comment on my understanding of your environmental impact review of your alternative to cleaning up Hanford.

It seems your alternative is not to clean it up & also to dump more waste there. *75-1*

Hanford is already the most contaminated site in the western hemisphere & for as long as I can remember you have not been cleaning it up.

I believe that this is unacceptable. We don't even know everything that has been dumped there or how it has changed through the years. We do know that contaminates have been migrating to the river & the water table, causing unknown dangers. The Columbia River is a magnificent river with ecological, cultural, & historical significance. How can you allow the desacration of this treasure? *75-2*

Please - don't even consider dumping more waste there. We have a serious problem there & it's time we faced up to our obligation to repair the damage *75-3*

75-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

75-2 Among the important elements of the analyses presented in this *TC & WM EIS* are evaluations of the effects that the Tank Closure, FFTF Decommissioning, and Waste Management alternatives could have on migration of contaminants to the river and the potential for long-term impacts on aquatic and riparian ecological resources. Regarding waste management at Hanford, the commentor is referred to Chapter 3, Section 3.2.12.1, Waste Inventories and Activities. Chapter 5, Sections 5.1, 5.2, and 5.3, address analysis of the long-term environmental consequences of implementing the different alternatives on ecological resources (i.e., ecological risk). Included in this analysis is a determination of the impacts of a number of constituents of potential concern (COPCs) on Columbia River aquatic and riparian resources. For a detailed discussion of the impacts of the alternatives on Columbia River ecological resources, the commentor is referred to Appendix P, Section P.3, Impacts on Columbia River Aquatic and Riparian Resources Resulting from Future Contaminant Releases.

75-3 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 75 (cont'd): Rebecca Durr

we've already caused. Let's start cleaning up the mess & let's continue to monitor the health of all aspects of that area, & not stop until we have restored the land & it is once again safe for plants, animals, birds, fish, and people. When you know that it's safe for your grandchildren to swim in the water, dig in the dirt, eat the fish, & breathe the air, then you will know you have done your job well. And when that day comes, let's erect a monument so future generations will know we made a terrible mistake & didn't rest until we corrected it. It will be a warning for the future not to take an action if we do not know all the consequences from that action, no matter how urgent the situation may seem. Many years ago we did not know how to dispose of nuclear waste, and we still do not know – that is what you should be trying to find out, instead of adding to the piles of contamination along the Columbia River.

Very truly,
Rebecca Durr
2703 Riverview Drive
Aberdeen, WA 98520

75-3 cont'd

75-4

75-4 Regarding research on ways to dispose of nuclear waste, research and development (R&D) on nuclear waste disposal methods began more than 50 years ago. The HLW vitrification treatment technology, for example, has been used around the world for decades. This *TC & WM EIS* analyzes the potential impacts of vitrification and other treatment technologies, waste-form performance, and closure options.

Commentor No. 76: P. Anna Johnson

P. ANNA JOHNSON
6934 NE Thirteenth Avenue Portland, OR 97211
[redacted] - pannaj@mercedlake.com
www.pannajohnson.com

February 15, 2010

To Whom It May Concern:

We call the river "Columbia" after the man who sailed across the Atlantic to find gold for the King and Queen of Portugal. The creation of the river, and the fertile land surrounding it, took millions of years. Then, for thousands of years, there were people who were nourished by fish from the river. They recognized that the river was sacred and they treated it kindly, as though it was a part of their family.

Then other people came, and they buried poison in the land near the river -- poison strong enough to kill the plants and the animals upon contact. Now the poison is spreading through the ground to the once clean river. Fish are dying. Birds are dying. People are dying. And now there is talk about bringing even more poison to the site. *76-1*

You say that restoring the land and the river to its pristine condition would cost too much money. You have plans for bringing more poison to the region. When will we learn? When will we ever learn?

Sincerely,

P. Anna Johnson

76-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 77: Carrie Anderson

From: Carrie Anderson [treelady@cet.com]
Sent: Monday, February 22, 2010 6:39 PM
To: tc&wmeis@saic.com
Subject: I oppose truckloads of radioactive waste being dumped at Hanford

I cannot believe that we have circled back to this ridiculous option. Hanford is STILL a disaster. The waste is leaking into the Columbia watershed which will eventually end up in the river and then thePacific Ocean. This ocean is NOT separated from the rest of the oceans on the planet. It WILL wash up onto the east coast eventually!! *77-1*

How can the "preferred alternative" to **make Hanford a national radioactive waste dump without fully cleaning up the existing contamination on site** be a SANE response to nuclear waste disposal. *77-2*

Anyone who is paying attention knows there is NO AWAY to throw things anymore.

Any toxins that are thrown away will just keep turning up in our backyards and water sources!! *77-3*

IF we have NO SANE place to dispose of these deadly materials why consider producing more?? *77-4*

I oppose truckloads of radioactive waste being dumped at Hanford *77-5*

Carrie Anderson
Urban Forest Council

Any fool can destroy trees. They cannot defend themselves or run away.

And few destroyers of trees ever plant any... John Muir, naturalist, explorer, and writer (1838-1914)

77-1 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this TC & WM EIS is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

77-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

77-3 Both DOE and Ecology acknowledge the need to make choices regarding future storage, treatment, and disposal of the waste associated with the SST system. One of the major purposes of this TC & WM EIS is to identify the impacts associated with waste-disposal options.

77-4 Although the waste generated from production activities (e.g., nuclear energy and weapons) is not within the scope of this TC & WM EIS, the management of waste generated from Hanford environmental cleanup activities is one of the proposed actions in this EIS. This TC & WM EIS analyzes disposal options for various types of waste (e.g., LLW, MLLW, HLW), as well as treatment options to convert waste to a form that renders it safe for disposal.

77-5 See response to comment 77-2 for a discussion on the transport and disposal of offsite waste.

Commentor No. 78: Richard Schramm

From: Schramm, Richard : CO IS [RSchramm@LHS.ORG]
Sent: Monday, February 22, 2010 7:58 PM
To: tc&wmeis@saic.com
Subject: Please clean up and preserve Hanford

To Whom It May Concern:

The U.S. Energy Department's plan to import low-level and mid-level radioactive waster from other sites in our country to Hanford after 2022 should be thrown out. Hanford is already one of the most polluted places on Earth and as such no more radioactive waste should be brought to this area for storage. And the fact that Hanford is so close to the Columbia River (i.e., immediately adjacent to it) is another excellent reason that no more radioactive materials should be brought there for storage. Instead, this is a unique area for wildlife that should be preserved in some kind of national monument or park. The Hanford Reach is one of the last great salmon spawning beds and Handford itself is home to wild grasses and wildlife that represent one of the few remaining preserves of what this area was like before man came on the scene to develop it. As such, it should be protected and one should not add injury to insult be bringing more radioactive materials to the site. Instead, it should be cleaned up sooner, rather than later, and any future radioactive materials should be stored in dry, stable geologic formations where there is little water to leach out radioactive elements, such as in Nevada or New Mexico, not right next door to one of the largest rivers in our country. Thank you for taking the time to consider my thoughts on this important matter.

78-1

78-2

78-3

Richard Schramm
3024 N.E. Bryce Street
Portland, OR 97212
(xxx)xxx-xxxx
rschramm@lhs.org

78-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

78-2 As noted in Chapter 3, Section 3.2, General Site Description, on June 9, 2000, the President issued a proclamation (65 FR 37253) establishing the Hanford Reach National Monument on approximately 78,900 hectares (195,000 acres) of Hanford. Much of this land borders the Columbia River. This proclamation recognized the unique character and biological diversity of the area, as well as its geologic, paleontological, historic, and archaeological significance. DOE manages land within the monument that is not subject to existing agreements; however, DOE consults with the Secretary of the Interior when developing any management plans affecting these lands.

See response to comment 78-1 for a discussion on the transport and disposal of offsite waste.

78-3 Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 79: Gabe Bohnee, Director, Environmental Restoration and Waste Management, Nez Perce Tribe

NEZ PERCE TRIBE TREATY OF 1855

Nez Perce

ENVIRONMENTAL RESTORATION & WASTE MANAGEMENT
P.O. BOX 365 · LAPWAI, IDAHO 83540-0365 · (208) 843-7375 / FAX: 843-7378

February 18, 2010

Ms. Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
P.O. Box 1178
Richland, WA 99352

Re: Comment Extension Request on the *Draft Tank Closure EIS*

Dear Ms. Burandt

The Nez Perce Tribe's Environmental Restoration and Waste Management Division (ERWM) is reviewing the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington [DOE/EIS-0391]* (TC/WM EIS) for the Nez Perce Tribe (Tribe). This review has been extensive and time consuming, where the ERWM has recognized a need for more time to review the impacts brought forth through this document. Therefore, the ERWM is seeking an extension of 45 days to accommodate the concerns of the Nez Perce Tribe.

The protection of cultural and natural resources at Hanford is of great importance to the Tribe, where this area is encompassed by the Tribe's "Usual and Accustomed" Treaty resource areas, via the Treaty of 1855 between the United States and the Tribe. With long-term potential impacts to this area and the Columbia River, the ERWM work needs to be thorough in technical and policy aspects affecting the Tribe. Lastly, this document and the comments generated by the Tribe need to be completed through the Tribe's policy board, the Nez Perce Tribal Executive Committee (NPTEC), which has a time scale that factors into our extension needs.

ERWM appreciates the longer than normal review period given for the TC/WM EIS, but like other stakeholders and the public, have been overwhelmed with the magnitude of this document. The ERWM would appreciate your consideration in this matter and look forward to hearing your response. If you have any questions please contact David Bernard, davidb@nezperce.org, or Stan Sobczyk, stans@nezperce.org of my staff or 208-843-7375.

Sincerely,

Gabe Bohnee
ERWM Director

Cc: David Brockman, DOE-RL Site Manager
Shirley Olinger, DOE-ORP Site Manager
Brandt Petrasek, DOE-HQ Tribal
Jill Conrad, DOE-RL Tribal Nations Program
Stuart Harris, CTUIR DOSE Manager
Russell Jim, Yakama ER/WM Director
Aaron Miles, DNR Manager
Samuel N. Penney, NPTEC Chairman

79-1 **79-1** DOE extended the public comment period for another 45 days, for a total comment period of 185 days.

Commentor No. 80: Laurie Fleming

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 2/23/2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

I do not want to see new waste be transported and dumped at Hanford and anywhere else in our beautiful State of Washington until DOE does a thorough CLEAN up of the waste you have already done. 80-1

Also, I understand that an earthquake could cause a disaster the size of Chernobyl. Nuclear waste dumped along a fault line is not acceptable. I request full disclosure of earthquake activity reporting from the past, as well as full reporting of future earthquake activity as each occurance happens via media reporting. 80-2

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Laurie Fleming

Address/Dirección: 2307 S. Southeast Blvd. #3, Spokane, WA 99203

City, State, Zip Code/Ciudad, Estado, Zona Postal:

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

80-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

80-2 Chapter 3, Section 3.2.5.1.1, of this *TC & WM EIS* depicts and discusses the locations of geologic faults relative to Hanford and their potential for producing earthquakes. Section 3.2.5.1.4 discusses the historical seismicity of the Hanford region, including the frequency and magnitude of historic and recent earthquakes, and presents the most recent seismic risk estimates for Hanford. Most of the earthquake information is publicly available online and all cited references, which are listed in Section 3.4, are available upon request or at reference libraries (e.g., Hanford Public Reading Room). As described in Chapter 4, Sections 4.1, 4.2, and 4.3, of this EIS, DOE Order 420.1B and its implementing standards require that nuclear and nonnuclear facilities be designed, constructed, and operated to safeguard the facility, the public, workers, and the environment from natural phenomena hazards, including earthquakes. Consequently, impacts of earthquakes are evaluated for waste management and disposal facilities, tank farms, and the WTP. Information can be found in Sections 4.1.11 and 4.3.11. More-detailed information can be found in Appendix K.

Commentor No. 81: Marilyn Darilek

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 2/23/10

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

I believe it is irresponsible to cap over tanks, landfills, dumpsite, and soils, etc. instead of enforcing thorough + complete removal &/or containment utilizing best-science processes + methods. The residents of WA. St. have made abundant sacrifice throughout previous decades by allowing Hanford to continue this heritage of pollution, deceit, disrespect for human health + public safety + environmental degradation. Voters overwhelmingly accepted the directive to the federal policy makers to clean up their mess — especially prior to dumping additional nuclear + other contamination wastes. Clean closure is definitely better than closed entombment. It seems insane that this facility was located so near a major river, in a known geologically active region — it's time to stop the influx of wastes to Hanford. Keep the moratorium in place!

81-1
81-2
81-3
81-2 cont'd

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Marilyn Darilek

Address/Dirección: 1814 W. Brimcliff Ln., Spo. WA. 99208

City, State, Zip Code/Ciudad, Estado, Zona Postal: _____

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

81-1 Comment noted.

81-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

81-3 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

The accident analysis in this *Final TC & WM EIS* includes accidents triggered by seismic events and discusses potential impacts on site workers and the general public (see Appendix K, Section K.3). For the groundwater analysis, no credit was taken during the analysis for long-term structural stability of the repository or of any of the waste-form containers.

Commentor No. 82: Brian Cladoosby, President, Norma Jean Louie, Secretary, Affiliated Tribes of Northwest Indians of the United States

2010 Winter Conference
Great Wolf Lodge, Grand Mound, WA

RESOLUTION #10 - 02

"TRIBAL INPUT FOR THE 2010 HANFORD CLEAN-UP ENVIRONMENTAL IMPACT STATEMENT"

PREAMBLE

We, the members of the Affiliated Tribes of Northwest Indians of the United States, invoking the divine blessing of the Creator upon our efforts and purposes, in order to preserve for ourselves and our descendants rights secured under Indian Treaties and benefits to which we are entitled under the laws and constitution of the United States and several states, to enlighten the public toward a better understanding of the Indian people, to preserve Indian cultural values, and otherwise promote the welfare of the Indian people, do hereby establish and submit the following resolution:

WHEREAS, the Affiliated Tribes of Northwest Indians (ATNI) are representatives of and advocates for national, regional, and specific tribal concerns; and

WHEREAS, ATNI is a regional organization comprised of American Indians in the states of Washington, Idaho, Oregon, Montana, Nevada, Northern California, and Alaska; and

WHEREAS, the health, safety, welfare, education, economic and employment opportunity, and preservation of cultural and natural resources are primary goals and objectives of ATNI; and

WHEREAS, the U.S. Department of Energy's (DOE) Hanford Nuclear Site, located in southeastern Washington along the Columbia River, contains chemical and radioactive waste that has contaminated our people and our water, air, and land; and

Response side of this page intentionally left blank.

Commentor No. 82 (cont'd): Brian Cladoosby, President, Norma Jean Louie, Secretary, Affiliated Tribes of Northwest Indians of the United States

AFFILIATED TRIBES OF NORTHWEST INDIANS **RESOLUTION #10 - 02**

WHEREAS, the health of the Columbia River and the salmon that spawn in the Hanford Reach are critical to the Indian People; and

WHEREAS, ATNI Member Tribes have invested countless hours and resources fighting to require a faster and more thorough cleanup of the Hanford Site while DOE has disposed of radioactive waste in 149 underground single-shelled tanks, among other places, and many tanks are leaking or have leaked radioactive waste which has in the past and currently is contaminating the groundwater, soil, and plants, and is leaching into the Columbia River; and

WHEREAS, DOE has released a Draft Tank Closure and Waste Management Environmental Impact Statement (EIS) that proposes alternative options on how thoroughly DOE will clean up the nuclear waste and whether to ship additional off-site nuclear waste to Hanford; and

WHEREAS, there is a limited time for influencing DOE's decision and sharing our concerns by the deadline on March 19, 2010 when DOE's decision will influence Tribal resources throughout the Columbia River Basin; and

WHEREAS, DOE is currently making decisions that will guide the cleanup of radioactive and chemical waste for the next fifty years that will affect human health, the environment, and tribal resources for many generations; for example, DOE is deciding whether to remove 90%, 99%, or 99.9% of the radioactive waste from 177 single-shell storage tanks, 67 of which are known or suspected "leakers." Radioactive waste is so long-lived that DOE projects that in the year 5000, 1:1,000 people who use Hanford (e.g. drink groundwater) will die of cancer if 90% of the tank waste is retrieved, and 1 in 100,000 will die of cancer if 99.9% of the tank waste is retrieved, therefore making today's decisions a very long-term impact; and

WHEREAS, DOE is also considering whether or not to clean up the contaminated soil and groundwater beneath the tanks and as part of this EIS, DOE has decided ***not*** to propose cleanup of large trenches that contain radioactive waste that DOE dumped for decades; and

WHEREAS, DOE's preferred alternative is to ship nuclear waste from across the nation to Hanford once the Waste Treatment Plant is operational making Hanford the nation's nuclear waste dump which will increase the exposure and cancer risks of Native Americans in the Pacific Northwest by transporting nuclear waste through Native American reservations on trucks and trains increasing risk of exposure; now

82-1

THEREFORE BE IT RESOLVED, that ATNI does hereby recommend that Hanford not be the nation's nuclear waste dump; and

BE IT FURTHER RESOLVED that ATNI recommends that DOE should reject any alternatives that propose shipping more waste to Hanford; and

82-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 82 (cont'd): Brian Cladoosby, President, Norma Jean Louie, Secretary, Affiliated Tribes of Northwest Indians of the United States

AFFILIATED TRIBES OF NORTHWEST INDIANS **RESOLUTION #10 - 02**

BE IT FURTHER RESOLVED that ATNI supports the principle of "cleanup first;" and *82-2*

BE IT FURTHER RESOLVED, that, when making decisions, the risk of exposure to Native Americans should be projected by the Tribes themselves, not DOE's exposure scenarios because Tribes are in the best position to judge the exposure of risk; and *82-3*

BE IT FURTHER RESOLVED, that ATNI demands the DOE choose the most aggressive plan possible to contain and treat radioactive and chemical wastes at Hanford with the goal of making the entire area safe for traditional uses; and

BE IT FURTHER RESOLVED, that ATNI demands DOE should remove and treat as much waste contained in the single-shelled tanks as possible with the goal of reaching 99.9%; and *82-4*

BE IT FURTHER RESOLVED, that ATNI demands DOE should immediately develop plans to clean up the million gallons of radioactive waste that has already leaked from the storage tanks and completely treat all of the leaked waste and evaluate and treat miles of unlined ditches and trenches containing nuclear waste that DOE currently has no plans to clean up; and *82-5*

BE IT FURTHER RESOLVED, that ATNI demands DOE should ensure that the Waste Treatment Plant create ultra-stable waste forms that are "good as glass," and DOE should reject all less stable treatment systems; and *82-6*

BE IT FINALLY RESOLVED, that ATNI demand DOE select cleanup plans that protect the health of all people today and for future generations.

CERTIFICATION

The foregoing resolution was adopted at the 2010 Winter Conference of the Affiliated Tribes of Northwest Indians, held at the Great Wolf Lodge, Grand Mound, Washington, February 8 - 11, 2010 with a quorum present.

Brian Cladoosby — Norma Jean Louie

Brian Cladoosby, President — Norma Jean Louie, Secretary

82-2 Comment noted.

82-3 The intent of the American Indian scenarios was to collectively reflect American Indian lifestyles for the purpose of comparison. It was never the intent to analyze all possible American Indian scenarios.

82-4 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

82-5 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present. Estimates of the total leak loss from the 67 SSTs range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons), some of which has reached the groundwater. DOE recognizes that groundwater contamination from past leaks is a concern at Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Since 2004, DOE has buried all LLW in lined trenches (see Appendix E, Section E.3.3, of this EIS for the evolution of past disposal practices). DOE continues to strictly limit the amount of waste that Hanford can accept and ensures that disposal activities are protective of the environment and meet regulatory requirements. Previous use of unlined trenches for disposal was a

Commentor No. 82 (cont'd): Brian Cladoosby, President, Norma Jean Louie, Secretary, Affiliated Tribes of Northwest Indians of the United States

big concern to stakeholders and Washington and Oregon States; DOE heard and addressed those concerns and is using lined trenches.

82-6 Vitrification of radioactive waste into glass is an attractive option because it atomistically bonds the species in a solid glassy matrix. Because radioactive constituents are bonded within the glass structure, the waste forms produced are very durable and environmentally stable over long time durations; however, they remain toxic. EPA has declared vitrification the best-demonstrated available technology for HLW disposal.

See response to comment 82-4 regarding future DOE decisions.

Commentor No. 83: H.T. Bernstein

TC &WM EIS
P.O. Bx 1178
Richmond, WA 99352

February 21, 2010

Dear Sirs,

It is not in the national interest to concentrate all radioactive dumping in one spot. Apart from the burden of guarding hazardous wastes for generations against not only terrorist activity but innocent civilian contact, a single location generates multiple and long transport routes for new waste. *83-1*

It is unfair to impose on the people of the State of Washington, especially those American Indian tribes and others who live in the vicinity of Hanford, the entire health risk of a single national dump. *83-2*

If the further development of nuclear electricity generation, in order to preclude the generation of carbon dioxide emissions, irrespective of higher costs and the dilemma of entombment guarded for thousand of years after end of useful life of plant, is so much in the national interest as to outweigh its disadvantages, the whole country ought to participate in the burdens of waste disposal, not dump them all on Hanford. and the people of Washington State.alone *83-3*

It is poor public policy to exaccerbate conditions in one place before cleaning up existing messes. Before adding further to radioactive hazards at Hanford, leaky barrels of waste should be removed from unlined trenches, transfer the remainder of high-level waste from leaking single walled containers to double ones, and above all prevent radioactive waste from contaminating the ground water that seeps into the Columbia River. This is a great American river affecting millions of people.Just one consequence of contamination would be to spoil the salmon fishery, which would spread out from the mouth of the Columbia along the west coast of America. *83-4*

It is in the national interest to clean up Hanford, not expand it as the radioactive dump for the entire United States. *83-5*

Sincerely,

H.T. Bernstein

H.T. Bernstein
3439 NW 62nd Street
Seattle, WA 98107

83-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

The commentor is also referred to Appendix H, Section H.7, for the results of the transportation risk analysis and Section H.6.6 for a discussion on potential acts of sabotage or terrorism.

83-2 This EIS addresses the environmental impacts of retrieval, treatment, and disposal of tank waste and final closure of the SST system. It also evaluates the impacts of FFTF decommissioning, including management of waste generated by the decommissioning process. Finally, this *TC & WM EIS* evaluates the potential environmental impacts of ongoing solid-waste management operations at Hanford, as well as the proposed disposal of Hanford LLW and MLLW and a limited volume of offsite LLW and MLLW.

See response to comment 83-1 for a discussion on the transport and disposal of offsite waste.

83-3 Nuclear energy production is not within the scope of this *TC & WM EIS*. Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding

Commentor No. 83 (cont'd): H.T. Bernstein

management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

83-4 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

This *TC & WM EIS* provides a detailed description of the SST system in Appendix E, Section E.1.1.1.1, Tank Farm Facilities. SST activities under way include planning the sequence for transferring waste currently stored in the DSTs to the WTP and retrieving and transferring waste from the SSTs to the DST system for eventual treatment. Section E.1.1.1.1 describes the technologies, facilities, assumptions, and uncertainties associated with options for retrieval of waste from SSTs and transfer to DSTs. Contingency planning for potential additional tank leaks is discussed in Section E.1.1.1.2. This section provides some insight into Hanford's tank farm operations, maintenance, surveillance and monitoring, and safety programs that DOE has instituted to ensure that, if new tank leaks develop, they do not affect the environment.

83-5 See response to comment 83-1 for a discussion on the transport and disposal of offsite waste.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor Number 84 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 73.

Commentor No. 85: Emma Amiad

From: Emma Amiad [eamiad@vashonislandrealestate.com]
Sent: Friday, February 26, 2010 5:54 PM
To: tc&wmeis@saic.com
Subject: Hanford

I would appreciate my comments being considered as you move forward at Hanford. I simply cannot believe there would be any further consideration of this site for toxic waste disposal. The Columbia river is vital for agriculture, drinking water, and wildlife in Washington state and must be protected. The ground water contamination alone is enough to keep us awake at night. Hanford should be cleaned up! But instead there is this plan to go back to dumping there. This must stop! *85-1* *85-2*

Emma Amiad

Vashon Island, Washington

85-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

All comments made during the public comment period, whether given orally at hearings or sent via mail or email, were considered equally by DOE. All comments received on the *Draft TC & WM EIS* and their approved responses are included in this CRD, a volume of this *Final TC & WM EIS*. DOE has posted this final EIS, including this CRD, on the Hanford website (http://www.hanford.gov) and on the DOE NEPA website (http://energy.gov/nepa), and a Notice of Availability will be published in the *Federal Register*. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

85-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 86: Tim Calvert

From: Tim Calvert [tcalvert@pcez.com]
Sent: Sunday, February 28, 2010 1:41 PM
To: tc&wmeis@saic.com
Subject: Clean up the poison at Hanford

The disaster that is Hanford is criminal. No more waste, clean it up, stop attacking the people of the Northwest. Sincerely Tim Calvert. *86-1*

86-1 Although not within the scope of this *TC & WM EIS*, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 87: Steve Shaiman

From: Steve Shaiman [steve@shaiman.net]
Sent: Sunday, February 28, 2010 5:53 PM
To: tc&wmeis@saic.com
Subject: Clean Up Hanford Before Expanding

If Hanford's role, serving as a dumping ground for radioactive waste must be expanded, the existing conditions must be addressed first. There is no going back later to clean it up. If this can't be done first, just dump the new waste directly in the Columbia and be done with it. The long-term results will be the same either way.

How can never cleaning up the million gallons of waste leaked from High-Level Nuclear Waste tanks be an option. *87-1*

What about the unlined soil trenches filled with highly radioactive wastes?

Both are causing massive contamination to flow toward the Columbia River.

Spending money for more dumping without first spending the money to deal with these problems, only promises even more problems to compound the existing conditions.

Unless the plan includes a plan to force evacuation and sealing off 100s, if not 1000s of square miles of land around Hanford and along the Columbia river, not cleaning up the existing conditions first makes no sense. *87-2*

Regards,

Steve Shaiman
4334 NE 43rd St
Seattle, WA 98105

87-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates. While this *TC & WM EIS* does not address remediation of contaminated groundwater, groundwater contamination resulting from past tank leaks is currently being evaluated under the RCRA Facility Investigation/Corrective Measures Study process. Disposal of LLW in unlined trenches within Hanford's LLBG 218-W-5 ceased in 2004, as described in Chapter 3, Section 3.2.12.1.4, of this EIS. Closure of these CERCLA past-practice units is outside the scope of this EIS. These LLBGs are included in a draft Remedial Investigation/Feasibility Study work plan that outlines possible characterization and remediation activities for specified landfills on the site. However, the contribution of past waste disposal in the burial grounds to contamination of the vadose zone and groundwater is included in the cumulative impacts analysis presented in Chapter 6 of this EIS.

Under the Waste Management alternatives evaluated in this *TC & WM EIS*, onsite-generated, non-CERCLA, nontank LLW and MLLW would continue to be disposed of in the "lined" trenches 31 and 34 in LLBG 218-W-5. As presented in Chapter 4, Section 4.3, and Chapter 5, Section 5.3, of this EIS and summarized in the Summary, the potential short-term impacts of disposal operations would be negligible, and the long-term groundwater and human health analyses indicate that it would be safe to continue disposal of LLW and MLLW in these "lined" trenches.

87-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 88: Edward Fredenburg, Washington State Department of Ecology

From: Fredenburg, Edward (ECY) [mailto:Efre461@ecy.wa.gov]
Sent: Wednesday, January 13, 2010 3:21 PM
To: Burandt, Mary E
Cc: Eberlein, Elis (ECY); Dahl-crumpler, Suzanne L; McDonald, Dan (ECY)
Subject: RE: errors in EIS

Another possible error:

Comparing chromium releases to VZ (Appendix M) vs. releases to GW (Appendix N) for the Waste Management alternatives, it generally appears that for tank closure alternatives 2B, 3A, 3B, and 3C the amount of chromium reaching groundwater is the same or slightly less than the amount released to the vadose zone. The one exception is for tank closure alternative 3B. Figure M-53 shows approximately 400,000 kg released to the vadose zone. Figure N-92 shows that only about 1/10 that amount reaches groundwater. Either there is an order or magnitude error somewhere, or the transport properties of chromium atoms in the vadose zone are somehow different if the source is cast stone vs. ILAW, bulk vit, or steam reforming product. ***88-1***

p.s. How is Charles doing on providing values for the bars in Appendix M and N? Elis Eberlein also needs the information. I'll be gone effectively by the end of today, so if you or Charles provide the requested values by email, please copy Elis on the email.

Thanks,

Ed

88-1 There was an error in the entry for chromium in Figure N–92 in the *Draft TC & WM EIS*. That error has been corrected in Figure N–133 of this *Final TC & WM EIS*.

Commentor No. 89: Edith E. Judd

TC & WM EIS

I am opposed to the plan to make Hanford a National Radioactive waste dump sight.

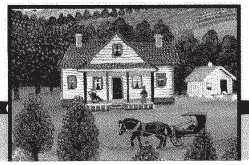
There should be more than one dump sight so the wastes won't have to be transported so far and endanger more cities as it passes through.

There are other desert like areas.

A high concentration of radioactive material at Hanford endangers ground water and human lives. It also endangers the columbia river, the salmon, and the residents of Southland oregon.

Please do more research to find other suitable locations so waste will not have to be transported so far and there will be less concentration in one place.

Sincerely
Edith E. Judd
E. 943 Indiana
Spokane WA 99207



89-1

89-2

89-1 cont'd

89-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

89-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 90: Janice Milani

February 23, 2010

Mary Beth Burandt, Document Manager
USDOE, Office of River Protection
P.O. Box 1178
Richland, WA 99352

Dear Ms. Burandt,

I am writing to you with three concerns about the aging Hanford nuclear plant--specifically, (1) cleanup from the leaking storage tanks, (2) wastes that have already leaked, and (3) the proposal to ship radioactive wastes from across the United States to Hanford.

I would like to say that I strongly oppose transporting any radioactive wastes across the country to Hanford, or for that matter, anywhere else. There is the strong possibility of spills or accidents during any phase of this, endangering peoples' lives through long-term soil and water contamination. No matter how careful humans are, there are always mistakes and accidents. Also, self-styled terrorists could try to hijack some of this material. There are mentally unstable people who would see this as an opportunity for whatever ends they have in mind. *90-1*

Also, I believe that all of the existing 55 million gallons of buried waste at Hanford need to be removed, with a 99.9% retrieval, and that the radioactive wastes that have already leaked from corroding holding tanks and are getting nearer and nearer to the Columbia River, should be cleaned up. *90-2*

I am sure you are aware that the Columbia River is one of the Northwest's major transportation highways, powers a series of dams, and is also a source of food to people who fish its waters. In addition, the Columbia is near drinking water wells that are used in summer by the city of Portland. And Portland is by far the largest urban area in Oregon, making the possibility of contamination able to affect a great many people. *90-1 cont'd*

In view of all these very real dangers, I hope you will use your influence to stop any transportation of nuclear wastes to Hanford and will recommend a thorough cleanup of all of the wastes.

Thank you very much for listening.

Sincerely,

Janice Milani

Janice Milani
323 S.E. 55th Ave.
Portland, OR 97215

90-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

90-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 91: Velura A. Garza

Feb 25, 2010
Velura A. Garza
707 E. Glass
Spokane, Wa. 99207
[redacted]

Tc+ Wm Eis
P.O. Box 1178
Richland, Wa. 99352

Please, Please Stop this Hazardous Waste We donot need it in Washington State. We don't Want it, We don't need it to Contaminate our Rivers, Lakes + other Water sources. We don't need it to cause more Cancer + other health risk for us to our Children + Grandchildren + What do you think it is doing to our Wildlife.
We need this to stop today, No More Radioactive - Hazardous Waste Dump. We need to protect What we have.

Thank you + May God Bless!

Velura A. Garza

91-1

91-1 The purpose of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 92: Jeff White

—— Original Message ——
Subject: Hanford toxic waste
Date: Mon, 01 Mar 2010 15:22:54 -0800
From: Jeff White <JWhiteCIN@comcast.net>
To: TCY&WMEIS@saic.com

To: Mary Beth Burandt, NEPA Document Manager, U.S. Dept.of Energy,
Office of River Protection
ATTN: TC & WM EIS, POB 1178 Richland, WA 99352

I completely agree with the following proposition:

1. speed the clean-up of nuclear and toxic waste at Hanford that is contaminating the COLUMBIA RIVER - DON'T DELAY CLEAN-UP! *92-1*

2. prevent further offsite waste shipments to Hanford that would require moving toxic waste through Oregon highways. *92-2*

I understand that we have energy problems that will likely require a drastic change of lifestyle.
My family and I are willing to undergo hardship to avoid further damage and contamination
of the planet.
We choose to Protect the environment, and invest in our future.

Jeff White
2966 Norkenzie Rd.
Eugene, OR 97408

[redacted]

1 of 1 3/1/2010 4:03 PM

92-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

92-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 93: Arun N. Toké

From: Arun Toke [editor@SkippingStones.org]
Sent: Monday, March 01, 2010 8:07 PM
To: tc&wmeis@saic.com
Cc: office@hoanw.org
Subject: Hanford Waste Cleanup and its potential threat to our environment

RE: Tank Closure & Waste Management EIS Hearings

Dear DOE Officials

Greetings.

Since I am unable to come to the public hearing this evening, I wanted to send you my concerns and comments regarding Hanford for the record.

I would like to see a speedy clean-up of nuclear and toxic waste at Hanford that is contaminating the COLUMBIA RIVER - PLEASE DO NOT DELAY CLEAN-UP TASK!

Hanford is located too close to the Columbia River. How could you all have not taken in to consideration the future pollution that it will cause and impact on this site on the important waterway? For many years it produced plutonium for nuclear weapons, leaving major nuclear and chemical pollution, some of which is a possible long-term threat to the river. Every now and then I have read reports in the newspapers about leakages from Hanford. And, as a former electrical engineer, I feel that somehow, the siting and construction must have been flawed. *93-1*

I am surprised to learn that the DOE spends around $2 billion per year.

I hope you will advise the President to not invest in Nuclear energy until the waste issues are fully and satisfactorily resolved. *93-2*

Thank you for seeking our input.

arun
Arun N. Toké, Editor
Skipping Stones Magazine
P.O. Box 3939
Eugene, OR 97403 USA

TEL. xxx-xxx-xxxx

email: editor@SkippingStones.org
website: www.SkippingStones.org

Celebrating Our 22nd year!
WINNER, 2007 NAME AWARD

93-1 Possible long-term threats to the river are analyzed in Chapter 5 of this *TC & WM EIS*. The long-term impacts analysis results for groundwater, human health, and ecological risk were derived from modeling releases (including leakages) of waste to air and groundwater. These impacts were analyzed out to 10,000 years in the future.

93-2 One of the purposes of this *TC & WM EIS* is to analyze the range of reasonable alternatives to safely retrieve and treat radioactive, hazardous, and mixed waste from the Hanford tank systems; close the SST system; and store and/or dispose of the waste generated from these activities at Hanford. National policies addressing commercial nuclear power generation and management of associated wastes are beyond the scope of this EIS.

Commentor No. 94: Justin Pearce, City Council, City of Pendleton, Oregon

From: Pearce, Justin (Pendleton) [JustinPearce@chiwest.com]
Sent: Tuesday, March 02, 2010 8:27 PM
To: ken.niles@state.or.us; tc&wmeis@saic.com
Subject: More info on Draft Tank Closure & Waste Managment EIS

Ken,

I am trying to understand the entire situation as best as I can regarding the liquid waste from Hanford. What is clear is that its vicinity to a massive river system such as the Columbia has the potential to affect a very large area, ecologically and geographically. I would hope, despite the costs, that retrieving the tanks is the most likely option. Does that seem to be the consensus? What would we do with the waste then? *94-1*

With landfill closure of all the tanks, what does that entail?

I am less concerned about the FFTF but obviously, continued nuclear waste processing at this site concerns me, as states as a possibility after 2022. *94-2*

Do you have more information, in a pdf that I can read. What is the best solution in your opinion and what is likely to happen, if you were to guess? *94-3*

Thanks for your time,

Justin Pearce
City of Pendleton, City Council

Justin J. Pearce JD MBA
Practice Manager, St. Anthony Hospital, CHI
justinpearce@chiwest.com
xxx.xxx.xxxx

94-1 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

94-2 DOE is convinced that processing the tank waste in the WTP is the best path forward for stabilizing this waste and reducing potential impacts on the environment. As with any treatment process, there are risks; however, DOE is working diligently to mitigate such risks while completing the mission. To be clear, FFTF is not currently processing nuclear waste and will not do so in the future.

94-3 DOE mailed copies of the *Draft TC & WM EIS* to all individuals who requested one. For those individuals who requested only a printed copy of the Summary, a CD that contained the complete draft EIS and a Reader's Guide was attached to the inside cover. Project information is also available to the public on Hanfords's website (http://www.hanford.gov). The commentor is referred to Chapter 2, Section 2.12, for a discussion of DOE's Preferred Alternatives for tank closure, FFTF decommissioning, and waste management. See response to comment 94-1 for information on the NEPA decisionmaking process.

Commentor No. 95: Marsie Martien

From: Marsie Martien [mmartien@gmail.com]
Sent: Tuesday, March 02, 2010 4:23 PM
To: tc&wmeis@saic.com
Subject: Hanford Waste Dump

Clean-up the Hanford site completely first before bringing more waste. *95-1*

remove the tanks and clean the soil. DO NOT make Hanford a national nuclear dump site!

Marsie Martien
3001 SE Kelly St.
Portland, OR 97202

95-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 96: James Bruvold

From: Jim Bruvold [jbruvold@efn.org]
Sent: Thursday, February 25, 2010 3:59 PM
To: Mary Beth Burandt
Subject: Geologic Isolation of Tank Wastes

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
Environmental Management Division
Richland, WA 99352

Dear Ms. Burandt,

Is there someone in the ORP who would be interested in discussing with me an idea to geologically isolate radioactive pollution using fungal mycelium? Use fungus to sequester and bind pollution to soil particles, and thus reduce aquatic transport into the Columbia River. The idea is to inject cultured microfauna into the vadoze zone beneath the seeping waste tanks, where they will reproduce and continue to grow on their own. *96-1*

There is a red fungus growing on the concrete walls of the Chernobyl reactor building in an environment of 10,000 Rads/hr. Apparently they rely upon radioactive disintegration energy for their life source.
There very well may be similar fungus growing in the vadoze zone beneath the leaking tanks that could be extracted and cultivated in a heterogeneous environment and then re-injected without un-intended consequences to the groundwater table.

My proposal is to culture fungus in a composted medium using a process I have designed. This process converts and separates metals and plastics from compost derived from raw city garbage and wastewater treatment sludge, on a scale of hundreds of tons per day. The municipal wastes generated in the Tri-Cities area could be used to help clean up the Hanford Site over the next 30 to 40 years. A large class of fungi overcome the difficulties encountered in such environments by the method of translocation which results in the internal redistribution of nutrients within the fungal mycelium. There is strong experimental evidence that diffusion is the dominant mechanism for translocation in heterogeneous environments. Diffusion is vital for exploration, i.e. the expansion of the fungal network into the surrounding area.

96-1 As discussed in Chapter 2, Section 2.6, of this *TC & WM EIS*, a number of technologies, including in situ soil remediation, were considered but not selected for detailed analysis in this *TC & WM EIS*. In situ soil remediation technologies were not evaluated in detail because of the difficulties and uncertainties associated with placement of treatment zones and their performance verification. In situ treatment also generally requires long periods of time and presents concerns about uniformity of treatment because of the variability in soil and aquifer characteristics.

Commentor No. 96 (cont'd): James Bruvold

Environmental heterogeneity has a strong influence on growth and function according to researchers at University of Dundee, U.K.

Sequestering nuclear wastes with mycelium my show to be a viable, cost effective method for cleaning up a very difficult situation.

Thank you for your consideration.

Respectfully,

James Bruvold, PE
Consulting Engineer
Energy and Environmental Sciences, LLC
88059-5th Street #2, P.O.Box 578
Veneta, OR 97487-0578
xxx-xxx-xxxx
jbruvold@efn.org

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Commentor No. 97: Matt Switzer

From: matt switzer [mattiswitz@gmail.com]
Sent: Tuesday, March 02, 2010 7:02 AM
To: tc&wmeis@saic.com
Subject: 3/1/2010

.9%-

Writing is hardly the optimal tool for expressing passion and emotioninstead, it functions best as a medium for conveying logic. Yet either are sufficient reasons to care about or respond to one basic point of Truth: life on earth is under attack. Whether or not we have come to be desensitized to this fact does not justify poisoning the web of life or contributing to the death of countless human beings. To confront this recently discovered reality of suicidal proportion, new democratic devices are needed for constructing the solutions that will prove commensurate with the problems faced today.

The recognition that all life is Sacred should prompt us to reconsider the lethal direction in which we are headed. It has indeed surpassed mere importance to educate ourselves fully on the complexities of the system we despise, to stage powwows and teach-ins that disperse and decentralize completely this knowledge we have accumulated. Rather, there has become a fundamental barrier in our Collective Psyche preventing us from taking full responsibility to the extent we should commit ourselves in our opposition to inadequate initiatives and impact statements. We can no longer be asked to trust the outside control of those in sanctioned offices of authority to provide us with a lifestyle dignifying civilization, for it will always be shortchanged without personalized determination.

Revitalization, the need for Self-rule and indisputable sovereignty, is required to eliminate violations of accepted social norms, i.e. the Public Trust Doctrine. Unfortunately the public is still mostly ignorant to these issues despite living in an information age and therefore the reform of education and the rebuilding of justice systems will be critical components to alleviating the grievances prevalent in this system of bureaucratic insanity. A critical mass, a group of people coming together from different backgrounds with different theories must be orchestrated to produce a stable, responsive, capable, integrated resource management plan, legitimately concerned about our investment in the future. In describing how best to reconsider responses to issues bearing most significance for Native peoples, Charles Wilkinson offers, The best outcomes will be inspired by Indian people themselves and carried out by their own institutions. (Wilkinson 2005)

97-1

97-1 Comment noted.

Commentor No. 97 (cont'd): Matt Switzer

Will we seek to entomb our most callous mistakes of the past, repressing our historical traumas even as its toxicity seeps into our unconscious; or will we take the lesson of today, the urgency of Now, and apply it to the larger picture? We must teach each other by doing and being what is right, while including ourselves in a cross-generational commitment to the ideal of Ultimate good. But this radical assembly cannot merely be just for showpower must shift from institutions of hierarchy to the collaborative human effort oriented towards a common purpose, namely its own sustainability. We must let the children speak for themselves while aiding and enforcing their engagement with the natural world. If we can do but one single thing for those who have been and will continue to be most affected by these decisions of highest priority, it will be to believe that rage can and will in fact educate and motivate us to assess the risks and cure ourselves of the greatest war crimes perpetrated of all time. Only then can the potential power of our collective intellect save us from the destruction of unforeseen prejudice, constructing a vessel of cultural regeneration much like our ancestors who, together, fashioned the canoes that saved them from the rising waters of certain death: **97-1 cont'd**

The canoe is a metaphor for community; in the canoe, as in any community, everyone must work togetherall facets of the contemporary canoe experienceplanning, building, fund-raising, travelingcombine to make our communities strong and vital in the old ways. (Neel 1995)

Wilkinson, Charles. (2005) Blood Struggle: The Rise of Modern Indian Nations. W.W. Norton & Co: New York

Neel, David. (1995) The Great Canoes: Reviving a Northwest Coast Tradition. University of Washington Press

Response side of this page intentionally left blank.

Comment Documents 98 through 109 are found in the Richland, Washington, and Boise, Idaho, public meeting transcripts. These transcripts can be found in the second book of this Comment-Response Document (all campaigns and public meeting transcripts).

Commentor No. 110: Amy Pincus Merwin

From: Amy Pincus Merwin [amy@informproductions.com]
Sent: Wednesday, March 03, 2010 8:57 PM
To: tc&wmeis@saic.com
Subject: Please, no more nuclear storage, dumping or transporting of nuclear or other toxic waste to Hanford

To whom it may concern,

I live in Eugene Oregon and have properties all over Oregon. My livelihood is based on the livability of Oregon. I have great concern that:

1. the transport of nuclear materials and waste along both the I5 and I84 and other highways are will attract a terrorist attack on these transports exposing the populations in WA and OR to nuclear radiation; *110-1*
2. the Columbia River will become further radioactive;
3. a leak at Hanford will create radioactive pollution downwind; *110-2*
4. creating more nuclear waste with no methods, means or location to properly reduce its toxicity or permanently store it without risk to present and future generations is foolhardy, irresponsible and unlikely to result in any difference than the present status of the radioactive toxicity currently at Hanford. *110-3*

Current health, environmental devastation and degradation and pollution issues at Hanford *should* be remedied *before* any other materials are introduced. And I believe no further nuclear or other toxins should ever be transported to or stored at Hanford. *110-1 cont'd*

I believe that America's energy future lies not in the creation of new nuclear power plants, despite the Obama administration's recent decision, and instead in true renewable energy sources, such as wind, solar, small hydro, algae-based bio-fuels, tidal and wave power and others. *110-4*

Please do not allow further and future transport and storage of nuclear materials and waste in the Northwest and specifically at Hanford. *110-1 cont'd*

Sincerely,

Amy
Amy Pincus Merwin
InForm Media and Property
2220 Sandy Drive
Eugene, OR 97401
cp xxx-xxx-xxxx
fx xxx-xxx-xxxx
amy@informproductions.com

110-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

110-2 One of the purposes of this *TC & WM EIS* is to analyze the range of reasonable alternatives to safely retrieve and treat radioactive, hazardous, and mixed waste from the tank systems; close the SST system; and store and/or dispose of the waste generated from these activities at Hanford. DOE acknowledges that long-term actions are required to permanently reduce the risk to human health and the environment posed by the waste in the tank systems.

110-3 Comment noted.

110-4 This *TC & WM EIS* addresses proposed actions to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and expand waste disposal capacity at Hanford to provide for disposal of on- and offsite DOE waste. The generation of energy in the United States is beyond the scope of this EIS.

Commentor No. 111: Janice Snyder

From: Janice Snyder [janiceliza@hotmail.com]
Sent: Thursday, March 04, 2010 1:12 AM
To: tc&wmeis@saic.com

Mary Beth Burandt, Document Manager
U.S. Department of Energy, Office of River Protection
P.O. Box 1178, Richland,WA 99352
Fax: 888-785-2865; Email: TC&WMEIS@saic.com

Dear Ms. Burandt,

Please accept these comments on the draft EIS for the US DOE Tank Closure and Waste Management plan.

As a resident of one of the largest cities downriver from Hanford, the fate of radioactive and chemical waste products has a direct impact on me and my community. I am extremely concerned that existing reports have shown that so many of the buried storage tanks have been known to be leaking for so long. I don't understand how a nation with our scientific expertise and willingness to fully fund defense efforts appears unwilling to remedy this alarming situation. *111-1*

I urge the Department of Energy to incorporate the following steps into the final EIS before it is too late:

1. **Clean up all 53 million gallons of buried nuclear waste to 99.9% retrieval.** It seems clear that anything below 99.9% retrieval will lead to elevated drinking water levels of radioactivity. It is not acceptable to knowingly expose citizens to this risk. *111-2*
2. **Drop the proposal to ship radioactive waste from across the nation to Hanford.** DOE's "preferred alternative" is to ship radioactive waste from across the nation to Hanford after the Waste Treatment Plant is operating. No more waste should be shipped to the banks of the Columbia River, the lifeblood of the Pacific Northwest.

   The State of Washington said, "disposal of the proposed offsite waste would significantly increase groundwater impacts to beyond acceptable levels." DOE should exclusively focus on clean up in order to reduce the cancer risks and threats to fish and wildlife posed by existing pollution at Hanford. Because DOE is decades behind its legal schedule in cleaning up existing waste, the proposal to ship more waste to Hanford is beyond foolish. *111-3*
3. **Clean up the millions of gallons of nuclear waste that has already leaked and is reaching the Columbia.** DOE's proposal fails to address important soil and groundwater contamination. DOE should excavate and fully clean miles of ditches and trenches that contain *111-4*

111-1 Both DOE and Congress are committed to the cleanup efforts at Hanford, and DOE continues to seek funding for these efforts. As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

111-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

111-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections describe the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of

Commentor No. 111 (cont'd): Janice Snyder

waste. In addition, DOE should treat the soil and groundwater beneath the leaky storage tanks. Unchecked, plumes of this contamination are moving toward the river. Complete cleanup is necessary to protect salmon from long-lived radioactive and chemical waste. *111-4 cont'd*

Thank you for your time and attention to these comments,

Janice Snyder
Portland, OR

offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Ecology's foreword to the draft EIS included its views and positions concerning DOE's analysis in the document and has been updated in this final EIS.

111-4 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 112: Gretchen Ellefson

From: Gretchen Ellefson [bellgre@gmail.com]
Sent: Thursday, March 11, 2010 1:02 PM
To: tc&wmeis@saic.com
Subject: Public Comment

I grew up in the Tri-Cities. My father worked at Hanford for years. When I was young, Hanford was just a part of life. Thats not to say that everyone in the Tri-Cities loves nuclear waste and hopes it will be in our water systems for millennia to come, but Hanford drives our economy and makes our area interesting. And for that, we appreciate it.

When I moved to Seattle in the fall of 2008, I found that the attitude of western Washingtonians isnt so different from those in eastern Washington when it comes to waste cleanup. The Tri-Cities may be more pro-nuclear power, but they are not, like some Seattleites seem to believe, pro-pollution and pro-waste. Everyone wants Hanford to be clean. Everyone wants a clean Columbia. So Im not quite sure why the Department of Energy doesnt plan on cleaning up the area as thoroughly as possible. And I dont quite understand how it could seem like a good idea to bring in more waste before Hanford is 100% clean. *112-1*

The Columbia River is hugely influential in the lives of native populations, as well as ecosystems in and around it, not to mention its influence of the livelihoods of thousands who live near the rivers shores. It doesnt make sense that anyone would look at this river and be resigned to the possibility that it could bring death rather than life to plants, animals, and humans who currently rely on it.

I understand it will be difficult. I understand it will be expensive. But which, in the long term, sounds worse: a little more work costing a little more money taking a little more time, or thousands of years of uninhabitable land? I can tell you what I would choose. I cant imagine the beautiful scenery that is the backdrop of so much of my childhood being unlivable, unavailable to future generations as the home it has been for me. *112-2*

112-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

112-2 Comment noted.

Commentor No. 113: Linnea Hirst

From: lwvquilter@comcast.net
Sent: Sunday, March 07, 2010 1:09 PM
To: tc&wmeis@saic.com
Subject: Hanford EIS

To the US Department of Energy
And to the Washington State Department of Ecology
Re: Hanford EIS document: Draft Tank Closure & Waste Management EIS

It is vital that the federal government continue—and accelerate—the thorough cleanup of the Hanford Nuclear Reservation in ways that protect the Columbia River and the people and all living creatures downstream from the Reservation.

We have laws, both federal and state, that must be met in order to protect the environment and the people who live and work in the areas affected by leaking radioactive and chemical wastes. Those wastes cannot be ignored and left to contaminate the land, the groundwater and sooner or later, the Columbia. *113-1*

It is time—beyond time—to pay attention to the generations that will follow us and to leave them an earth that at least is no worse than when we arrived here.

Thank you,

Linnea Hirst
1602 E. McGraw Street
Seattle WA

113-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 114: Ken Niles, Assistant Director, Oregon Department of Energy

From: Ken Niles [mailto:ken.niles@state.or.us]
Sent: Wednesday, January 27, 2010 2:33 PM
To: Borak, David
Cc: Hedges, Jane; Jpri461@ECY.WA.GOV
Subject: February 2000 ROD related to disposal of LLW and MLLW

Dave,

As we discussed on the phone, I would appreciate knowing how to initiate a review of the February 25, 2000 Record of Decision that selected Hanford and the Nevada Test Site as "regional" disposal sites for low-level and mixed low-level waste from throughout the DOE complex.

That ROD was based on a programmatic Environmental Impact Statement that did not assess site-specific impacts of that action. That site specific analysis has now been completed, and a draft EIS, the Tank Closure and Waste Management EIS (TC & WM EIS), was released by Hanford late last year. The site-specific analysis shows significant long-term impacts to the Hanford groundwater from the disposal of off-site waste at Hanford, especially if it contains long-lived mobile radionuclides, such as Technetium 99 and Iodine 129. *114-1*

Even though there is a moratorium in place on receipt of off-site wastes that will extend through 2022, DOE's has previously made it quite clear that it does intend to bring off-site waste to Hanford once that moratorium is no longer in effect. Given the findings in the draft TC&WM EIS, it is clear that the ROD issued in February 2000 designating Hanford for receipt of off-site waste must be amended to withdraw Hanford from that decision.

By doing so, it will allow DOE to move forward with planning for more appropriate disposal of waste streams that will still be in need of a disposal path beyond 2022. It will also allow for a very contentious issue at Hanford to be put to rest once and for all.

Thanks.

Ken Niles
Assistant Director
Oregon Department of Energy
625 Marion Street NE
Salem, OR 97301-3742
503-378-4906
503-884-3905 - cell
503-378-6457 - fax
ken.niles@state.or.us

114-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 115: Lucy E. Schneid

From: jlschneid@comcast.net
Sent: Monday, March 08, 2010 1:33 PM
To: tc&wmeis@saic.com
Subject: Hanford Cleanup

Dear Mary Beth Burandt, Document Manager, Office of River Protection

Regarding the Department of Energy's decision to quit treating radioactive waste at Hanford and possible sending additional waste to the site, I need to inform you this is a bad idea. It is a long slog, but Hanford needs to be cleaned up. We cannot leave a nightmare for our children and future generations. We cannot drop the ball here. That is unacceptable. I, like Senator Ron Wyden, am dissatisfied with the cleanup progress, and "I am absolutely opposed to DOE bringing more waste" to this place. Keep the Columbia River a radioactive-free zone forever. This cannot be done without finishing the cleanup job and sealing it from further waste. *115-1* *115-2*

Respectfully yours,

Mrs. Lucy E. Schneid
2334 NE 47th Avenue
Portland, OR 97213

115-1 DOE continues to manage both radioactive waste and MLLW (waste that consists of both radioactive and hazardous components) at Hanford, including processing and/or treating these wastes in accordance with applicable statutory and regulatory requirements. The TPA, negotiated and signed by DOE, EPA, and Ecology in 1989, established Hanford cleanup priorities, actions, and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

115-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 116: Lucy Garrick

From: Lucy Garrick [lgarrick098@gmail.com]
Sent: Sunday, March 07, 2010 2:17 PM
To: tc&wmeis@saic.com
Subject: PUBLIC COMMENT ON THE DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT

PUBLIC COMMENT ON THE DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT

Humans do not mix well with radio active waste and chemical toxins. Neither to plants and animals. As a mother, grandmother and resident of Washington State, I am concerned about the plume maps in the DOE report on the Handford site that show toxins migrating into the ground water and into the Columbia River over time. Once these toxins go into the the river there will be no way to contain them. They will eventually be absorbed into plants which are eaten by fish, which are eaten by mammals and birds. *116-1*

The US DOE needs to use every resource at their disposal to correct this problem by *116-2*

1) complying with existing laws that regulate the disposal of nuclear waste,
2) not dumping additional waste at the Hanford site from elsewhere,
3) limiting wastes at Hanford to those that won't cause future leakage and migration, and
4) digging up wastes in unlined soil disposal ditches and tank leaks and disposing them in a way that prevents them from spreading or harming the the environment and living things.

Lucy Garrick
4119 E Edgewater Pl. G178
Seattle, WA 98112

116-1 In general, the scope of this *TC & WM EIS* does not include (nor will the potential NEPA ROD) groundwater remediation activity as part of the proposed actions evaluated. DOE recognizes that groundwater contamination is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

116-2 Responses to each of the commentor's concerns are as follows:

(1) DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2, discusses Hanford regulatory compliance requirements and the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE order requirements that must be met for DOE to implement Tank Closure alternatives. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter. Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives, as well as the permits and approvals DOE must obtain from Federal, state, and local agencies. In Chapter 8, Sections 8.1.7 and 8.3, DOE identifies the consultations and coordination that DOE has undertaken with American Indian tribes and that would need to continue for the purpose of implementing the proposed actions and alternatives.

(2) Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with

Commentor No. 116 (cont'd): Lucy Garrick

some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections describe the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

(3) and (4) Since 2004, DOE has buried all LLW in lined trenches. DOE continues to strictly limit the amount of waste Hanford can accept and ensures that disposal activities are protective of the environment and meet regulatory requirements. Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 117: Mary Allison

From: Mary Allison [maryallison17@comcast.net]
Sent: Sunday, March 07, 2010 7:01 PM
To: tc&wmeis@saic.com
Subject: Hanford needs a clean-up not a cover-up

I am writing you on behalf of myself and my family to request that you take the necessary action to insure the following:

- Removal of 99.9% of tank wastes currently at the Hanford Reach facility;
- Take an unyielding "clean closure" stance to remove all tanks and investigate and remediate the soil contaminations from tank leaks; *117-1*
- Maintain the standard established by Oregon for the Trojan nuclear reactor and treat the waste at Hanford. Do not put radioactive waste on our roads to harm that WILL HARM our adult citizens AS WELL AS our children and seniors. *117-2*
- Discard the "supplemental treatment" options and start up the LAW vitrification portion of the WTP prior to 2019 and start funding a second LAW facility in 2012 in order to have it ready by 2022. *117-3*
- DO NOT ADD MORE WASTE TO HANFORD. I implore you to say no to making Hanford a national radioactive waste dump site. *117-4*
- Dig up Plutonium and other Transuranic wasted in unlined soil disposal ditches and tank leaks, treat the wastes and dispose of them in deep geological repositories. *117-5*

Be the steward that you must be to insure the health of our families and planet.

Mary Allison
xxx-xxx-xxxx

117-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

117-2 Chapter 8 of this *TC & WM EIS* identifies the laws, regulations, and other requirements that potentially apply to the alternatives. Specifically, Section 8.1.4 identifies and summarizes the hazardous waste and materials management requirements. This section also discusses the treatment standards and transportation requirements for both hazardous and radioactive materials and waste. Radioactive waste and materials are transported in DOT-certified containers that meet strenuous technical standards established by NRC.

117-3 This EIS analyzed supplemental LAW treatment capability by building new treatment facilities that are either part of (expanded LAW capacity) or separate (bulk vitrification, steam reforming, or cast stone) from the WTP. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means

Commentor No. 117 (cont'd): Mary Allison

for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, and the BOF, as well as the Pretreatment Facility and the HLW Vitrification Facility. For more information regarding the *2020 Vision,* please see Appendix E, Section E.1.3.3.2.

117-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

117-5 Treatment and disposal of the tank waste is evaluated in this EIS. However, the removal of waste in unlined disposal ditches and stored TRU waste at Hanford is not within the scope of this *TC & WM EIS* and, therefore, is not analyzed in this EIS. As described in the Summary and Chapter 1, Section 1.4.2, Decisions Not to Be Made, these wastes are part of the CERCLA past-practice units and closure of these units would be addressed at a later date consistent with the TPA process, which includes consideration of NEPA values.

The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 118: Tom Pickens

From: Tom Pickens [tsrland@yahoo.com]
Sent: Sunday, March 07, 2010 7:59 PM
To: tc&wmeis@saic.com
Subject: Opposing Hanford site dumping

As a grandfather and father of residents in Washington State, I am concerned about the plume maps in the DOE report on the Hanford site that show toxins migrating into the ground water and into the Columbia River over time. Once these toxins go into the river there will be no way to contain them. They will eventually be absorbed into plants, which are eaten by fish, which are eaten by mammals and birds. *118-1*

The US DOE needs to use every resource at their disposal to correct this problem by *118-2*

1) complying with existing laws that regulate the disposal of nuclear waste,
2) not dumping additional waste at the Hanford site from elsewhere,
3) limiting wastes at Hanford to those that won't cause future leakage and migration, and
4) digging up wastes in unlined soil disposal ditches and tank leaks and disposing them in a way that prevents them from spreading or harming the environment and living things.

Thank you for listening,

Tom Pickens
Danville, CA

118-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

118-2 The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter. Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives, as well as the permits and approvals DOE must obtain from Federal, state, and local agencies.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Commentor No. 119: Mike Conlan

From: Mike Conlan [mikeconlan@hotmail.com]
Sent: Monday, March 08, 2010 2:32 PM
To: tc&wmeis@saic.com
Subject: Comment on Tank Closure & Waste Management Environmental Impact Statement

USDOE:

1) dismantle the FFTF reactor, *119-1*
2) cleanup ALL the tank waste,
3) "clean closure" for all tanks and soils,
4) startup the vitrification as soon as possible, *119-2*
5) no more waste added to Hanford! - a nuclear waste dump within throwing distance of the Columbia River!! *119-3*

USDOE seems more interested in NOT doing the needed cleanup! It is like our disabled vets - easily forgotten - after the fact.

Mike Conlan
6421 139th Place NE, #52
Redmond WA
98052-4588

119-1 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated.

The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all of the SST system, effectively removing 100 percent of the waste. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

119-2 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

119-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 120: Kristen McNall

From: Kristen McNall [kmcnall@gmail.com]
Sent: Monday, March 08, 2010 5:57 PM
To: tc&wmeis@saic.com
Subject: Clean Up Hanford for Future Generations

Hello,

I have chosen Mosier as my home. The Columbia River is a vital part of our community, both for commerce and for recreation. Were the Columbia to become unusable, our community would suffer, and quite possibly cease to exist. I urge you to clean up Hanford to the best of our abilities to ensure the health of the river for future generations. The goal should be to empty the tanks to the 99.9% or better level, and to address the other sources of contamination rather than just burying them and hoping they won't cause trouble later. Hope can not be our sole strategy for protecting our homeland. *120-1*

Sincerely,

Kristen McNall
Mosier, Oregon

120-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 121: Linda Densmore

From: Linda Densmore [densmore@eoni.com]
Sent: Tuesday, March 09, 2010 4:51 PM
To: tc&wmeis@saic.com
Subject: Transportation of nuclear waste to Hanford is a bad idea

Hello- I have lived in La Grande, Oregon for 16 1/2 years and can't believe with all the problems Hanford is having to clean up the nuclear waste that you are willing to bring more there. We also have a home in Hood River and my husband loves to wind surf in the summers. Our kids join and we hope their kids (eventually) will someday too. But they already have a syndrome there I beleive it is called the "sick sinus syndrome" where people who windsurf there end up with a chronic stuffy nose and sometimes sinus infections. When my husband wind surfs other places this doesn't happen. Also La Grande is along hwy 84 and we live in between two of the worst snow passes in the whole U.S. We've already had one spill and we feel we should have a say. There are many families who i visit as a visiting nurse who live right near the freeway. Plus the Tri-Cities area has grown so much over the years...don't you think you should go someplace where there are no people and not a huge source of water that you could further contaminate and interfer with life connected to that river? Please clean up the nuclear waste that is there and then don't bring anymore there. *121-1*

Linda Densmore
7 Pine Crest Drive
La Grande, Oregon
97850
xxx-xxx-xxxx

121-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 122: John Whisler

From: John Whisler [john.whisler@seattlebiomed.org]
Sent: Tuesday, March 09, 2010 5:59 PM
To: 'TC&WMEIS@saic.com'
Subject: clean up

Please clean up the nuclear waste at Hanford now. *122-1*

Thank you

John Whisler

122-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 123: Karen McMichael

From: Lisa Van Dyk [lisa@hoanw.org]
Sent: Tuesday, March 09, 2010 7:32 PM
To: tc&wmeis@saic.com
Subject: Fw: Please forward comments

----- Original Message -----

From: Karen McMichael
To: lisa@hoanw.org
Sent: Tuesday, March 09, 2010 4:40 PM
Subject: Please forward comments

Thanks in advance for forwarding.

Karen:

****

I am deeply concerned about the pending decision to disallow waste materials going to Yucca Mountain. It seems only a matter of time until the waste materials begin leaching into the Columbia river, at which time a crisis would be called and the damage already done. *123-1*

Money has been spent and wasted in the sixty plus years since the Manhattan Project in storing waste. **Please push the Energy Department and our elected officials to honor the commitment made over time to clean up the waste at Hanford! It is dishonorable to current and future generations to perpetuate the health and environmental hazard the waste represents.** *123-2*

Thank you, Karen McMichael,

Karen McMichael 13840 18th Ave. Sw Burien, WA 98166 xxx-xxx-xxxx Home xxx-xxx-xxxx Cell kmcmich@msn.com

123-1 The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

This EIS does analyze short-term (minimally 49 years and up to 245 years, depending on the alternative) interim storage of IHLW glass and HLW melters; their storage is predicted to result in no additional risk or environmental hazard to the Hanford area or community. This is because the HLW and HLW melters taken out of service are extremely robust waste forms. In addition, the HLW and selected tank closure debris would be stored in robust interim-storage containers (stainless steel canisters and shielded storage boxes), all of which would be stored in covered, weather-protected facilities until their final disposition path is chosen. Any changes to the disposition path described and analyzed in this *TC & WM EIS* would be subject to appropriate NEPA review.

123-2 Both DOE and Congress are committed to the cleanup efforts at Hanford, and DOE continues to seek funding for these efforts. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. Negotiations among the TPA agencies resulted in an agreement to make changes to the TPA that (1) reflect the shared priorities of the agencies, tribal nations, stakeholders, and the public to protect the Columbia River by cleaning up the soils and groundwater along the river corridor, and (2) adjust cleanup schedules to focus currently anticipated funds on near-term, higher-priority milestones by delaying cleanup work identified by the agencies as lower priority at this time.

Commentor No. 124: Madya Panfilio

From: Madya [madyapan@yahoo.com]
Sent: Tuesday, March 09, 2010 7:55 PM
To: tc&wmeis@saic.com
Subject: Comments of a Citizen

Just what is it going to take for the citizens of the Northwest to have safe water, if the government agencies that are to protect us completely ignore the urgency of the clean-up of Hanford Waste? Where is the Spirit of America? We must have agencies that want to move forward with the most expedient cleanup.

We need the Disposal of Radioactive & Hazardous Waste to be disposed into lined trenches. *124-1*

Hanford agencies have been given Billions of dollars for clean-up by the citizens of the United States of America. These citizens expect these funds to be used effectively and wisely…..not squandered on frivolous experiments. *124-2*

To abandon the contamination which leaked from the High-Level Nuclear Waste Tanks would be criminal because it is shown to be spreading rapidly towards the Columbia River. *124-3*

I want to see the closure of the SST system and absolutely NO transporting of waste along our highways. *124-4*

Madya Panfilio
Vancouver, WA

124-1 Since 2004, DOE has buried all LLW in lined trenches (see Appendix E, Section E.3.3, for the evolution of past disposal practices). DOE continues to strictly limit the amount of waste Hanford can accept and ensures that disposal activities are protective of the environment and meet regulatory requirements. Previous use of unlined trenches for disposal was a big concern to stakeholders and Washington and Oregon States; DOE heard and addressed those concerns and is using lined trenches.

124-2 The usage of taxpayer dollars in the cleanup of Hanford is beyond the scope of this *TC & WM EIS*.

124-3 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

124-4 This *TC & WM EIS* addresses proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 125: Gerson Robboy

From: Gerson Robboy [uncleyascha@gmail.com]
Sent: Wednesday, March 10, 2010 1:04 AM
To: tc&wmeis@saic.com
Subject: Comment on DOE plans for Hanford

The contamination at Hanford is already a disaster unprecedented in history. If we do not clean up or permanently contain the contamination, we not only hand a huge problem down to our own descendents, but to any possible future civilizations in this area. The existing DOE preferred options are not merely negligent, but criminal. *125-1*

The tank farms must be closed, the soil trenches must be cleaned up or contained, the ground water must be isolated from the Columbia River, regardless of the cost. We must not dump any more waste at Hanford.

Gerson Robboy
uncleyascha@gmail.com
909 NE Brazee St., #11
Portland, OR 97212

125-1 Cleanup of Hanford is a major goal of implementing the Preferred Alternatives presented in this *TC & WM EIS*. The commentor is referred to Chapter 2, Section 2.12, for a discussion of the Preferred Alternatives for tank closure, FFTF decommissioning, and waste management. While implementation of the Preferred Alternatives would go a long way toward achieving cleanup of the site, not all actions related to cleanup are addressed in this *TC & WM EIS*. As stated in Chapter 1, Section 1.4.2, of this EIS, the groundwater contamination in the non-tank-farm areas within the 200 Areas (including the burial grounds, cribs, and trenches [ditches]) is being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements. Contamination in the vadose zone resulting from tank farm past leaks will be addressed in the SST closure process. The cumulative impacts analysis for this *TC & WM EIS* (see Appendix U and Chapter 6) includes the vadose zone of the 200 Areas in addition to the other areas of Hanford.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 126: Eric Adman

From: Eric Adman [ericladman@gmail.com]
Sent: Wednesday, March 10, 2010 10:30 AM
To: tc&wmeis@saic.com
Subject: Comments on Hanford Draft Tank Closure and Waste Management Environmental Impact Statement

To whom it may concern - I have the following comments with regard to this document and plan:

I do not support storing more radioactive waste on the Hanford site. Storage and contamination issues with existing waste have yet to be adequately resolved. Waste which is currently stored on site should be stabilized and removed to a more stable deep geologic repository. *126-1*

I do support removing 99.9% of high-level waste from the single-shell tanks, the tanks themselves, and the remediating the contaminated soils. *126-2*

I support vitrification of all of the Low Activity Waste and removal to a deep geologic repository, and increasing vitrification capability to allow this to happen in a shorter time period. *126-3*

Thank you for your attention.

Eric Adman
7815 NE 192 St
Kenmore, WA 98028

126-1 The draft EIS assumed that the IHLW canisters would not be shipped immediately after the IHLW generation. Storage capacity for the IHLW canisters was analyzed as part of the short-term impacts analysis for onsite IHLW interim storage.

Regarding the commentor's concern about the disposition of HLW, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

126-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. Tank Closure Alternatives 6A and 6B evaluate 99.9 percent retrieval of the tank waste and clean closure of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

126-3 As discussed in the Summary, this *TC & WM EIS* analyzes additional waste treatment capability, including expanding the vitrification process capability currently being constructed in the WTP (i.e., constructing a second vitrification plant or supplementing the WTP's capability with supplemental treatment technologies). Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

See response to comment 126-1 for a discussion of Hanford waste disposal options.

Commentor No. 127: T. J. Mueller, Naval Nuclear Propulsion Program, Naval Sea Systems Command, U.S. Department of Defense

From: Steele, Jeffrey M CIV SEA 08 NR [jeffrey.m.steele@navy.mil]
Sent: Wednesday, March 10, 2010 10:38 AM
To: mary_e_burandt@orp.doe.gov
Cc: tc&wmeis@saic.com
Subject: TC&WMEIS Comment Letter
Attachments: TC-WM Comment Letter.pdf

Ms. Burandt,

Attached is a pdf copy of the Navy comment letter on the TC&WM Draft EIS. It is coming through the regular mail, but I thought I would back up the Post Office by emailing a pdf copy. Thank you.

Jeff Steele
Naval Sea Systems Command
xxx-xxx-xxxx

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Commentor No. 127 (cont'd): T. J. Mueller, Naval Nuclear Propulsion Program, Naval Sea Systems Command, U.S. Department of Defense

DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
1333 ISAAC HULL AVE SE
WASHINGTON NAVY YARD DC 20376-0001

08R:JMS:jms
Ser 08R/10-00897
March 5, 2010

Ms. Mary Beth Burandt
Document Manager, TC&WM EIS
DOE Office of River Protection
P.O. Box 1178
Richland WA 99352

This letter provides comments from the Naval Nuclear Propulsion Program on the Draft Environmental Impact Statement on Tank Closure and Waste Management (TC&WM).

In accordance with the Low Level Radioactive Waste Policy Amendments Act of 1985, consistent with two previous Navy Environmental Impact Statements that were both adopted by DOE, and as agreed to by the State of Washington in the *State of Washington v. Bodman* Settlement Agreement, defueled reactor compartments from decommissioned Navy nuclear-powered ships are transported to Hanford for disposal. Reactor compartment disposal is not considered within the scope of the alternatives considered by this Draft EIS, but rather is treated as a separate ongoing action for which the cumulative impacts are evaluated. The enclosed comments are provided to improve the accuracy of the cumulative impact analysis as it pertains to reactor compartment disposal.

The analysis in the Draft TC&WM EIS, in conjunction with the two Navy EISs, clearly demonstrates that Navy reactor compartment disposal at Hanford results in a negligible contribution to long-term Hanford groundwater impacts. The two radionuclides that are most significant in the TC&WM EIS analysis are the long-lived and mobile radionuclides Tc-99 and I-129. The total inventories of Tc-99 and I-129 in all of the Navy reactor compartments are very small - approximately 2.8 curies and less than 0.001 curie respectively. The amounts of these nuclides analyzed in the TC&WM EIS from several other sources, including Hanford tank waste sources, on-site and off-site waste sources, and previous releases to the Hanford environment, exceed the Navy contribution by several orders of magnitude.

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Commentor No. 127 (cont'd): T. J. Mueller, Naval Nuclear Propulsion Program, Naval Sea Systems Command, U.S. Department of Defense

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As demonstrated in the Navy 1996 EIS, the release of these small amounts of long-lived radioactivity from the Navy reactor compartments is very slow, since first the thick reactor compartment hull and packaging must corrode, and then the very slow process of corrosion of highly corrosion-resistant metals must occur. The Navy 1996 EIS analysis calculated that the peak impacts would be very small and well beyond 10,000 years. The TC&WM EIS calculates maximum groundwater impacts within the 10,000 year period, even for waste disposed of in the lined trench of the Hanford Integrated Disposal Facility. This analysis confirms the reasoning behind the lined trench exemption request for Trench 94. The containment provided by the reactor compartments and the inherent containment provided by the metal matrix of corrosion resistant metals result in better long-term environmental protection than a lined trench.

Thank you for the opportunity to review this Draft EIS. The Navy appreciates the assistance of the Department of Energy and the State of Washington in the continued shipment of defueled reactor compartment packages to Hanford.

for T. J. Mueller
Naval Nuclear Propulsion Program

Enclosure: Comments on the TC&WM Draft EIS

Copy to:
M. Collins, DOE-RL
C. Gelles, DOE EM-43
G. Robertson, WDOH

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Commentor No. 127 (cont'd): T. J. Mueller, Naval Nuclear Propulsion Program, Naval Sea Systems Command, U.S. Department of Defense

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Comments on the TC&WM Draft EIS

1. Summary: The Summary and Chapter 1 of the Draft EIS never clearly state whether or not the Navy reactor compartment disposal is within the scope of the proposed action and alternatives for this EIS. In Chapter 6 (Cumulative Impacts) and in Appendix S (Waste Inventories for Cumulative Impact Analysis), the Draft EIS makes it clear that Navy reactor compartment disposal is not within the scope of this EIS, but rather is evaluated along with other past and future actions as part of the cumulative impact analysis. A similar clear statement is needed in the Summary and Chapter 1. *127-1*

2. Chapter 1, Section 1.8: This section lists other past and current NEPA reviews and their relation to the TC&WM EIS. The Navy's 1984 EIS on defueled reactor compartment disposal is listed in this section, but not the 1996 EIS on the same subject that expanded the evaluation to newer ship classes. In addition, the relationship of these EISs to the TC&WM EIS is not discussed. This would be a good location to note that reactor compartment disposal is not within the scope of the TC&WM EIS, but is evaluated in the cumulative impact analysis. *127-2*

3. Chapter 6: On page 6-25, Navy reactor compartment disposal is listed as contributing 1505 person-rem to Hanford Involved Workers. The Navy 1996 EIS does list an estimated occupational dose of 1508 person-rem, but this dose is received by Navy shipyard personnel and not Hanford workers. This should be corrected. *127-3*

4. Appendix S: This appendix lists the waste inventories not associated with the proposed action and alternatives of the TC&WM EIS that are used for the cumulative impacts analysis. The Hanford 218-E-12B burial grounds include both Trench 94, in which the Navy reactor compartments are placed, as well as nearby burial trenches with other Hanford wastes. On page S-95, a single radionuclide inventory is listed for the 218-E-12B burial grounds. It is not possible to tell how much of the listed inventory is attributed to the Navy reactor compartments and how much comes from other Hanford waste. However, even if all of the listed radionuclides were from the Navy reactor compartments, they would not be consistent with the amounts listed in the 1984 and 1996 EISs on reactor compartment disposal. In order to be able to assess the small contribution *127-4*

127-1 Disposition of Navy reactor compartments was added to the list of items in the sections entitled "Decisions Not to Be Made" in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this EIS to clarify that the decisions regarding the Navy reactor compartment disposal were addressed in previous NEPA documentation.

127-2 Regarding the inclusion of reactor compartment disposal in the *TC & WM EIS* cumulative impacts analysis, the listing in Chapter 1, Section 1.10, of this final EIS is for purposes of identifying separate but related actions that are either pending or that have been completed. Chapter 6 identifies the actions considered as part of cumulative impacts and specifically mentions the U.S. Navy reactor compartments in Section 6.2.

127-3 The error identified by the commentor was corrected. The dose associated with Navy shipyard work was removed from the presentation of cumulative impacts on Hanford workers.

127-4 In reviewing the information provided by the commentor, DOE was unable to distinguish the stated discrepancies between the inventory reported in Appendix S and those provided in the commentor's letter. The inventory listed in Appendix S for the 218-E-12B burial ground includes both the inventory attributed to the Navy reactor compartments and other Hanford waste previously disposed of, as stated by the commentor. The source for this information is the Hanford Solid Waste Information Tracking System (SWITS), as reported through 2006, not the Navy's 1984 or 1996 EIS, as referenced in the comment. SWITS reports this information as one entry, which cannot be broken out to distinguish trench 94 from the other trenches in this burial ground. SWITS is the most recent and more comprehensive source for waste inventory for the burial grounds; therefore, this EIS uses this reference as its source document. Database updates from the 2006 SWITS are accounted for in the waste projections identified in Chapters 4 and 5 of this *TC & WM EIS* for disposal of waste at Hanford.

Commentor No. 127 (cont'd): T. J. Mueller, Naval Nuclear Propulsion Program, Naval Sea Systems Command, U.S. Department of Defense

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of the Navy reactor compartments to the overall cumulative impacts total, Trench 94 should be separately listed. The following information is provided to assist in such a listing.

a. In a letter dated July 22, 2002, the Navy provided information on the long-lived radionuclide content of Navy reactor compartments as a comment on the Draft Hanford Solid Waste EIS. This information was based not only on the data from the 1984 and 1996 EISs, but also additional Navy reactor compartments beyond those analyzed in these two EISs that could be expected to be disposed of at Hanford through 2046. The total amounts of C-14 and Tc-99 were 499 curies and 2.8 curies respectively. These curie totals would be appropriate for a separate listing of Trench 94 in Appendix S.

b. I-129 was not one of the key radionuclides emphasized in the Draft Hanford Solid Waste EIS, so it was not addressed in the Navy's 2002 comment letter. The amount of I-129 in Navy reactor compartments is very low. Some I-129 is present in activated structural metals as a result of trace uranium impurities in these metals. As discussed on page D-5 of the 1996 Navy EIS, the amount of I-129 in Navy reactor compartments varies from 2E-10 curie to 1.7E-7 curie. Multiplying these values by the total number of reactor compartments, the I-129 in structural metal would be less than 5E-6 curie. Trace amounts of fission product radionuclides are present in the layer of activated corrosion and wear products on the interior surfaces of plant components and piping systems within the reactor compartments. I-129 is not present in sufficient amounts in Navy plants to be measurable in these corrosion and wear products. However, by applying the same scaling factor for I-129 that is used for low level radioactive waste disposal curie calculation, the total amount of I-129 in all of the reactor compartments can be calculated. This would be less than 1E-3 curie for all of the reactor compartments. This amount is greater than the activated structural metal total, so 1E-3 curie would be the appropriate amount to include for I-129 in Trench 94.

c. On page S-148, a lead inventory of 1.06E7 kg is listed for the 218-E-12B burial grounds. It is not clear whether this value is intended to include the Navy reactor compartments or the nearby trenches, or both. Both the 1984 and 1996 Navy EISs state that lead shielding in excess of 100 tons is permanently built into each reactor compartment. Thus, while the 1.06E7 kg

127-4 cont'd

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Commentor No. 127 (cont'd): T. J. Mueller, Naval Nuclear Propulsion Program, Naval Sea Systems Command, U.S. Department of Defense

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value would be appropriate for the 100 reactor compartments evaluated in either the 1984 or 1996 EISs, a value of 3E7 kg would be appropriate for the total number of reactor compartments. The Navy's 1996 EIS included an evaluation of the long term impacts of this shielding lead. Due to the containment provided by the reactor compartment package, the very slow rate of corrosion of lead, and retention in the soil for long periods of time, lead did not result in any significant groundwater contamination for periods well in excess of 10,000 years.

d. On page S-148, a PCB inventory of 1.82E3 kg is listed for the 218-E-12B burial grounds. It is not clear whether this value is intended to include the Navy reactor compartments or the nearby trenches, or both. On page 4-32 of the 1996 Navy EIS, it is noted that older reactor compartments can contain up to about ten pounds of PCBs in solid materials, while newer compartments would contain much less. The 1.82E3 kg value would be a reasonable upper bound for PCBs in Navy reactor compartment packages based on the 10 pounds per reactor compartment value.

e. In the tables of chemical constituents for the various Hanford sites, the column header for chromium is listed as "Chromium (includes hexavalent chromium and chromium from $Na_2Cr_2O_7$)." No value is listed in this column for the 218-E-12B burial grounds (including Trench 94). On page 4-33 of the Navy's 1996 EIS, it is noted that approximately 1 kg of residual potassium chromate corrosion inhibitor is present within each reactor compartment package. Thus, approximately 200 kg of hexavalent chromium could be listed for Navy reactor compartments in Trench 94. The Navy reactor compartments each contain more than one ton of metallic chromium as an alloying element in corrosion resistant metals. The 1996 EIS includes an analysis of the long term corrosion of nickel, which is also present in these corrosion resistant metals, and concluded that due to the containment provided by the reactor compartment package, the very slow rate of corrosion of corrosion resistant metals, and retention in the soil for long periods of time, metals such as nickel and chromium did not result in any significant groundwater contamination for periods well in excess of 10,000 years.

127-4 cont'd

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Commentor No. 128: Gail W. Johnson

From: Gail Johnson [gailahree@yahoo.com]
Sent: Wednesday, March 10, 2010 1:30 PM
To: tc&wmeis@saic.com
Subject: No more waste at Hanford

Rethink Hanford as an option. The location to a major river makes this an especially dangerous choice for all people and wildlife within miles and miles. Until there is some way to decontaminate what already exists we have no right to burden future generations with the responsibility of our toxic waste. *128-1*

Sincerely,

Gail W. Johnson
Portland,Oregon

128-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

This EIS addresses the environmental impacts of retrieval, treatment, and disposal of tank waste and final closure of the SST system. It also evaluates the impacts of FFTF decommissioning, including management of waste generated by the decommissioning process. Finally, this *TC & WM EIS* evaluates the potential environmental impacts of ongoing solid-waste management operations at Hanford, as well as the proposed disposal of Hanford LLW and MLLW and a limited volume of offsite LLW and MLLW.

Commentor No. 129: Jim Minick

From: Jim Minick [jiminick@gorge.net]
Sent: Wednesday, March 10, 2010 1:31 PM
To: tc&wmeis@saic.com
Subject: HANFORD FUTURE COMMENT

Here is my comment concerning the future of Hanford :

As a citizen of Washington State and living within 1 mile of the Columbia here in Klickitat County, I do not want any more hazardous waste being brought to Hanford.

Have extended studies been conducted to see if Hanford should be the new National Radioactive Dump Site? No, they have not. But, by dumping there, it becomes the de facto dump site for the West. That is completely unacceptable. *129-1*

Can we trust that DOE will not allow that to happen ? Of course not. DOE has a terrible track record of lieing and misleading the public and wasting BILLIONS in tax payer money at Hanford. That would be one of the last agencies I would trust. I would not trust DOE to deliver my mail, let alone regulate hazardous waste. They have lost all credibility with me.

Jim Minick
5 Wilkins Dr.
Lyle, Washington
98635

Jim Minick
xxx-xxx-xxxx
jiminick@gorge.net
5 Wilkins Dr.
Lyle, Wa. 98635

129-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 130: Maxine Hines Huber

From: Maxine Huber [maxsprite@hotmail.com]
Sent: Wednesday, March 10, 2010 2:23 PM
To: tc&wmeis@saic.com
Subject: surprise, surprise another comment

Hello Mary Beth,

Maxine Hines Huber here in La Grande with my comments, at least they are usually short. Thanks again to all of you for coming to La Grande, it was the first time in many years. Bet you're worn out. Hope you get lots of emails and then get a rest. So here's my bit.....

If the decision is to leave the dirt under the tank without testing, then one would never know if the contamination was only 10 feet down and easily contained or if it was 70 and hard to deal with. If there is a huge hole, then line it and use it to hold the rest of the waste and contaminated dirt after treatment. So to not look is out of the question. To not act with long term cleanup intentions is not acceptable to me and many more. Retrieve, treat and dispose has been our mantra, capping is an unacceptable short cut. *130-1*

The plant is not a high priority if it's doing no harm and not costing lots to safeguard. Perhaps that could be done with stimulus money when available.

The honesty of the last EIS is impressive but supports the concerns we've all had for years, that it was a more contaminated situation than presented. So, now is the time to make permanent, long term commitments to a thorough cleanup. ARRA money is available, jobs are needed, the new wave of employees and mindset are in support, so are the people and mother nature. Tons of dirt have been moved and more can be, that part is manageable. Momentum and new thinking will come if the intent is set to do thorough cleanup. *130-2*

We are all most effective when body, mind and soul are working together. This is our job and it will work in sync with the earth's fantastic ability to cleanup our messes, we must participate to the fullest extent possible. The short cuts don't work. The contamination will arise again to haunt the fish, water, land, tribes, and the government.

Maxine Hines Huber 701 D Ave. La Grande, Or. 97850 xxx xxx-xxxx

130-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

130-2 Comment noted.

Commentor No. 131: Mary McCracken

From: Mary McCracken [mcmcc@uci.net]
Sent: Wednesday, March 10, 2010 2:33 PM
To: tc&wmeis@saic.com
Subject: Hanford Cleanup

I was demonstrating in MN in the early 60's about nuclear problems. The guys from the Atomic Energy Committee said they were so clever there was no need to worry. I wasn't even that naive THEN. Now I'm just plain cynical. Let the (expletive deleted) seep in the Columbia, haul it in leaky containers, store it in leaky containers. no problem. How about drinking a bit with breakfast while taking your morning vitamins. This country has been RUINED by folks such as yourselves.
mary mccracken

131-1

131-1 One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the site.

Commentor No. 132: Mary McCracken

From: Mary McCracken [mcmcc@uci.net]
Sent: Wednesday, March 10, 2010 3:18 PM
To: tc&wmeis@saic.com
Subject: nice talk

Mary Beth, Max says you are a very nice person. I guess that means I should talk pretty. Is this better?

To Whom It May Concern:

I trust a plan was created to ensure the protection our rivers, soil and children from Hanfords waste sites before they were ever created. I KNOW I can COUNT on my government to protect me! I believe all I've been told in history classes about what motivates the USA. Democracy for all, Peace, Justice, Equal Opportunity, Health Care, Shared wealth and resources. Thus I know we will be protected against toxic chemicals whether manufactured by the government in its pursuit of world dominance or by corporate agriculture in pursuit of profits. *132-1*

In god i trust. mary

132-1 Comment noted.

Commentor No. 133: Richard Mathis

From: richard [bienestar@gocomala.com]
Sent: Wednesday, March 10, 2010 5:02 PM
To: tc&wmeis@saic.com
Subject: Environmental Impact Statement (EIS) for Hanford Nuclear Reservation

I'm amazed that the public is not more informed of the gravity of the conditions at Hanford. The longer we allow leakage to spread, the more hopeless the situation. That we continue to generate waste, and would think to add it to an already bad situation, is unconscionable. I hope you will make clear our situation, and generate support for responsible practices. *133-1*

Sincerely,
Richard Mathis

133-1 The public hearings on the *Draft TC & WM EIS* were intended to inform and educate the public, as well as to collect comments on the draft EIS.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 134: Brian Bright

From: Brian Bright [bbright123@yahoo.com]
Sent: Wednesday, March 10, 2010 5:02 PM
To: tc&wmeis@saic.com
Cc: lisa@hoanw.org
Subject: Public Comment on the Draft Tank Closure & Waste Management Environmental Impact Statement

My name is Brian Bright and I'm a student a the University of Washington. I want to say that the DOE bureaucracy is committing first degree murder by knowingly transporting nuclear waste through highways, and any deaths in the future caused by the radioactive Columbian. I grew up next to the Columbian, and already it isn't safe to swim there because of pollution. Why are you contributing more to the problem instead of trying to fix it? Dumping waste at the Hanford site is contradictory to what the people need. Bureaucracy was created to serve the people, but what you're doing shows that all the DOE cares about is money and quick solutions. *134-1*

134-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Monitoring data and potential doses to a variety of receptors are reported annually in the Hanford Site environmental reports (Poston, Duncan, and Dirkes 2011). As presented in Chapter 3, Table 3–13, of this *TC & WM EIS*, the estimated dose from liquid releases from Hanford to the MEI in 2010 was 0.056 millirem.

Commentor No. 135: Gary L. Westerlund

From: Gary Westerlund [gwesterlund@readysetsurf.com]
Sent: Thursday, March 11, 2010 12:18 PM
To: tc&wmeis@saic.com
Subject: Hanford Tank Closure and Waste Management E.I.S.

I'd like to make some comments concerning the Tank Closure and Waste Management E.I.S. for Hanford. Hanford is not a suitable site for long term which means 1000's of years storage of radioactive waste. All tanks with radioactive waste eventually leak and the tanks at Hanford are already leaking. *135-1* The radioactive contamination is spreading rapidly through the soil to the ground water and Columbia River. Long term storage of radioactive waste should be in a deep geological repository where any leakage cannot reach ground water, lakes or *135-2* rivers. Thus, Hanford should be cleaned up and shut down. No new waste should be shipped to Hanford. *135-3*

Since all waste at Hanford should be cleaned up, another Waste Treatment Plant needs to be built as soon as possible so all Low Activity Waste can be vitrified for permanent storage. It is not acceptable to use half-good treatments such as bulk vitrification, cast stone treatment or steam reforming for radioactive waste that will be dangerous for 1000's of years and that could leak into ground water or rivers. *135-4*

The Fast Flux Test Facility should not be entombed in cement ant left at Hanford. It should be removed and the site restored which is the Washington State standard for decommissioning nuclear reactors. *135-5*

Sincerely,

Gary L. Westerlund
9623 S. 205th Pl
Kent, WA 98031
xxx xxx-xxxx

135-1 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

135-2 Regarding the commentor's concern about the disposition of HLW, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

135-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

135-4 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

135-5 Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives in an EIS and identify where standards may be exceeded. Chapter 8 of this *TC & WM EIS* provides both a listing and short descriptions of the laws, regulations, and requirements that may apply to the proposed actions, including FFTF decommissioning.

Commentor No. 136: Maxine Wilkins

3-2-2010

Clean up the Waste!!!
No more waste brought to
Hanford!!
Maxine Wilkins
13703 S.E. Clay St.
Portland, OR 97233

136-1

136-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 137: Frances and Bill Geske

WILLIAM P. GESKE 3/5/10
William P. Geske
716 NE 108
PORTLAND, OR 97220

NO MORE WASTE

CLEAN UP AT HANFORD

Frances Bill Geske
454 NE Lancashire Rd.
Portland Oregon 97232

137-1

137-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 138: Fran Daggett

Do not bring more waste into Hanford where hazardous waste is already leaking ~~into~~ groun-water contaminating the Columbia River and farming said downriver. Do not build more treatment facilities.

Fran Daggett

138-1

138-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 139: Roddy M. Daggett

- DO NOT BUILD MORE FACILITIES FOR TREATMENT OF ADDITIONAL TANK WASTE. *139-1*
- DO NOT BRING IN TO HANFORD MORE WASTE *139-2*
- CLOSURE OF SINGLE-SHELL TANK (SST) SYSTEM. LANDFILL CLOSURE EITHER USING CLEAN OR CONTAMINATED SOIL IS NOT ACCEPTABLE. THE COLUMBIA RIVER IS ALREADY IN GREAT JEOPARDY OF CONTAMINATION. *139-3*

RODDY M. DAGGETT

139-1 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs are known or suspected to have leaked. It is likely that some of these tanks continue to leak liquid waste into the subsurface. The construction of the WTP has already commenced and its currently planned configuration includes two HLW and two LAW melters. Treatment of tank waste with this configuration without expanded capacity or supplemental treatment is analyzed under Tank Closure Alternative 2A, where treatment through the WTP would last until 2093. However, under this configuration, construction of a replacement WTP and new DSTs would still be required because the design life of these facilities would be exceeded. Under all action alternatives, either (1) treatment of tank waste would need to be expedited by increasing tank waste treatment capacities (i.e., through WTP expansion and/or constructing supplemental treatment facilities) or (2) construction of replacement facilities to replace those that exceed their design life (i.e., the WTP and/or DSTs) would be required. Without supplemental treatment technologies or expanded WTP capacity, retrieval and treatment of tank waste would take significantly longer to complete, as presented in Chapter 2, Section 2.5.2.

139-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

139-3 The impacts of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or

Commentor No. 139 (cont'd): Roddy M. Daggett

the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 140: Carol Brooke

From: Carol Brooke [carolbrookems@yahoo.com]
Sent: Wednesday, March 10, 2010 5:31 PM
To: tc&wmeis@saic.com
Subject: Toxic Wast Dump Plan

Dear Mr. Gregory H. Friedman,

I just heard that you are planning a toxic waste dump in the Portland, Oregon area. Is this true?

This is unacceptable. Why would we want to destoy this beautiful environment? I am asking that you please stop this. Oregon is not the right place for this. I purposely moved here from an environment with dirty air and rude people. I love Oregon. Please don't send environmental waste here. We are a green state that recycles and cares for our environment. *140-1*

Please stop this plan.

Thank you,

Carol Brooke

Classroom Crafting with Carol
www.CarolBrookeBooks.com

140-1 This *TC & WM EIS* does not evaluate waste disposal in the state of Oregon. This EIS analyzes the potential impacts of various Hanford waste management activities on the environment and human health.

Commentor No. 141: Blair Anundson, Consumer and Democracy Advocate, WashPIRG

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 03/08/10

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

***** CONTINUE ON BACK FOR MORE SPACE *****
***** CONTINUAR AL DORSO PARA MÁS ESPACIO *****

Name/Nombre: Blair Anundson, WashPIRG Consumer and Democracy Advocate
Address/Dirección: 1402 3rd Ave, Suite 715
City, State, Zip Code/Ciudad, Estado, Zona Postal: Seattle, WA 98101

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager,
TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

Response side of this page intentionally left blank.

Commentor No. 141 (cont'd): Blair Anundson, Consumer and Democracy Advocate, WashPIRG

03/08/10

Hanford Testimony:

My name is Blair Anundson and I'm the Consumer and Democracy Advocate for WashPIRG, the Washington Public Interest Research Group. We're a non-profit, non-partisan public interest advocacy organization with over 18,000 members across the state. WashPIRG favors cleaning up all existing hazardous material at Hanford, investigating the presence and impact of leaks from any of the tanks farms at the site, and prohibiting the importation of additional material until the existing wastes are safely disposed of. *141-1*

This is one of the most heavily polluted sites in the western hemisphere and this pollution presents a growing threat to public health. Contaminated groundwater beneath the site covers an area larger than the city of Seattle, with estimates ranging between eighty and two hundred square miles. Groundwater from the site feeds pollution into the Columbia River, which flows directly along the border of the Hanford Site for more than 50 miles past nine full-scale nuclear reactors and hundreds of liquid waste and burial sites. *141-2*

This flow of hazardous toxins presents a serious risk to the health of people and wildlife below the site and the economy of the region. There are 42 cities and towns downriver from Hanford and businesses in Oregon and Washington along the Columbia create 750,000 jobs, with payrolls totaling $27.5 billion dollars. In Washington alone, farming below Hanford is worth $6.4 billion dollars. And the Columbia River has the single most important salmon run of the entire region. *141-3*

We've waited for over twenty years as the DOE has delayed and under funded cleanup efforts. In 2004, we passed I-937 overwhelmingly. WashPIRG campaigned on that issue and, over the course of four months, we talked to a quarter of a million Washington residents. The sentiment among Democrats, Republican, and Independents was the same: clean up the existing mess before bringing any additional waste into our state. The voters of this state are tired of waiting and they're tired of delays. They want to see action on this issue now and we should pursue policies that reflect their wishes. *141-4*

141-1 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

141-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

141-3 Relevant data indicate that current Hanford operations do not represent a serious health threat to Columbia River users. Monitoring data and potential doses to a variety of receptors are reported annually in the Hanford Site environmental reports (Poston, Duncan, and Dirkes 2011). As indicated in Chapter 3, Table 3–13, of this *TC & WM EIS*, the estimated dose from liquid releases from Hanford to the MEI in 2010 was 0.056 millirem. The risk of a fatal cancer from this dose is lower than 1 in 35 million.

This EIS analyzes the potential environmental impacts associated with a specific set of proposed actions and reasonable alternatives for the storage, retrieval, treatment, and disposal of tank waste generated from defense plutonium production activities; closure of SSTs containing HLW; decommissioning of FFTF; and continued management of LLW and MLLW at Hanford. Potential long-term impacts are presented in Chapter 5; details of the potential long-term ecological impacts, in Appendix P; and long-term human health impacts, in Appendix Q. Projected impacts will be considered by DOE in making

Commentor No. 141 (cont'd): Blair Anundson, Consumer and Democracy Advocate, WashPIRG

the decisions as discussed in the Summary, Section S.1.3.1, and Chapter 1, Section 1.4.1, Decisions to Be Made.

141-4 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

See response to comment 141-1 for a discussion on the transport and disposal of offsite waste.

Commentor No. 142: Karina Putri Indrasari

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 3/8/2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
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Hanford is the most contaminated site of western hemisphere. I just concern about our future generations if we keep dumping more waste to Hanford without cleaning the previous nuclear waste, how can our future generation live healthy or even longer than we are? I have two points to make here. First, just stop dumping more waste to Hanford, ~~and stop~~ second, clean the waste in Hanford and protect our environment.

142-1

**** CONTINUE ON BACK FOR MORE SPACE ****
**** CONTINUAR AL DORSO PARA MÁS ESPACIO ****

Name/Nombre: KARINA PUTRI INDRASARI

Address/Dirección: 1810 N 103rd St # 408

City, State, Zip Code/Ciudad, Estado, Zona Postal: Seattle, WA, 98133

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager,
TC & WM EIS, PO Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@scic.com

142-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 143: Janice Faris

Passing on nuclear waste to future generations is cruel. It is our moral responsibility to not create more waste and to treat and dispose of current waste in the safest manner possible. That means on site, not hauling radioactive waste down the freeway to the Idaho National Lab or bringing more to Hanford. We all know the hazards involved with highway travel and with rail travel too. Given the vulnerability of any cargo container that is in motion, one can easily imagine it to be a perfect target for a terrorist or mentally unstable person to say nothing of weather-related accidents or driver error. *143-1*

The DOE's proposal of leaving 1% of the material in the leaking tanks actually means leaving 30% of the most highly radioactive components because the heavy metals settle and accumulate at the bottom. *143-2*

Sorry to say but some of the USDOE's preferred alternatives sound like a true sociopath made them up. I sight: "The USDOE's preferred alternative in the TC & WM EIS is to leave forever the bulk of the contamination from tank leaks and deliberate discharge along with the tanks themselves, under dirt caps instead of cleaning up the contamination" Reference: Heart of America Northwest Research Center *143-3*

Even the USDOE report has acknowledged that "Tank Farm vadose zone work essentially disproved some long-held assumptions that the contamination from the tanks did not migrate and therefore was not a significant environmental risk". This is not news to me as years ago, The Seattle Times documented groundwater contamination going into the Columbia River. *143-4*

So what about the Vitrification Plant? How many years behind and billions of dollars over budget is it? How are the design plans coming? Are there design plans or does it continue to be "design as you go?" Or should it be called "THE FOREVER PROJECT"? *143-5*

We have all feared an insane, sociopathic leader whose finger could ignite a worldwide nuclear war but now we are faced with insane, sociopathic alternatives presented by the DOE which are just as fatal.
"This is the way the world ends
This is the way the world ends
This is the way the world ends
Not with a bang, but a whimper" T.S. Elliot

Check out Helen Caldicott's website and books to learn how radioactive contamination acts on all living cells. Google "depleted uranium and birth defects in Fallujah" to see what uses our spent nuclear wastes have been put to. I think once you are informed you will agree that the use of depleted uranium in munitions should be declared a crime against humanity.

Janice Faris
Renton, WA

143-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

143-2 With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks, residual waste, and surrounding waste in the soil, requires preparation of detailed performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

143-3 The commentor is referred to Chapter 2, Section 2.12, for a discussion of DOE's Preferred Alternatives for tank closure, FFTF decommissioning, and waste management. Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 143 (cont'd): Janice Faris

143-4 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

143-5 DOE is working diligently to bring the WTP online to treat the tank waste at the site as soon as possible. Chapter 1, Section 1.2, provides a brief history and background on DOE's efforts to reduce costs and speed up Hanford cleanup efforts. As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies. Therefore, DOE has no plans to build "more than one such plant." As noted in the Summary, Section S.3.1.4, and Chapter 2, Section 2.2.2.2, the WTP is currently being constructed in the 200-East Area of Hanford. Site work associated with the project began in late 2001 and construction is more than 62 percent complete. Details regarding the WTP are provided in Appendix E, including its design and processes, waste-form performance, waste forms/disposal packages, and assumptions and uncertainties.

Commentor No. 144: Angela Samsel

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 03/08/10

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

My name is Angela, I am a student at Seattle University and as part of one of my classes I volunteer with the organization Heart of America Northwest, a watch dog group for Hanford, WA. Working for this organization has really opened my eyes to the serious issues with the EIS and the radioactive waste already present in Hanford. I have learned that already over a million gallons of waste have leaked from these tanks contaminating ground water that is flowing towards the Columbia River. I have become very concerned about what this will mean for the future of the Pacific Northwest, the place I call home. I feel that the DOE should be working on cleaning up Hanford using the clean closure standard instead of trying to turn it into a national radioactive waste dump. I believe we need to act responsibly, consciously, and most importantly we need to act now, before the problem gets worse.

144-1

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: ANGELA SAMSEL

Address/Dirección: 13201 Linden ave. N #311

City, State, Zip Code/Ciudad, Estado, Zona Postal: Seattle, WA 98133

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TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

144-1 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 145: Frank Zucker

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 3/8/2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

I find it disturbing that we have to keep coming to these hearings to remind the DOE, now run by a Nobel physicist, about lessons that we should all have learned in kindergarten - and that they're now teaching in pre-school:
- If you make a mess, clean it up!
- Before you bring out new toys, put away your old ones!
- Don't run with scissors!

Specifically, I urge the DOE to reconsider their preferred options:
- clean up 99.9% of the tank waste - don't leave the worst 1% in the tanks to leak + kill future generations.
- Clean up the contaminated soil - clean closure, not sweeping it under the rug.
- Start vitrification as soon as possible, and start planning for building more such plants immediately, not in five years.
- Don't ship parts of the FFTF back + forth to Idaho - that's running with scissors
- Don't bring in more waste unless you clean up what you've got + can show you can clean up more waste.

145-1

**** CONTINUE ON BACK FOR MORE SPACE ****
**** CONTINUAR AL DORSO PARA MÁS ESPACIO ****

Name/Nombre: Frank Zucker

Address/Dirección: 1612 N ~~East~~ 39TH ST

City, State, Zip Code/Ciudad, Estado, Zona Postal: SEATTLE, WA 98103

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TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

145-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

Commentor No. 146: Jack Smith

U. S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 5/8/10

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS?)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS?)*

Woody Guthrie was a wonderful singer. He sang songs of the Columbia. If he were here today he would write a song to the DOE. It would say "Shame, Shame Shame!"

I concur: Removal should be to the amount possible - at least 99.9%

146-1

Transfer between state MUST be stopped

146-2

Shame Shame Shame

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Jack Smith

Address/Dirección: 9728 - 3rd Ave NW

City, State, Zip Code/Ciudad, Estado, Zona Postal: Seattle WA 98117

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

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146-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 147: Victor Odlivak

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 8 March 2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

Hanford began in the 1940's to create plutonium for the atomic bombs dropped in WW II. At present this is the most polluted place in the entire western hemisphere. All this radioactivity needs to be cleaned up. No offsite waste is to be imported to Hanford. All waste presently there needs to be cleaned up 100 percent including water, building materials, solids, effluents, soil etc. It is especially important to prevent air and ground water contamination going down to the deepest aquifer, i.e. one mile below the ground. Entombment is not sufficient for the FFTF facility. It needs to be removed totally. All reactors need to be totally shut down now.

Thank you for listening.

147-1

147-2

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Victor Odlivak

Address/Dirección: Seattle, WA 98103 (21 Years)

City, State, Zip Code/Ciudad, Estado, Zona Postal: email: victor@converttolinux.com

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E-mail: TC&WMEIS@saic.com

147-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

147-2 Shutting down all nuclear reactors is not within the scope of this *TC & WM EIS*. This EIS addresses proposed actions to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites. The disposal of other wastes, including waste associated with commercial nuclear power generation, is beyond the scope of this EIS.

Commentor No. 148: Amy Easton

TANK CLOSURE AND WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: 3-8-2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*?
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*?

After hearing this presentation it seems clear that leaving contaminated soil, which is inevitable without clean closure, will lead to contamination of the Columbia river. *148-1*

Clean closure and no acceptance of waste from off site are the clear answers. *148-2*

Costs now will save us great later *148-3*

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Amy Easton

Address/Dirección: [redacted]

City, State, Zip Code/Ciudad, Estado, Zona Postal:

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Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

148-1 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B; selective clean closure is represented by Tank Closure Alternative 4. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

148-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

148-3 Both DOE and Congress are committed to the cleanup efforts at Hanford, and DOE continues to seek funding for these efforts.

Commentor No. 149: Jude Kone

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

Date/Fecha: March 8, 2010

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*?
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*?

(1) Do not bring any more waste to Hanford! That means any more inc. greater than Class C. NO MORE! — 149-1

(2) Clean up the tanks to 99.9% — or the 'Clean Closure' alternative. Start with tank 105 A. — 149-2

(3) Clean up the ditches to 99.9% also. up to 100% if at all possible!

(4) Chose the REMOVAL alternative for the T.T.T.F. NO CAPS NO CENTRUPS (for anything at Hanford).

(5) Create a smaller Vitrification plant that can start the clean up before 2018 — Complete the larger plant A.S.A.P. and complete the cleanup completely A.S.A.P.! — 149-3

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Jude Kone

Address/Dirección: 2223 NW 63rd St.

City, State, Zip Code/Ciudad, Estado, Zona Postal: Seattle, WA 98107

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E-mail: TC&WMEIS@saic.com

149-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections describe the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Section 2.12 of this CRD.

149-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

As noted in Chapter 1, Section 1.4.2, the six sets of cribs and trenches (ditches) that are contiguous to the SSTs are CERCLA past-practice units. These would fall under the barriers placed over the SSTs during closure. They are evaluated in this EIS as part of a connected action because they would be influenced by barrier

Commentor No. 149 (cont'd): Jude Kone

placement. However, closure of these CERCLA past-practice units is not part of the proposed actions for this EIS. Closure of these units would be addressed at a later date.

Regarding the total dismantlement of FFTF (essentially FFTF Decommissioning Alternative 3), although nearly all elements of FFTF and the two adjacent support facilities would be removed under this alternative, the lower portion of the RCB concrete shell would remain. This would be backfilled with either soil or grout to minimize void space. The area would be regraded and revegetated, with no need for a barrier. DOE's preference is for FFTF Decommissioning Alternative 2, under which some below-grade structures would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment.

149-3 DOE is working diligently to bring this facility, the WTP, online to treat the tank waste at the site as soon as possible, as well as to clean up Hanford. As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies, including supplemental treatment waste-form performance (durability) for long-term groundwater protection.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such

Commentor No. 149 (cont'd): Jude Kone

early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, and the BOF, as well as the Pretreatment Facility and the HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

Commentor No. 150: Leslie Reilly

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) Leslie Reilly
Address 1110 E. Spring St. Seattle, WA 98122
Telephone 847-915-0435 Email REILLYL1@SEATTLEU.EDU

Comment:
Just recently moving to Seattle from Chicago. I've never been aware of the problems at Hanford. How can this be such a huge issue but stay so quiet. This going to affect future generations even more than it effects us. As children we learn that we need to clean up the messes that we make. In adulthood, how is this any different? We created deadly waste and the only acceptable answer is to clean it up. Clean all of it up! It hurts everyone, and everything in the Pacific Northwest. It just is plain and simple.

150-1 **150-1** Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 151: Howard Jess

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) Howard Jess
Address 4336 E Mercer Way, Mercerisland WA
Telephone [redacted] Email hjess@yahoo.com

Comment:
I would like DOE officials to imagine that they, their children and grandchildren for generations were to make Hanford & the areas downstream their HOME. Really visualize that and then DO THE RIGHT THING.

151-1 **151-1** Comment noted.

Commentor No. 152: Rachelle Peebles

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) Rachelle Peebles

Address 20407 68th Ave. West #A-101 Lynnwood, WA 98036

Telephone _____ Email rachellepeebles@yahoo.com

Comment:

I've just learned about the toxic waste site going on in Hanford about a month ago. I'm a student at [redacted]. It's sad to hear of the toxic wastes that are harming the environment upon which we live, and the "down-winders" that are affected and getting ill by the toxic wastes. I think that now that a huge mess was caused in the Tri-cities, the best thing to do is clean up the messes caused. It also does not prove to be beneficial, to continue using Hanford as a toxic waste dump, or a national waste dump. The site is too close to the river (Columbia), which can carry wastes to all sorts of locations, and cause even more harm. We only have one earth to live upon, and we need to take care of it. Our generation, and the generations to follow, rely upon that fact and determination.

152-1 **152-1** Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

152-2 **152-2** Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 153: Joelle Puccio

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) Joelle Puccio, RN
Address 119 Harvard AVE #207
Telephone [redacted] Email jppuccio@hotmail.com

Comment:
My Dad grew up in Kennewick. All my cousins and family are still there. I have lived in WA my whole life. As a nurse in neonatal intensive care, I am always thinking about future generations. The proposed plan to add more waste and incompletely remove old waste is unacceptable. We are going down in history as the generation that sold out our species for money and convenience. Please vote for ① clean closure, ② no new waste production/importation, and ③ keep working on cleanup until we have finished.

153-1

153-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

This document addresses the environmental impacts of storage, retrieval, treatment, and disposal of tank waste and final closure of the SST system. It also evaluates the impacts of the decommissioning of FFTF, including management of waste generated by the decommissioning process. Finally, this *TC & WM EIS* evaluates the potential environmental impacts of ongoing solid-waste management operations at Hanford, as well as the proposed disposal of Hanford LLW and MLLW and a limited volume of offsite LLW and MLLW.

Commentor No. 154: Thomas Buchanan

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) THOMAS BUCHANAN
Address 603 NW 75th St. SEATTLE 98117
Telephone (206) Email CLRTOM@EARTHLINK.NET

Comment:
I DON'T WANT THE DOE "NATIONAL REPOSITORY for NUCLEAR WASTES" LOCATING AT HANFORD, WASHINGTON UNTIL THE 99.9% OPTION of CLEANING UP THE WASTES FIRST AT THE SITE. THE IMPACT OF 17,000 trucks of WASTES ON AMERICAN HIGHWAYS, WITH THE POTENTIAL OF ACCIDENTS, LEAKAGE, HIGH TEMPERATURE FIRES ARE VERY SERIOUS! 154-1

THE RADIOACTIVE + CHEMICALLY TOXIC LEAKS IN THE SOIL, SLOWLY MOVING TO THE COLUMBIA, WITH RADIOACTIVE TRITIUM, URANIUM + TECHNICIUM 99 ALREADY BUBBLING UP INTO THE COLUMBIA RIVER, THIS LEAKAGE IS ALSO UNACCEPTABLE

154-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs during incident-free operations or postulated accidents. This *TC & WM EIS* analyzes the transportation of RH-LLW from INL to Hanford for disposal. Based on the public's input and concerns about offsite waste disposal at Hanford, DOE has included in this *Final TC & WM EIS* an example of a potential mitigation measure that could be taken by DOE. Specifically, an offsite waste stream containing a significant inventory of iodine-129 (i.e., RH-LLW resins from INL) was eliminated from the analysis. This mitigation measure has been incorporated into the Waste Management alternatives.

In addition, a sensitivity analysis is included that shows the impacts of limiting offsite waste streams containing iodine-129 and technetium-99. The results of this sensitivity analysis illustrate the difference this would make in potential groundwater impacts and are included in Appendix M. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this EIS.

Commentor No. 155: Thomas F. Robinson

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) Thomas F. Robinson
Address 1371 31st Ave S, Seattle, WA 98144
Telephone
Email tom.seattle@gmail.com

Comment: The current EIS does not propose to clean up enough waste. ~~Fig~~ In the future there will be fatal amounts of iodine and carbon tetrachloride, according to your own maps in the present EIS. This is unacceptable!!
Please keep cleaning up while drafting a more comprehensive EIS.

155-1

155-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 156: Margaret McLane

Comment on the *draft Tank Closure & Waste Management EIS*:

The government needs to develop a new Manhattan project – to figure out what to do with all our toxic waste. They put endless dollars into developing nuclear weapons, now they need to put the dollars into cleaning it up.

The nuke waste is going to be toxic & deadly for centuries, so figure out what to do with it! Hanford is an environmental disaster, and it seems that you've decided to give up on cleaning it up, and bring more waste in instead. Clean up Hanford, and don't bring any more waste onsite until you've done so! *156-1*

Margaret McLane

156-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 157: Tony Chhay

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) Tony Chhay

Address

Telephone Email CHHAYTOP@yahoo.com

Comment:

While watching Obama campaign during the 2008 election he talked about a cleaner environment. Has your organization talked to his administration? The Hanford issue needs to go beyond the Pacific Northwest since it deals with a federal issue and federal laws. *157-1*

157-1 Operations at Hanford are affected and, in many cases, regulated by numerous Federal legal requirements addressing environmental compliance, remediation, planning, preservation, and waste management. The major Federal laws and regulations and Executive orders that potentially apply to the alternatives analyzed in this *TC & WM EIS* are presented in Chapter 8.

Commentor No. 158: Michael Hodapp

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) Michael Hodapp
Address 2306 S Hill St, Seattle, WA 98144
Telephone [redacted] Email ichadm@yahoo.com

Comment:
My name is Mike Hodapp. I've been a resident of Seattle for 6 years and currently run a youth mentoring program in Seattle. I'd like to see the DOE adopt a Hanford Cleanup alternative that fully protects the Columbia River, prevents further groundwater contamination, and minimizes human health risk. To this extent, I strongly believe that DOE should remove 99.99% of waste, adopt clean closure of the tank farms, and not accept off-site waste at Hanford. I've read the EIS Summary and the Oregon Dept of Ecology's alternative proposal in their response to the EIS. I support the Oregon Proposal as a more level headed alternative to cleanup than any of the alternatives listed in the EIS. Voters and citizens of Washington State have been clear. We want a cleanup that protects future generations and that properly remediates dirt and groundwater that's already been contaminated. In addition, we don't want Washington state to become a dumping site for imported nuclear waste.

Thank you,
Mike Hodapp
Seattle, WA

158-1

158-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Chapter 2, Section 2.6.4, of this *Final TC & WM EIS* has been revised to include a discussion of the Oregon Department of Energy's proposal and how DOE has addressed the range of reasonable alternatives for tank waste storage, retrieval, and treatment and remediation of the existing tank farms in its original Tank Closure alternatives. DOE has carefully considered the Oregon proposal and, as explained in Section 2.6.4, has determined that it is not reasonable.

Commentor No. 159: Lane Rasberry

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) LANE RASBERRY
Address PO Box 45303
Telephone [redacted] Email LANE@BLUERASBERRY.COM

Comment:
I CARE ABOUT THE CLEANUP OF THE HANFORD SITE BUT I DO NOT FEEL THAT MAKING A DECISION ON THE ENVIRONMENTAL IMPACT IS THE MOST PRESSING ISSUE AT THIS TIME.

IT IS MOST IMPORTANT RIGHT NOW TO COLLECT THE INFORMATION NECESSARY TO BE ABLE A DECISION, AND THE INFORMATION THAT YOU DO NOT HAVE AND CANNOT GET WITHOUT TAKING ACTION IS THE SET OF INFORMED OPINIONS FROM THE GENERAL PUBLIC. ALTHOUGH I AM GLAD TO SEE SO MANY PEOPLE HERE TONIGHT, IT IS A STATEMENT OF FACT THAT THE MAJORITY OF STAKEHOLDERS IN THE ISSUE EITHER DO NOT KNOW THAT THE HANFORD SITE EXISTS OR DO NOT KNOW THE EXTENT OF ITS SIGNIFICANCE.

PLEASE DO NOT MAKE A RASH DECISION ONLY TO HAVE THE NEXT GENERATION SECOND GUESS YOU AND UNDO YOUR EFFORTS, AS ALREADY HAS HAPPENED THROUGH SEVERAL GENERATIONS. I PROPOSE THAT YOU, TO BETTER REACH THE PUBLIC, PRODUCE AND FACILITATE LAYMAN-FRIENDLY EDUCATIONAL RESOURCES SUCH AS DOCUMENTARIES, WEBSITES, YOUTUBE ACCOUNTS, AND BLOGS TO DESCRIBE HANFORD NEWS AND ISSUES.

159-1

159-1 The public hearings on the *Draft TC & WM EIS* were intended not only to collect comments, but to inform and educate the public as well. In addition to a DOE presentation at the beginning of each public hearing, an hour was provided before each hearing to allow the public to ask questions of staff who supported the development of this EIS. Posters and factsheets were made available at each hearing as well. The Hanford website is also available (http://www.hanford.gov) to inform the public of project activities, including development of this *TC & WM EIS*.

Commentor No. 160: Irene Kochendorfer

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) IRENE KOCHENDORFER
Address Seattle - WASH - 98122
Telephone _____ Email _____

Comment:

Please do what you have agreed to do in the past —
1 - Clean up Hendford tanks
2. Clean up the tank waste using the clean closure standard
Please Please. Do not add more waste to Hanford =
We have contaminated one beautiful state enough — Energy is energy —

160-1 **160-1** DOE directs the commentor to Chapter 2, Section 2.5.2.6, which describes Tank Closure Alternatives 6A and 6B, both of which call for clean closure of the tank farms. Under these alternatives, all 12 SST farms in the 200-East and 200-West Areas would be clean-closed following deactivation. Clean closure of the tank farms would involve removing all SSTs, associated ancillary equipment, and contaminated soil to a depth of 3 meters (10 feet) below the tank base, all of which would be managed as HLW. Where necessary, deep soil excavation would be conducted to remove contamination plumes within the soil column.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 161: Bryan Croeni

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) Bryan Croeni
Address 20068 10th Ave NW, Shoreline, WA 98177
Telephone (▪▪▪) ▪▪▪-▪▪▪▪ Email bryan.croeni@gmail.com

Comment:

It is the government's responsibility to return the land to the condition in which it was found (i.e. clean closure) A full clean-up is the only acceptable option. No additional waste should be transferred to this damaged and environmentally sensitive (i.e. on the Columbia river) site. **161-1** **161-2**

This land must be made safe for future generations, in 10 years, 100 years, 1000 years and 10,000 years. **161-1 cont'd**

161-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

161-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 162: Anonymous

Comment Period Through March 19, 2010
Comment Title PUBLIC COMMENT ON THE *DRAFT TANK CLOSURE & WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT*

Submit your comments at the Seattle hearing on Monday, March 8 (Seattle Center, Northwest Rooms at 7pm)

If you cannot attend the hearing, please place your comment in one of the pre-addressed envelopes provided

Name (optional) _____

Address 1110 E. Spring St. Seattle, WA 98122

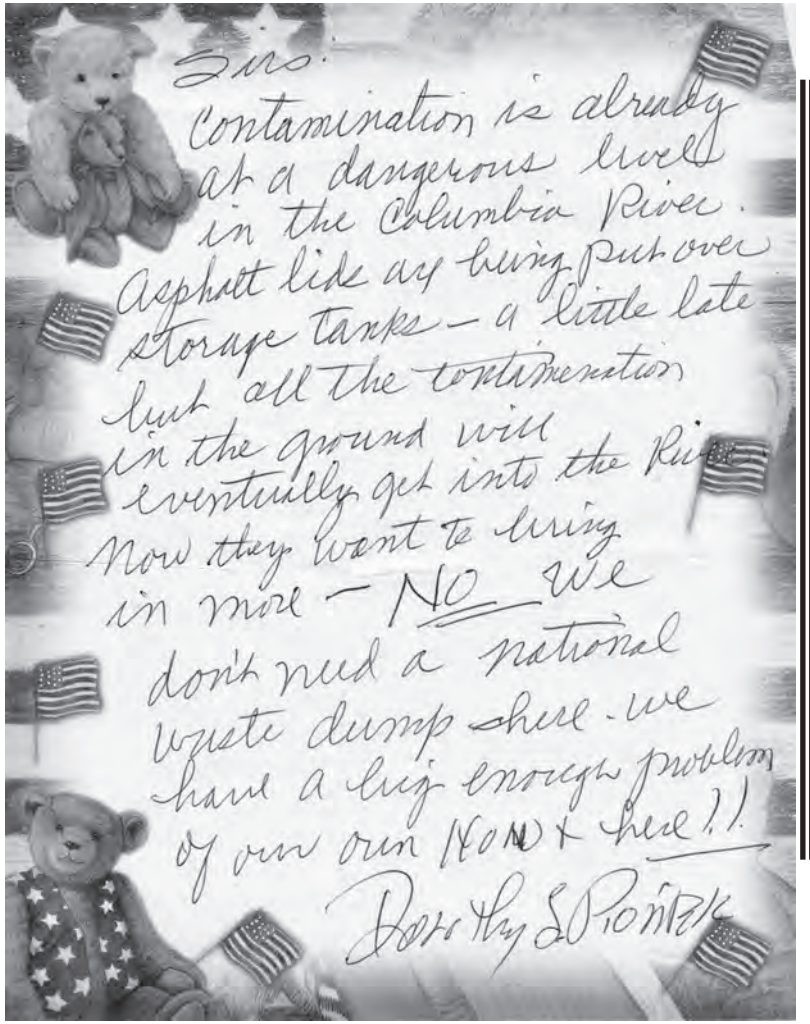
Telephone _____ Email _____

Comment:
Before today, I was not aware of the Hanford nuclear site. After learning about it, I am disheartened to know how little is being done to clean up Hanford. The Pacific Northwest is a beautiful place, and I'm saddened that it could potentially be destroyed, not to mention the harm that it poses to to the people living near Hanford & along the Columbia River. 99.9% of the waste needs to be dealt with with as much speed & efficiency as possible.

162-1 **162-1** Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 163: Dorothy Piontek



Sirs:
Contamination is already at a dangerous level in the Columbia River. Asphalt lids are being put over storage tanks – a little late but all the contamination in the ground will eventually get into the Riv
Now they want to bring in more – NO We don't need a national waste dump here. We have a big enough problem of our own (NOW & here!!)
Dorothy S Piontek

163-1

163-1 The purpose of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites.

Commentor No. 164: Lucinda Tate

Please, I deplore this action to bring contamination to Hanford through my state of OR.
I request that you take immediate action to stop this craziness
Lucinda Tate, Portland OR resident near I-5.

164-1

164-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 165: Jean Dorene Smyth

No more nuclear waste
at Hanford !!
Jean Dorene Smyth.

165-1

165-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 166: Lydia Garvey

3.5.10

TC & WM EIS

Lydia Garvey
429 S 24th St
Clinton, OK 73601

Dear Ms. Burandt,

I strongly urge a thorough clean-up (99.9%) of 53 M gall's of buried nuke waste, including removing the waste (toxic, radioactive) that leaked into the ground, and preventing that contamination from reaching the Columbia River.

Do your job - Protect our waters, lands, health & wildlife!

Your attention to this most urgent matter would be much appreciated by all present & future generations of all species.

Thank-you,

166-1

166-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 167: Beth Standen

From: Beth Standen [bethstanden@earthlink.net]
Sent: Thursday, March 11, 2010 3:33 PM
To: tc&wmeis@saic.com
Subject: Hanford

I am writing to inform you that I oppose using Hanford as a national radioactive waste dump. *167-1*

167-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 168: Marylia Kelley, Executive Director, Tri-Valley CAREs

Tri-Valley CAREs

Communities **A**gainst a **R**adioactive **E**nvironment

2582 Old First Street, Livermore, CA 94551 • (925) 443-7148 • www.trivalleycares.org

Peace Justice Environment since 1983

March 11, 2010

TC & WM EIS
P.O. Box 1178
Richland, WA 99352

Re: Comment on Draft Tank Closure & Waste Management Environmental Impact Statement (TCWMEIS)

To Whom It May Concern:

Tri-Valley CAREs (TVC) is a non-profit organization founded in 1983 by Livermore, California area residents to research and conduct public education and advocacy regarding the potential environmental, health and proliferation impacts of the Department of Energy's Lawrence Livermore National Laboratory. On behalf of our 5,600 members, Tri-Valley CAREs submits the following comments on the Draft Tank Closure & Waste Management Environmental Impact Statement (TCWMEIS) for the Hanford Nuclear Reservation.

The Hanford Site is a nuclear production complex on the Columbia River in Washington. Today, Hanford is already the most contaminated site in the Western Hemisphere. Yet, the U.S. Department of Energy (DOE) proposes dumping even more radioactive wastes, endangering public health and environment. The draft TCWMEIS evaluates the environmental impacts of DOE's preferred alternatives for cleanup and of using Hanford as a national mixed and low level radioactive waste dump, once vitrification plant is "operational." This preferred alternative presents unacceptable risks. In drafting the TCWMEIS, DOE blatanly ignores the public's interest, fails to analyze reasonable alternatives, and proposes to make Hanford a national radioactive waste dump without fully cleaning up the existing contamination. *168-1*

I. The Proposed Alternative Results in an Unacceptable Level of Contamination to the Local Environment

Over a million gallons of deadly liquid High-Level Nuclear Waste have already leaked out from Single Shell Tanks (SSTs), contaminating the groundwater and heading towards the Columbia River. In order to further prevent this High-Level Nuclear Waste from leaking out of SSTs, DOE proposes to remove 99% of tank wastes. While this "preferred alternative" will reduce the level of future contamination, removal of only 99% of tank wastes will not significantly decrease existing contamination. Under DOE's preferred alternative of removing only 99% of the tank wastes, cancer risk from groundwater contamination would be 50 times the State's cancer risk standard! Granted that removal of 99.9% of tank wastes will still be 10 times the State's cancer risk standard, there is a significant reduction of cancer risk if DOE were to remove 99.9% of tank wastes. Therefore, we recommend that DOE remove 99.9% of tank wastes in order to significantly decrease groundwater contamination. *168-2*

168-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

168-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). DOE's preferred retrieval option (i.e., to retrieve at least 99 percent of the tank waste) is consistent with the TPA goal of residual waste not exceeding 10.2 cubic meters (360 cubic feet) for 100-series tanks or 0.85 cubic meters (30 cubic feet) for the smaller 200-series tanks, corresponding to 99 percent retrieval. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 168 (cont'd): Marylia Kelley, Executive Director, Tri-Valley CAREs

II. The DOE Must Remove the Tanks and Investigate and Remediate the Soil Contamination Already Emanating from Tank Leaks

There is 35 million gallons of High Level Nuclear Waste stored in the oldest SSTs. Over a million gallons has already leaked. Further, billions of gallons of waste have been discharged from tanks into the soils near the SST "tank farm." This poses a significant environmental and health risk, since contamination from these tank leaks is spreading rapidly through the soil to the groundwater and is moving towards the Columbia River. The risk of cancer, as a result of groundwater and soil contamination, is increasing significantly and will only grow worse over time. This dire problem requires only one solution: that DOE remove the SSTs and clean up the soil contamination in SST tank farms. However, the TCWMEIS does not reflect that DOE understands the serious negative repercussions that may result from SST leaks, and fails to provide an effective solution to this problem. DOE's preferred alternative makes no mention of cleaning up the contamination; instead, DOE proposes to leave forever the bulk of the contamination from SST leaks and deliberate discharge along with the SST themselves under dirt caps. Without cleaning up the present contamination and preventing future SST leaks, the contamination will continue to spread, and result in serious environmental and health risks to those not only living in the surrounding areas, but also to those living hundreds of miles away (especially if the contamination spreads to the Columbia River). Therefore, we recommend that DOE remove the SSTs and investigate and remediate the soil contamination from SST leaks. "No Cleanup" of the leaked waste is an unacceptable standard. *168-3*

III. Proper Treatment of Hanford's High-Level Nuclear Waste

The 53 million gallons of liquid High-Level Nuclear Waste at Hanford needs to be treated and turned into a stable glass form, through a process called Vitrification. The current vitrification plant, Waste Treatement Plant (WTP), is still under construction, and will have the capacity to treat only half of the volume of Low Activity Waste (LAW) from the tanks. Decision on how to treat the other half of LAW waste is pending. DOE's preferred alternative proposes to wait until after 2015 to make this critical decision of either using vitrification, or using supplemental treatment options, like steam reforming, bulk vitrification, or cast stone to treat LAW. The implications for waiting until 2015 means that the radioactive waste will continue, thereby increasing the already grim problem of soil and groundwater contamination. Further, the supplemental treatments have significant drawbacks, particularly for future contamination of groundwater and cancer risk if LAW is buried in a landfill at Hanford. Therefore, we recommend that DOE should start funding a second LAW facility in 2012 in order to have it ready to operate by 2022. Further, DOE should discard the supplemental treatment option since they are less effective and less protective of the environment. *168-4*

IV. How and Where to Dispose of Radioactive and Hazardous Waste

DOE proposes two "waste management" alternatives for waste generated from on-site cleanup activities, both of which include using Hanford as a national waste dump when DOE operates the vitrification plant. DOE proposes to dispose of all the wastes in the currently existing 200 East landfill (and not construct a second landfill at 200 West), which will add 3 million cubic feet of radioactive and radioactive toxic waste. The TCWMEIS, however, fails to include an alternative of not using Hanford as a national radioactive and mixed radioactive waste dump. Even without using either landfill as a national radioactive and "mixed" radioactive hazardous waste dump, DOE's analysis shows that either landfill location will cause high contamination and cancer risks for thousands of years! Using the 200 East landfill at Hanford as a radioactive and hazardous waste dump will increase radioactive contamination and cancer risk levels over the next thousand years by tenfold, to 100 times WA State's cancer risk standards for toxic cleanup sites! In order to prevent this unacceptable increase in contamination and cancer risk levels, we recommend that DOE consider not using Hanford as a waste dump site. Further, DOE should limit wastes in Hanford landfills to amounts and types of Hanford clean-up wastes which will not cause future leakage and violate cancer risk standards. *168-5*

2

168-3 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

This *TC & WM EIS* evaluates the long-term impacts of different potential approaches to closing the SST farms, ranging from no closure to complete clean closure. As discussed in this *TC & WM EIS*, the modeled responses of the groundwater system (as indicated by the concentration of contaminants as a function of time at the Core Zone Boundary) support the finding that past leaks from SSTs are an important factor in determining future outcomes.

168-4 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

168-5 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 168 (cont'd): Marylia Kelley, Executive Director, Tri-Valley CAREs

V. Risks of Transporting Radioactive Waste to Hanford

DOE proposes trucking nearly 3 million cubic feet (or more than 2 trucks a day, every day for twenty years) of radioactive and "mixed" radioactive wastes to Hanford under its preferred alternatives. This has severe negative implications for the public since they will be exposed to the radiation from the trucks along the routes. These shipments of radioactive waste cause fatal cancer in the communities along the truck routes that would be greatly compounded by a reasonably foreseeable traffic accident or terrorist attack involving one of the trucks, especially in a population center. Such event would result in hundreds of square miles of contamination, evacuation of those areas, and over a thousand fatal cancers.

In addition, the draft TCWMEIS fails to address several important questions regarding the routes for the transport of radioactive wastes. For example, will there be radioactive waste transported from California? If so, when will the waste from CA be shipped and what routes will be taken to transport this waste? Will shipment of waste from CA be examined in a separate NEPA document? Will there be public hearings on shipments of waste from CA to Hanford?

168-5 cont'd

VI. Final Thoughts

Cleanup of the Hanford Nuclear Reservation is essential to prevent the spread of contamination, which currently endangers public health and environment in Washington and beyond. Further, existing wastes will create so much contamination that adding more waste is unconscionable. Therefore, DOE needs to analyze additional sites and strategies besides using Hanford as a national radioactive waste dump site. Implementing the preferred alternatives would set a dismal precedent for dealing with future radioactive waste. Thus, this decision has significant impacts on other DOE operated facilities around the country, including our local site, Lawrence Livermore National Laboratory.

We look forward to the agencies response to our concerns and questions and a more thorough alternatives and analysis in the final TCWMEIS. Thank you for your consideration.

Sincerely,

Iti Talwar
Legal Intern, Tri-Valley CAREs

Scott Yundt
Staff Attorney, Tri-Valley CAREs

Marylia Kelley
Executive Director, Tri-Valley CAREs

2582 Old First Street
Livermore, CA 94551
Telephone: (925) 443-7148
Email: marylia@trivalleycares.org

Response side of this page intentionally left blank.

Commentor No. 169: Gretchen Randolph

From: Gretchen Randolph [aha4kids@sterlink.net]
Sent: Thursday, March 11, 2010 8:57 PM
To: tc&wmeis@saic.com
Subject: Citizen comment: Handford as the National Radioactive Waste Dump

No, do not turn Hanford into the National Radioactive Waste Dump. This is utterly stupid, and will risk the lives and health of all of us in the Northwest. It isn't enough that we can't even contain the radioactive water leaking toward the Columbia River, you want to add more of the most toxic poison know to mankind to our area. Plus, you are creating more radioactive trucks driving across our country. How safe is that? Can you guarantee to keep those away from innocent people. Not to mention the extreme cost of producing energy with nuclear plants. *169-1* *169-2*

We have wind power, solar power and so many other options for energy. Don't let this happen. Stop, Georgia from building more nuclear plants. Let them keep their radioactive waste in Georgia. Fight the moneyed interests that try to turn your department away from being our government, working to protect our citizens. *169-3*

My Senator and my state rep are working on bills to stop the designation of Hanford as the National Waste Dump. Do your part within the Department to clean up Hanford, and not trash our beautiful NW.

Gretchen Randolph, Ph.D., PMHNP
grandolph@addportland.com
http://www.addportland.com

169-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

169-2 Transportation of radioactive materials and waste to or from Hanford must comply with DOT regulations in "Other Regulations Relating to Transportation" (49 CFR Subtitle B), as well as state and local regulations. These regulations include requirements for inspecting and surveying packages, containers, and transport conveyances (truck and rail) prior to offsite transport. In addition, Hanford's *PHMC Radiological Control Manual* contains requirements for transportation and receipt of radioactive material that include surveying and decontaminating trucks, railcars, and any onboard packages as necessary (Fluor Hanford 2006). Other DOE sites have their own radiological control manuals and implementing procedures for ensuring trucks and railcars leaving their sites meet contamination requirements.

169-3 Comment noted.

Commentor No. 170: Kevin March

From: Anne and Kevin March [amarch@eoni.com]
Sent: Friday, March 12, 2010 9:07 AM
To: tc&wmeis@saic.com
Subject: Hanford

Dear Mary Beth Burandt, US Dept. of Energy

Please do the right thing. Since they do not seem to be interested in cleaning the radioactive plume beneath Hanford from leaking tanks, their hand must obviously forced in this matter. The region will forever be altered if this plume is allowed to reach the Columbia. There should not even be a question about the right thing to do in this matter. *170-1*

And yet the DOE is looking to allow more wastes being brought to Hanford from outside the region in 2022? Absurd and inane.

I obviously strongly oppose this idea of adding waste to the already leaking and toxic mess that is Hanford and request that you use your power to do the right thing, also forcing the DOE to clean up the mess before even thinking of adding more toxicity. *170-2*

Thank you for your consideration.

Kevin March
206 Main Ave.
La Grande, OR 97850
amarch@eoni.com

170-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

170-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

DOE recognizes the potential negative impacts on Hanford groundwater that this offsite waste poses. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this EIS.

Commentor No. 171: Jan Castle

From: Jan Castle [jancastle@comcast.net]
Sent: Friday, March 12, 2010 3:24 PM
To: tc&wmeis@saic.com
Subject: Comments

These comments are in addition to my statements given at the USDOE hearing in Portland, OR on Feb. 10, 2010. Regarding the TC&WMEIS.

Tank wastes

USDOE should retrieve a minimum of 99% of waste from each tank and determine on a tank by tank basis what methods are required to remove as much of the last 1% as is technically feasible.

As tanks are emptied, soil under and around the tanks should be tested, excavated and treated to the standard of "clean closure" rather than "landfill closure." I understand the concerns for worker safety, and the magnitude of the challenge as expressed at the hearing by Mary Beth Burandt. But DOE's own research shows such devastating effects on the Columbia River, over the course of thousands of years, that these challenges simply must be met. I am looking for much more of a "can do" attitude from DOE, and an acknowledgement that it is simply morally inconceivable to leave the wastes in place. If the scope and safety of this excavation and treatment project is beyond what DOE knows how to handle today, the necessary resources must be employed to find new methods. Two resources which may be of value are these:

171-1

1. **Amory Lovins** of the Rocky Mountain Institute, who has worked extensively with the US Army to make it's operations far more energy efficient and sustainable.

www.rmi.org
1820 Folsom Street
Boulder, CO 80302-5703
(303) 449-5226

2. **Janine Benyus** of the Biomimicry Institute, who pioneered the idea of looking at how nature solves a given problem, and finding a way to imitate it.

*www.**biomimicryinstitute**.org*
257 West Front Street
Missoula, MT 59802-4301
(406) 728-4134

171-2

171-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. As required by NEPA, this *TC & WM EIS* addresses the impacts on both the short- and long-term human environment. Workers related to the activities being analyzed are part of the human environment, and impacts on workers are presented in Appendix K, Section K.3.10 and Chapter 4, Sections 4.1.10, 4.2.10, and 4.3.10, of this EIS. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

171-2 This EIS addresses the environmental impacts of retrieval, treatment, and disposal of tank waste and final closure of the SST system. It also evaluates the impacts of FFTF decommissioning, including the management of waste generated by the decommissioning process. Finally, this *TC & WM EIS* evaluates the potential environmental impacts of ongoing solid-waste management operations at Hanford, as well as the proposed disposal of Hanford LLW and MLLW and a limited volume of offsite LLW and MLLW.

This EIS analyzed supplemental LAW treatment capability by building new treatment facilities that are either part of (expanded LAW capacity) or separate (bulk vitrification, steam reforming, or cast stone) from the WTP. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although

Commentor No. 171 (cont'd): Jan Castle

Vitrification of high level wastes

USDOE should plan to start up the LAW portion of the WTP as soon as it's done, and start planning and funding a second LAW facility in 2012, have it operational in 2022, to target vitrification of all wastes by 2040. USDOE should decide now to discard the "supplemental treatments" as they are not as effective as vitrification. *171-3*

Hanford as a national radioactive waste dump

This is unacceptable. Hanford's mission is clean-up and I expect it to be cleaned up to the highest extent that is technically feasible, not turned into a dump that will continue to contaminate the Columbia River, and the groundwater at Hanford, for thousands of years.

It is unacceptable to have nuclear waste trucked through our communities in either eastern or western Oregon on their way to Hanford. DOE is in violation of NEPA requirements for simultaneous disclosure of all actions by separating this EIS from the one about GTCC wastes. Shipment of these wastes alone would constitute an unacceptable risk to our citizens, just by exposure in passing traffic. The Portland area experiences traffic gridlock under many circumstances, thus insuring exposure to adults and children without their knowledge or consent. Your studies do not include exposure risk to children, or accidents or sabotage of either GTCC or lower level waste shipments. *171-4*

The US government is bound by treaties with sovereign nations to return the Hanford land to native use, and by the Endangered Species Act to protect salmon. *171-5*

The decision to make Hanford a national radioactive waste dump was made based on a flawed EIS, so the decision should be rescinded and reexamined. Based on the evidence in this EIS of the effect on the river and groundwater, it is clear that this plan should be abandoned. Because of these issues, this plan would be legally indefensible in a court of law, which is where it would surely end up if not withdrawn. As a taxpayer, I do not want money wasted on fruitless legal battles, I want it spent on solutions. *171-6*

Only clean-up waste that will not leak should be stored in landfills at Hanford. Plutonium and other Transuranic wastes in the soil should be dug up, treated, and disposed of in deep geological repositories. DOE should consider removing other wastes from soils to a regulated commercial radioactive waste facility which is not above a river or drinkable groundwater. *171-7*

Decommissioning the FFTF

The Washington standard for decommissioning nuclear reactors requires removal and site restoration; this should be done. The sodium and components should be treated at Hanford, rather than being shipped to Idaho and back. *171-8*

the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, and the BOF, as well as the Pretreatment Facility and the HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

171-3 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies.

171-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

171-5 DOE respectfully disagrees with the tribe's position regarding tribal rights at Hanford. There is substantial documentation indicating that the tribes understood at the time the treaty was signed that the lands were no longer "unclaimed" when they were claimed for the purposes of the white settlers' activities. Most of Hanford had been so "claimed" at the time it was acquired for Government purposes in 1943. DOE is not aware of any judicially recognized mechanisms that would allow these lands to revert to "unclaimed" status merely through the process of being acquired by the Federal Government.

Commentor No. 171 (cont'd): Jan Castle

Thank you for the opportunity to comment on the Tank Closure and Waste Management EIS.

Jan Castle
16181 Parelius Circle

Lake Oswego, OR 97034

The portion of Hanford that remained in the public domain in 1943 (those lands now under U.S. Bureau of Land Management ownership) as well as all the acquired lands were closed to all access initially, first under authority of the War Powers Act and then under the authority of the Atomic Energy Act. Therefore, it is DOE's position that Hanford lands are neither "open" nor "unclaimed."

In addition, DOE recognizes that it must comply with the Endangered Species Act. This is acknowledged in Chapter 8, Section 8.1.6, of this *TC & WM EIS* and is further discussed in the ecological resources sections of this EIS.

171-6 DOE recognizes the potential negative impacts on Hanford groundwater posed by the offsite waste. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this final EIS.

171-7 Chapter 1, Section 1.4.1, states that DOE has committed to disposing of LLW at Hanford in lined trenches, a change from the past disposal practice of using unlined trenches. DOE ensures that disposal activities are protective of the environment and meet regulatory requirements. (See Appendix E, Section E.3.3, for the evolution of past disposal practices.)

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

171-8 Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives and identify where standards may be exceeded. Chapter 8 of this *TC & WM EIS* provides both a listing and short descriptions of the laws, regulations, and requirements that may apply to the proposed actions, including FFTF decommissioning.

Commentor No. 172: Anne M. Jess

From: Anne Jess [annemjess@yahoo.com]
Sent: Friday, March 12, 2010 7:43 PM
To: tc&wmeis@saic.com
Subject: EIS comment

March 12, 2010.

My name is Anne Jess and I live on Mercer Island, WA. I have lived in Washington State since late 1981.

Here are my comments about the DRAFT Tank Closure and Waste Management EIS for the Hanford site:

- DOE should remove and treat all (99.9%) of the tank waste.
- DOE should expand the ability of the Waste Treatment Plant (the vitrification facility) to immobilize more waste by building more glass melters. This would allow stabilization of the waste until other future disposal options can be determined.
- DOE should dispose of treated tank waste on-site for now. If another waste site is developed off-site, then DOE could revisit that decision then. *172-1*
- DOE should completely remove the underground waste storage tanks and some of the contaminated soil beneath the tanks. DOE should NOT leave the tanks and contaminated soil in place.
- DOE should NOT accept offsite waste and add it to Hanford's waste inventory.

In other words,

Do a complete CLEAN CLOSURE of the tanks at Hanford, and the contaminated ground underneath *172-2*
and
DO NOT bring OFF-SITE WASTE to Hanford.

Please help clean up the toxic waste from our Washington "back yard."

Thank you for including these comments for the EIS review.

Anne M Jess
Mercer Island, WA

172-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. DOE's preferred retrieval option (i.e., to retrieve at least 99 percent of the tank waste) is consistent with the TPA goal of residual waste not exceeding 10.2 cubic meters (360 cubic feet) for 100-series tanks or 0.85 cubic meters (30 cubic feet) for the smaller 200-series tanks, corresponding to 99 percent retrieval. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

This *TC & WM EIS* addresses alternatives for on- and offsite disposal of treated tank waste, depending on the waste type. However, the scope of this EIS does not include making a decision on the ultimate disposition of HLW and any transportation related to such disposition. The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

172-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 173: Eldon Ball

From: Eldon Ball [eldonball@juno.com]
Sent: Friday, March 12, 2010 8:06 PM
To: tc&wmeis@saic.com
Subject: national radioactive waste dump

Hanford should never be considered as a radioactive waste dump! The present radioactive waste, that was supposed to be cleaned up by now, is leaching toward the Columbia River. If the river becomes contaminated, it would endanger the health of 1 million people living down river! The national radioactive waste dump should be in the Great Basin so it would not leach to the ocean. We had chosen a site in Nevada years ago. Use it! Thanks. *173-1* *173-2*

Sincerely,

Eldon Ball, 3200 NE 140th St., #11, Seattle, WA 98125

173-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

173-2 Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 174: Elinor A. Graham

From: Steve Gary or Ellie Graham [gramgary@earthlink.net]
Sent: Friday, March 12, 2010 11:33 PM
To: tc&wmeis@saic.com
Subject: draft EIS

March 12, 2010

To US Dept of Energy

Re: Draft Tank Closure & Waste Management EIS for Hanford

I am a pediatrician who spent the first 13 years of my life (1943-56) living in small towns around Walla Walla in the path of radiation exposure from Hanford. I developed lung cancer, although I never smoked, at age 52. Most of my childhood friends have had at least one form of cancer. We need to clean up Hanford in a manner which reduces this risk for people living in the Tri-Cities area and everyone downstream on the Columbia. *174-1*

I am appalled at your draft plan for cleaning up Hanford and for advocating even more radio-active waste be brought to that site where there is currently inadequate containment of existing waste and significant evidence of contamination of water in the Columbia as well as well water in the surrounding area. *174-2*

We must have a plan that:

- Removes 99.9% of the tank wastes or to the limits of technical capabilities.
- Insures that existing tanks that are leaking are closed and the soil remediated.
- Starts the LAW vitrification immediately and expands this capability.
- Does not add more waste to the Handford site.

174-3

Peoples lives are in your hands and you need to act responsibily to provide maximal protection for those lives as you correct past mistakes.

Yours,

Elinor A. Graham MD, MPH
5124 S. Graham St.
Seattle, WA 98118
xxx-xxx-xxxx

174-1 The potential doses to, and health impacts on, the public and workers from past Hanford operations have been the subject of a number of studies. Summaries of these studies are presented in Chapter 3, Section 3.2.10.3, of this EIS. As indicated in that section, the question of whether the population around Hanford has elevated cancer incidence or cancer mortality is unresolved. One past study showed no elevated levels of cancer around nuclear facilities, including Hanford; another study of 16 counties near Hanford determined that cancer incidence in white males and females was below the national average in most counties. The counties in which the incidences of cancer were higher than the national average were not those downwind of Hanford.

The Hanford Dose Reconstruction Project evaluated doses to, but not health effects on, members of the public from releases from 1944 through 1972. Airborne releases of iodine-131 from 1944 through 1957 were responsible for most of the doses from air emissions. The largest organ doses were estimated to be 24 to 350 rad to the thyroid. The maximum total effective dose equivalent to an adult from air emissions over the period from 1944 through 1972 was estimated to be 1 rem. The risk of a fatal cancer associated with a dose of 1 rem is about 1 in 1,600. The maximum dose through releases to the Columbia River (from eating nonmigratory fish) was estimated to be 1.4 rem.

Through this EIS, DOE evaluates the potential environmental and human health impacts of proposed actions that would contribute to the cleanup of Hanford, namely alternatives for the storage, retrieval, treatment, and disposal of tank waste generated from defense plutonium production activities; closure of SSTs; and FFTF decommissioning. This EIS also addresses disposal of LLW and MLLW. The analyses include potential human health impacts (through the air pathway) of normal operations, presented in Chapter 4, with details in Appendix K ("Short-Term Human Health Risk Analysis"), as well as long-term impacts (including through the groundwater and river pathway), presented in Chapter 5, with details in Appendix Q ("Long-Term Human Health Dose and Risk Analysis").

174-2 DOE publishes an annual Hanford groundwater monitoring report documenting conditions in groundwater across the site. This *TC & WM EIS* contains a comprehensive assessment of groundwater contamination that includes a prediction of current conditions and comparison with field measurements (Appendix U).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

174-3 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 175: Ed Martiszus

From: ed martiszus [martiszus@yahoo.com]
Sent: Saturday, March 13, 2010 7:08 PM
To: tc&wmeis@saic.com
Cc: office@hoanw.org
Subject: Future Hanford Plans

I have been asked to make comments on Hanford future. I want to say that Hanford has been contaminated more than any area within the range of the Hubble telescope. The people of the Northwest have suffered enough. I know I have been a RN in Oregon for over 32 years. I cleaned up the human debris from Hanford every day on the job. Early on I put 2+2 together about all the environmental reports on radioactive releases and what I was seeing at the bedside. *175-1*

This area (Columbia Basin) is contaminated with all the radiation, air, land, and water pathways have already been established to continually expose the population into the forseeable future. That is a crime. Especially when it is linked to making illegal nuclear weapons. To walk away and say "good luck" to the Northwest is irresponsible and criminal. Due process has been violated, human rights have been violated, accountability and liability is in order in a nation that struts around the world stage lecturing others about "the rule of law". Let's see some rule of law. *175-2*

The tank farm is another area that will not be ignored. Gravity dictates Portland, OR be concerned. Portland draw water from wells along the Columbia River when it isn't using Bull Run. I have heard talk that they already have plutonium contamination in them. So what we have now is a column of toxic/radioactive material directly connected to the Columbia. *175-3*

The high level truckloads 17,500. I ask what is the dose at the rear tailgate? What is the dose if I get passed three time s week in traffic? I have to end this, but I could go on and on. *175-4*

I read the transcripts of the Hanford Health Effects Subcommittee. Heartbreaking tale of genocide along the Columbia. I also know about the fact that by US-DOE's calculationssometime in the future you will only be able to stand next to the Columbia River for 8 hours out of the year. *175-5*

The most advanced, state of the art technology needs to be employed to isolate toxic/radioactive wastes while we try to figure out a way to move to more stable iootopes *175-6*

Ed Martiszus, RN

175-1 The potential doses to, and health impacts on, the public and workers from past Hanford operations have been the subject of a number of studies. Summaries of these studies are presented in Chapter 3, Section 3.2.10.3, of this EIS. As indicated in that section, the question of whether the population around Hanford has elevated cancer incidence or cancer mortality is unresolved. One past study showed no elevated levels of cancer around nuclear facilities, including Hanford; another study of 16 counties near Hanford determined that cancer incidence in white males and females was below the national average in most counties. The counties in which the incidences of cancer were higher than the national average were not those downwind of Hanford.

The Hanford Dose Reconstruction Project evaluated doses to, but not health effects on, members of the public from releases from 1944 through 1972. Airborne releases of iodine-131 from 1944 through 1957 were responsible for most of the doses from air emissions. The largest organ doses were estimated to be 24 to 350 rad to the thyroid. The maximum total effective dose equivalent to an adult from air emissions over the period from 1944 through 1972 was estimated to be 1 rem. The risk of a fatal cancer associated with a dose of 1 rem is about 1 in 1,600. The maximum dose through releases to the Columbia River (from eating nonmigratory fish) was estimated to be 1.4 rem.

175-2 The purpose of Chapter 3, Section 3.2, of this *TC & WM EIS* is to provide a succinct discussion of the Hanford affected environment as a whole and as relevant to the entire scope of proposed actions and alternatives considered in this EIS. Key areas discussed include radiation, air, land, and water impacts. To prepare this chapter, DOE used existing documentation. For example, DOE annually publishes compilation and assessment reports of groundwater monitoring data (Hanford site groundwater monitoring reports, the latest of which is available at http://www.hanford.gov/page.cfm/SoilGroundwaterAnnualReports) and of multimedia environmental monitoring data (Hanford Site environmental reports [Poston, Duncan, and Dirkes 2011]), which were used to prepare Chapter 3. The commentor is directed to those documents for an indepth discussion of current conditions at the site.

175-3 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 175 (cont'd): Ed Martiszus

175-4 Approximately 14,200 truck shipments would occur during transport of LLW and MLLW from offsite sources to Hanford under the Waste Management alternatives (see Chapter 4, Table 4–151, Waste Management Alternatives – Estimated Number of Shipments). The dose to an MEI under incident-free transportation conditions was estimated for a person caught in traffic and located 1.2 meters (4 feet) from the surface of a remote-handled radioactive waste shipping container for 30 minutes. This dose was calculated to be 10 millirem for a single shipment. If a person were stuck in traffic three times next to this shipment, then the cumulative dose would be 30 millirem. The dose would be less if the shipment were contact-handled radioactive waste or if the person were stuck in traffic next to the waste shipment for a shorter period of time or were farther away. A dose of 10 millirem is roughly equivalent to that obtained from an x-ray of a broken bone, and the risk of incurring a fatal cancer from such a small dose would be 6×10^{-6}, or 6 chances in 1,000,000, which is very low.

175-5 DOE respectfully disagrees with the commentor's assertion that, in the future, an individual will be able to stand next to the Columbia River for only 8 hours per year. Elevated doses reported in the *Draft TC & WM EIS* for the Columbia River nearshore location are due to non–*TC & WM EIS* sources from which impacts would have occurred in the past or would occur in the near future and for which no remediation or access control was assumed in the analysis. Access to the site is controlled, and these doses, estimated as part of a comprehensive analysis, have not and would not occur. In addition, DOE is implementing an extensive cleanup program at Hanford under RCRA, CERCLA, and the TPA. Implementation of these cleanup projects will significantly reduce impacts of sources identified as non–*TC & WM EIS* sources in the draft EIS.

175-6 This EIS analyzed supplemental LAW treatment capability by building new treatment facilities that are either part of (expanded LAW capacity) or separate (bulk vitrification, steam reforming, or cast stone) from the WTP. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made

Commentor No. 175 (cont'd): Ed Martiszus

a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, and the BOF, as well as the Pretreatment Facility and the HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

Commentor No. 176: Kathy Andrew

From: Kathy Andrew [kandrew@eoni.com]
Sent: Sunday, March 14, 2010 10:14 PM
To: tc&wmeis@saic.com
Subject: Comment for Draft TC & WM EIS

Dear Ms. Burandt,

Please accept this comment for the Draft TC & WM EIS for Hanford:

It is very clear to those living in this area that Hanford is not an appropriate site for storage of nuclear waste generated in other parts of the country. It is located extremely near to a large waterway which is vital for the entire Northwest region. The Columbia is already severely endangered by nuclear toxicity currently in the environment. It is simply ridiculous to compound toxicity problems which can be argued to be the worst in the world by bringing even more nuclear waste to the site. Additionally, because waste currently stored in the tanks will take until the middle of this century to vitrify at the proposed plant, it does not seem there is any realistic excess capacity for the vitrification plant. *176-1*

I also believe that the nuclear contamination at Hanford should be cleaned up to the absolute best of our ability i.e., 99.9% removal and vitrification of waste in the tanks, as well as the remediation of the impacted soil and groundwater. I realize that at this point remediation options may be limited, and that developing new technologies and procedures for cleaning up the soil and groundwater poses many challenges. However, we cannot do any less; and it is by rising to these sorts of challenges that humanity progresses. Our nation would benefit in numerous ways. First and obviously, we would not be living in a dangerously toxic environment (it was my understanding from the study itself that conditions will only get worse in the near future if nothing is done to clean up impacted soil and groundwater). Secondly, we would derive significant economic benefits. Jobs would be created in research and environmental cleanup, and much-needed new technologies would be created. And thirdly, we would be showing our children and grandchildren how to behave responsibly towards problems we have created. A "Can Do" attitude is really the only option for the conundrum of Hanford!! *176-2* *176-3*

With Best Wishes,

Kathy Andrew

176-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

DOE is not proposing treatment of offsite waste at the WTP or any facility at Hanford, only disposal.

176-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Options for tank waste treatment encompass a variety of technologies, including vitrification. DOE decisions based on the data presented in this EIS will be documented in a ROD or a series of RODs, issued no sooner than 30 days after publication of EPA's Notice of Availability for this *Final TC & WM EIS* in the *Federal Register*.

176-3 This EIS addresses the environmental impacts of retrieval, treatment, and disposal of tank waste and final closure of the SST system. It also evaluates the impacts of FFTF decommissioning, including management of waste generated by the decommissioning process. Finally, this *TC & WM EIS* evaluates the potential environmental impacts of ongoing solid-waste management operations at Hanford, as well as the proposed disposal of Hanford LLW and MLLW and a limited volume of offsite LLW and MLLW.

Commentor Number 177 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 127.

Commentor No. 178: Floy Jones

Please do not risk further contamination of the Columbia River already a toxic river.
Hanford should not be a dumping grand for further waste.
Allowing 15 deaths/1000 is unacceptable!
The accumulative effect of even low-level exposure is a significant public health concern.
Floy Jones Floy Jones

178-1

178-2

178-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

178-2 DOE respectfully disagrees with the commentor's assertion that this *TC & WM EIS* supports an estimate of 15 deaths per 11,000 individuals over the long term. The long-term dose assessment completed for this EIS estimates dose and risk for individuals over the long term, but does not accumulate impacts across generations. While even low doses are of concern, this *TC & WM EIS* is consistent with ICRP guidance that uncertainties of future medical technology and of population size, makeup, and behavior are so great that accumulation of low doses over long timeframes would not provide a reasonable basis for decisions on radiation protection (Valentin 2007).

Commentor No. 179: Cass Martinez

Dear Sirs:

Please do not accept more waste at Hanford: the site is too closely entwined with our Columbia River System, salmon system, crops irrigation, drinking water, and human population.

Cass Martinez

179-1

179-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 180: Bill Tattam

3/6/10

Please shut-down and clean-up Hanford. No future waste should be shipped to Hanford: It has enough already. Hanford is a continual threat to Humans, let alone a threat to N.W. Salmon & steelhead.

Bill Tattam, Portland, Oregon

180-1

180-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 181: Jane Howell

From: Jane Howell [jhowell@eou.edu]
Sent: Monday, March 15, 2010 1:33 PM
To: tc&wmeis@saic.com
Subject: Hanford Comments

My name is Jane Howell, I live in La Grande and attended your Hanford meeting at EOU. I am not much of a public speaker so I am voicing my concerns in this email.

1. I do not want Hanford to be the National Depository for Nuclear waste. The Columbia river is the gateway to the northern west coast and the effects that the waste could have on the Northwest is too extreme for Hanford to be a safe place for more waste. *181-1*
2. I do not want anymore waste to come to Hanford ever! We have too much waste to deal with now and the land is too fragile to take on more.
3. I want to have the waste that is currently in the holding tanks and in the ditches at Hanford to be cleaned to the 99.9% *181-2*
4. I am concerned about the years it will take to do anything and want to know what is happening now to protect people and the Columbia.
5. Do the right thing for the people, animals and our water supply. We are all counting on the Government to be safe in the solidification process! *181-3*
6. Please do not allow hypothetical solutions to protect our mother earth. Stop playing with fire and figure out the real solution to our national nuclear waste problem.
7. I do not want bio-hazardous materials trucked down the freeway like any other product. If people want to use bio-hazardous materials they need to discover onsite solutions. *181-4*

Jane Howell
307 N Ave
La Grande, OR
97850
xxx.xxx.xxxx

181-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

181-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

As noted in Chapter 1, Section 1.4.2, the six sets of cribs and trenches (ditches) that are contiguous to the SSTs are CERCLA past-practice units. These would fall under the barriers placed over the SSTs during closure. They are evaluated in this EIS as part of a connected action because they would be influenced by barrier placement. However, closure of these CERCLA past-practice units is not part of the proposed actions for this EIS. Closure of these units would be addressed at a later date.

181-3 This *TC & WM EIS* addresses proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites. See response to comment 181-2 regarding future DOE decisions.

181-4 DOE assumes the commentor is referring to radioactive waste as "bio-hazardous materials." The transportation of radioactive materials must comply with DOT regulations, while the packages containing the materials must comply with NRC regulations, as described in this *TC & WM EIS*, Appendix H, Section H.3.

Commentor No. 182: Tom Seppalainen, Philosophy Department, Portland State University

From: Tom Seppalainen [seppalt@pdx.edu]
Sent: Monday, March 15, 2010 4:17 PM
To: tc&wmeis@saic.com
Subject: EIS Comment
Attachments: Hanford TCWM EIS from PSU PhiloDept.pdf

Please see attch for a public comment (I'll also have a hard-copy sent)

Best regards,

Tom

--

Tom Seppalainen
Chair
Department of Philosophy

xxx xxx xxxx office
xxx xxx xxxx fax
seppalt@pdx.edu
www.philosophy.pdx.edu

Office hours:

Monday 11am-1pm
Thursday 9am-10am

Neuberger Hall, 393B
724 SW Harrison
Portland, Oregon 97201
PO Box 751
Portland, Oregon 97207-0751

Response side of this page intentionally left blank.

Commentor No. 182 (cont'd): Tom Seppalainen, Philosophy Department, Portland State University

Portland State UNIVERSITY

College of Liberal Arts and Sciences
Philosophy
Post Office Box 751 Portland, Oregon 97207-0751
503 725 3524 tel
503 725 5984 fax

March 12, 2010

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
Post Office Box 1178 Richland, WA 99352

Dear Ms. Burandt:

Pertaining to the recent Tank Closure and Waste Management Environmental Impact Statement conducted by the US Department of Energy for the Hanford site, we are contributing a public comment for the following points:

- Further investigation of broader regional well-being is called for in such a review of environmental impacts. In particular, the EIS insufficiently recognized the perspectives and values of both the Native community and citizens in this region. *182-1*
- More generally, long term value sets were not included in this EIS. As this has been the case throughout the history of decision making at Hanford, it is due time to include such elements, even in 'technological' reviews. This is particularly crucial given the effects on many future generations and the degree of contamination. *182-2*
- We are also concerned about proposals to transport more waste to Hanford without sufficient citizen input and discussion. The community deserves a significant opportunity to represent concerns about the high threats of civilian exposure and possible massive evacuation in the case of a transportation accident. *182-3*
- Finally, further research and development should be conducted for tank waste retrieval, technetium immobilization, and ground water contamination modeling. The investment in such R&D would prove a shift in technique from "doing it quickly" to "doing it right". *182-4*

We appreciate the extended public comment period and the opportunity to contribute to this locally- and globally-significant project.

Sincerely,

Tom Seppalainen, Ph.D.
Chair

182-1 The perspectives and values of both the American Indian community and the citizens in this region are among the factors driving the current ORP mission to clean up the chemical and radioactive wastes left behind from the previous Hanford mission of defense-related nuclear research, development, and weapons production activities. DOE recognizes that the tribes feel a strong connection and association with their surrounding environment. For example, DOE appreciates receiving the Nez Perce Tribe's narrative, which provides its perspectives. DOE included this narrative in this *Final TC & WM EIS* as part of a new appendix (Appendix W), with references to this appendix added in the main volume of this EIS. Also, this EIS includes a number of analyses of the potential impacts of the various alternatives on the local American Indian population over the short term (see Appendix J) and long term (see Appendix Q).

182-2 Chapter 8 of this *TC & WM EIS* identifies the laws, regulations, and other requirements that potentially apply to the alternatives. Throughout this EIS, the standards established by EPA, Ecology, NRC, DOE, and others, as applicable to the particular subject matter, are identified, and the results of the impact analyses are compared with these standards.

As discussed in the Summary, this *TC & WM EIS* analyzes additional waste treatment capability, including expanding the vitrification process capability currently being constructed in the WTP (i.e., constructing a second vitrification plant or supplementing the WTP's capability with supplemental treatment technologies). Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies. This demonstration process is discussed in further detail in Appendix E of this *TC & WM EIS*.

182-3 For the *Draft TC & WM EIS*, eight public hearings were held within a 185-day comment period for members of the public to express their concerns and ask questions.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 182 (cont'd): Tom Seppalainen, Philosophy Department, Portland State University

182-4 This EIS analyzed supplemental LAW treatment capability by building new treatment facilities that are either part of (expanded LAW capacity) or separate (bulk vitrification, steam reforming, or cast stone) from the WTP. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, and the BOF, as well as the Pretreatment Facility and the HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

Commentor No. 183: Nancy Kroening

From: nancy newkirk [greeniefrost@yahoo.com]
Sent: Monday, March 15, 2010 4:36 PM
To: tc&wmeis@saic.com
Subject: Comments on EIS

Dear People:

Following are my comments re: the EIS re: putting more nuclear waste at Hanford:

Please drop all consideration of using Hanford as a national radioactive waste dump. (In fact, the Statement should be re-issued to include an alternative in which Hanford is not receiving off-site radioactive wastes). There has not been anywhere enough progress at the Hanford site to warrant even considering placing more waste there, in my opinion! *183-1*

The Environmental Impact Statement shows that existing wastes at Hanford will create so much contamination that adding more wastes would be "way bad" due to soil, water, and air contamination and the ability of the contractors to deal with any of it. I noted when we passed by there that there is FOOD growing downwind of Hanford! We eat that food! *183-2*

I stress that the Department of Energy must cleanup the contamination from High-Level Nuclear Waste tank leaks and billions of gallons of discharges that occur NOW.

They need to empty the tanks to 99.9% & fully remove the tanks from the ground instead of leaving them there to recontaminate the groundwater & the Columbia River over the next thousand years. *183-3*

Our family has a big interest in this because our grandchildren spend time in Richland, WA, right next door to Hanford.

The people of Washington spoke loudly and clearly when they voted to NOT have more waste at Hanford. I want the federal government to honor the people's wish. *183-1 cont'd*

Thank you.

Nancy Kroening, 123 East Calavar Road, Phoenix, AZ 85022

183-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

183-2 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

183-3 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the

Commentor No. 183 (cont'd): Nancy Kroening

selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 184: Vivian Adams

From: vha@icehouse.net
Sent: Monday, March 15, 2010 6:37 PM
To: tc&wmeis@saic.com
Subject: Hanford Reach

Dear USDOE:

Please remove Hanford from your consideration as a national waste dump. Look for a further alternative that would not endanger a river. *184-1*

Please do not reopen FFTF. It should be dismantled entirely. *184-2*

Thank you for your consideration of my comments.

Vivian Adams
3526 S Cook St
Spokane, WA 99223
vha@icehouse.net

184-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

184-2 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. As discussed in Chapter 1, Section 1.4.2 (Decisions Not to Be Made), DOE is not considering restarting FFTF. The scope of this *TC & WM EIS* is to address the final decommissioning of FFTF.

Commentor No. 185: Martha Lightfoot

From: Martha Lightfoot [martha.lightfoot@gmail.com]
Sent: Monday, March 15, 2010 7:31 PM
To: tc&wmeis@saic.com
Subject: Handford Nuclear Waste Site

I believe that all of the existing waste at Handford should be cleaned up- 99.9 or 100%. Including all structure above and under ground, all dry casks, all soil, all water. *185-1*

I do not believe that Handford should become a nuclear waste repository for the country. The area around the Hanford site is already so contaminated the DOE itself says they have never tackled such a large clean-up. To add more waste would simply compound an already difficult situation. To not clean it up and simply add more waste on top of it is unconscionable, and callous in its disregard for human life & public health, and for the earth and the water supply that would be contaminated forever in human terms. *185-2*

I do not support the trucking of radioactive waste across the country. The danger involved to innocent people even if everything goes according to plan is too high. The potential risk of accidents, the vulnerability to attacks, the radiation danger to the drivers and the people, especially children and pregnant women, whose paths may cross that of the trucks is too great. *185-3*

I do not support any federal or state subsidies for new nuclear power. I support putting that money into truly renewable forms of energy, and into cleaning up and safeguarding existing nuclear waste. The only way to safely deal with nuclear waste is to stop making it. *185-4*

Martha Lightfoot, Portland Oregon.

--

Growth, control, and repose. These three need to exist in balance to make for a good forest of thought. The difficult task for the caretaker of the forest is to ensure watering the right areas, trimming back unaesthetic overgrowth, being cautious of the growth of weeds, transplanting less-thriving species to find greater strengths, and planting new seeds. But most important, ultimately knowing when to leave the forest alone. John Maeda

185-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. DOE's preferred retrieval option (i.e., to retrieve at least 99 percent of the tank waste) is consistent with the TPA goal of residual waste not exceeding 10.2 cubic meters (360 cubic feet) for 100-series tanks or 0.85 cubic meters (30 cubic feet) for the smaller 200-series tanks, corresponding to 99 percent retrieval. DOE has already begun the process of retrieving waste from the tanks, such as tanks located in Waste Management Area C. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

185-2 This *TC & WM EIS* addresses proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. The analyses contained in this EIS are based on the best-available, referenceable waste inventory estimates DOE could find and/or develop. These radioactive and chemical inventories are presented in Appendices D and S. In general, this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

185-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to

Commentor No. 185 (cont'd): Martha Lightfoot

appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

185-4 Funding or subsidizing renewable energy sources and nuclear energy production and its resulting waste are not within the scope of this *TC & WM EIS*. Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 186: Catherine Kettrick

From: Catherine Kettrick [catherine@performanceschool.org]
Sent: Monday, March 15, 2010 8:25 PM
To: tc&wmeis@saic.com
Subject: Clean up Hanford

Do not bring any more radioactive waste to Hanford. What is there now is leaking and heading to the Columbia River. It will poison the river, kill fish, cause cancers, pollute the water we use for irrigation, transportation, recreation. *186-1*

Clean up Hanford, please.

Sincerely

Catherine Kettrick, Ph.D., CSC
Director, The Performance School
xxx-xxx-xxxx

186-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 187: William Vertal

From: William Vertal [raymondovichmm@yahoo.com]
Sent: Monday, March 15, 2010 8:45 PM
To: tc&wmeis@saic.com
Subject: hanford

The proposal to add to the hazardous material at the Hanford facility is completely unacceptable. There is a list of major high risk and deadly issues that should be dealt with first:

40 miles of unlined trenches that will be left with high risk material that may be left untreated and with no accounting of the material. *187-1*

Plutonium that may leach into the Columbia River and increase in toxicity to 300 times drinking water standards.

With the knowledge we have of the risks and costs of taking on a new material or waste without having an understanding of proper disposal or recycling seems unfathomable in this century.

W S Vertal / Forest Grove, OR

Raymondovich

187-1 As stated in Chapter 1, Section 1.4.2, of this *TC & WM EIS*, groundwater contamination in the non-tank-farm areas of the 200 Areas (which include cribs, trenches [ditches], and unlined solid-waste trenches), as well as sources of plutonium, is being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements. Contamination in the vadose zone resulting from tank farm past leaks will be addressed during the SST closure process. The cumulative impacts analysis for this *TC & WM EIS* (see Appendix U and Chapter 6) includes the vadose zone of the 200 Areas in addition to other areas of Hanford.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 188: Kathy M. Haviland

From: Kathy Haviland [kathymhaviland@yahoo.com]
Sent: Monday, March 15, 2010 9:36 PM
To: tc&wmeis@saic.com
Subject: Submission of Comment

I wish to add my name to the list of citizens who are opposed to the Department of Energy's intent or "preferred " decisions at the Hanford site.

It is nothing less than inhuman to not clean up the million gallons of radioactive waste that has already leaked from the High-Level Waste tanks or the forty miles of unlined soil trenches. *188-1*

I support dismantling the FFTF reactor and not entombing it.

I am totally against any more nuclear waste being deposited at Hanford.

Sincerely,

Kathy M. Haviland
107 NE 43rd Street
Seattle, WA 98105

188-1 Cleanup of Hanford is a major goal of implementing the preferred alternatives presented in this *TC & WM EIS*. The commentor is referred to Chapter 2, Section 2.12, for a discussion of the Preferred Alternatives for tank closure, FFTF decommissioning, and waste management. While implementation of the Preferred Alternatives would go a long way toward achieving cleanup of the site, not all actions related to cleanup are addressed in this *TC & WM EIS*.

As stated in Chapter 1, Section 1.4.2, of this EIS, the groundwater contamination in the non-tank-farm areas within the 200 Areas (including the burial grounds, cribs, and trenches [ditches]) is being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements. Contamination in the vadose zone resulting from tank farm past leaks would be addressed in the SST closure process. The cumulative impacts analysis for this *TC & WM EIS* (see Appendix U and Chapter 6) includes the vadose zone of the 200 Areas in addition to the other areas of Hanford.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 189: Robert W. Batty, Washington State Chapter, Republicans for Environmental Protection

WASHINGTON STATE CHAPTER

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Environmental Protection

National Office
971 S. Centerville Rd. #139
Sturgis, MI 49091-2502
Phone: 269.651.1808
www.rep.org

March 12, 2010

Mary Beth Burandt
EIS Document Manager
DOE Office of River Protection
PO Box 1178
Richland Washington 99352

RE: Draft TC&WM EIS Comments

I. INTRODUCTION SUMMARY

This letter is the official comments letter on the Draft Hanford Tank Closure and Waste Management Environmental Impact Statement (hereinafter "EIS") dated 10/16/09 submitted by the Washington Chapter of Republicans for Environmental Protection ("WAREP"). While we acknowledge DOE's and Washington Ecology's hard work in developing and publishing the draft EIS, we have concluded that there are deficiencies in it that, if eliminated, would provide a clearer, more effective path toward accomplishing the DOE's Mission at Hanford which, in the words in the Cover Sheet to the EIS is now "focused on the cleanup of those wastes [from earlier Hanford activities] and ultimate closure of Hanford". We believe failure to focus on the above-referenced mission is a primary risk in following some of the preferred alternatives proposed by DOE and our comments are geared toward keeping that focus aligned with that Mission. Toward that end our primary recommendations (developed in detail below) are as follows:

A. Failure to Provide all Alternatives With a "No Offsite Waste" Option

We believe the EIS is deficient on its face in that 5 of the alternatives in Table S-1 (numbers 3A through 5) are proposed with offsite waste included. We believe that alternatives 3A through 5 should, at a minimum include no-offsite-waste sub-alternatives. Failure to do so forces those evaluating the EIS to choose possibly less beneficial alternatives in order to achieve a no-offsite-waste goal, which is a primary concern for many other parties as further discussed at section I.C. below. If offsite waste treatment must remain in the EIS (we think it is best eliminated per paragraph I.C. below), the alternatives that include it should include no-offsite-waste sub-alternatives. Note that the underlined Mission Statement above says nothing about processing offsite waste.

189-1

189-1 This *TC & WM EIS* addresses proposed actions to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites. None of the Tank Closure alternatives, including Alternatives 3A through 5, include specific provisions for receiving offsite waste. Rather, the receipt of offsite waste is addressed as a component of Waste Management Alternatives 1 through 3.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 189 (cont'd): Robert W. Batty, Washington State Chapter, Republicans for Environmental Protection

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March 12, 2010
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B. WAREP's Preferred Alternative is #6B (Using "Option Case" vs. "Base Case" Sub-Alternative) for Tank Closure

As further developed in Section IV. of this letter below, WAREP has selected Alternative #6B (using the "Option Case" vs. "Base Case" sub-alternative) as its preferred choice for Tank Closure. If Alternative #4 had been presented with a no-offsite-waste sub option, we would have considered it more carefully, but our concern in that respect, expressed at I.C. below, led us to remove it from consideration summarily due to the primacy of the offsite waste concern. Thus our belief that the EIS fails to provide all reasonable alternatives per I.A. above. We have also added a risk management recommendation to the alternative #6B implementation plan (adding DST s to the process if delays cause increased risk of SST failure).

189-2

C. Elimination of Offsite Waste In-Shipment, Processing and Storage from the Process

While WAREP shares the concerns of the many groups and individuals about offsite waste issues, its primary concern in this response to the EIS is that including offsite waste substantially increases the risk that the delays and other problems it adds will result in the Cleanup objectives for Tank Closure to not be achieved. In addition to technical concerns, public support for any cleanup plan will be severely hampered if offsite waste is included. While the moratorium on shipping in offsite waste until the Waste Treatment Plant (WTP) is completed, as discussed below, is a good step, it does not carry sufficient weight in that form to engender confidence that it will not become an impediment to the primary focus (Tank Cleanup). We believe elimination of offsite waste treatment is in the best interest of the DOE, State of Washington and everyone affected by the Cleanup Plan for Hanford. We are encouraged by the similarity of our views with those of Washington Ecology and, consequently, it appears that we will be able to work closely with them in follow up work on this letter. See section V. of this letter below for more details about the need to eliminate offsite waste In-Shipment, Processing and Storage from the process.

189-3

D. WAREP's Preferred Alternative is #3 (using the "Hanford Option" for disposition of Bulk Sodium and RH-SCs) for FFTF Decommissioning

As more fully developed at Section VI. of this letter below, WAREP believes the removal of all the structures under FFTF Decommissioning alternative #3 would eliminate some very dangerous and long half-life contaminants that would be left under the other 2 alternatives.

189-4

189-2 See response to comment 189-1 for a discussion on the transport and disposal of offsite waste.

DOE does not believe that construction of additional DSTs would be warranted under Tank Closure Alternative 6B. The 28 existing DSTs at Hanford are active components needed to complete waste treatment. The construction of additional DSTs was only considered under alternatives where the existing DST capacity was insufficient to support the proposed treatment schedule (Tank Closure Alternative 5) or required replacement because the design life of these facilities would be exceeded (Tank Closure Alternatives 2A and 6A).

189-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

189-4 Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 189 (cont'd): Robert W. Batty, Washington State Chapter, Republicans for Environmental Protection

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National Office
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Mary Beth Burandt
March 12, 2010
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II. BACKGROUND

Republicans for Environmental Protection (REP) is an Organization of Republicans who believe that "Conservation is Conservative" and pursuing environmental issues is not fundamentally at odds with the historical and philosophical underpinnings of our party. WAREP is the Washington State Chapter of REP and, while REP is supportive of the concepts in this letter, it is the sole product of WAREP. In 2006, after a review of many potential environmental issues, the Executive Committee of WAREP adopted Hanford Cleanup as its number one focus. The author of this letter and other members of WAREP have attended "State of the Site" meetings and Public Hearings over the past several years and have reviewed the Site Status reports for 2006 and 2007, in addition to the EIS that is the subject of this letter. We expressed concerns similar to those in this comments letter in a March 27, 2009 letter to DOE and Ecology and have received responses to that letter from DOE and other sources that have assisted in developing our approach.

The author of this letter was president of WAREP from 9/06 to 2/10 and has now resigned that position to form a WAREP task force devoted exclusively to Hanford Cleanup, which will remain under the oversight of the Executive Committee of WAREP. That task force will have the job of monitoring implementation, for WAREP, of the EIS that is finally adopted and maintaining communication with the implementing agencies. We do not share the antipathy against DOE and Ecology that was apparent in the most recent Public Hearings and want to work through the system to achieve accelerated results toward the stated mission. That being said, we will focus diligently on that mission and that might result in strong disagreement with implementation actions and in bringing outside pressure to bear when necessary to achieve our goal of ensuring Hanford cleanup.

While WAREP understands that cost considerations are not normally a major part of the EIS process, it did take costs into account, especially in deciding that the very costly alternative 6A would not be our preferred alternative for Tank Closure. As a conservatively oriented organization, we feel it is our duty to consider costs in our analysis and believe it is important to achieve the objectives in the most cost efficient manner.

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Commentor No. 189 (cont'd): Robert W. Batty, Washington State Chapter, Republicans for Environmental Protection

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Environmental Protection

National Office
971 S. Centerville Rd. #139
Sturgis, MI 49091-2502
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Mary Beth Burandt
March 12, 2010
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III. FAILURE TO INCLUDE A "NO OFFSITE WASTE" OPTION FOR ALL ALTERNATIVES

We are very concerned by DOE's inclusion of importing, processing and storing offsite waste in several alternatives. In addition to the poor judgment that shows as discussed in section V of this letter below, we believe inclusion of offsite waste has resulted in the EIS itself being defective in not providing all reasonable alternatives. As discussed more fully in section IV of this letter below, a reasonable person might be forced to select a preferred alternative solely to eliminate off-site waste when another alternative without off-site waste might result in more effective cleanup. We discuss that more fully for Alternative #4 below. While this might be felt to be a result with any presentation of alternatives, bear in mind that processing offsite waste is not stated in the underlined mission statement in the EIS so is not mission critical and the EIS should not be forcing a constrained choice of alternatives just to eliminate it.

WAREP recognizes that the "Purpose and Need for Agency Action" on page S-10 of the EIS includes a reference to off-site waste disposal and related "Decisions to be Made" based on that. However, we believe those parts of the purpose and decision sections will, if addressed now, reduce the likelihood of achieving the other purposes significantly enough that those portions of the Purpose and Decision sections of the EIS should be eliminated.

189-5

An adequate EIS measures the impacts of all reasonable alternatives available to achieve a stated purpose and need. By failing to include specific alternatives without off-site waste in-shipment, processing and storage, DOE has not analyzed all reasonable alternatives leading to the ultimate closure of the Tank Farm at Hanford. By not including these alternatives, DOE hasn't met its NEPA obligations and has artificially constrained its choice of alternatives to meet the purpose of the Project. As long as the purpose of the project includes the ultimate closure of the Tank Farm, alternatives that do NOT add to the existing problem by importing more waste must be fully developed, considered, and ultimately selected as the recommended alternative.

IV. WAREP's PREFERRED ALTERNITIVE IS #6B

A. Primary Reasons for Selecting Alternative #6B

189-2 cont'd

Our primary reasons for selecting Alternative #6B (All Vitrification with Separations; Clean Closure) are as follows:

189-5 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

The alternatives for the regional disposal of LLW and MLLW were analyzed in a previous EIS. DOE issued a ROD (65 FR 10061; February 25, 2000) for the *WM PEIS* (DOE 1997) choosing Hanford and NNSS as the regional locations for the disposal of LLW and MLLW from across the DOE complex. In the *WM PEIS*, DOE indicated that additional analyses would be prepared to implement these programmatic decisions. This *TC & WM EIS* analyzes the potential environmental impacts associated with a number of proposed actions, including disposal of LLW and MLLW potentially shipped to Hanford from offsite DOE locations. See response to comment 189-4 regarding future DOE decisions.

Commentor No. 189 (cont'd): Robert W. Batty, Washington State Chapter, Republicans for Environmental Protection

WASHINGTON STATE CHAPTER

REP
★★★ Republicans for ★★★ Environmental Protection

National Office
971 S. Centerville Rd. #139
Sturgis, MI 49091-2502
Phone: 269.651.1808
www.rep.org

Mary Beth Burandt
March 12, 2010
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1. 99.9% Cleanup Objective

While seemingly only slightly more effective than 99% cleanup, we believe that the .9% difference can leave a significant residual risk to the Columbia River watershed and other cleanup beneficiaries, warranting a 99.9% cleanup objective. Note that alternative #4 also shows a 99.9% cleanup but we dismissed alternative #4 summarily because of the inclusion of offsite waste in that alternative as a result of the factors discussed in section V. of this letter below.

2. Clean Closure

While we agree that there are some technical and cost advantages to selective clean/landfill closure, that option was only presented in Alternative #4, which also includes offsite waste processing so we dismissed it summarily because of the factors in Section V. of this letter below.

3. "Option Case" vs. "Base Case"

WAREP believes that the "Option Case" is the preferable sub-alternative to the "Base Case" in alternative 6B because the additional clean closure of the 6 adjacent cribs and trenches under the "Option Case" significantly lowers the post closure risk of dangerous elements getting into the ground water and therefore eventually into the Columbia River.

189-2 cont'd

B. Suggested Addition of New DSTs as a Risk Management Technique

In all of the alternatives, we believe there is a significant risk that the Single Shell Tanks (SSTs) might fail before the selected plan eliminates the waste in them. However, only alternatives #5 (which includes off-site waste so we dismissed summarily) and alternative #6A (which we dismissed as too costly and too delayed) envisages new Double Shell Tanks (DSTs). Accordingly, we believe that alternative #6B should have a DST risk management process added, stating that new DSTs will be built to the extent needed to transfer waste from failed SSTs.

C. Illustration of Impact of Off-Site Waste Processing on the Decision Process

In our analysis we concluded that Alternative #4 was a promising alternative but the inclusion of offsite waste in it caused us to summarily dismiss it for the reasons noted at section V of this letter below. The impact of that inclusion further supports our position in section III of this letter above that the failure to include no off-site waste sub-alternatives in alternatives #3A-5 is a deficiency in the EIS itself.

Response side of this page intentionally left blank.

Commentor No. 189 (cont'd): Robert W. Batty, Washington State Chapter, Republicans for Environmental Protection

WASHINGTON STATE CHAPTER

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V. ELIMINATION OF OFFSITE WASTE IN-SHIPMENT, PROCESSING AND STORAGE FROM THE PROCESS

We strongly believe that elimination of off-site waste from all of the alternatives and especially the selected alternative is in the best interest of all parties for the following reasons:

A. Off-Site Waste Processing is not "Mission Critical" to the Cleanup Objectives

The plain language of the underlined mission statement in section I of this letter above does not support inclusion of it in the cleanup effort. We challenge DOE to provide a logical reason why including offsite waste processing is "mission critical" to the cleanup effort in its response to the EIS comments letters. Absent that, we see no support logically for including offsite waste processing and disposal as part of any of the alternatives.

B. Public Opinion Overwhelmingly Disapproves of Bringing in and Processing Offsite Waste Before the Cleanup Objectives are Achieved

I-297 (admittedly invalidated by a federal court) and public testimony in recent Hearings on this EIS shows the public is strongly opposed to bringing in waste from offsite. In the Spokane meeting, a moratorium on off-site waste until the WPT is operational was stated by DOE and Ecology but we found no reference to that in the EIS. At a minimum, we think it should be added to the EIS and elevated to the status of the other conditions in the EIS so it has the same force and effect as all other provisions. However, complete elimination until the cleanup objectives are achieved is a better approach as most citizens are strongly inclined to oppose any importation of offsite waste. The very difficult and complex task of Hanford Cleanup is unnecessarily made even more so by including the possibility of importing, processing or storing offsite waste with a Public continuously opposed to the process due to that.

C. Offsite Waste Activities Will Dilute the Focus Upon the Cleanup Objective, Increasing the Risk of Failure to Achieve It

As stated clearly and well in Washington Ecology's Foreword on page 7 of the EIS, the track record so far in cleanup has been very mixed and adding Offsite Waste to the cleanup effort increases risks of failure. Ecology admonishes DOE to take a conservative approach and eliminate the disposal of off-site disposal at Hanford. REP is fully aligned with Washington Ecology in that respect. We challenge DOE to

189-6

189-6 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS. Ecology's foreword to the draft EIS included its views and positions concerning DOE's analysis in the document and has been updated in this final EIS.

Commentor No. 189 (cont'd): Robert W. Batty, Washington State Chapter, Republicans for Environmental Protection

WASHINGTON STATE CHAPTER

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Mary Beth Burandt
March 12, 2010
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fully explain why a cooperating agency's opinions are being disregarded if the final version of the EIS still includes any off-site waste in-shipment, processing or storage before the cleanup objectives are achieved. 189-6 cont'd

VI. FAST FLUX TEST FACILITY DECOMMISSIONING

DOE prefers FFTF Decommissioning Alternate 2 (Entombment) with RH-SCs (remote handled special components) shipped to Idaho and the bulk sodium (Na) kept at Hanford for reuse. (See Table S-17 pg S-116) This is the most expensive variant of Alt 2. About 12% could be saved by doing the opposite, shipping the Na to Idaho and keeping the RH-SCs at Hanford or by sending both to Idaho. The expensive part is processing the Na at Hanford.

Alternate 3 calls for complete Removal of all above ground structures as well as contaminated below-grade structures equipment and materials. The Reactor Containment Building (RCB) would be demolished and removed to grade and all auxiliary facilities would be removed to 3 ft below grade. Essentially, everything that could be hot would be removed. If the RH-SCs were handled at Hanford and the Na shipped to Idaho, it would cost 8% less than DOE's preferred option. If both were kept at Hanford the additional cost over DOE's preference would be only 3%. 189-4 cont'd

The difference becomes clearer when the "groundwater influences" are compared. This is found in 24 pages in the main document on the CD. (pages 5-371- 5-395) Only two pages discuss Alternate 3's contamination. At first we thought DOE was ignoring it, but it turns out that this alternative leaves NO contamination to discuss. Alternates 1 (do nothing) and 2 (Entombment) cause significant contamination of the groundwater and at the Columbia River. Alternate 2 reduces the amount of short lived tritium but makes virtually no reduction in the Technetium-99 that has a 213,000-year half-life. Alternate 3 eliminates everything.

We appreciate the opportunity to provide this comments letter and hope it will help DOE and Washington Ecology to accomplish their respective roles in the Cleanup of Hanford.

By: Robert W Batty
Robert W. Batty
Immediate Past President
Washington State Chapter
Republicans for Environmental Protection

cc: Washington State Department of Ecology

Response side of this page intentionally left blank.

Commentor No. 190: Mannfried Funk

3/10/2010

Dear Ms Burandt;

I am writing in concern about the intention of the US government to use the already contaminated Hanford Nuclear Reservation as the latest dumping ground of nuclear waste. The area needs to be cleaned up, not made worse. We in Washington do not want our waters and wild life sacrificed further and we certainly do not want our population sacrificed at all! The intent is wrong in every way. It is a terribly misguided idea that must not be followed through.

Sincerely,

Mannfried Funk

190-1

190-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 191: Sister Leslie L. Lund

March 12, 2010

Sister Leslie Lund
2892 SR 211 #3
Newport, WA 99156

Dear TC & WM EIS Folks:

I wish to comment on the clean up of the Hanford area, the transportation of dangerous materials through populated areas, and the issue of making Hanford a national radioactive waste dump. *191-1*

It is not enough to say that making Hanford the national radioactive waste dump is shortsighted in the extreme, it is truly suicidal and murderous of a populated region. I do not want dangerous waste transported through populated areas or stored near major watersheds that affect millions of people (or any people at all)! I want Hanford to be cleaned up as close to 100% as is technically possible. I do not want any nuclear reactor facilities anywhere near the Columbia River or any watershed of the United States. *191-2*

Some years ago the GAO already did a study for Congress on the placement of the national radioactive waste dump. I know this because my own sister worked on this research. Yucca Mt. in Nevada was the recommendation by the GAO because it is in the middle of no where, not near populated areas or near water sources and it has better geologic formations for storage. Why is this research being ignored? That Hanford would be left to deteriorate the water supplies of the northwest, and jeopardize the lives of millions of people with continued, mounting contamination defies all rational sense and understanding. *191-3*

I protest the US DOE's proposals to dump more radioactive wastes at Hanford. As a former philosophy major I know that ***ad hominum*** arguments attacking the character or intelligence of others is not a compelling argument, but honestly whoever the people are who are behind such an outlandish proposal need to have their heads examined for lack of logical thinking, and need to examine their consciences on moral grounds for considering seriously harming the lives of others. *191-1 cont'd*

Please do not let these immoral proposals of USDOE happen!

Sincerely,

Leslie L Lund

Sister Leslie L. Lund, ocdh

191-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

191-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

191-3 The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 192: Marjon Riekerk and Dr. Ir. A.G. Voorhoeve

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

Date/Fecha: 03/09/10

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS?)*

After attending the public hearing on the Hanford Draft Tank Closure and Waste Management EIS, March 8, 2010, the thought occurred to us that there is a far more efficient and possibly far cheaper solution to the problem of dispersing contamination that threatens the water quality of the Columbia River:

Isolate the contamination source by creating one huge frozen block of land, several miles wide and long, and 300 feet deep.

This may need a bit of explaining:

Efficiency: it would put an immediate stop to the groundwater flow that transports the contaminants down to the Columbia River, giving DOE the urgently needed time to clean up the existing contamination. As long as the frozen block of land is maintained the contamination can go nowhere. The energy needed could be generated by a massive wind park on site.

Cheaper solution: a technology is presently being developed, although currently only in it's conceptual phase, to extract energy from warm air, with electricity, water, and (freezing) cold air as products. This is a self-supporting system, because the generated electricity can be (partly) used to run the equipment. But no outside-generated electricity may be needed and the freezing air can be used to create the desired frozen land block. Once the whole block of earth is frozen it will take less energy to keep it frozen.

The technology to create frozen soil is available, especially in the drilling industry. It only needs to be expanded for such a large project. It needs huge amounts of energy, but that energy is right there, either as wind energy or in the warm air of the Columbia Basin.

An additional advantage to fully develop this technology is that it can be applied everywhere, thus solving the problem of long-distance transport of contaminated waste.

One more advantage is that the whole Hanford cleanup project is less earthquake sensitive. A frozen block of earth may crack and split, but it still will be frozen and will freeze together again. If the installed pipe system is damaged, it can be replaced.

I urgently request that you propose this possibility to USDOE for evaluation.

Sincerely yours,

Marjon Riekerk
36th District.

Dr. Ir. A.G. Voorhoeve

Address/Dirección: 10051 Dibble Ave NW Seattle WA 98177

City, State, Zip Code/Ciudad, Estado, Zona Postal:

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 - Toll-free Fax: 1-888-785-2865

192-1

192-1 As discussed in Chapter 2, Section 2.6, Technologies and Options Considered But Not Evaluated in Detail, as well as Section 2.6.1, Tank Closure, this technology, called "in situ soil remediation," was one of many in situ soil remediation technologies initially considered by DOE. However, it was not evaluated in detail in this *TC & WM EIS* because of the difficulties and uncertainties associated with placement of treatment zones and verification of performance. In situ treatment generally requires long periods of time and provides questionable uniformity of treatment because of the variability in soil and aquifer characteristics. The overall efficacy of in situ processes is also relatively difficult to verify.

Commentor No. 193: H. Anderson

I am sickened to know
More waste is coming
to damage our wonderful
Oregon – Northwest
Please Stop
H. Anderson

193-1

193-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 194: J. McCredy

6 Mar 2010

to whom it concerns:

Would you please clean up the mess already made?

So, obviously this means "No" to the "preferred alternatives" nonsense site! So to repeat No to the National Waste Dump.

Sincerely, J. McCredy

194-1

194-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 195: Nancy Lou Tracy

From: Nancy Tracy [nancyloutracy@gmail.com]
Sent: Tuesday, March 16, 2010 8:18 PM
To: tc&wmeis@saic.com

We rsidents of the Northwest have had enough of the DOE's delays, fabrications, false assurances - decades of them. Obviously We the People must now lead the way. We are not going to allow Hanford to be a Natl. Radioactive Waste Dump. Your 60 years of inaction, premeditated negligence have created shameful history . Now permanent radioactive contamination of the Columbia River and what that portends for agriculture, recreation, wildlife, drinking water and cancer threat for millions has your OK. You now face a public fed up with Wall Street, stupid wars and a virtual corporate control of decisions benefiting Big Money - not in any way connected to the a sustainable future for all of life. We the People are a growing force and it is going to start here. Clean up and shut up the nonesense talk. We are no longer good citizens responding in good faith. We are now well trained and seasoned watchdogs. The Coloumbia Riveer is a national treasure and we are not going to lose it because the nuclear industry and its stockholders want an easy way out. Sincerely, Nancy Lou Tracy 7310 S.W. Pine St. Portland, OR 97223 *195-1*

195-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor Number 196 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 183.

Commentor No. 197: Sharon Evoy

From: Sharon [sharonevoy@eoni.com]
Sent: Tuesday, March 16, 2010 10:07 PM
To: tc&wmeis@saic.com
Subject: HANFORD

Dear TC & WMEIS,

I am a resident of La Grande, OR and attended the recent presentation at Eastern Oregon University. My stand from listening to the various agencies and commentary is:

1. CLEAN IT UP

2. NO MORE WASTE

This site is a hazard to our quality of life and is already a threat to the soil and rivers.

Thank you for coming to La Grande to raise our awareness of this situation.

Sincerely,

Sharon Evoy

197-1

197-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor Number 198 is not included in this Comment-Response Document because it is a duplicate of a Commentor submitted in Campaign A.

Commentor No. 199: Lynn Sims, Hanford Watch

From: Lynn Sims [lsapplecrisp@gmail.com]
Sent: Wednesday, March 17, 2010 3:12 AM
To: tc&wmeis@saic.com
Subject: Hanford Tank Closure and Waste Management EIS Comment

March 17, 2010

Hanford Tank Closure and Waste Management EIS Comment

Thank you for the opportunity to comment.

This EIS is certainly one of the most important documents concerning Hanford management. After attending informational and public meetings and hearings for eighteen years, I have seen that although progress has been made regarding Hanford containment and clean up, many challenges are ahead. The Tank Closure and Waste Management issues top the list for public concern.

The activities at Hanford may have been well intentioned, but many were mismanaged and directed without a long term vision or solution. As the years passed, complications arose, contamination spread, dangers increased and accidents happened. Furthermore, no comprehensive program for the site was implemented, management companies changed, federal leadership changed, personnel changed, the tanks deteriorated, funding fluctuated and technology advanced, all of which influenced Hanford activities.

The irrefutable fact remains that Hanford is the most seriously contaminated site in the western hemisphere. The problems must be addressed with moral and technological emphasis upon protecting the Colombia River and the health and well being of future generations. *199-1*

At least 99 percent of the tank waste should be treated now, and as technology develops, we should aim for 99.9 percent.

Construct and expand vitrification facilities. Store the high level waste in canisters on site until a different disposal site is available.

Soils should be characterized and contaminated soils and equipment should be removed and placed in a disposal facility.

The best attempts to immobilize/contain dangerous waste should be made and improved upon as technology develops.

No off-site wastes should be transported to Hanford at this time. *199-2*

199-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies. This *TC & WM EIS* addresses alternatives for on- and offsite disposal of treated tank waste, depending on the waste type. However, the scope of this EIS does not include making a decision on the ultimate disposition of HLW and any transportation related to such disposition. The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

199-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 199 (cont'd): Lynn Sims, Hanford Watch

All projects must be made to adhere to legal requirements.

Strong efforts must be made to clean up Hanford NOW to the best of our abilities and with a vision for the future. We must have funding for these projects...we seem to have enough for wars and weapons...and Hanford is a relentless attack on our homeland! If we wait, the problems and risks and expenses become greater.

We have been dealing with Hanford for less than 100 years, cleaning up for only decades and what we have on our hands impacts our environment for 10s and 100s of thousands of years to come! It is necessary to develop a spiritual and political will to confront this immense problem! If we don't approach this challenge with the mission to clean up and contain contaminants to the highest standards then despite all our advanced technologies, we are unleashing doom. *199-3*

This project is a monumental task. Like cathedrals of ages ago, the finishing will stretch into the next generations. But we must begin with excellent decision making now that will direct the remedy for our terrible mistakes. Thank you to everyone who has worked long and hard on these issues and good luck forever.

Respectfully submitted,

Lynn Sims
Hanford Watch
3959 NE 42nd Ave.
Portland, OR 97213

199-3 Throughout this EIS, DOE identifies the legal requirements that it would need to comply with concerning the specific activities that are part of the proposed action and alternatives. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements and the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE order requirements that must be met for DOE to implement the Tank Closure alternatives. The tank closure process, which includes detailed examinations of the tanks, residual waste, and surrounding waste in the soil, requires preparation of detailed performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions regarding tank closure. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter.

Commentor No. 200: Edwin "Ed" H. Shaul Sr.

From: Ed Shaul [eshaul@eoni.com]
Sent: Tuesday, March 16, 2010 3:22 PM
To: Mary Beth Burandt
Cc: CREDO Action LiAnna Davis; Office; Heart of America Northwest
Subject: Comments on Draft TC&WM EIS
Attachments: Hanford Appeal.docx

Mary Beth Burandt
Document Manger
Office of River Protection
U. S. Dept of Energy
TC&WM EIS, P. O. Box 1178
Richland, WA 99352

Dear Mary Beth:

I appreciate your team coming to Eastern Oregon University last Feb 22 to inform our community of the alternatives under consideration regarding the Hanford proposed cleanup and transportation issues. It is my understanding that comments will be accepted via email or in written form before the deadline of March 19, this coming Friday. Based information received at your meeting and from other sources, I submit my following comments:

I write in hopes of preventing the Hanford location in Washington State becoming the national dump site for all nuclear waste and associated hazardous materials. Also, I support the concept of leaving existing nuclear waste at current nuclear power plant sites and at weapon production facilities until such can be disposed of with maximum public safety. Highly radioactive wastes should not be transported over our interstate highways that would produce any harmful health hazards, no matter how insignificant. *200-1*

I am against any additional radioactive wastes being added to the Hanford site. I applaud what has been done so far to close and demolish existing reactors at the site, and also support the dismantling of the FFTF reactor versus entombing it. It is my understanding that it is possible to remove 99.9 percent of radioactive waste in the more than 200 single wall and double wall underground tanks, many of which are leaking. And, all liquid, tanks and piping can be disposed of and/or treated via a glass-type processing method in a plant being built at the Hanford location. That processing facility needs to be built sooner than later since time is of the essence. The processing plant needs to be dedicated to waste on the Hanford site, exclusively. I support the so-called "Clean Closure" of all contaminated earth areas, not the "cap method" that would allow toxic and radioactive materials to *200-2*

200-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

SNF and HLW are transported in DOT-certified containers that meet strenuous technical standards established by NRC.

200-2 Under DOE's Preferred Alternative for FFTF decommissioning (Alternative 2: Entombment), some below-grade structures would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment.

The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks).

As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding

continue to seep into the Columbia River at greater speed in the generations and decades to come. *200-2 cont'd*

While I realize that our nation is dealing with a number of issues, not to mention great financial challenges now and in the future, it is imperative that the States of Oregon, Washington and Idaho continue to encourage their Departments of Energy, Transportation and Environment to work in concert with the US Department of Energy to address the ultimate cleanup of Hanford to protect citizen's health now and of those to be born in the decades to come. The Columbia River is the source of drinking water, salmon migration, irrigation, recreation and must be protected. Those traveling on our highways need to be protected, as well. In short, we need to work as fast as possible to clean up the site and find ways to process radioactive materials nationwide. A safe, national repository for processed materials also needs to be found, but Hanford is clearly not that place. *200-3*

Thank you for taking my requests under consideration.

Edwin "Ed" H. Shaul Sr.

62179 Starr Lane, LaGrande, OR 97850 xxx-xxx-xxxx
P. O. Box 3167, LaGrande, OR 97850-7167 eshaul@eoni.com

the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

200-3 The *TC & WM EIS* alternatives were developed to help DOE compare the short- and long-term potential impacts of the proposed actions and analyze the tradeoff between the two. For example, the Waste Management alternatives were developed partly to compare the potential short-term impacts of expanding some existing facilities, constructing new facilities, and operating and deactivating those facilities used to store, treat, and dispose of waste. The Waste Management alternatives were also developed to compare the potential long-term water quality, human health, and ecological impacts resulting from these activities.

Short-term impacts analysis, as described in the Summary, Section S.5.3 and Chapter 2, Section 2.8, covers potential impacts associated with the active project phase during which construction, operations, deactivation, and closure activities would take place, as well as potential impacts that could occur during the applicable 100-year administrative control, institutional control, or postclosure care period. Short-term potential impacts are presented primarily in Chapter 4 of this EIS. Long-term impacts analysis is presented primarily in Chapter 5, which addresses the potential impacts for groundwater, human health, and ecological risk through the 10,000-year period of analysis. This time period starts in 1940, extends out to the year 11,940, and captures the impacts associated with past tank leaks, retrieval leaks, and past practices associated with contiguous cribs and trenches (ditches).

Commentor No. 201: Lisa Van Dyk, Heart of America Northwest

From: Lisa Van Dyk [lisa@hoanw.org]
Sent: Tuesday, March 16, 2010 4:46 PM
To: tc&wmeis@saic.com
Subject: Comments on the TC&WM EIS

These comments are in addition to the public testimony I gave at the Hood River, Portland & Seattle public hearings on the draft Tank Closure & Waste Management Environmental Impact Statement

Tank Wastes

The impacts of not cleaning up the tank leaks, cribs & trenches are tremendous – and entirely unprotective of groundwater & the Columbia River. The oldest High-Level Nuclear Waste tanks at Hanford have already leaked over one million gallons into the soil, where it threatens the Columbia River & public health. The Hanford Advisory Board & other stakeholder groups have repeatedly warned that the hard heel wastes in the bottom of the tanks are more likely than not to hold a disproportionate amount of radioactivity.

USDOE must retrieve 99.9% of the wastes from the tanks, or retrieve to the absolute limits of technology. Any other alternative is unacceptable.

The tanks must be fully removed from the ground. All the stakeholder groups are unanimous in advocating for clean closure of the tank farms, and USDOE must amend its preferred alternative to chose this, which is most protective of the environment and public health over thousands of years. Landfill closure is short-sighted and inappropriate, given the current contamination at Hanford. Leaving the tanks in the ground only contributes further to the contamination, as capping does not prevent the contamination from spreading. Abandoning the contamination from tank leaks and deliberated discharges is unacceptable. It is obvious, but must be stated: the TC & WM EIS should include an alternative that is fully protective of human health and the environment and that results in compliance with federal and state clean up standards! *201-1*

In addition, it recently was brought to my attention that the estimates of the amount of tank waste in the soil included in the TC & WM EIS dramatically under-represent the amount of waste actually present. Thus, the maps of modeled groundwater contamination – as scary as they already are – are not even telling us the true story of contamination at Hanford. The TC & WM EIS should be revised, before the final draft is released, to include accurate inventories of the amounts and compositions of the wastes at Hanford. *201-2*

201-1 The decision whether to leave 0.1 percent, 1 percent, or more of the waste in the SSTs is one of the decisions supported by the *TC & WM EIS* analyses (see Section S.1.3.1 of the *TC & WM EIS* Summary and Chapter 1, Section 1.4.1). With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed on only a small number of SSTs and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks and residual waste, requires preparation of a performance assessment and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks. The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

201-2 Regarding the commentor's concern as to the accuracy of data, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

Commentor No. 201 (cont'd): Lisa Van Dyk, Heart of America Northwest

Offsite Waste

Considering the environmental impacts analyzed in the TC & WM EIS, the Department of Energy must withdraw its February 2000 Record of Decision to use Hanford as a national waste dump for Low Level Waste & Mixed Wastes.

It is inappropriate that the draft TC & WM EIS does not include an alternative under which Hanford is not used as a national radioactive waste dump. Figure S-21 in the TC & WM EIS shows that importing waste for disposal at Hanford increases the cancer risk levels over the next thousand years by tenfold, which is unacceptable. It is also confusing that the Greater Than Class C wastes are not considered at all in the TC & WM EIS. What does the term cumulative impact mean if a huge amount of highly radioactive wastes are not considered? *201-3*

The promise to not bring waste to Hanford until 2022 is meaningless; it has nothing to do with protecting the environment, the Columbia River or public health. Withdrawing the Record of Decision to use Hanford as a national radioactive waste dump site would be the only action the Department of Energy can take to fully assure the public that it will not import waste to Hanford.

The public's said it over and over again over the past decade, but I'll add my voice to the chorus – do not bring any more waste to Hanford.

Vitrification

The supplemental treatment options mentioned in the TC & WM EIS should be discarded, not preferred. I'm relying on the expertise of the members of the Hanford Advisory Board, which was repeatedly recommended and advised that USDOE vitrify all of Hanford's wastes, as that is most protective of the environment. USDOE should instead, start up the Low Activity Waste portion of the Waste Treatment Plant as soon as possible, and add additional LAW melters. *201-4*

Fast Flux Test Facility

While I've thought of the FFTF portion of the TC & WM EIS as the most innocuous part of the EIS, we've learned from past experience that the FFTF can come back from the dead. Therefore, USDOE must take this opportunity to finally decommission the FFTF once and for all, remove the reactor core from the ground and treat the wastes at Hanford. *201-5*

201-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, Figure S–21, and Chapter 2, Section 2.10.3, Figure 2–132. These graphs illustrate the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Section 2.12 of this CRD.

201-4 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

201-5 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. As discussed in Chapter 1, Section 1.4.2, Decisions Not to Be Made, DOE is not considering restarting FFTF, only decommissioning it. Removing the FFTF reactor core and treating the associated special components

Commentor No. 201 (cont'd): Lisa Van Dyk, Heart of America Northwest

Public Involvement

I appreciate the Department of Energy's willingness to hold eight hearings throughout the Northwest on the TC & WM EIS, as all of the Hanford stakeholders recognize that this is an extremely crucial document for the future of Hanford cleanup. I hope the Department of Energy was encouraged by the hundreds of members of the public who took time out of their weeknights to attend the hearings, and that the Department of Energy will take seriously and under equal consideration all of the comments submitted through the process.

The Department of Energy is required to give notice of the hearings to the public – an effective notice. I personally did not find the mailer that the Department of Energy sent out to be effective, or quite frankly, readable at all. The TC & WM EIS is of public concern because of the environmental and health impacts it outlines – not because of what was or was not included in the EIS. In addition, graphics and/or color make a huge difference in the aesthetics of a direct mail piece.

Again, I would like to encourage the Department of Energy to record the question and answer periods of the public hearings as part of the public record. This is important, as there were noted inconsistencies in how questions were answered at the various TC & WM EIS hearings. For example, the public in Hood River & Portland was left confounded when they were told that the moratorium on importing offsite waste to Hanford is legally enforceable. That's currently true, but the way it was phrased led them to believe that it would still be legally enforceable even after the Final TC & WM EIS is issued, which is not true. At that point, the public is relying on the Department of Energy's promise, not a legally binding document. *201-6*

Finally, I think it is inappropriate that the email address to which the public is to submit comments is an SAIC email address. The Department of Energy should be transparent about who exactly is reviewing and responding to comments, in a document available to the public at the hearings and online. In addition, the Department of Energy should commit to a timeline for reviewing comments and notify the public of that timeline, so they know when to expect responses and when the process will move forward.

Thank you for the opportunity to comment on the Tank Closure & Waste Management Environmental Impact Statement.

Lisa Van Dyk
1314 NE 56th St, Suite 100
Seattle, WA 98105

and bulk sodium at Hanford are analyzed under FFTF Decommissioning Alternative 3 in this *TC & WM EIS*.

201-6 All comments made during the public comment period, whether given orally at hearings or sent via mail or email, were considered equally by DOE. All comments received on the *Draft TC & WM EIS* and their approved responses are included in this CRD, a volume of this final EIS. DOE has posted this *Final TC & WM EIS*, including this CRD, on the Hanford website (http://www.hanford.gov) and the DOE NEPA website (http://energy.gov/nepa), and a Notice of Availability will be published in the *Federal Register*.

Commentor No. 202: Susan B. Edwards

From: Sue Edwards [suebedwards@comcast.net]
Sent: Tuesday, March 16, 2010 8:40 PM
To: tc&wmeis@saic.com
Subject: DOE proposal for Hanford

I am among the many in the Northwest who would like to voice my strenuous objection to the DOE dumping more nuclear waste at the Hanford Reservation, particularly if it is sent from other existing DOE sites as they propose. It is already the largest nuclear waste repository in the Western Hemisphere. Following are some of the reasons: *202-1*

-Existing waste from 170 old, single shell tanks has not yet been entirely cleaned up and it appears that about 67 of those are leaking. At the rate clean-up is going (for 30 years now) it will take about 100 years to clean up these alone. *202-2*

-According to the latest court decision, no more waste is supposed to be dumped at Hanford until the existing waste is adequately disposed of and stored safely. *202-3*

- Nothing has been done (nor are there provisions to do anything) to remove waste in an unlined trench. *202-4*

- There has already been nuclear waste contamination of the Columbia River and it allegedly contains 1500 times the allowable drinking water standard of Strontium 90... and that's not even withstanding a number of other detects of radioactive substances that have been found

- There has been evidence of statistically significant incidences of various cancers and chronic diseases that could be related to nuclear waste exposure and contamination, including 32 new cases of chronic beryllium disease. *202-5*

-There is increasing evidence that there is already groundwater, earth, and vegetation contamination...including some found in the milk local cows produce who have been eating grasses growing in this area.

-The threat of earthquake in this area is too high to risk continued dumping of any nuclear waste - the existing waste is dangerous enough. *202-6*

-More than 17,500 truck-loads of radioactive waste (about two a day for 20 years) would be carrying these extremely dangerous substances along some of our busiest state and interstate highways. What are the odds that something could happen to one of these trucks carrying radioactive substances that have half-lives in the hundreds of thousands and millions of years? *202-1 cont'd*

202-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

202-2 One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates. Currently, DOE is retrieving waste from the C Area tank farm; the TPA milestone to close this tank farm is 2019.

202-3 See response to comment 202-1 for a discussion on the transport and disposal of offsite waste.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

202-4 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is engaged

Commentor No. 202 (cont'd): Susan B. Edwards

The continued dumping of nuclear waste at Hanford is absolutely NOT worth the risk to human and animal lives. The proof is already in the pudding with the problems incurred with the existing waste - both in terms of cost and longevity of clean-up and health and safety problems.

Susan B. Edwards

202-5 cont'd

in an extensive cleanup program at Hanford under the TPA, subject to active oversight and participation by EPA, the State of Washington, American Indian tribes, and other stakeholders. Disposal of LLW in unlined trenches within the Hanford LLBG 218-W-5 ceased in 2004, as described in Chapter 3, Section 3.2.12.1.4, of this EIS. Closure of these CERCLA past-practice units is outside the scope of this EIS. As described in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, Decisions Not to Be Made, there are six sets of cribs and trenches (ditches) that are contiguous to the SSTs and would fall under the barriers placed over the SSTs during closure. They are CERCLA past-practice units and were evaluated in this EIS as part of a connected action because they would be influenced by barrier placement. Similarly, closure of these CERCLA past-practice units is not part of the proposed actions analyzed in this EIS. Closure of these units would be addressed at a later date. These six sets of cribs and trenches (ditches) are noted in Chapter 2 and described in detail in Appendix D, Section D.1.

202-5 The sources of information from which the commentor's comments derive are unclear. Regarding strontium contamination in the Columbia River, DOE publishes an annual Hanford Site environmental report (Poston, Duncan, and Dirkes 2011). In the report, Table C.4 shows that the average concentration of strontium-90 in river water samples collected in Richland, Washington, in 2010 was 0.020 picocuries per liter, and the average over the previous 5 years was 0.041 picocuries per liter. These results are more than 100 times lower than the water quality standard of 8 picocuries per liter (40 CFR 141).

The potential doses to, and health impacts on, the public and workers from past Hanford operations have been the subject of a number of studies. Summaries of these studies are presented in Chapter 3, Section 3.2.10.3, of this EIS. As indicated in that section, the question of whether the population around Hanford has elevated cancer incidence or cancer mortality is unresolved. One past study showed no elevated levels of cancer around nuclear facilities, including Hanford; another study of 16 counties near Hanford determined that cancer incidence in white males and females was below the national average in most counties. The counties in which the incidences of cancer were higher than the national average were not those downwind of Hanford.

The Hanford Dose Reconstruction Project evaluated doses to, but not health effects on, members of the public from releases from 1944 through 1972. Airborne releases of iodine-131 from 1944 through 1957 were responsible for

most of the doses from air emissions. The largest organ doses of 24 to 350 rad were to the thyroid. The maximum total effective dose equivalent to an adult from air emissions over the period from 1944 through 1972 was estimated to be 1 rem. The risk of a fatal cancer associated with a dose of 1 rem is about 1 in 1,600. The maximum dose through releases to the Columbia River (from eating nonmigratory fish) was estimated to be 1.4 rem.

The *TC & WM EIS* analyses include potential human health impacts (through the air pathway) of normal operations, presented in Chapter 4, with details in Appendix K ("Short-Term Human Health Risk Analysis"), as well as long-term impacts (including through the groundwater and river pathway), presented in Chapter 5, with details in Appendix Q ("Long-Term Human Health Dose and Risk Analysis").

202-6 Chapter 3, Section 3.2.5.1.1, of this *TC & WM EIS* presents the locations of geologic faults relative to Hanford and their potential for producing earthquakes. DOE has thoroughly and objectively analyzed the potential risks from, and environmental consequences of, an earthquake-induced accident at Hanford during waste storage, treatment, transfer, and handling. For the analysis of seismic impacts, see the geology and soils sections of Chapter 4 (Sections 4.1.5, 4.2.5, and 4.3.5) for each of the alternatives analyzed.

Commentor No. 203: Barbara Glancy

1620 NE Broadway St., #515
Portland, OR 97232
March 12, 2010

Ms Mary Beth Burandt
Document Manager
TC & WM EIS
PO Box 1178
Richland, WA 99352

Dear Ms. Burandt:

I have not read the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington, but I have listened to news reports and read articles in The Oregonian.

I am concerned that they plan to deposit more nuclear waste there. I understand that tanks filled with such have been buried but are leaking into the soil below. I understand that this waste is slowly making its way to the Columbia River. That needs to be corrected before there is any idea of depositing more poisons at Hanford. *203-1*

I also hear that the surrounding population has a higher incidence of cancer. No wonder!. *203-2*

I am horrified that President Obama wants to build more nuclear reactors elsewhere in the nation while there is no agreement on where to dispose of all this contamination. I know you cannot do anything about that. However, adding to the nuclear mess at Hanford is just as foolish. *203-3*

Please devote yourselves to adequately cleaning up the mess already deposited there. *203-1 cont'd*

Sincerely,

Barbara Glancy

Barbara Glancy

203-1 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on the Columbia River. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

203-2 The potential doses to, and health impacts on, the public and workers from past Hanford operations have been the subject of a number of studies. Summaries of these studies are presented in Chapter 3, Section 3.2.10.3 (for Hanford), of this *TC & WM EIS*. As indicated in that section, the question of whether the population around Hanford has elevated cancer incidence or cancer mortality is unresolved. One past study showed no elevated levels of cancer around nuclear facilities, including Hanford; another study of 16 counties near Hanford determined that cancer incidence in white males and females was below the national average in most counties. The counties in which the incidences of cancer were higher than the national average were not those downwind of Hanford.

The Hanford Dose Reconstruction Project evaluated doses to, but not health effects on, members of the public from releases from 1944 through 1972. Airborne releases of iodine-131 from 1944 through 1957 were responsible for most of the dose from air emissions. The largest organ doses of 24 to 350 rad were to the thyroid. The maximum total effective dose equivalent to an adult from air emissions over the period from 1944 through 1972 was estimated to be 1 rem. The risk of a fatal cancer associated with a dose of 1 rem is about 1 in 1,600. The maximum dose through releases to the Columbia River (from eating nonmigratory fish) was estimated to be 1.4 rem.

203-3 This *TC & WM EIS* addresses proposed actions to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and expand waste disposal capacity at Hanford to provide for disposal of on- and offsite DOE waste. The disposal of other wastes, including waste associated with commercial nuclear power generation, is beyond the scope of this EIS.

Commentor Number 204 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 174.

Commentor No. 205: Stephen Bomkamp

3/13/10

USDOE:

THIS IS MY RESPONSE TO THE DRAFT TC & WM EIS:

PLEASE FULFILL THE LEGAL AND MORAL RESPONSIBILITIES INCURRED BY THE FEDERAL GOVERNMENT TO CLEAN UP THE HAZARDOUS WASTE CREATED BY DECADES OF NUCLEAR ACTIVITIES. THESE RESPONSIBILITIES INCLUDE:

① REMOVAL OF 99.9% OF THE HIGH LEVEL TANK WASTE OR REMOVE TO THE LIMIT OF TECHNICAL CAPABILITIES.

② REMOVE THE STORAGE TANKS AND REMEDIATE THE SOIL CONTAMINATION FROM TANK LEAKS. *205-1*

③ REMOVE THE FAST FLUX TEST FACILITY, RESTORE THE SITE AND TREAT THE WASTES AT HANFORD.

④ START UTILIZING THE LOW ACTIVITY WASTE PORTION OF THE VITRIFICATION PLANT PRIOR TO 2019 AND START FUNDING A SECOND LAW FACILITY IN 2012 IN ORDER TO HAVE IT OPERATING BY 2022. *205-2*

⑤ DO NOT TRANSPORT ANY ADDITIONAL WASTE TO HANFORD. DIG UP PLUTONIUM AND OTHER TRANSURANIC WASTES IN UNLINED SOIL DISPOSAL DITCHES AND TANK LEAKS, TREAT THE WASTES AND DISPOSE OF THEM IN DEEP GEOLOGICAL REPOSITORIES. DIG UP OTHER WASTES FROM UNLINED SOIL DITCHES AND TANK LEAKS, TREAT THEM, AND DISPOSE OF THEM IN A REGULATED COMMERCIAL RADIOACTIVE WASTE FACILITY WHICH IS NOT ABOVE DRINKABLE GROUND WATER OR NEXT TO A RIVER. *205-3*

THE USUAL ARGUMENT AGAINST RESPONSIBLE, THOROUGH CLEANUP IS THAT IT COSTS TOO MUCH. HOWEVER, THAT ARGUMENT HAS BEEN DESTROYED BY RECENT ACTIONS BY THE FEDERAL GOVERNMENT WHICH WITHIN THE LAST COUPLE OF YEARS HAS SPENT SEVERAL TRILLION DOLLARS BAILING OUT THE FINANCIAL INDUSTRY. *205-4*

205-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. Tank Closure Alternatives 4, 6A, and 6B evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Under DOE's Preferred Alternative for FFTF decommissioning (Alternative 2), some below-grade structures would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment.

205-2 This EIS analyzed supplemental LAW treatment capability by building new treatment facilities that are either part of (expanded LAW capacity) or separate (bulk vitrification, steam reforming, or cast stone) from the WTP. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

205-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 205 (cont'd): Stephen Bomkamp

CAN ANYONE SERIOUSLY ARGUE THAT THE BAIL-OUTS WILL MAKE ANY DIFFERENCE TO ANYONE A THOUSAND YEARS FROM NOW? I DON'T THINK SO. BUT THE GOVERNMENT'S FAILURE TO CLEAN UP THE NUCLEAR WASTE IT HAS CREATED WILL BE SERIOUSLY IMPACTING THE LIVES AND HEALTH OF PEOPLE LIVING IN THE HANFORD AREA AND ALL DOWN THE COLUMBIA RIVER IN A THOUSAND YEARS AND LONG BEYOND THAT. TO CREATE SUCH HAZARDOUS WASTES AND THEN TO FAIL TO CLEAN THEM UP AND RESTORE THE AREA TO A HABITABLE CONDITION IS IRRESPONSIBLE AND IMMORAL. OBVIOUSLY THE MONEY TO DO THE JOB CORRECTLY IS AVAILABLE. IT IS JUST A MATTER OF PRIORITIES

SINCERELY,
STEPHEN BOMKAMP
3944 SW 97TH ST
SEATTLE WA 98136

205-4 cont'd

205-4 Both DOE and Congress are committed to the cleanup efforts at Hanford, and DOE continues to seek funding for these efforts.

Commentor No. 206: Marshall Houston

CLEAN UP WASTE

NO MORE WASTE
BROUGHT TO HANFORD
WASTE DISPOSAL.

206-1

206-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 207: Kathleen Bushman

- Do not build more facilities for treatment of additional tank waste *207-1*
- It's insanity to make Hanford a national nuclear waste dump! *207-2*
- Closure of single shell tank system is essential! Clean & properly contain the waste that's there *207-3*

Kathleen Bush

207-1 Construction of tank waste treatment facilities is beyond the scope of this *TC & WM EIS*.

207-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

207-3 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 208: Jean Poyer

TC&WM EIS Comment from 1-888-829-6347
10:49 a.m. 3/15/2010

"I hope it's alright to leave a comment on this line. My name is Jean Poyer. I'm calling from Cashmere, WA. And I – I support the Hanford Challenge folks. I – and just anything that the Department of Energy can do with this EIS statement we need our government to conduct a thorough, uh, effective, uh, clean-up at Hanford with environmental remediation actions just as soon as possible to protect our current and future generations. So again, this is just a comment, um, for Mary Beth Burandt on the Tank Closure and Waste Management at Hanford Nuclear Site. Thank you."

208-1

208-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 209: Max Power, Chair, Oregon Hanford Cleanup Board

From: Carlson, Shelley [shelley.carlson@odoe.state.or.us]
Sent: Wednesday, March 17, 2010 1:17 PM
To: tc&wmeis@saic.com
Subject: Oregon Hanford Cleanup Board's comments on the TC&WM EIS.
Attachments: OHCB_TCWM-EIS_Comments_FINAL.pdf; Report_capping_final08.pdf

Please see the Oregon Hanford Cleanup Board's attached comments on the TC&WM EIS.

Sincerely,

Shelley Carlson
Hanford Cleanup/Emer. Planner
Oregon Department of Energy

625 Marion St SE
Salem, OR 97301

(xxx) xxx-xxxx direct
(xxx) xxx-xxxx cell
shelley.carlson@state.or.us
www.oregon.gov/ENERGY/

Think Green, please print only if necessary and recycle.

Response side of this page intentionally left blank.

Commentor No. 209 (cont'd): Max Power, Chair, Oregon Hanford Cleanup Board

OREGON HANFORD CLEANUP BOARD

March 17, 2010

Max Power, Chair
Barry C. Beyeler, Vice-Chair
Pat Hart
Maxine Hines
Wayne Lei
Robert McFarlane, M.D.
Shelby Rihala
David Ripma
Mecal Samkow
Lyle Smith
Althea Huesties-Wolf Confederated Tribes of the Umatilla Indian Reservation
Mark Long Oregon Dept. of Energy
Jessica Keys Governor's Office
Phil Ward, Director Water Resources Department
Sen. David Nelson
Rep. Jules Bailey
Rep. Vicki Berger
Shelley Carlson Administrator

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
Post Office Box 1178
Richland, WA 99352

Dear Ms. Burandt:

The Oregon Hanford Cleanup Board appreciates the opportunity to comment on the draft Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS).

This is a tremendously complex document that has important health and environmental implications for the future. We commend the U.S. Department of Energy (DOE) for providing a 140 day comment period to allow a thorough and considered review of this document. We also commend DOE for conducting four public hearings within the State of Oregon to take comment on this document. All four hearings had large turnouts, demonstrating the wide interest within Oregon in ensuring that the cleanup decisions DOE makes are protective both now and in the future.

The Cleanup Board endorses preliminary comments submitted by the Oregon Department of Energy on January 4, 2010, which proposed a new alternative be analyzed regarding Hanford's tank waste. We believe this is a reasonable new alternative and strongly encourage DOE to analyze this proposed alternative and publish a comparison of the results with its other alternatives. *209-1*

The Board takes note of DOE's own analysis in the draft TC&WM EIS showing that importation of offsite waste has seriously unacceptable impacts. The Cleanup Board therefore also endorses the request put forward by the Oregon Department of Energy that DOE amend its February 2000 Waste Management Record of Decision which designated Hanford as a disposal site for low-level and mixed low-level waste from throughout the DOE complex. *209-2*

Some alternatives within the draft TC&WM EIS include widespread capping of waste sites. We would like to call your attention to the Cleanup Board's "Position Paper on Capping Waste Sites located on *209-3*

phone 503.378.4040 800.221.8035 in Oregon fax 503.373.7806
625 Marion Street, N.E., Suite 1, Salem, Oregon 97301-3131
www.oregon.gov/ENERGY/NUCSAF/HCB/hwboard.shtml

209-1 Chapter 2, Section 2.6.4 of this *Final TC & WM EIS* has been revised to include a discussion of the Oregon Department of Energy's proposal and how DOE has addressed the range of reasonable alternatives for tank waste storage, retrieval, and treatment and remediation of the existing tank farms in its original Tank Closure alternatives. DOE has carefully considered the Oregon proposal and, as explained in Section 2.6.4, has determined that it is not reasonable.

209-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

209-3 The scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and closure of the SST system, including the tank system and the vadose zone impacted by the tank farms (i.e., past leaks). The *TC & WM EIS* closure alternatives for the tank farms include no action, landfill closure, selective clean closure, and clean closure (which would involve actions to remove the source of contamination). DOE will consider all comments and recommendations carefully in reaching decisions about the proposed actions evaluated in this *TC & WM EIS*.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development,

Commentor No. 209 (cont'd): Max Power, Chair, Oregon Hanford Cleanup Board

the Hanford Nuclear Site," which we have included with this comment letter. This position paper clearly lays out the limited circumstances in which the Board believes capping is an acceptable remedy. We ask that DOE take these recommendations into consideration before it considers moving forward with actions that include capping of waste sites.

We are deeply concerned by the potential future shown in the draft TC&WM EIS modeling analysis. That future is one of persistent and recurring contamination of the groundwater that was modeled at concentrations well above regulatory standards for thousands to tens of thousands of years. We believe this analysis demonstrates the need to address contaminants that are deposited in the vadose zone, and particularly those associated with tanks. We encourage DOE to dedicate additional funds towards developing new technologies to deal with wastes that have escaped from tank farms, including waste already in the deep vadose zone. *209-3 cont'd*

The EIS also clearly shows the need for technology development to permanently immobilize technetium. Technetium is one of the, if not the most, significant future risk drivers. The EIS indicates that current technologies to immobilize technetium have limited value and that the technetium will eventually leak from virtually all waste forms except glass or isolation in a deep, dry geologic repository. *209-4*

We are disappointed that the draft TC&WM EIS does not provide a clearer picture of the cumulative risks at Hanford, or provide decision makers an ability to differentiate the incremental risk burden from various tank closure activities, waste sites, waste forms, and cleanup approaches. Without knowing these incremental impacts, decision makers are forced to prioritize cleanup actions without knowing whether the actions will have the most meaningful positive impact. *209-5*

We support DOE's preferred alternative for the decommissioning of the Fast Flux Test Facility (FFTF). However, spending money at this time at FFTF is not a priority for the Board. We encourage you to move forward with a Record of Decision on FFTF, but then defer further decommissioning work for the indefinite future until other priorities have been dealt with. *209-6*

Finally, this EIS is being conducted under the National Environmental Policy Act (NEPA). In 1969, Congress enacted NEPA in response to public concerns about the deteriorating quality of the environment and the inadequate consideration of environmental impacts from major federal projects. The intent of NEPA is to: *209-7*

corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

209-4 As discussed in Appendix E, Section E.1.2.3.1.1, the Pretreatment Facility within the WTP was originally designed to remove technetium-99. Based on reviews of technetium-99 in ILAW glass, DOE and Ecology agreed to eliminate technetium-99 removal from the WTP permit. To date, the Pretreatment Facility is not being constructed to include a capability for removing technetium-99 from the LAW stream. This *TC & WM EIS*, however, assumes that technetium-99 removal could be completed in the existing Pretreatment Facility and analyzes it under Tank Closure Alternatives 2B and 3B. Design and construction modifications would be necessary to add the technetium-99 removal capability to the Pretreatment Facility, if required. As noted by the commentor, technetium-99 is a risk driver, which is one of the reasons for its removal from the ILAW; its immobilization in IHLW is analyzed under Tank Closure Alternatives 2B and 3C.

209-5 The incremental groundwater impacts and human health risks from the Tank Closure alternatives; FFTF Decommissioning alternatives; Waste Management alternatives; and other past, present, and reasonably foreseeable future actions are presented separately in Chapter 5 and Appendix U. Chapter 5 provides the impacts of each Tank Closure, FFTF Decommissioning, and Waste Management alternative; Section 5.4, the impacts of each of the three alternative combinations; and Appendix U, the impacts of the other past, present, and reasonably foreseeable future actions. Chapter 6 combines the impacts of the alternative combinations (Chapter 5, Section 5.4) with the impacts of other past, present, and reasonably foreseeable future actions (Appendix U) to derive cumulative impacts.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 209 (cont'd): Max Power, Chair, Oregon Hanford Cleanup Board

"...prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man...recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man ...without degradation, risk to health or safety, or other undesirable and unintended consequences.[1]"

209-7 cont'd

We strongly encourage DOE to keep these principles in mind as it moves forward with actions based on analysis within the TC&WM EIS.

Sincerely,

Max Power
Chair

[1] [1] NEPA Pub. L. 91-190 § 4321-4327, January 1, 1970 as amended.

As described in Section S.3.5 of Appendix S, 403 waste sites are involved in the other past, present, and reasonably foreseeable future actions considered in the cumulative impacts analysis. Because of the large number of sites evaluated, results were not presented separately for each of them. Additional sensitivity analyses in this EIS evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5. Ecology may also impose additional performance milestones through future permitting processes or RCRA/CERCLA remedial actions within the scope of the TPA.

209-6 Comment noted.

209-7 DOE appreciates the commentor's recommendation and has made a good faith effort to follow NEPA and CEQ principles in its decisionmaking process. This is reflected by the scope of this EIS's analyses and DOE's efforts to obtain and consider the public's comments.

Commentor No. 210: David Waln

From: David Waln [dwaln@eoni.com]
Sent: Wednesday, March 17, 2010 3:19 PM
To: tc&wmeis@saic.com
Subject: Ethics of Nuclear Waste cleanup

Ethics is the weighing of the negative consequences our actions and our inactions. In the case of Nuclear Waste this is a calculation that could make the long term consequences of Slavery in America look like a brief interlude.

By not getting on top of all the waste streams of our Nuclear activities, past and present, we are irresponsibly gambling with the future.

Civilization has beneath its' veneer of human creations, the ultimate function of organizing a tribally adapted species into competitive - but unnaturally large-survival units. Because Empires and even Nation States do not come natural, they have also not proved very durable. During hard times they factionalize. *210-1*

We are at a pinnacle of sorts. The largest, most technologically advanced, most capable survival unit that good circumstances and fossil fuels could create out of a tribally adapted species.

We are also at a crossroads of sorts. Do we have the clarity of vision to see the magnitude of the responsibility we have to future generations to not leave a world with dangers that they may not have the political organization or resources to deal with.

Perspective and priorities are key to ethical decisions.

Sincerely,

David Waln
67322 Timberline Rd.
Summerville, OR 97876
xxx-xxx-xxxx

210-1 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. To that end, this *TC & WM EIS* analyzed the reasonably foreseeable direct, indirect, and cumulative impacts of the proposed actions, including potential short-term and long-term impacts.

Commentor No. 211: Carl Holder, Board Member, Eastern Washington Section of the American Nuclear Society

From: Carl Holder [holdercarl@hotmail.com]
Sent: Wednesday, March 17, 2010 7:02 PM
To: tc&wmeis@saic.com
Cc: thesecretary@hq.doe.gov; warren.miller@nuclear.energy.gov; mark.gilbertson@em.energy.gov; denise.freeman@hq.doe.gov; Doug Chapin
Subject: Merits of Deactivation - EWS American Nuclear Society
Attachments: 100317 Merits of Deactivation.pdf

TC&WM EIS Public Comment

Please find attached the Public Comment of the Board of Directors of the Eastern Washington Section of the American Nuclear Society.

Attached .pdf file.
100317 Merits of Deactivation

Best regards,

Carl Holder
Member of the Board of Directors

Response side of this page intentionally left blank.

Commentor No. 211 (cont'd): Carl Holder, Board Member, Eastern Washington Section of the American Nuclear Society

Public Comment: **Merits of NO ACTION** March 17, 2010

The Department of Energy proposes to decommission the deactivated Fast Flux Test Facility (FFTF) in Washington State.

Alternative #1 – **NO ACTION** would leave the facility in its current state of Deactivation - Cold-Standby.

As late as 2007, the Assistant Secretary for Nuclear Energy confirmed consideration of reactivation to support the Global Nuclear Energy Partnership (GNEP) and a study was completed to evaluate FFTF's physical and legal integrity. Subsequently, the nuclear infrastructure listed the FFTF as an available asset to support civilian nuclear R&D. GNEP was a Bush Administration initiative to recycle and burn spent nuclear fuel. $10s of millions were spent in competitive programs that defined processes and facility designs and reactor development.

Evaluation ceased when the GNEP initiative and the Environmental Impact Statement (GNEP EIS) were canceled. But the new Administration has picked up the ball.

Dr. John Holdren, Director of the Office of Science and Technology Policy, Executive Office of the President, wrote on March 5, 2010, *"The President directed the Secretary of Energy to establish a Blue Ribbon Commission on America's Nuclear Future. The Commission will conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle … The review will include an evaluation of advanced fuel-cycle technologies... The important work of the Commission is just getting underway."*

The FFTF is deactivated, but remains a fully licensed reactor with a 20-year full-power core-life remaining. Combined with the Fuels and Materials Examination Facility (FMEF), and the Maintenance and Storage Facility (MASF) a demonstration of the closed nuclear fuel cycle could not find a more perfect location.

The cost to continue Deactivation – NO ACTION – is only $1.2 million per year. This status has been supported by Washington Ecology and EPA having written, *"It is our view that FFTF work should proceeded only until it can be placed in a min-safe configuration...."* This is the current status – Deactivation, Surveillance and Maintenance.

The NO ACTION Alternative #1 continues the availability of the FFTF for the benefit of nuclear energy policymakers.

The Board of Directors of the Eastern Washington Section of the American Nuclear Society recommend – NO ACTION – Alternative #1 for FFTF Decommission (TC&WM EIS).

Public Comment: Open through Friday, March 19, 2010
TC&WMEIS@saic.com Fax 888-785-2865 – Voice mail 888-829-6347

Copy to:
The Secretary of Energy Steven Chu: thesecretary@hq.doe.gov
Assistant Secretary of Nuclear Energy: Warren.Miller@nuclear.energy.gov
Department of Environmental Management: Mark.Gilbertson@em.doe.gov
NEPA Hotline: denise.freeman@hq.doe.gov

EWS-ANS contact: Carl Holder holdercarl@hotmail.com

211-1

211-1 DOE has previously weighed FFTF's potential use in other applications but determined that no further uses should be pursued and shutdown of the facility is appropriate. DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. DOE has identified the need to determine an appropriate end state for FFTF; that is the scope of analysis regarding FFTF in this *TC & WM EIS*. Decisions regarding proposed future uses of FFTF, the Fuels and Materials Examination Facility, and the Maintenance and Storage Facility are beyond the scope of this EIS.

Commentor No. 212: Don Meyers

From: Bogeyandbobby@aol.com
Sent: Wednesday, March 17, 2010 10:50 PM
To: tc&wmeis@saic.com
Subject: D.Meyers' Comments on Draft TC&WM EIS

DOE, TC & WM EIS, My comments are being provided by Email and regular mail to make sure you receive them. I have commented on Hanford's Waste Cleanup effort over the years, mainly to optimize the effort applying lessons learned to revisiting the strict requirements of the Tri Party Agreement. The optimization might have already saved much money and time. It can surely be applied now as problems are encountered and as DOE supports preserving the Hanford history to tell its roll in the Plutonium production part of the Manhattan Project. Sorry the following is lengthy but hopefully some applicable to the waste cleanup and closure EIS.

Thank you, Don Meyers (also signed off at end)

March 17, 2010
TO: DOE, TC & WM EIS, Waste Cleanup and Closure
FROM: Don Meyers, Hanford Retiree
SUBJECT: **D. Meyers' Comments on Draft TC & WM EIS, Waste Cleanup and Closure**

DOE, TC & WM EIS,

I am providing my comments on the Cleanup and Closure of Hanford waste storage facilities, including: 1) underground storage tanks, single shell tanks; 2) the FFTF Reactor & auxiliary facilities; and 3) the ongoing and expanded management efforts to dispose of Hanford's waste and waste from offsite. Efforts to complete Hanford Cleanup should be optimized continually, and with preservation of Hanford's History relative to the Manhattan Project. My comments are in the form of excerpts from past suggestions to **optimize the Waste Cleanup effort**, which were transmitted to representatives of Hanford Contractors, State and Federal DOE, State Politics, and the Hanford Advisory Board (all stakeholders).

My 23 years experience at Hanford never directly involved production facilities, only FFTF (18 years fuel exam and handling), BWIP till stopped, Tank Waste Retrieval, and Solid Waste Nuclear Safety.

The optimization of Waste Cleanup would consider alternate approaches to utilize existing facilities and storage areas as in-place disposal sites, thereby generating more **"Cleanup Monuments" and saving much time and cost.** The DOE funding saved can fund the maintenance and operation of the Monuments. The Monuments will show and describe the history of Hanford's plutonium

212-1

212-1 The creation of national monuments, parks, or other tourist attractions for such purposes is not within the scope of this EIS. This *TC & WM EIS* addresses proposed actions to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites. DOE does not consider the use of onsite waste disposal areas and facilities as public attractions to be reasonable alternatives due to the radiological and unique chemical hazards associated with these facilities, the age of the buildings, and the lack of financial sponsors.

Commentor No. 212 (cont'd): Don Meyers

production effort to the very interested public and tourists -- already apparent with Hanford Site and B Reactor Museum tours.

My past comments suggested consideration of Alternate Approaches to achieve the following:

1) Use lessons learned about characteristics of waste removed from original storage/disposal locations;
2) Leave as much radioactive waste in original locations as safely possible;
3) Isolate safe waste monuments from the Public on clean Hanford roads and grounds;
4) Let tourists visit the safely fenced monuments to hear verbal descriptions of how each contributed to the plutonium production effort;
5) Support B Reactor Museum and other "saved facilities" as Monuments to preserve Hanford's history and possible establishment as a National Nuclear Park;
6) Save considerable time of high risk waste cleanup to assure the safety of groundwater, Columbia River, and the public in the Columbia River Corridor; and
7) Save millions of DOE dollars that can be used to maintain/operate the Hanford Site and Monuments for tourists to learn of its Manhattan Project History.

These suggested Alternate Approach features and achievements **have been rejected by most recipients**, based on "must exactly meet" TPA requirements.

212-1 cont'd

My more detailed comments on Waste Tank Closure are as follows:

This is one of several of my past Emails that covers my concerns.

Subj: Comments to Chris Smith's Request for Public Comments
Date: 3/3/03 10:30:37 PM Pacific Standard Time
From: Bogeyandbobby@aol.com
To: jodi.giles@co.benton.wa.us, jroberson@doehq.gov, JeffMarkey@mail.house.gov, senator_murray@murray.senate.gov, emailago@atg.wa.gov, Secretary@hq.doe.gov, Rost461@ecy.wa.gov, Jennifer_L_Sands@rl.gov, governor.locke@wa.gov, pmabie@enviroissues.cp, Hanford_Advisory_Board@rl.gov, Richard_A_Holten@RL.gov, GRogers522, Julie_A_Goeckner@rl.gov, DavidM4@atg.wa.gov, Bryan_L_Foley@rl.gov, gwen@crehst.org, hale_pa@leg.wa.gov, longterm_stewardship[@rl.gov, holdercarl@hotmail.com

CC: Bogeyandbobby

To Distribution,

My following comments to Chris Smith on "Changes to Cleanup Decisions on the Columbia River Corridor" are transmitted to you Representatives

Response side of this page intentionally left blank.

Commentor No. 212 (cont'd): Don Meyers

of the Hanford Cleanup Effort for your consideration and information. I strongly believe there are some very good overall ideas for Hanford Site restoration in my comments. They are based on my strong interest in this latest "Changes to Cleanup Decisions", and my past Email transmittals to you that suggested an Alternate Approach be considered. That Approach would expedite cleanup of River Corridor to minimize risk of contamination of the groundwater or the Columbia River.

Chris Smith,

Sorry for the overall lenghthy nate=ure of my comments, gur I have been very interested in the total Hanford Cleanup for the last 15 years or so!

In response to the DOE/ROO request for Public Comment on "Changes to Cleanup Decisions on the Columbia River Corridor", my enthusiasm for this approach is apparent from my comments as below. The Tri Party Agencies have taken a big step toward a more realistic cleanup approach (i.e. level of risk vs: extent of effort).

The proposed "significant change to the scope, schedule or cost of cleanup" appears to be a genuine effort to revisit applicable Regulatory Requirements now specified in the Tri Party Agreement. For now, this only applies to the extent of cleaning up the 100-N Area land, and with the added proposal that all future irrigation of that land be prohibited. It follows that any other reactor/ processing site cleanup efforts that pose an "extensive effort with no additional protection to the Groundwater or the Columbia River" (or Public or Environment) would also justify revisiting appropriate Regulatory Requirements. Any other extensive cleanup efforts with no additional protection to the Columbia River, Public or Environment would also justify the same consideration.

In the past, I have often proposed that DOE, Hanford Contractors, Wash. State Ecology, Tribes and Stakeholders revisit the Nuclear Regulatory Requirements for Environmental Cleanup as applicable to the Hanford Site. The purpose being to finalize cleanup of Hanford Land, not to "Original Condition"(for unlimited Public use) as stated in the Tri Party Agreement, but to perform the Cleanup to extent there is no realistic hazard to our water, the public and the environment. The remaining "No Risk Contamination" would be disposed of in-place and isolated from the Public as fenced-in sites. All Fenced Cleanup Sites would be included as Monuments in a proposed "Hanford Nuclear National Park", which would also include the Hanford Reach Monument, B Reactor Museum, CREHST, and FFTF (either operational or cleaned up). The remaining part of Hanford land would be available for Public uses either irrigated or not as determined by Tri Party Agencies. This approach would optimize the Vitrification Plant facility scope and processing effort to only that for readily retrievable, high risk waste. Overall, this would result in

212-1 cont'd

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Commentor No. 212 (cont'd): Don Meyers

very significant savings in Time, Risk and Cost to the United States Government! This savings would be realized many times based our large number of national cleanup sites.

It seems we will bankrupt our country in trying to cleanup Hanford, then repeat the process at all other national and commercial reactor cleanup sites in the same costly manner! All stakeholders should be most interested in spending otherwise wasted cleanup funds on important national issues regarding our citizens needs. As Cleanup progresses, it is obvious that removing all waste from tanks, basins, burial grounds and structures is no longer feasible. We must review the in-storage waste forms as they now exist, then be sure the Tri Party Agreement and Nuclear Regulatory Requirements still apply for safe storage and removal. Also:

1. How realistic are the risks to the environment, river corridor and the public in its present state?
2. How difficult is removal of all non-pumpable waste from each tank with the existing physical and radiological properties?
3. How feasible to leave waste in-situ in some existing storage/disposal sites?
4. What words of the TPA and/or Regulatory Reqmts need to be re-interpreted or changed to ensure low risk, timely and cost effective cleanup?

My views on overall Hanford Site Preservation cover environmentally safe cleanup, historical preservation and future utilization of land and facilities. That proposed approach is to ensure cost effective efforts on FFTF, Hanford Cleanup and Hanford Museums/National Parks. My general comments above are based on the following information – hopefully to be read and taken into consideration for this current "Changes" effort. This proposed Hanford Nuclear National Park approach applies to the Overall Hanford Cleanup and "Long Term Stewardship Program"

D. MEYERS' COMMENTS ON LONG TERM STEWARDSHIP PROGRAM

Great title for effort to ensure Hanford's facilities are demolished, secured and further utilized while preserving the overall Atomic History of Hanford! This being accomplished without endangering our water, the public and the environment, while fully utilizing existing facilities to benefit the Tri City Area, Washington State, and our National Government. My comments on the 3 points of Approach for Long Term Stewardship are addressed as follows:

212-1 cont'd

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Commentor No. 212 (cont'd): Don Meyers

1. Management of Leftover Contamination

A. Concentrate cleanup effort and funding completely on the River Protection Part of Hanford Cleanup. Do it RIGHT NOW! -- at considerably lower total cost, elapsed time, and risk to the Public and Environment. Could probably complete for only $5 to 10 BILLION and in 5 to 10 YEARS!! --- Let development of the Vitrification Plant be a parallel effort -- **Vit Plant problems must not delay the River Protection part of Hanford Cleanup!!**

B. Ensure all Radioactive Waste is DRIED UP

1. Forget about total clean out of tank waste -- remove liquid slurry and leave solids.

2. Stir tank liquid/sludge waste into slurry in a safe manner using proven, standard, existing equipment/procedures

3. Pump tank slurry to Evaporator and process, dry out remaining sludge/mud and leave in tank

4. Stir, transfer and process basin liquid/sludge, in proven manner similar to tank waste in (2) above

5. Dryout basin sludge/mud/trash items and leave in basin -- cover to confine contamination

6. Remove liquid waste from cribs/other holding areas in manner similar to tanks/ basins.

7. Dispose of Hanford Site contaminated structural and equipment items by placing in dried-out waste tanks, basins and old process buildings (canyons, reactors), while filling voids with contaminated soil, etc.

C. Remove High Level Radioactive PU/TRU waste (e.g. fissile and irradiated component) from old process buildings and basins, and transfer into surface fuel storage/disposal using safe, reliable and proven transfer/handling methods. For insignificant amounts of High Level PU/TRU, dry out and leave/dispose of in-place within secured/covered facilities.

D. Keep Low Level Radioactive PU/TRU in existing containers and storage in Hanford facilities until transfer to Permanent Nevada Disposal Facilities.

E. Leave Low Risk Radioactive/Hazardous waste in storage and disposal structures intact to maximum extent possible, and fill structures with other dry waste like contaminated soil, equipment and materials. Seal/cover the filled structures and facilities for permanent in-place disposal of these waste.

212-1 cont'd

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Commentor No. 212 (cont'd): Don Meyers

F. Permanently cover/enclose the filled tanks, basins and buildings so rainwater can't contact contamination and leach to the groundwater or the Columbia River.

2. Protection of the Hanford Site's Cultural, Biological and Natural Resources

A. Cleanup Monuments

1. Install security fences around permanent cleaned-up waste

Areas and building sites to isolate from Public.

2. Declare each fenced-in site a FEDERAL MONUMENT (like B-Reactor Museum).

3. Each fenced site would have Tourist actuated audio stations providing description and history of that particular site -- all sites combined would

help tell the Hanford Production Story!

4. The cleaned-up Hanford Site would contain clean public roads and mostly usable lands, with Cleanup Monuments fenced in.

5. The cleaned-up site Custodian would ensure that in future, if any existing radioactive contamination gets into the groundwater and Columbia River, that it proceeds only at diminishing and acceptable rates.

B. B Reactor Museum

This Museum has already proved itself invaluable for tourist understanding about the Hanford Production Reactor's operation. Historical remains are preserved to display various aspects of the reactor's operation and production of the Plutonium. Excellent verbal descriptions are provided on walk-thru tours.

C. Hanford Reach National Monument

This unique part of the Hanford Site has preserved the original condition of the Hanford town, Columbia River and surrounding areas. It is apparent there are little adverse affects on the vegetation and wildlife activity on this reservation-type area.

D. CREHST (Columbia River Exhibition of History, Science & Technology)

This special museum houses the overall history of the Hanford Atomic activities, with remnants, photos, stories and documented articles to show, display and tell the detailed history of personnel, facilities and way of life at Hanford and communities.

E. FFTF (Fast Flux Test Facility)

The FFTF Project was successful from the first proposals thru design, research & development, construction, plant acceptance testing and initial operation. This facility has been self sustaining as evidenced by its good operating record over

212-1 cont'd

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Commentor No. 212 (cont'd): Don Meyers

the past 20 years of operation. That was possible by performing its own remote maintenance on radioactive equipment utilizing the remote capability of the Interim Examination & Maintenance Cell.

The "fast reactor" (fast neutrons greatly shorten irradiation time) lets materials be irradiated faster to predict long term radiation affects for future materials and energy development. In the same fast reactor environment, FFTF can quickly produce radio-isotopes which are required for medical applications including early detection, treatment and cure of cancer patients. The FFTF has already provided materials research to expedite improvement of reactor plants around the world. The "new generation" of nuclear reactors being considered will require the advanced testing capability of the FFTF.

3. Reuse of the Hanford Site's Assets

It is apparent that combining the B Reactor Museum, CREHST, and Hanford Reach National Monument efforts, with the upcoming "Hanford Cleanup Monuments" into one overall Hanford Nuclear National Park could result in great savings. Presently our Hanford Site Projects continue to compete for DOE funding and priority which results in increased time, cost and risk.

The total Cleaned-Up Hanford Site would consist of the Cleanup Monuments, with clean roads and lands accessible to the Public. The Cleanup Monuments, B Reactor Museum, CREHST, the Hanford Reach and the FFTF could combine to make up the Hanford Nuclear National Park with all historical aspects preserved. That history would span from initial Hanford construction days to present energy and medical research capability provided by the FFTF Fast Breeder Research Facility. Tourists could visit all these Monuments and Museums to view and hear the overall Hanford Atomic History.

It was bad enough to lose our Hanford Nuclear Power Park when the successful Fast Breeder Reactor Program was terminated in the 1980's. That started with cancellation of the Clinch River Breeder Reactor Plant, then the planned Full Scale Demonstration plants in New England states and our four Fast Breeder Power Production Plants here at Hanford. We could have furnished electrical power to whole Pacific Northwest – possibly even the West Coast! For just bringing Enriched Uranium into the Nuclear Power Park, recycling the spent fast breeder fuel, and processing the radioactive waste (all within the Power Park site!) and sending clean electrical power out of the Park. A series of about 5 or 6 Nuclear Parks across the U.S. could have provided most of our national electrical energy needs – without depending on foreign supplies!

212-1 cont'd

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Commentor No. 212 (cont'd): Don Meyers

Let's not lose this chance for an Economical Hanford Cleanup and National Monument to preserve the atomic age history at Hanford for our Nation.

Nuclear Energy is good – we just need to deal realistically with processing the radioactive waste products. We can take pride in displaying such a successful and high quality facility as the FFTF, and still use it as an important medical, materials, and energy research tool!

Thank you for considering my comments on Cleanup and Closure of Hanford's waste storage facilities . I hope they may help in future discussions to evaluate the decision with long term stewardship and national recognition in mind. The B Reactor Museum may get national Historical National Park status in near future. If so, that can grow to take in the other Monuments to tell the whole story of the Hanford Site history! That could become a real asset to our communities and the whole Columbia Basin Region.

212-1 cont'd

In my interest for our Hanford Site History,

Don Meyers Ph. xxx-xxx-xxxx
1807 W.8th Place
Kennewick, WA 99336

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Commentor No. 213: Ken Dobbin

United States Department of Energy March 17, 2010

TC & WM EIS, P. O. Box 1178, Richland, WA 99352

Subject: Comments on the Draft TC & WM EIS

To Whom It May Concern:

As the preferred alternative to the decommissioning the Fast Flux Test Facility (FFTF), please select the no action alternative in order to maintain the current deactivation status of the FFTF to assure future proper disposal of Hanford's tank waste. For the purposes of this EIS, it is important to leave this facility as it is until a record of decision is made on the nuclear reactor spent fuel recycle program which dramatically impacts the ultimate disposition of Hanford's tank waste, as explained below. To demolish this facility would remove one of the options for the future decision path, to the detriment of the environment. *213-1*

Tank waste disposal involves vitrification and disposal at a Yucca Mountain type repository. This glassified waste from Hanford competes with spent fuel from more than 100 nuclear reactors that have already created sufficient spent fuel to nearly fill a repository the size of the one planned for Yucca Mountain. These reactors are currently creating, and will continue to create more of this waste as Hanford's vitrification plant goes on line. There will simply be no place to ship the Hanford waste whether the United States Department of Energy (US DOE) completes the Yucca Mountain facility or another like it under the current policy of sending spent reactor fuel to a repository without processing. This EIS should not predetermine the environmental or economic viability of providing separate repositories for these waste streams. Future options should not be precluded. *213-2*

There would be sufficient room in a reasonably-sized repository to store both Hanford's glassified waste as well as spent fuel from nuclear power reactors if the spent fuel was recycled. The volume, toxicity, and required time for the waste to be isolated from the environment would all be reduced by recycling the fuel. In order to accomplish this task, facilities are required to create actinide fuel assemblies, test them in a reactor environment having the correct neutron flux, fluence, and temperatures, and then examine the irradiated assemblies. Hanford's FFTF and Fuels and Materials Examination Facility (FMEF) in the 400 Area are facilities designed to do that and must be maintained in their current status until a record of decision is made regarding spent fuel recycle and its ultimate disposal with respect to geologic storage requirements. *213-1 cont'd*

These 400 Area facilities are keys to implement nuclear fuel recycle. These facilities can provide the required testing of fast reactor actinide fuel recycle to provide for nuclear safety development and licensing purposes. Nuclear fuel recycle involves reuse of the actinide elements in fast reactor fuel and the transmutation of the long-lived fission products such as Tc and I in either fast or thermal reactors. Actinide fuel elements burn up well fast reactors, but not in light water reactors. Fast reactors have a neutron spectrum where the capture-to-fission ratios of actinide elements cause more actinides to fission than get captured, thus burning up the actinide elements. In a thermal reactor, on the other hand, more captures take place in the actinide

213-1 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. The scope of this *TC & WM EIS* is to address the final decommissioning of FFTF. As discussed in Chapter 1, Section 1.4.2, Decisions Not to Be Made, DOE is not considering restarting FFTF. Decisions regarding the status and disposition of the Fuels and Materials Examination Facility, which, although constructed to be a support building for FFTF, was never used in a nuclear capacity, are beyond the scope of this *TC & WM EIS*.

213-2 This *TC & WM EIS* analyzes storage of the IHLW canisters generated from treating the waste from the SSTs and DSTs at Hanford; however, the ultimate disposition of the IHLW canisters is outside the scope of this EIS. The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 213 (cont'd): Ken Dobbin

elements creating more actinide elements. Actinide fuel use in fast reactors requires extensive testing to provide the US DOE and Nuclear Regulatory Commission (NRC) information vital to safety characteristics, important for licensing.

FFTF was built for the required testing. It accommodates a core large enough to obtain the right temperature/neutron flux/neutron fluences to simulate a large power plant's fuel characteristics. The FFTF has been placed into a safe minimum maintenance mode with its fuel and sodium coolant removed. Starting at its current state, it could be resurrected quicker, at less cost, and less impact to the environment than reconstructing the facilities somewhere else. Also located adjacent to the FFTF, the FMEF is a large hot cell facility that was constructed to fabricate fuel elements for the FFTF and examine irradiated fuel elements from that reactor. It is nearly a complete hot cell with only the windows and manipulators to install when construction was halted.

Future consideration for disposal of Hanford's vitrified tank waste shall involve a repository which would most expeditiously include waste from nuclear power plants. The characteristics of that repository will depend upon the radiological status of the waste. If a future record of decision finds beneficial use for spent fuel recycle, then it is important not to preclude environmentally sound options. The Fast Flux Test Facility and the Fuels and Materials Examination Facility (FMEF), located in the 400 Area on the Hanford Site near Richland Washington, need to be maintained without further degradation so as not to preclude one environmentally sound option.

Sincerely,

Ken Dobbin

Ken Dobbin, nuclear engineer

5303 Blue Heron, West Richland, WA 99353

213-1 cont'd

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Commentor No. 214: Stuart Buchan

From: stubuchan@comcast.net
Sent: Thursday, March 18, 2010 12:01 PM
To: tc&wmeis@saic.com
Subject: Hanford Tank Closure and Waste Management Environmental Impact Statement

To Whom it may concern,

I am a WA Bellevue resident and have lived here over 30 years. I have great concern for the future of the Hanford site and its nuclear waste impact on the Columbia river and detrimental affects to the local environment for generations to come. I have attended the USDOE public hearings and submit my comments in this email to your organization for consideration in the public comment period through March 19th, 2010 of the subject above.

The following points must be considered in the future plans of this site:

1. It is well known that the site is currently contaminated from the failures in the single shell tanks and the waste leakage has already reached the river and will continue to get worse. *214-1*

2. The attempts to clean up this site have been delayed far too long and substantial damage has already been done to the environment. The current plans for clean up are less than required to arrest the problem *214-2*

3. The USDOE waste treatment proposed project schedule has been deferred substantially decades more with attendant cost overruns and no future funding source guarantees for completion, so there is no expectation that the government can complete this project successfully *214-3*

4. The USDOE plans to make this site a national radioactive dumping ground, adding to the mess already in existence. Given the foregoing problems, it is unconscionable that the USDOE would plan to make this site a national dumping ground. *214-4*

5. The EIS has well underestimated the situation and it is flawed *214-2 cont'd*

Suggestions with urgent priority:

1. Drop all consideration of using the Hanford site as a National radioactive waste dump (this should be the top priority to not allow further damage) *214-4 cont'd*

2. Focus all efforts on conducting a "clean closure" program on what exists at the site today and arrest further spreading of the contamination, which entails finding alternate ways of moving the wastes to repositories that will not contaminate groundwater or the rivers. *214-5*

214-1 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of past leaks.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

214-2 Although some contamination has reached Hanford's groundwater, efforts are ongoing to prevent existing plumes from reaching the Columbia River. For example, groundwater pump-and-treat systems are currently in place or under construction, and temporary caps are being placed on the tank farms as part of RCRA corrective action. These and other short-term cleanup measures are being conducted while longer-term cleanup decisions are being addressed. The analyses presented in this *TC & WM EIS* will aid DOE in making these longer-term decisions regarding the treatment and disposal of tank waste and the closure of the SST farms (by landfill closure, selective clean closure, or clean closure). The EIS analyses are also intended to aid DOE in making decisions regarding cleanup of contamination from past leaks, including remediation of the contamination in the vadose zone. Because uncertainties are associated with implementing the proposed actions described in this EIS, the analyses presented therein were based on conservative assumptions that tend to overestimate potential environmental impacts. These uncertainties are summarized in Chapter 2, Section 2.7.4; more-detailed discussions are provided in Chapters 4 and 5 and associated appendices.

214-3 Hanford cleanup is governed by the 1989 TPA, a legal agreement signed by DOE, Ecology, and EPA (parties). According to the TPA, DOE was years behind schedule for pumping radioactive waste out of the storage tanks and for startup of the vitrification plant (the WTP). In late 2008, the State of Washington sued DOE to enforce deadlines for Hanford's cleanup. In October 2010, the parties reached a settlement, resulting in a Consent Decree (*State of Washington v. Chu*, Civil No. 2:08-cv-05085-FVS, October 25, 2010). The settlement imposed a new, enforceable, and achievable schedule for cleaning up waste from Hanford's underground tanks and notification requirements.

Commentor No. 214 (cont'd): Stuart Buchan

3. Dismantle the FFTF reactor entirely *214-6*

sincerely,

Stuart Buchan
16800 S E 29th St
Bellevue WA 98008 tel xxx-xxx-xxxx

214-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

214-5 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all of the SSTs. Tank Closure Alternatives 6A and 6B assumed that the materials removed during clean closure activities would be managed as HLW, as appropriate, and stored on site pending disposition.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

214-6 Regarding the complete dismantlement of FFTF, although nearly all elements of FFTF and the two adjacent support facilities would be removed under this alternative, the lower portion of the RCB concrete shell would remain. This would be backfilled with either soil or grout to minimize void space. The area would be regraded and revegetated, with no need for a barrier.

Commentor No. 215: Ken Niles, Nuclear Safety Division Administrator, Oregon Department of Energy

From: Niles, Ken [ken.niles@odoe.state.or.us]
Sent: Thursday, March 18, 2010 12:42 PM
To: TC&WMEIS@saic.com
Cc: Burandt, Mary Beth
Subject: Oregon Comments on the Draft TC&WM EIS
Attachments: Oregon-TC&WM_EIS_Final_Comments.pdf

Attached are the State of Oregon's comments on the draft Tank Closure and Waste Management EIS. Please acknowledge receipt of our comments.

Ken Niles

Nuclear Safety Division Administrator
Oregon Department of Energy
625 Marion Street NE
Salem, OR 97301
xxx-xxx-xxxx
xxx-xxx-xxxx – cell
ken.niles@state.or.us

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Commentor No. 215 (cont'd): Ken Niles, Nuclear Safety Division Administrator, Oregon Department of Energy

Oregon
Theodore R. Kulongoski, Governor

OREGON DEPARTMENT OF ENERGY

625 Marion St. NE
Salem, OR 97301-3737
Phone: (xxx) xxx-xxxx
Toll Free: x-xxx-xxx-xxxx
FAX: (xxx) xxx-xxxx
www.energy.state.or.us

March 18, 2010

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
Post Office Box 1178
Richland, WA 99352

Dear Ms. Burandt:

Thank you for the opportunity to provide comments on the draft Hanford Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS). The Oregon Department of Energy previously submitted preliminary comments on January 4, 2010[1]. These comments should be considered as a supplement to those earlier comments.

Oregon appreciates the fact that the U.S. Department of Energy (DOE) provided a 140 day comment period for this document. It is an incredibly complex document and the additional review time was necessary in order to complete at least a somewhat thorough review of the draft EIS. DOE served the public well by not unnecessarily rushing the public's review of this document. Please note that a lack of a comment by Oregon regarding any portion of the EIS should not be read as concurrence; rather it reflects the lack of time and resources to fully consider every element in detail.

Oregon has extensive comments which follow. However, the fundamental conclusion from our review is that serious flaws within this document require that DOE issue a new draft for review and comment before it moves to a final EIS. Oregon expects to continue a dialogue with DOE as it responds to and incorporates the comments received. *215-1*

We recognize that the draft TC&WM EIS analyzes a series of potential actions, many of which are integral to the cleanup of the site and which are governed by state and federal agencies enforcing environmental laws. The full investigation, analysis and decisions on these actions will be made by the regulatory agencies, the Washington State Department of Ecology and the U.S. Environmental Protection Agency, and not by DOE as a result of this draft TC&WM EIS. This EIS should support, rather than supplant, their analyses and decisions. *215-2*

[1] Oregon Department of Energy letter to Mary Beth Burandt, Document Manager, DOE, January 4, 2010.

pg. 1

215-1 DOE has satisfied NEPA requirements by responding to public comments on the draft EIS in this CRD and by making changes to the draft EIS where appropriate and necessary. Subsequent to the issuance of the *Draft TC & WM EIS*, DOE prepared an SA to analyze 14 topics it identified where it is unclear whether updated, modified, or expanded information warrants preparation of a supplemental or new draft EIS. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* is not required. See Chapter 1, Section 1.8.2, for more information. Early stakeholder participation in the *TC & WM EIS* planning and development process is important to DOE, which has provided numerous opportunities for such interaction. For example, the Oregon Hanford Cleanup Board and other key stakeholders have provided extensive input to the *TC & WM EIS* development process and analyses. Chapter 8 of this *TC & WM EIS* identifies the process for these interactions and includes a description of the outcomes of such stakeholder meetings.

215-2 DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; Section 1.2.7 discusses the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE order requirements that must be met for DOE to implement Tank Closure alternatives. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter. Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives, as well as the permits and approvals DOE must obtain from Federal, state, and local agencies. In Sections 8.1.7 and 8.3, DOE identifies the

Commentor No. 215 (cont'd): Ken Niles, Nuclear Safety Division Administrator, Oregon Department of Energy

❒ **Conformance with the National Environmental Policy Act (NEPA)**

This draft TC&WM EIS must show that future actions will conform to the policy and specific directions provided by NEPA. NEPA requirements are to:

> *"…prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man…recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man …without degradation, risk to health or safety, or other undesirable and unintended consequences; The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall….insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations.[2]"*

215-3

In its current form and with its current alternatives, actions proposed within the draft TC&WM EIS do not meet NEPA requirements. None of the proposed actions, if implemented, would prevent or eliminate damage to the environment. Instead these actions result in on-going injury to the environment for more than 30,000 years[3].

The proposed actions in the draft EIS do not restore the environment. The proposed actions in the draft EIS do not prevent degradation or risk to health and safety or other undesirable consequences. Instead the draft EIS looks at a narrow range of alternatives, all of which result in increased damage to the environment and risk to human health. Additionally, the draft EIS does not give appropriate consideration to environmental amenities and values alongside economic and technical considerations as required by NEPA.

215-4

Under both NEPA and the Council on Environmental Quality Regulations implementing NEPA, mitigation actions are required. The draft TC&WM EIS details a series of potential mitigation actions in section 7.1. The proposed actions are, for the most part, proposed ways to lessen the impacts of the proposed actions, and do not constitute actual mitigation of the impacts. Moreover, DOE does not commit to these actions.

❒ **Tank closure alternatives**

215-5

DOE analyzed 11 different alternatives related to the storage, retrieval, treatment and disposal of Hanford's tank wastes, along with closure of the tank farms.

The Oregon Department of Energy reviewed each of the 11 alternatives against the following criteria:

[2] NEPA Pub. L. 91-190 § 4321-4327, January 1, 1970 as amended.
[3] Figure U-2 and Tables U-2, U-5, U-6, U-7, U-9 and others.

pg. 2

consultations and coordination that DOE has undertaken with American Indian tribes and would need to continue for the purpose of implementing the proposed actions and alternatives. In addition, Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that may be needed and are feasible for DOE to implement to offset the potential impacts that might result from implementing an alternative.

While DOE's Preferred Alternative for waste management in this *TC & WM EIS* may not be the most environmentally preferred alternative, the ROD issued by DOE will identify any additional mitigation and monitoring commitments adopted by DOE and specify other factors considered by DOE in reaching its decision, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. In announcing its decision in the ROD based on the EIS analyses, DOE will be obligated to carry out the decision consistent with the requirements identified in this EIS. These requirements will be interpreted and applied by Federal, state, and local regulatory agencies through their independent authorities. These agencies may also impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA, which include additional opportunities for public comment.

215-3 This EIS addresses many environmental amenities and values, including American Indian cultural and religious values, aesthetics, visual resources, noise, land use, and ecological resources, among others.

The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

Commentor No. 215 (cont'd): Ken Niles, Nuclear Safety Division Administrator, Oregon Department of Energy

- Long-term protectiveness of the Columbia River, primarily associated with preventing additional migration of contaminants into Hanford's groundwater
- Compliance with the Tri-Party Agreement; meeting schedules for waste treatment and requirements for quality of the final waste form
- Permanence of the actions (for example, durability of the waste form so as to prevent future releases)
- Minimizing natural resource injury liability
- Protectiveness of human health and the environment

We believe these criteria meet the purpose and need of the draft TC&WM EIS, which as stated on page S-9 includes "…treat the waste and close the (single-shell tank) system in a manner that complies with Federal and applicable Washington State laws and DOE directives to protect human health and the environment. Long-term actions are required to permanently reduce the risk to human health and the environment posed by waste in the (Hanford tanks)."

We found that perhaps only one of the Tank Closure alternatives satisfied all of these criteria, while many failed to satisfy most or all of the criteria. The 11 alternatives lack the necessary actions to ensure that, to the maximum extent possible, soil and groundwater will not be further contaminated by the actions proposed; that the risk to the environment and human health will not increase in the future; and that existing contamination will be remediated to ensure protectiveness of human health and the environment. The biggest failing was that few of the alternatives took measures to retrieve existing waste from the soil, which the draft EIS clearly indicates causes some of the most significant long-term impacts[4]. ***215-5 cont'd***

Oregon's Proposed Alternative 7 (Alternative 7) is a reasonable new alternative[5]. We believe it would better meet the purpose and need of the TC&WM EIS. It focuses on compliance with applicable state and federal laws, while proposing actions to reduce the risk to human health and the environment. It largely selects elements already analyzed (as shown in Table S-1 on Page S-27) within the draft TC&WM EIS, however Alternative 7 bundles these elements together in a new way that offers a reasonable alternative to the 11 alternatives which have already been analyzed.

Alternative 7 is environmentally preferable, especially with respect to the criteria listed above in that:

> Tank Waste Storage – Alternative 7 would include construction of New Waste Receiver Facility tanks to help ease retrieval operations and necessary waste transfers.

[4] As one example, Figure 2-83 on Page 2-217.
[5] "The existence of a viable but unexamined alternative renders an environmental impact statement inadequate." Resources Ltd. v. Robertson, 35 F.3d 1300, 1307 (9th Cir.1993) (quoting Idaho Conservation League v. Mumma, 956 F.2d 1508, 1519 (9th Cir.1992)).

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215-4 DOE disagrees that mitigation has been inadequately discussed in this *TC & WM EIS*. The NEPA evaluation process is conducted early in agency planning, when details of the proposed project are not yet well enough defined for specific mitigation measures to be developed. The discussion presented in this EIS identified potential mitigation measures that could be applied; specific mitigation measures would be selected based on the course of action chosen by DOE as identified in the ROD. Following issuance of this *Final TC & WM EIS* and its associated ROD, DOE is required to prepare a mitigation action plan that addresses mitigation commitments expressed in the ROD (10 CFR 1021.331).

215-5 Regarding the adequacy of the Tank Closure alternatives analyzed in the *Draft TC & WM EIS* and the suggestion that the proposal put forth by the Oregon Department of Energy be evaluated as a distinct alternative in this EIS, DOE has determined that implementation of such an alternative would be technically infeasible as defined. Accordingly, the Oregon proposal cannot be considered a reasonable alternative and was not analyzed in detail in this *TC & WM EIS*. For a more comprehensive discussion of this issue, see Section 2.6 of this CRD.

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This would result in less long-term reliance on the integrity of the aging single-shell tanks.

Tank Waste Retrieval – Alternative 7 would include removal of a *minimum* 99 percent of the waste from each of the tanks. Additional retrieval would be determined on a tank-by-tank basis, based upon the remaining radioactivity and composition of the waste, and whether the tank itself would need to be removed to access contaminated soil beneath the tank. The EIS analysis clearly indicates that as more waste is removed from the tanks, future impacts will be less severe[6].

Tank Waste Treatment – Alternative 7 includes constructing and operating Hanford's Waste Treatment Plant (WTP) as currently configured (two high-level waste melters and two low-activity waste [LAW] melters). We propose to supplement the existing WTP by expanding LAW vitrification capacity to the extent necessary with the goal of completing vitrification by 2040. We reject supplemental technologies such as bulk vitrification, cast stone or steam reforming, which the draft EIS demonstrates are poor choices as supplemental waste forms[7]. We also advocate studying additional pre-treatment options like fractional crystallization or the removal of sodium and technetium from the waste stream to reduce the volume of glass produced and make the process more efficient and effective in achieving permanent immobilization of waste.

Tank Farm Closure – Alternative 7 advocates retrieving high concentrations of contaminants that exist in the soil within and beneath Hanford's tank farms. The analysis already demonstrates that these past releases and leaks contribute significantly to the long-term impacts to the groundwater. Tanks which have not leaked and are not blocking access to contaminant retrieval would likely not need to be exhumed.

Tank Farm Cribs and Trenches Closure – As with past tank releases and leaks, Alternative 7 proposes a similar action for nearby cribs and trenches – retrieving high concentrations of contaminants that exist in the soil. This applies not just to the limited suite of cribs and trenches considered in the EIS, but to all similar locations posing a threat to groundwater, the environment or human health.

NEPA requires that environmental impact statements present all reasonable alternatives and disclose and consider the impacts of all related pending federal agency proposals for action, including cumulative impacts. We believe that Alternative 7 is a reasonable alternative, and therefore DOE should "rigorously explore and objectively evaluate" this alternative[8]. In addition to Oregon's proposed alternative, a new array of reasonable alternatives is needed. These alternatives should provide decision makers with an objective basis for comparison of the benefits and impacts of potential decisions, and should meet the full intent of NEPA.

215-5 cont'd

[6] Page S-88, Figure S-14.
[7] Page S-91, Figure S-15.
[8] 40 C.F.R. § 1502.14(a).

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None of the proposed supplemental waste forms (bulk vitrification, cast stone, or steam reforming) can meet environmental standards[9]. Each of these waste forms releases contamination into the soil and groundwater at unacceptable levels. If DOE retains these waste forms for further analysis, it must be predicated upon shipping the resulting waste forms to a repository at another site rather than disposal in the Hanford soil. *215-5 cont'd*

❒ **Off-site waste**

The modeling analysis in the draft EIS clearly shows that no matter where at Hanford DOE proposes to dispose of off-site wastes, the impacts exceed standards and are unacceptable[10]. Moreover, the impacts from Hanford-origin wastes in these same areas already exceed standards under the most aggressive cleanup considered, leaving no room for any additional impact from off-site wastes. All of the waste forms that were considered will release contaminants and exacerbate the contamination already present. As a result, no off-site wastes can be allowed[11].

A major deficiency in the draft EIS is that it did not analyze any alternative in which off-site waste was not brought to Hanford for disposal. Such an analysis should be included in the revised draft EIS.

DOE issued a Record of Decision (ROD) in February 2000[12] as part of its Final Waste Management Programmatic EIS that designated Hanford as one of two disposal sites for low-level waste (LLW) and mixed low-level waste (MLLW) from throughout the DOE complex. The Nevada Test Site was the other disposal location. *215-6*

The "Basis for Decision" for the selection of Hanford, as generically explained in the February 2000 ROD, was "low impacts to human health, operational flexibility, and relative implementation cost." Yet the only "environmental safety benefit" that the ROD specifically mentioned was that as an arid site, "evaporation rates exceed rainfall by approximately 10 to 1 or more.[13]" In addition, Hanford LLW disposal facilities were pointed out to have expansion capability and could dispose of a wide range of radionuclides. Lastly, Hanford (and the Nevada Test Site) were the only two DOE sites which had MLLW disposal facilities already constructed.

The 2000 ROD provided no further environmental justification for the selection of Hanford, as the site-specific analyses of the impacts of this decision were to be assessed through a separate EIS. That has eventually evolved into this draft TC&WM EIS, which does show

[9] Chapter 2 and others comparing the impacts of DOE's proposed alternatives
[10] Figures 5-397, 5-399, 5-401 and others.
[11] Section 7.1, Table 7-1, Additional Consideration for Long-Term Mitigation, Water. The TC&WM EIS authors note as mitigation that several COPCs are predicted to exceed benchmark concentrations and they propose as mitigation that DOE "Restrict the receipt of offsite waste to waste that would have low impacts on groundwater over the long term at Hanford (e.g., limit or restrict receipt of off-site waste containing iodine-129 or technetium-99 at Hanford)."
[12] Federal Register, Volume 65, Number 38, February 25, 2000, DOE/EIS-0200-F.
[13] Federal Register, Volume 65, Number 38, February 25, 2000, DOE/EIS-0200-F, pages 10064 and 10065.

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215-6 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East. As can be seen in the sections above, the radiological risks increase by an approximate factor of six. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. With regard to the February 2000 ROD, DOE explained in the *WM PEIS* (DOE 1997) that additional analyses would be prepared to implement DOE's programmatic decisions.

Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Section 2.12 of this CRD.

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that the adverse impacts of disposing of additional off-site waste at Hanford – especially if it contains certain mobile and long-lived radionuclides – would be significant.

Therefore, given that the February 2000 ROD was contingent upon the assumption that the site-specific analysis would demonstrate that the impacts would not be significant, and the draft TC&WM EIS assessments are to the contrary, the 2000 ROD should be immediately amended to withdraw Hanford as an acceptable disposal location for LLW and MLLW from throughout the DOE complex.

In addition, Hanford should be withdrawn for consideration as a disposal site for Greater Than Class C waste[14], and Hanford should no longer be considered as a reasonable alternative for other, future waste[15] or disposal missions.

215-6 cont'd

❒ **It is impossible to assess impacts of various options against each other**

Whatever alternatives DOE develops and analyzes in the revised draft EIS, these should be assembled in such a manner that decision makers can assess the impacts and merits of the various component parts of the decisions. The approach used in the existing draft EIS makes it impossible to judge which alternatives in each step of the remediation process (for example, tank closure, waste treatment, etc.) are more appropriate or more protective. There is no way to separate the impacts of alternative aspects in these evaluations in order to understand their individual impacts. There is no practical way, for example, to directly compare the impacts of clean closure to landfill closure.

The draft EIS should have analyzed elements of each remediation step in comparison to each other and then assembled the best elements to create the best alternative approaches for comparison in the draft EIS analyses.

215-7

❒ **There are no "reasonable" remediation alternatives in the draft EIS**

DOE created alternatives that individually contain aspects which make them unacceptable. The EIS incorporated technologies (cast stone, bulk vitrification, steam reforming) that are individually and as a group unacceptable because they fail to permanently immobilize highly mobile technetium and iodine. It was also not clear what criteria DOE used in assessing the viability of an alternative. DOE should have used compliance with criteria from environmental laws and with Tri-Party Agreement milestones as threshold standards in creating and evaluating the various alternatives.

The draft EIS does not appear to contain a "reasonable or protective" remediation alternative. DOE should have used water quality criteria (drinking water and aquatic life

215-8

[14] Environmental Impact Statement for the Disposal of Greater-Than-Class C Low-Level Radioactive Waste (GTCC EIS), DOE/EIS-0375 (72 FR 40135).
[15] E.g. Environmental Impact Statement for the Long-Term Management and Storage of Elemental Mercury, DOE/EIS-0423 (74 FR 31723).

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215-7 The alternatives presented in the *Draft TC & WM EIS* were developed under NEPA to address the essential components of DOE's three sets of proposed actions and to provide an understanding of the differences among the potential environmental impacts and the range of reasonable alternatives. Because several hundred impact scenarios could result from the potential combinations of the 11 Tank Closure, 3 FFTF Decommissioning, and 3 Waste Management alternatives, DOE analyzed combinations of alternatives to represent key points covering the full spectrum of potential actions and associated overall impacts that could result from full implementation. The analyses of potential environmental impacts are presented in detail in Chapters 4 ("Short-Term Environmental Consequences") and 5 ("Long-Term Environmental Consequences") of the *Draft TC & WM EIS*, allowing an in-depth comparison of the alternatives by resource area. The impact analyses presented in Chapter 2, Sections 2.8 and 2.9, are summaries of the short- and long-term impacts presented in Chapters 4 and 5, respectively. DOE believes that there are specific aspects of each alternative that illuminate key issues or concerns, including the potential impacts related to landfill closure or clean closure of the SST system. These comparative impacts are described in the key environmental findings sections of the Summary (Section S.5.5) and Chapter 2 (Section 2.10) of this EIS.

215-8 See response to comment 215-3 regarding NEPA alternative development.

The "benchmark standards" used in this EIS represent dose or concentration levels that correspond to known or established human-health effects. For groundwater, the benchmark is the MCL if it is available. For example, the benchmark for iodine-129 is 1 picocurie per liter; for technetium-99, 900 picocuries per liter. These benchmark standards for groundwater impacts analysis were agreed on by both DOE and Ecology as the basis for comparing the alternatives and representing potential groundwater impacts. In addition, use of the standards is consistent with the Model Toxics Control Act (MTCA) standards Method A used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs as listed in Table 720-1 of the MTCA. In this *TC & WM EIS*, the use of MCLs as benchmarks for purposes of determining potential groundwater contamination is thus consistent with the manner in which MCLs are considered in the CERCLA process and provides information to help inform future cleanup decisions.

One purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of

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standards) from environmental laws, together with risk-based criteria for human and ecological health, as minimum threshold standards in creating and evaluating alternatives. The modeling analysis of the impacts from the implementation of the EIS alternatives proposed shows that none of the alternatives appear to keep water quality below Federal CERCLA and Washington Model Toxic Control Act water quality thresholds for groundwater.[16] Any alternative that included importation of off-site waste demonstrated little chance of meeting the thresholds. A series of near-term, more comprehensive and aggressive remediation alternatives should be developed that address the potential to prevent future degradation of groundwater.

Some of the remediation elements (for example, leaving contaminated vadose zone unremediated or capping cribs and trenches) will damage the future state of cleanup, negating current cleanup efforts. Remediation selection should focus on cumulative risk and should be directed toward developing alternatives that bring about risk reduction, both now and into the future, for the entire site.

215-8 cont'd

❒ **The draft EIS fails to be all-inclusive**

The cumulative impacts and risks of all Hanford wastes and cleanup actions must be part of the EIS. The EIS fails to note that nearly all of the activities and wastes analyzed in the EIS are DOE wastes, and that the impacts from all of these are additive, not comparative. It is impermissible for DOE to use the impacts of wastes from parts of DOE (for example, the Richland Field Office (RL), the Office of River Protection (ORP), or other DOE sites) as a basis upon which to compare impacts. The EIS repeatedly does precisely this, assessing the significance of impacts in comparison to impacts from other DOE wastes[17]. All of these impacts are additive. DOE must meet environmental standards for all of them together. The risk of this EIS is not "small in comparison to the RL waste."

The EIS also fails to include wastes from US Ecology in a cumulative analysis. There are large inventories of uranium, other radioactive elements, and other hazardous substances at US Ecology, and these must be included in any credible assessment of cumulative effects.

215-9

❒ **The draft does not account for planned and on-going remediation work**

While the impacts of disposed contaminant inventories of waste sites, tank leaks, intentional releases, and unintentional releases were used in the construction of the draft EIS, none of the on-going or planned remedies for some of these contaminant masses were used in the modeling. The impacts of past, on-going and nearly implemented groundwater and vadose zone remediation projects were not part of the modeling input, which limited the ability of the model to simulate reality. For example, no groundwater or vadose zone remediation was included in the analyses and many CERCLA past-practice units were not included.

215-10

[16] Draft EIS, Appendix O, "Groundwater Transport Analysis".
[17] For example, Summary section 5.4.4.2 Long Term Cumulative Impacts on Groundwater Quality, on Human Health, and on Ecological Resources. Note that these risks are often not temporally correlated. The peak risks used for comparison are often decades in the past and not meaningful for analysis or comparison.

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this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

215-9 As described in Appendix R, and summarized in Chapter 6, Section 6.1, cumulative impacts were estimated by the addition of impact values for the alternative combinations (Chapters 4 and 5), the baseline (Chapter 3), and the reasonably foreseeable future actions (Appendices R, T, and U). For any given resource, cumulative impacts are the total impacts regardless of what agency or action produces the impact, although an important secondary consideration is what action is producing the bulk of the impact. Therefore, it is important to indicate whether the actions that are the subject of this EIS, and thus the decisions to be included in the ROD, produce the bulk of the impact or are only minor or negligible contributors to the cumulative impact. This helps the reader distinguish between activities responsible for the bulk of the impact/risk and activities outside the scope of this EIS. As described in Chapter 6; Appendix R, Table R–4; and Appendix S, Tables S–24, S–50a, and S–50b, the U.S. Ecology Commercial Low-Level Radioactive Waste Disposal Site (US Ecology) is included in the cumulative impacts analysis.

215-10 This EIS does not consider groundwater remediation; its scope is limited to non-groundwater remediation activities for tank closure and FFTF decommissioning, as well as waste management. Other Hanford remediation activities as required under RCRA, CERCLA, and/or the TPA are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. Cleanup decisions regarding the non-tank-farm contamination sites will be made in consultation with Federal and state agencies. The other Hanford remediation activities are considered in the *TC & WM EIS* cumulative impacts analysis.

As noted in Section S.3.5 of Appendix S, 403 waste sites are involved in the other past, present, and reasonably foreseeable future actions considered in the cumulative impacts analysis. Appendix S also describes the development of the waste site characteristics for the cumulative impacts analysis, including key characteristics such as the names and locations of the waste sites, the mass or volume of waste disposed of, the disposal dates, the inventories of contaminants present, and the current or future end state. Information on the current or future end state helps determine how the waste sites were factored into the cumulative impacts analysis. For instance, for waste sites subject to landfill closure, the inventory of contaminants would be disposed of in place; for waste sites subject

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This skews the results of the modeling. Trying to predict the outcome of remediation efforts may be somewhat speculative. However, an attempt to include these impacts into the model analysis would have produced a much more comprehensive and realistic result. *215-10 cont'd*

❒ Currently contaminated groundwater, groundwater yet to be contaminated, and the vadose zone must not be declared "Irreversible and Irretrievable" lost resources

The groundwater and vadose zone are State, not Federal resources, and are not subject to an irreversible and irretrievable claim under NEPA. The cleanup and protection of groundwater is the driver for most of the remediation work planned for the future at Hanford. It is not reasonable to declare the resource that is the focus of the cleanup as irretrievably lost. DOE management has always maintained and guaranteed that the groundwater at Hanford would be returned to drinking water standards by the end of cleanup.

Likewise, excluding large masses of contaminated vadose zone from remediation by declaring them as irretrievable is not reasonable. These vadose zone sources will continue to supply contaminants to the groundwater. *215-11*

Perhaps more important, the long-term impacts on soil and groundwater are not "unavoidable" and are therefore not appropriate for consideration as irreversible and irretrievable lost resources. Although the draft EIS shows impacts to the vadose zone and groundwater under all of the alternatives considered, that outcome is an artificial construct resulting from the limited set of alternatives considered in the EIS, together with decisions limiting the level of cleanup for non-EIS wastes. Just as it is possible to develop alternatives that are protective of human health and the environment, it is possible to develop alternatives that do not lead to unacceptable contamination of the vadose zone and groundwater and that obviate the need to even consider making claims for irreversible and irretrievable loss of these resources.

❒ The EIS makes it clear that minimizing the amount of waste left in place is probably the only approach that will analyze as a successful alternative

The draft TC&WM EIS's cumulative impact analysis projects that the Hanford Site will persist in re-contaminating groundwater and the Columbia River over the next one hundred to tens of thousands of years. This flow of contamination will continue long after current allocated budgets and identified cleanup is done. There is no acknowledgement within the current draft EIS of the potential to drive down the cumulative impacts by initiating a policy of pursuing additional retrieval from burial grounds, tank leaks, tank bottoms and all other sources (RL and ORP) where there are significant amounts of waste discharges and buried waste. *215-12*

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to "remove, treat, and dispose," the inventory would be removed to the extent possible, treated as necessary, and disposed of in the ERDF or an IDF. The groundwater modeling incorporates the disposition locations for the contaminant inventories from each waste site, and thus the long-term cumulative impact analyses reflect the current or future end states to the extent possible.

Despite its consideration of end states, however, this EIS is not able to fully reflect the effectiveness of all remediation activities. There are significant uncertainties in estimating the degree of cleanup to be achieved by the remediation activities. Among these uncertainties are (1) the inventories of contaminants released to the ground at many of the sites; (2) for liquid release sites, the portion of the originally disposed of contaminants remaining in the vadose zone and the portion that has migrated into the groundwater; (3) the selection of specific cleanup/containment methods for some sites; and (4) the effectiveness of the cleanup/containment methods. Therefore, the cumulative impacts analysis for this *TC & WM EIS* is conservative in that it does not account for cleanup/containment of waste and contaminated soil at liquid release sites, or cleanup/containment of current or future groundwater contamination.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

215-11 DOE does not make a claim in Chapter 7, Section 7.3, that groundwater or vadose zone contamination is irreversible or irretrievable. However, permanent in-place closure of existing facilities analyzed in this EIS, including newly created disposal facilities, is considered an irreversible and irretrievable commitment of land resources. DOE acknowledges the commentor's assertion that long-term impacts on soil and groundwater are not "unavoidable," but disagrees that this is because the selection of alternatives analyzed in this EIS is limited and is not fully protective of human health and the environment. Section 7.2 provides a discussion on unavoidable, adverse impacts on water resources that would occur under any of the alternatives analyzed in this EIS. In reference to the suggestion to develop an alternative that "does not lead to unacceptable contamination of the

It is clear from the analysis in the EIS that the wastes already released deep into the soil dominate the onsite risks, and that vastly more work and research is needed to find ways to retrieve this contamination or to stop it in place. As the dominant long-term risks are from mobile species (notably technetium 99 and iodine 129, and also uranium and carbon tetrachloride), it seems likely that in-place stabilization will at best slow the movement temporarily, providing time for other remediation actions to be taken. It is abundantly clear that tank closure decisions are highly dependent on first retrieving the leaked waste beneath the tank farms, and that no decision on tank closures can be made until that problem is solved. *215-12 cont'd*

❒ **Favoring use of one Integrated Disposal Facility (IDF) over another is a false choice**

The draft EIS analyzes whether disposing of Hanford-generated waste in an IDF in the 200-East Area is better than disposing of waste in a pair of IDF's, one in each of the 200 areas. However, neither choice ultimately makes much difference to the eventual loading of contaminants into Hanford's groundwater. The perceived advantage comes simply from an increased velocity of groundwater, which temporarily dilutes the waste stream and changes the time in which waste migrates through groundwater and reaches the Columbia River. The amount of waste input to the cumulative waste loading of the site does not effectively change. The perceived "better option" is only a false choice that does not result in actual improvement. The EIS must examine other alternatives for disposal of this waste that do not negatively impact Hanford's groundwater. *215-13*

❒ **Caps and barriers are shown not to be protective**

The EIS itself notes that caps and barriers do not effectively prevent movement of wastes in the soil and fail to provide protectiveness. The Draft EIS notes that caps "would delay, but not prevent down-gradient movement of contaminants…,"[18] and that barriers "… would degrade over time, allowing infiltration and contaminant migration, and the (Hanford tanks) would fail, resulting in release of their contents to the vadose zone and unconfined aquifer system."[19] Caps and barriers may have a place in the short term in slowing infiltration in the near surface. They may also have a place when coupled with other technologies as an additional layer in the defenses for the future. However, they should be accorded no credit as a solution on their own. Caps do not isolate waste from the environment for a long enough time period to be effective. Wastes must be exhumed, removed and isolated, not merely capped. This concept should also apply to non-TC&WM EIS cleanup decisions. Caps are neither effective nor durable enough for the long term, as acknowledged in the EIS. *215-14*

This conclusion also means that vadose zone contamination, including intentional releases, tank leaks and unintentional releases, must be addressed to reduce cumulative impacts to lower groundwater impacts to a level below regulatory thresholds. Caps over vadose zone

[18] Page 2-146, Section 2.8.1.6.
[19] Page 4-69, Section 4.1.6.3.2.

vadose zone and groundwater," any alternative that would involve onsite disposal facilities or that would fall short of remediating the site to a level completely "free" of contaminants would result in some measure of long-term unavoidable, adverse impacts on soil and groundwater, whether or not these adverse impacts would be considered unacceptable. Certain long-lived radionuclides such as technetium-99 do not disappear, but can be mitigated through changing the waste form to achieve better performance.

Chapter 7, Section 7.1, discusses mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives. Sensitivity analyses that evaluate improvements in IDF performance (e.g., infiltration rates) and in secondary- and supplemental-waste-form performance (e.g., release rates) were performed and are included in this final EIS, with a summary of these analyses in Section 7.5.

215-12 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

215-13 DOE disagrees with the commentor's assertion that the choice of one IDF over another is a false choice because waste that would be generated from the WTP treatment process, FFTF decommissioning activities, and other waste management activities at Hanford will need to be disposed of at some location. This *TC & WM EIS* analyzed disposal of certain wastes in two different IDF locations, as described in Chapter 2, Section 2.5.1.3. The long-term groundwater analysis compares the anticipated impacts of disposal of this waste in IDF-East with those of disposal in IDF-West. As the commentor points out, there are some differences between these locations in terms of their geological and hydrological characteristics that could influence disposal considerations. In response to this and related comments, and following further analysis of the *Draft TC & WM EIS* results, DOE expanded the analysis of waste disposal in an IDF to address uncertainties in infiltration rates, waste-form performance, and components and inventories of offsite LLW and MLLW streams. This analysis specifically addresses the impacts of an IDF in the case of no offsite waste importation and disposal. The expanded analysis is presented in Chapter 7, Section 7.5, of this *Final TC & WM EIS*.

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contaminant masses were clearly shown in the EIS modeling as an ineffective method for the protection of groundwater from vadose zone contamination. *215-14 cont'd*

❒ **The EIS proposes secondary waste forms that are unacceptable**

Waste forms that don't permanently immobilize waste are unacceptable and must be avoided. Mitigation for secondary waste, including that generated by the Waste Treatment Plant, must include the development of robust waste form(s) that will reduce the impacts to groundwater to the extent possible over the long term. The secondary wastes currently being produced must also be locked up in protective, durable waste forms.

All of the proposed secondary waste forms modeled in the draft EIS failed to immobilize contaminants for long enough time lengths necessary to be truly protective. Secondary waste forms proposed for wastes containing technetium 99, iodine 129, uranium, and other mobile nuclides have not been demonstrated to meet required standards. Development of additional waste forms that permanently immobilize waste and/or deep repository development work are urgently needed. In addition, the operation of the waste treatment plant must be performed such that the intent is to minimize generation of secondary waste. The maximum amount of hazardous and radiological constituents possible should be directed into the vitrification waste streams, leaving a minimum of these constituents for treatment as secondary waste streams. *215-15*

The results of the EIS analysis argue heavily for the use of vitrification technology as the most durable waste form for secondary waste.

❒ **The draft EIS should include full life-cycle costs in the alternative selection**

Cost estimates in the EIS are incomplete and substantively misleading. The EIS does not consider any of the long-term stewardship costs that are required for cleanup decisions that leave waste in place and that do not permit unrestricted access and unrestricted use. These include activities such as monitoring and maintenance and CERCLA Five-Year reviews. The EIS also does not account for costs for environmental restoration (mitigation[20]) or for natural resource injury liabilities, including service losses that will continue to accrue until the site is restored to baseline condition. *215-16*

The draft EIS further fails to consider the costs of active security that would be required to prevent access to large amounts of plutonium, or high curie radioactive sources left on site – costs that would require active security for so long as the wastes remain on site. When all of these costs are fully considered, a more comprehensive remediation effort initiated now could be more cost-effective and protective of human health and the

[20] Section 7.1 Mitigation – lists but does not commit to a series of "potential mitigation measures." The vast majority of these are not actual mitigations, but are measures to reduce impacts to varying degrees.

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215-14 The scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and on closure of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). The *TC & WM EIS* closure alternatives considered for the tank farms range from no action to landfill closure, selective clean closure, and clean closure, which would involve actions to remove the source of contamination.

215-15 As discussed in Chapter 7, Section 7.5.2.8, of this EIS, this is a particular area of focus for DOE, especially with regard to partitioning and capture of iodine-129, a conservative tracer, in secondary-waste forms. Additional sensitivity analyses have been added to this *Final TC & WM EIS*. These additional analyses evaluate what changes in potential impacts might occur if partitioning of contaminants could be increased in primary-waste forms and/or if secondary-waste-form performance could be improved. The results of these analyses will aid DOE in formulating appropriate performance targets for secondary-waste forms. As referenced in the discussion, DOE has drafted a roadmap that implements a strategy for development of better-performing secondary-waste forms.

215-16 Chapter 2, Section 2.11, of this *TC & WM EIS* summarizes and compares the relative consolidated costs of continued operation of existing facilities; construction, operation, and deactivation of new or modified facilities; and associated activities in support of the proposed actions, including administrative controls, institutional controls, and postclosure care. Cost estimates for other environmental restoration activities or natural resource injury liabilities are considered beyond the scope of this EIS. For analysis purposes, these cost estimates were calculated using constant 2008 dollars and, where applicable, existing cost information. Where cost information was not directly applicable, relevant data were scaled to estimate costs, or, where appropriate, scoping-level cost estimates were developed.

However, because there is currently no specific path forward for final disposition of IHLW, an associated cost basis for disposal of this material is not available for inclusion in this EIS. Accordingly, the cost estimates are valid for the purpose of understanding the relative costs of the alternatives, but do not represent complete life-cycle costs.

The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding

Commentor No. 215 (cont'd): Ken Niles, Nuclear Safety Division Administrator, Oregon Department of Energy

environment over the long-term, as opposed to leaving large amounts of waste in place that would need on-going care and monitoring.

No analysis of alternatives should even consider costs as a factor unless the estimates fully account for all life-cycle costs. An incomplete cost analysis is at best meaningless; at worst it is misleading and might lead to inappropriate cleanup decisions. *215-16 cont'd*

management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

❒ **The EIS should include life-cycle risk analyses in alternative selection**

Analogous to the concern noted above for cost estimates, risk analyses in the draft EIS are incomplete and misleading, because they consider risks only until the time of site closure. The EIS points to increased recordable worker occurrences as an argument against clean closure, but does not do any analysis of long-term risk of wastes left in place, either as a danger to exposure to someone on the Central Plateau or as exposure to groundwater or river water. This argument also ignores the fact that successful, clean closure and on-going remediation of waste sites has occurred all over the Hanford Site with little worker exposure. Long-term risks following closure are implicitly assumed to be zero. *215-17*

As was noted for cost analysis, no analysis of alternatives should even consider risk as a factor unless the estimates fully account for all life-cycle risks.

215-17 The statements that long-term risks following closure to intruders, including those of workers and from groundwater-mediated pathways, are assumed to be zero are incorrect. First, exposures to intruders after the loss of institutional control are considered under the Tank Closure, FFTF Decommissioning, and Waste Management alternatives intruder scenarios in this *TC & WM EIS* in Appendix Q, Section Q.3. In all scenarios, the impacts on intruders would be dominated by external exposure and inhalation, with the peak exposures occurring immediately after the loss of institutional control. The impacts through the groundwater pathways, including impacts on the Columbia River, are the subject of much of this EIS, detailed in Chapter 5 (alternatives impacts), Chapter 6 (cumulative impacts), and, in particular, Appendices L (groundwater flow field), M (release of contaminants to the vadose zone), N (vadose zone flow and transport), O (groundwater transport of contaminants), P (ecological risk), and Q (long-term human health dose and risk). This EIS estimated human-health impacts for a 10,000-year period following closure covering the entire life-cycle of the alternative.

❒ **Decommissioning of the Fast Flux Test Facility**

The EIS analysis is sufficient to select entombment for the Fast Flux Test Facility. However the priorities for site funding and work are such that DOE should make that decision, then defer the work until other priority work has been completed. *215-18*

215-18 Comment noted.

❒ **Characterization/source term**

The draft EIS inventory is missing waste volumes that may be indicative of a systemic under-estimation of the levels and amounts of vadose zone contamination. The estimates of tank waste in the EIS for the vadose zone consider only known leaks from tanks. These limited leak estimates appear to understate the real size of the tank waste releases. These estimates omit non-leak tank release events, such as tank overflows and discharges, as well as other intentional releases. Estimates of the quantity of waste in auxiliary equipment in tank farms which appears to be an extrapolation from another estimate may differ greatly from what they actually contain. Moreover, current analyses presume that all waste remaining in the tanks resides inside the steel liner. A significant quantity of waste may remain between the steel tank and the concrete walls for tanks that were overfilled or that leaked. The possibility exists that many tanks may have failed steel liners, but may not yet be accounted for as leakers as the waste has not yet escaped from the concrete external liner. *215-19*

215-19 Regarding the commentor's concern as to the accuracy of data, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

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There is a great deal of uncertainty in the composition of the waste in the single-shell tanks which could drastically affect the inventory estimates. The sampling of the tank contents has been limited and the EIS approach, which blends tank composition across the tank farms, does not appear to account for the complex chemistry of the liquid and solid makeup of waste that is found in individual tanks. This limited tank composition data does not engender high confidence in current DOE estimates of the tank waste compositions and severely limits our confidence in the risks reported in the draft EIS.

The draft EIS modeled impacts from leaving waste in the tanks as if the contents of all of the tanks are homogenous. The final one percent left as a tank heel likely will have a chemistry that is something different than one percent of the bulk heavy metal radionuclides and chemical contaminants of concern.

215-19 cont'd

The draft EIS should adequately report all chemical-radiological inventories from all disposal sites at Hanford (including non-Environmental Management disposal sites, such as US Ecology) to ensure a credible analysis of the actual and potential cumulative impact to groundwater.

Some older inventory documents (for example, PNNL-15289, 2006) indicate that a considerable amount of uranium has been disposed that was not accounted for in the draft EIS. The uranium in the solid waste burial grounds, in US Ecology and in the 618-11 burial ground, for example, has not been included in the modeling analysis. While the uranium disposed in these burial grounds was reported to be uranium salts or uranium metal, it is reasonable to assume that after a few thousand years, these shallowly buried toxic metals will be affected by weathering, will corrode, and will be converted to forms that are more mobile in the environment. The amount of uranium not reported is 6.42 million kilograms, or about 25 times the amount of uranium that was reported. These wastes become doubly important in that they would probably continue to corrode and leach into the vadose zone and groundwater well past the assumed 10,000-30,000 year analysis period, which was modeled assuming more mobile uranium forms already found in the vadose zone.

215-20

The characterization of contamination in the vadose zone beneath cribs, trenches and ponds was poor in the EIS modeling analysis. The EIS comments that "Uncontaminated aqueous waste, such as cooling water, was discharged to surface ponds." This statement is misleading. Surface ponds often received significant levels of contamination[21 22 23 24].

The EIS also comments that high volume waste streams containing modest levels of contaminants were discharged to cribs and trenches. However, the waste stream disposed in the cribs and tile fields (for example on the west side of the T Tank Farm) often was tank

[21] PNNL-11800 Addendum 1, *Addendum to Composite Analysis for Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site*, M. P. Bergeron, E. J. Freeman, & S. K. Wurstner; Appendix A: C. T. Kincaid, M. M. Coony, D. L. Strenge, R. L. Aaberg, & P. S. Eslinger, September 2001; Table A-16.
[22] PNNL-15479, *Groundwater Monitoring Plan for the Hanford Site 216-B-3 Pond RCRA Facility*, D. B. Barnett, R. M. Smith, C. J. Chou, & J. P. McDonald, November 2005.
[23] PNL-2499, *Comparative Ecology of Nuclear Waste Ponds and Streams on the Hanford Site*, Richard M. Emery & M. Colleen McShane, October 1978.
[24] BNWL-1884, *Aquatic Studies of Gable Mountain Pond*, C. E. Cushing & D. G. Watson, December 1974.

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One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

215-20 Appendix S of this *TC & WM EIS* explains the process used to develop the inventory data set for the cumulative impact analyses. All disposal sites for which inventories were identified and considered to be potential contributors to cumulative impacts on groundwater are included in the inventory listing provided in Appendix S and, therefore, were modeled. This includes non-DOE sites—in particular, US Ecology. The inventories for these sites were identified using the most recent information available.

As stated in Table S–5, the liquid release inventories were obtained from (1) SIM, Rev. 1 (Corbin et al. 2005); (2) the *Radionuclide Inventories of Liquid Waste Disposal Sites on the Hanford Site* (Diediker 1999); (3) the *Hanford Site Waste Management Units Report*, also known as the *Cramer Report* (DOE 1987); (4) technical baseline reports; (5) the latest version of the Waste Information Data System (the *Hanford Site Waste Management Units Report* [Shearer 2005], also referred to as the "WIDS database"); and (6) other sources. Solid-waste inventories were taken from (1) the *Summary of Radioactive Solid Waste Received in the 200 Areas During Calendar Year 1995* (Anderson and Hagel 1996) or other site-specific solid waste references; (2) the *Hanford Site Waste Management Units Report* (DOE 1987); (3) technical baseline reports; (4) the latest version of the Waste Information Data System (Shearer 2005); and (5) other sources.

DOE has compared the inventory values reported in Appendix S to the report cited in the comment, and the numbers are identical. However, DOE notes the commentor's concern regarding the lack of uranium inventories (i.e., total uranium) in the cumulative impact analyses. DOE acknowledges that none of the reviewed documents included a total uranium inventory estimate for certain waste sites, particularly for the solid-waste disposal sites. However, DOE again reviewed the data and revised the inventories to include a calculated total uranium inventory for those that had not been reported in the referenced documents, as appropriate. This inventory was included in this *Final TC & WM EIS* and analyzed appropriately.

Chapter 5 of the *Draft* and this *Final TC & WM EIS* provides concentration versus time for COPCs under each alternative. These figures provide an

supernate that flowed from the third tank in a three tank cascade. The trenches, cribs, and tile fields around the Tank Farms received considerable amounts of waste contamination which then flowed to the vadose zone and groundwater. Improvement of the characterization of the vadose zone beneath the cribs, trenches and ponds is needed to establish how much contamination is contained there.

We urge DOE to revise the draft TC&WM EIS to include estimates of current and future maximum concentrations for all potential contaminants of concern. Information contained in the current draft EIS which shows past peak concentrations in groundwater for many contaminants is not useful to evaluate current or future risk.

215-20 cont'd

❒ **The TC&WM EIS does not make allowance for the possibility of foreseeable natural events**

Natural disasters such as floods and seismic events need to be considered in the EIS analyses. Predictable events should be fully considered in all analyses. By definition, the site should expect approximately ten one-thousand year floods, and one ten-thousand year flood during the 10,000 year forecast period, and the EIS should consider the ramifications of those events. The EIS should analyze the likely water level along the Columbia River; groundwater levels; and the potential effects if there is catastrophic failure of one or more dams on the Columbia River. The EIS should also analyze the likelihood and potential impact if the channel of the Columbia River were to be catastrophically rerouted (for example, to the historic channel through Gable Gap and into the 200 Area).

Similarly, very large earthquakes (Cascadia Zone earthquakes) associated with the Juan de Fuca subduction zone appear to occur at 300-1,000 year intervals, based on geologic evidence, so one should expect and plan for 10-30 such events during the 10,000 year planning period. The EIS should analyze the likely effect of such major seismic events.

While less predictable, other environmental events are at least plausible and should be considered. The 1980 Mt. St. Helens eruption, and evidence of magma movements under the other Cascade volcanoes makes possible a range of volcanic events that could affect Hanford in a number of disastrous ways.

The EIS has also avoided inclusion of climatic effects, specifically the consideration of global warming effects that are recently being modeled throughout the world scientific community. The advance of climatic effects can be measured in decades, suggesting that thousands of years of climate change could present a very different Hanford environment to the one viewed today. The variation of climatic factors like temperature, wind strength and precipitation amount would have direct impact on infiltration rates, and on evaluation of alternative choices like the use of evapo-transpiration barriers and the life expectancy of landfill caps.

215-21

indication of the trend and identify peaks that could occur during the 10,000-year analysis period (through calendar year 11,940). In addition, Appendix U provides the concentration versus time for the COPCs for the cumulative impacts analysis, which includes past, present, and reasonably foreseeable actions.

215-21 Chapter 3, Section 3.2.5.1.1, of this *TC & WM EIS* discusses and depicts the locations of geologic faults relative to Hanford and the faults' potential for producing earthquakes, as well as the location of floodplains at the site. DOE Order 420.1B and its implementing standards require that nuclear and nonnuclear facilities be designed, constructed, and operated to safeguard the facility, public, workers, and environment from natural phenomena hazards, including earthquakes and floods. Appendix V of this EIS also provides an analysis that depicts potential impacts at Hanford that could result from climatic changes, which may increase infiltration rates and the rise of the groundwater table.

Commentor No. 215 (cont'd): Ken Niles, Nuclear Safety Division Administrator, Oregon Department of Energy

❒ **There are a number of issues with the Model used for the EIS analyses**

Prior to DOE issuing a revised draft TC&WM EIS, DOE should conduct a thorough analysis of the conceptual models used in fate and transport modeling and a critical re-examination of assumptions and presumptions upon which the EIS is based. The process then should proceed to develop and select reasonable alternatives in an open public process. Coupled with this, DOE should then develop and select a reasonable set of simulation codes capable of analyzing these alternatives. *215-22*

- The alternatives modeling analysis is based on only one deterministic modeling run. With limited model runs and a lack of documentation, the results cannot be considered reliable. Under these conditions, no sensitivity analysis or uncertainty analysis is possible, leaving decision makers and the public with little confidence in the repeatability of the results. In analysis of the draft EIS for the Hanford Advisory Board, K.D. Auclair and Associates[25] discussed at length the incomplete uncertainty analyses and poor quality assurance documentation of the EIS, shortcomings that limit the reliability of the EIS findings. We also note the instability of model forecasts for contaminant concentration and risk. In many model projections, these kinds of numbers vary erratically by as much as four orders of magnitude over short periods of time, reinforcing concerns about the stability of the models and likewise reinforcing skepticism of the reliability of any conclusions based on the models. *215-23*

- The model does not agree with present day conditions. While it is true that the model was fed known gross inventories of contaminants and then asked to predict where the waste would be transported, the model does not include on-going or past remediation that would have reduced the inventory and possibly impacted the flow direction of the waste streams. The model was not calibrated with present day conditions as part of model development and does not simulate known conditions. Some modern-known plumes (for example, the uranium plume under 200-East) are not well predicted by the model. This would appear to call the model's output into question.

- DOE's general inability to satisfactorily explain the sources of some groundwater contamination at Hanford (for example, the 200-East and 300-Area uranium plumes, or the chromium upwellings in the river at 100-BC) undermine the credibility of the input data and conceptual bases for the draft TC&WM EIS analysis. *215-24*

- The model was used inappropriately. The modelers ran subsections of the model using a variety of parameters, then selected the parameter set that gave the "best" observational fit[26] (based only on agreement of modeled particle tracks with an approximation of the tritium plume coming from the PUREX plant). The result is a shaped answer from a "pushed" model, not a reliable, natural simulation. The model *215-25*

[25] K.D. Auclair and Associates, 2010. Independent review of the Draft Tank Closure and Waste management Environmental Impact Statement, DOE Task Order DE-AT27-06RV14745.
[26] Section O.2.4

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215-22 There are currently no plans to issue a revised *Draft TC & WM EIS*. The alternatives analyzed in this *TC & WM EIS* were communicated to the public during the public scoping period, and public comments from this process were considered during development of this *Final TC & WM EIS*. There are no plans to conduct another public comment period.

The modeling codes used to perform the vadose zone and groundwater analysis were selected in the *Technical Guidance Document* (DOE 2005). There are no plans to revise that document and, therefore, no plans to revise the codes used in the vadose zone and groundwater analysis.

215-23 DOE disagrees with the commentor's assertion that the alternatives modeling analysis is based only on one deterministic modeling run. As described in this *TC & WM EIS*, the factors most strongly influencing the model results are the following: (1) Material properties of the vadose zone. Over 18 million parameter sets were investigated (see Appendix N, Section N.1.2, of the draft EIS). The suitable sets were used to construct predictions of contaminant distributions for the BC and BY Cribs and the 216-T-26 Crib, and the predictions were compared with groundwater measurements. Those most in agreement were used to construct predictions of the Plutonium-Uranium Extraction (PUREX) and REDOX tritium plumes, which were in turn compared with field observations (see Appendix N, Section N.3.6.1, of this final EIS). (2) Hydraulic conductivities in the unconfined aquifer. Over 6,000 parameter sets were investigated for the Base Case, and over 5,000 parameter sets were investigated for an Alternate Case (see Appendix L, Section L.9, of the draft EIS). The resulting predictions of water table elevations were compared with field observations from the late 1940s through 2006 (see Appendix L of the draft EIS), and those most in agreement were used to construct predictions of the PUREX and REDOX tritium plumes, which were in turn compared with field observations (see Appendix N, Section N.3.6.1, of this final EIS). (3) Transport parameters. Over 600 runs were made to investigate various transport parameter sets (see Appendix O, Section O.2.6, of this final EIS). The predictions were compared against measurements of the PUREX and REDOX plumes. (4) Infiltration rates, anthropogenic recharge, presence/absence of interbeds and other heterogeneities, distribution coefficients, and waste-form performance parameters. A variety of analyses were performed to demonstrate the effects of changes in these parameters on the flux of contaminants in the vadose zone (see Appendix N, Section N.5, of this final EIS).

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was not allowed to converge to a solution and the model output with the least amount of error before converging was chosen as the best. This is not industry standard practice. **215-25 cont'd**

▪ The groundwater model chosen was inappropriate. The particle track function of MODFLOW is a crude modeling approach, which does not account well for reactive transport and is too simple an application to adequately simulate the hydrologic conditions found at Hanford. A reactive transport model would have been a better choice and would probably have used much smaller computer resources to run. The model should also have included some attempt at simulating the heterogeneity in sediment distribution and groundwater flux along preferential pathways that has been documented in the Hanford literature for a couple of decades. **215-26**

▪ Inappropriate modeling assumptions were used. The model assumed there is no movement of water in or out of the basement basalts and there was no recognition of sedimentary architecture and features like the erosional windows into basalt layers in the 200-East Area, where the uppermost confined aquifer is connected with the unconfined groundwater aquifer above it[27 28 29 30]. Contrary to modeling logic, the MODFLOW model for this area models this as an impermeable boundary. A number of similar areas of known inter-aquifer communication across the site through the fractured basalt basement are also modeled as having no flow. The southeast boundary of the model domain was made into a no-flow boundary where there actually is important groundwater flux that would affect the performance of the model. **215-27**

▪ The model used an inappropriate application of parameters. For example, the model uniformly applies a distribution coefficient (for uranium, Kd = 0.6) and hydraulic conductivity (K = 156 m/d) across Hanford, which appears to be quite low as an average value for sediments that have hydraulic conductivities into the thousands of meters per day. Such model uniformity is only of value for uniform soils with no heterogeneity and under-represents the mobility of contaminants and the flux of groundwater. The model fails to account for heterogeneity of sediments, lateral transport, paleochannels, clastic dikes[31], preferential pathways and zones of flux retardation.

[27] M J Graham, G V Last, and K R Fecht, 1984, *An Assessment of Aquifer Intercommunication in the B Pond - Gable Mountain Pond Area of the Hanford Site*, RHO-RE-ST-12 P.
[28] M. J. Graham, M. D. Hall, S. R. Strait and W. R. Brown, 1981, *Hydrology of the Separations Areas*, RHO-ST-42.
[29] PNL- 7468, *2101-M Pond Hydrogeologic Characterization Report*, M. A. Chamness, S. P. Luttrell, D. J. Bates, W. J. Martin, September 1990.
[30] PNNL-13623, *Transient Inverse Calibration of Site-Wide Groundwater Model to Hanford Operational Impacts from 1943 to 1996—Alternative Conceptual Model Considering Interaction with Uppermost Basalt Confined Aquifer*, V. R. Vermeul, C. R. Cole, M. P. Bergeron, P. D. Thorne, S. K. Wurstner, August 2001.
[31] Fecht KR, KA Linsey, BN Bjornstad, DG Horton, and SP Reidel. 1999. *Clastic Injection Dikes of the Pasco Basin and Vicinity.* BHI-01103, Bechtel Hanford Inc., Richland, Washington.

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DOE also disagrees with the commentor's assertion that uncertainty and sensitivity are not adequately addressed in the *Draft TC & WM EIS*. DOE's view is that NEPA requires a comparison of the impacts of the various alternatives in the context of the cumulative impacts; that the comparison be technically sound and traceable to reliable sources of data; and that important sources of uncertainties in the analyses be identified and their potential implications for decisions and alternatives impacts discussed. Although DOE believes that uncertainty and sensitivity were adequately addressed in the draft EIS, in light of technical review and other comments, DOE has expanded and clarified the discussion of the nature and role of uncertainty in the groundwater modeling in this *Final TC & WM EIS*.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

In addition, DOE disagrees with the commentor's assertion that the model was not calibrated with present-day conditions. The vadose zone flow and transport model and the groundwater flow field and groundwater transport model were calibrated to conditions from 1980 to 2006, and this *Final TC & WM EIS* contains additional data through 2009. The areas of agreement and disagreement between modeled and measured conditions are discussed in Appendix U. In response to this comment and similar comments, this *Final TC & WM EIS* contains an expanded discussion of these comparisons.

215-24 DOE notes that Appendix U presents the results of a comparison of model predictions versus measured conditions in groundwater, as well as maps and discussions of these results. Uranium-238, total uranium, and chromium are specifically addressed, and the sources and inventories associated with these plumes are presented in Appendix S. DOE has received a number of comments suggesting that there is "missing contamination" in the groundwater model results based on interpretations of graphs and maps presented in Chapter 5 of the *Draft TC & WM EIS*. Such comments appear to result from a lack of understanding that the graphs and maps in Chapter 5 are for specific groups of sources that

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- The EIS briefly considered then excluded consideration of the observed interruption of lateral flow by the broadly emplaced network of clastic dikes. These dikes appear to redirect water and waste vertically to the groundwater. The STOMP model framework is incapable of adequately modeling these structures. *215-28*

- The EIS only crudely models the known preferential flow along the massive buried river channels of previous floods through the use of certain selectively chosen particle paths. Rather than including these important features directly in the model parameters, the model relies on assigned soil properties to model their effects. *215-29*

- The EIS modeling entirely omits the known and observed daily and seasonal oscillation of the Columbia River stage. These oscillations result in washing of soils near the river and of water table changes far inland. Additionally, these oscillations spatially rearrange and alter the chemistry in the soil. The impact of this inflow is important when considering that redox and pH changes have such huge consequences in the sorption chemistry of most of the contaminants. These impacts become especially important when it is noted that the effects on local water well levels in response to these river stage changes can be detected through the Gable Gap and nearly to the 200-East Area. *215-30*

- The EIS ignores the known and observed chemistry for uranium, plutonium, and neptunium which invalidate the use of simple adsorption (Kd) models. The understanding of the chemistry and fate and transport of these elements has changed dramatically in the last fifteen years. These changes include understanding the dominance of soluble carbonate complexes in the Hanford soils; the formation of soluble charged colloidal complexes; the formation of non-charged organic complexes; and the formation of nanometer scale traditional colloids. For example, the draft EIS models the movement of half a kilogram of plutonium and portrays highly unacceptable water quality results along the Columbia River thousands of years from now. Simultaneously, the draft EIS excludes from analysis the movement of nearly a ton of plutonium inventory in burial grounds and tank wastes on the presumption that it is immobile. The draft EIS makes similar assumptions for uranium. There is also a presumption that very large inventories of uranium in metal form buried in the solid waste burial grounds and other sites is also immobile, and will remain so, and therefore was excluded from the modeling analysis. *215-31*

- The amount of vadose zone characterization performed to date is insufficient to adequately model contaminant flux. The characterization of vadose zone contamination below the tanks is very limited. These data gaps impose serious limits on how well the TC&WM EIS model can simulate and estimate waste impacts to groundwater. Oregon is concerned that the EIS analysis may seriously understate the degree of contamination in the vadose zone. *215-32*

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make up particular alternatives, are presented for the purposes of comparing the impacts of those alternatives, and represent only the limited group of sources appropriate to that alternative. This *Final TC & WM EIS* includes, as an introduction to Chapter 5, a more detailed guide on the purposes and limitations of the data presented in that chapter.

215-25 DOE is not in agreement with the commentor's assertion. Each of the individual trial runs was allowed to converge naturally (or allowed to fail to converge) to a precise numerical solution consistent with the trial parameters. The model calibration process involved selection of the best results (i.e., those most in agreement with field conditions) from the entire suite of the trial results. Both the *Draft* and *Final TC & WM EIS* regional-scale groundwater models were calibrated using this industry standard practice.

215-26 DOE disagrees with the assertion that the groundwater model is inappropriate for use in this EIS. Two primary drivers contributed to the selection of particle tracking as the groundwater transport modeling tool: (1) Ecology requires that groundwater contaminant concentrations be measured and reported to within 100 meters of the fence lines of waste management areas/facilities, which is a requirement that the particle tracking model can meet; and (2) the March 25, 2005, *Technical Guidance Document*, which documents agreements between DOE and Ecology related to the *TC & WM EIS* groundwater pathway analyses, directs the use of particle tracking as the groundwater transport modeling tool.

DOE also notes that the MODFLOW [modular three-dimensional finite-difference groundwater flow model] model is the most frequently used commercial model for calculating flow fields; reactive solute transport models require more computational resources than the particle tracking model; and adequate site characterization data are not available to parameterize such models. Given the points noted above and the level of complexity that is needed for this type of model, DOE does not believe the reactive solute transport model is necessary.

DOE agrees with the comment that the groundwater model must simulate the heterogeneity in sediment distribution and groundwater flux along preferential pathways. The *TC & WM EIS* groundwater modeling process achieves this objective by encoding into the model the various subsurface material types observed across Hanford based on available well-boring data, and simulating flux along preferential flow pathways as appropriate, consistent with the encoded material types and their respective hydraulic properties.

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❒ **The justification for favoring landfill closure over clean closure[32] is misleading and contradicted by information in the EIS**

The draft EIS cites several reasons on page 2-292 for favoring landfill closure over clean closure. Some of these reasons are contradicted by other information in the EIS and seriously mislead readers:

- "Total recordable worker occurrences would increase by sixfold." This assertion is contradicted by data in Table 4-98 which shows that total worker recordable cases would increase less than 50% (from 3,940 under Alternative 2B to 5,760 for alternative 6B). Large increases in worker occurrences are projected for Option 6A, but those result from extensive construction and prolonged operation of the waste treatment plant, not from clean closure. *215-33*

- "Average radiation worker dose from normal operations would increase by over twofold." This may be true, but as the EIS notes on p 4-131, "radiation doses to individual workers would be managed and mitigated to minimize impacts. Such measures were not taken into account in this analysis."

- "Sagebrush habitat affected would increase by over two orders of magnitude." It is ironic for the EIS to cite habitat destruction as justification for an action. During the Supplemental Analysis for the Hanford Comprehensive Land-Use Plan (CLUP) in 2008, DOE refused to consider, or even acknowledge, the desirability of rezoning to protect sagebrush habitat. Moreover, as is noted on page 4-385, DOE is not even committed to mitigating this habitat loss, were it to occur. Perhaps most important, the projected loss of sagebrush habitat results solely from DOE decisions on where to place new facilities (a new IDF and the River Protection Project Disposal Facility). The tentative decision by DOE to place these disposal facilities on some of the best sagebrush habitat on the Hanford Site is an arbitrary decision that could be changed if DOE so decided, in order to preserve irreplaceable habitat. The implied need to choose between clean closure and habitat loss is an artificial, false choice. *215-34*

- "Electricity use would increase by one order of magnitude." According to Table 4-2, this is not true. Total electricity use under Alternative 6B would be increased by 33% from Alternative 2B (23.8 Million Megawatt hrs compared to 17.9 for Alternative 2B). The huge difference attributed to "clean closure" is in reality attributable almost entirely to building and operating 84 new double-shell tanks and operating two additional waste treatment plants for more than a century (Alternative 6A), not to clean closure. Increases in other utility infrastructure costs for clean closure similarly increase modestly (7% for water, 36% for gasoline, and 10% for diesel fuel) for clean closure compared to landfill closure. *215-35*

- On page 2-294, the EIS claims that "As a result of the above conclusions (discussed in preceding bullets) and excessive cost, DOE believes that clean closure may not be a viable alternative." "Excessive cost" is a subjective determination, and *215-36*

[32] Pages 2-292 and 2-294.

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215-27 A simplifying assumption was made that there is no hydraulic connectivity between the unconfined aquifer and any existing confined aquifers. It is likely that some interaction between unconfined and confined aquifers exists. However, the availability of data that describe the locations, sizes, and water flux amounts between the aquifers is not sufficient to encode these features into the model. This simplifying assumption should not bias the EIS analysis and is, therefore, believed to be reasonable in light of the uncertainty related to this feature.

Distribution coefficients are defined by the *Technical Guidance Document* (DOE 2005) and applied consistently to contaminants no matter where a contaminant comes from or where it is located during the model simulation. Hydraulic conductivity values were derived through model calibration. To account for the higher-conductivity regions in the model that result in some preferential flow due to paleochannels from historical cataclysmic flooding in the region, a separate conductivity zone named the highly conductive Hanford formation is encoded in the model. This zone of material has a hydraulic conductivity of almost 4,000 meters per day.

215-28 DOE acknowledges that clastic dikes exist at Hanford and that they are an example of complex geology that could affect the movement of water and solutes through the vadose zone. The STOMP [Subsurface Transport Over Multiple Phases] model is entirely capable of simulating clastic dikes when adequate characterization data are available to encode them in the model. However, the availability of data on the locations and sizes of clastic dikes at Hanford is limited. Such dikes were included in the STOMP model to the extent that they were represented in the boring logs and other information used to develop the geology. A sensitivity analysis of the effect of a clastic dike was included in Appendix N, Section N.5.5, to allow the reader to assess the impact of any such feature on the outcomes of the analysis.

215-29 DOE disagrees with the commentor's assertion that preferential pathways were accounted for through the use of selectively chosen particle paths. The particle paths are an outcome of the analysis, not an input chosen by the modeling team. The observed head data provide reasonably strong constraints on the presence and character of a zone of high hydraulic conductivity. This zone, in turn, influences the calculated particle pathways and, ultimately, the evolution of the contaminant plumes.

215-30 The regional nature of the flow model required an encoding resolution no finer than one value per year to account for river stage at any given location, and thus

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many would disagree with this characterization, even if the cost estimates were credible. Total cost of clean closure (Table 2-50) is $66.6 billion for Alternative 6B (with Option) compared to $40.1 billion for Alternative 2B. As discussed earlier however, these figures are misleading because they do not include all life-cycle costs. If those were factored in, the difference in cost for clean closure would be much smaller. It might turn out to be the cheaper alternative. Cost-based arguments are meaningless and should not be made unless all life-cycle costs are included in the comparison.

215-36 cont'd

In sum, the arguments against clean closure are erroneous and misleading, based on data in the EIS. The argument against clean closure is not supported and should be deleted from the EIS.

❒ **There is very little "environmental impact" analysis in this draft EIS**

This draft EIS is, in reality, predominantly a human health risk assessment, rather than an environmental impact assessment. The focus throughout most of the document is on human health, with some discussion of short-term environmental impacts and (especially in the summary document) little or no discussion of long-term environmental impacts. Human health risk information is critical for assessing and comparing alternatives presented in the EIS, but there needs to be a similar set of analyses, with a comparable level of detail, describing the environmental impacts of the proposed alternatives.

There is no meaningful analysis in the report of long-term contamination of abiotic resources in the environment. There is not for instance, any analysis of impacts on soil and groundwater, analyzing the extent, duration, and area of these resources that would be contaminated under the different alternatives, whether from EIS-related actions (for example, tanks, associated cribs and trenches) and from existing RL wastes as described in Appendix U.

215-37

In the case of long-term effects of biota, only a few summary data (for example, maximum hazard quotients in Appendix P) are provided. No information is presented, for instance, on the length of the shoreline or area of the Columbia River bottom in which biota may be exposed to high contaminant concentrations, or the duration of projected high concentrations. Projected high contaminant concentrations are trivialized by discussion in the text ("The chromium hazard quotients above 1.0 did not necessarily indicate high risk…" page P-50) and by modeling based on assumptions that are unsupported or contradicted by data, such as the presumption that groundwater will be diluted because upwellings into the river occur over a large area (page P-51). Recent data do not suggest any dilution of chromium in the hyporheic zone at the 100-B/C Area. Moreover, the upwelling data suggest contamination is more widespread than expected, such that a larger area of the river bottom and associated fauna (benthic invertebrates, salmon eggs and fry) are exposed to high contaminant concentrations.

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a corresponding limitation in the wellhead observation data set. It is known that river stage elevations vary during the course of a day at times, and even more over a week or a month, and that river stage boundary conditions strongly affect nearby wellheads. Given the limitation in river stage encoding, therefore, it was determined that it would not be helpful for the head observation data set to include the typically more detailed fluctuations. Specifically, it was decided to remove from the head calibration data set those head observation wells within 600 meters of the river, as these are the wells most likely affected by river stage fluctuations.

215-31 DOE disagrees with the commentor's assertion that the *Draft TC & WM EIS* did not include a projected concentration of uranium in groundwater. Uranium concentrations in groundwater for all of the alternatives are presented in Chapter 5, and concentrations for the vast majority of those alternatives are shown to be increasing near the end of the 10,000-year simulation period. This issue is extensively discussed in the text of Chapter 5. A discussion of the causes of the increase and the implications for comparison of the alternatives was presented in Appendix O, Section O.6, of the draft EIS. In addition, Appendix M, Section M.5 (constituents addressed in the source release model results), and Appendix N, Section N.4 (constituents addressed in the vadose zone transport model results), have been revised to reflect the same constituents.

As shown in Appendix M, Section M.4, both neptunium-237 and plutonium-239 are released from the waste form, but, as shown in Appendix N, Section N.4, are not released to the aquifer. The distribution factors for both of these radionuclides are listed in Table M–11 of this final EIS; both were obtained from the *Technical Guidance Document* (DOE 2005), which was signed by DOE and Ecology.

DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in the draft EIS represented the best-available data at the time of the draft's publication. None of the reviewed documents included a total uranium inventory estimate for these disposal sites. However, DOE again reviewed the data and revised the inventories to include a calculated total uranium inventory. This inventory, appropriately analyzed, has been included in this *Final TC & WM EIS*. For further information, see Section 2.2 of this CRD.

215-32 Regarding the commentor's concern for increased detail in site characterization to support modeling and assessment, this issue of characterization has been brought up previously by the Oregon Department of Energy. Both DOE and Ecology

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There is no substantive recognition of DOE's potential liabilities under the natural resource damage provisions of CERCLA, and correspondingly, no attempt to analyze the occurrence or magnitude of likely natural resource injuries and service losses under the different proposed alternatives. *215-37 cont'd*

❒ **Estimates of risk cited in the text underestimate actual long-term risk to the public**

The draft EIS fails to report and adequately discuss results for plausible exposure scenarios developed and presented in the appendices. The result is that the draft EIS shows only the lowest-risk exposure scenario in the primary part of the document.

The main portion of the EIS reports risk almost exclusively for only one exposure scenario – the drinking water well user. In Appendix Q, results are reported for two additional exposure scenarios – a "resident farmer" and an "American Indian resident farmer." Risks for those alternate scenarios are, on average, about 3 times and 7 times higher, respectively, than the risks reported for a drinking-water well user. By choosing to report results in the primary portion of the documents only for the lowest-risk scenario, the EIS under-reports plausible risk. *215-38*

Moreover, the "resident farmer" scenario used here is different from the "resident farmer" scenario used in EPA risk analyses and results in a lower estimate of risk.

Also, the American Indian scenario used here is inconsistent with exposure scenarios developed by at least one of the tribes at the Hanford Site, and likely underestimates risk relative to their exposure scenario.

The revised EIS should more fully report risk under all reasonable scenarios, and needs to structure risk scenarios to conform to those already developed and used by Hanford regulators and stakeholders.

❒ **Public involvement/information related to the EIS** *215-39*

We believe DOE's efforts to inform and engage the public in review of this draft EIS were uneven. As mentioned, DOE was responsive in providing an extended review period. A 140 day comment period was an acceptable review period.

We also appreciate the fact that DOE added additional public hearings and eventually conducted four public hearings within the State of Oregon, at which an estimated 330 citizens attended. The Oregon Department of Energy worked hard to engage new citizens into this process and believe our efforts helped increase attendance at the Oregon public meetings.

DOE was also quite responsive in conducting an informational workshop in December 2009 and in engaging the Oregon Hanford Cleanup Board at its February 2010 meeting.

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believe there is sufficient characterization to support this *TC & WM EIS*. The goal of NEPA is completion of an impacts analysis for a proposed Federal action (or state action under a SEPA) early enough in the agency's decisionmaking process to be useful. Accordingly, balanced judgment must guide an agency's decision to initiate the NEPA process; that agency must act as soon as sufficient information is available to inform its decisions, and yet it must recognize that all useful information may not be available. The CEQ regulations have long recognized this tension and provided appropriate ways to proceed with an EIS (40 CFR 1502.22).

DOE's view is that this EIS provides a comparative analysis of strategies for retrieving, treating, and disposing of wastes, and closing waste facilities associated with the SST system. DOE also believes that site characterization data that support differentiation among alternatives are a key feature of a comparative analysis. Available site characterization data do support comparison of key features in the alternatives, e.g., differences in the geologic settings of IDF-East and IDF-West, differences in spread of contaminant plumes in the 200-East and 200-West Areas, and the locations of contaminant plumes versus key lines of analysis (the Core Zone Boundary and the Columbia River). As part of the closure and permitting processes, additional subregional-scale site characterization data will be developed to support smaller-scale, more-detailed modeling assessments. As this EIS has progressed, information has been incorporated as appropriate between the draft EIS and this final EIS.

215-33 The point of the comparison regarding doses to radiation workers is that clean closure, which would involve removing the tanks and exhuming contaminated soil beneath the tanks, would have a larger radiological impact. As noted, individual worker doses would be managed to ensure that they are maintained ALARA and below regulatory requirements. To avoid potential misunderstanding by readers, the comparison was changed to be presented in terms of collective worker dose. The statement regarding recordable worker occurrences was also revised to directly compare the impacts of clean closure and landfill closure. The number of recordable worker occurrences would be directly proportional to the number of labor hours worked. For clean closure, the number of labor hours would be a factor of 8 to 18 greater than for landfill closure, depending on whether the cribs and trenches (ditches) are included.

215-34 The acreage of sagebrush habitat potentially disturbed by the various Tank Closure alternatives is presented in Chapter 4, Sections 4.1.7.2 through 4.1.7.11. As noted in these sections, the area of sagebrush habitat potentially disturbed

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However, we did have concerns with the following:

- The Executive Summary did not provide sufficient information on the severity of the long-terms risks posed by the decisions that DOE proposes to make from this EIS. The document instead focused too heavily on short-term risks. Decision makers and the public who relied on the Summary alone for their view of the EIS were given a slanted view of the importance of short-term related impacts versus the more important long-term impacts to human health and the environment.

- The Executive Summary was difficult for a lay reader to understand. The repeated use of "unitless" radiological risk numbers in many of the graphs, without a thorough and clear explanation of the use of this term, was confusing.

- DOE was late to consult with the State of Oregon and stakeholders on dates and locations of public meetings.

- Despite considerable input provided to DOE, DOE did not make significant changes to its second public mailing. The mailing did not sufficiently highlight the importance or significance of the issues and failed to highlight in any way the preliminary findings from the EIS analyses.

- DOE "overstaffed" the public hearings – unnecessarily increasing the cost of the hearings.

If you need clarification on any of our comments, please don't hesitate to contact me.

Sincerely,

Ken Niles
Nuclear Safety Division Administrator

c.c. Jane Hedges, Washington Department of Ecology
Dennis Faulk, U.S. Environmental Protection Agency
Dave Brockman, U.S. Department of Energy, Richland Field Office
Shirley Olinger, U.S. Department of Energy, Office of River Protection
Stuart Harris, Confederated Tribes of the Umatilla Indian Reservation
Russell Jim, Yakama Indian Nation
Gabriel Bohnee, Nez Perce Tribe
Susan Leckband, Hanford Advisory Board Chair
Max Power, Oregon Hanford Cleanup Board Chair

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ranges from 1.2 to 46.1 hectares (3 to 114 acres) under the landfill alternatives and from 98.3 to 182 hectares (243 to 450 acres) under the clean closure alternatives. The statement made in Chapter 2 of the *Draft TC & WM EIS* merely reflects the disparity in the amount of sagebrush habitat potentially disturbed by the clean closure alternatives versus the landfill alternatives. However, this statement has been modified to indicate that the amount of sagebrush habitat affected would increase by up to two orders of magnitude.

DOE recognizes the importance of late successional sagebrush habitat and categorizes it as a Level III resource at Hanford under the *Hanford Site Biological Resources Management Plan* (DOE 2001). As pointed out in this plan and reflected in the discussion in this EIS, sagebrush loss may be mitigable at different replacement levels or, in some cases, not at all. Chapter 7, Section 7.1.7, discusses potential mitigation measures for sagebrush habitat. The locations of facilities associated with the Tank Closure, FFTF Decommissioning, and Waste Management alternatives were not chosen at random, but rather were selected based on the need for certain facilities to be in proximity to each other and the availability of space. It should also be noted that the 200 Areas are within the Industrial-Exclusive land use zone designated in the *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (*Hanford Comprehensive Land-Use Plan EIS*) (DOE 1999). This area is deemed suitable for the treatment, storage, and disposal of hazardous, dangerous, radioactive, and nonradioactive wastes.

Finally, the difference in sagebrush habitat potentially disturbed between the landfill and clean closure alternatives is only one of several potential adverse short-term impacts listed in Chapter 2, Section 2.10. This list does not imply that these impacts are of equal importance or that long-term impacts were not considered in determining DOE's preference for the landfill alternative over clean closure. For instance, an important consideration was the tradeoff between short-term worker risk, which would be higher under clean closure, and long-term groundwater risk, which would be higher under landfill closure.

215-35 As shown in Chapter 4, electricity (and other resources, such as diesel, gasoline, and water) is consumed in much larger quantities under Tank Closure Alternative 6A than under any of the other alternatives. However, the large increase in utility use under this alternative is attributable to the requirement to treat all tank waste as HLW and, thus, is not attributable to the construction and operation of replacement DSTs or the long operational period of WTP facilities. The reason for this is that substantially more utilities are needed to operate the

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HLW melters for treating all of the tank waste. The text comparing clean closure to landfill closure of the SSTs in Chapter 2, Section 2.10, has been revised to clarify that the substantial increase in utility use is attributable to the clean closure option (e.g., Tank Closure Alternative 6A) of treating all tank waste as HLW in HLW melters and is not applicable to all clean closure options.

215-36 Chapter 2, Section 2.11, of this *TC & WM EIS* summarizes and compares the relative consolidated costs of continued operation of existing facilities; construction, operation, and deactivation of new or modified facilities; and associated activities in support of the proposed actions, including administrative controls, institutional controls, and postclosure care. For analysis purposes, these cost estimates were calculated using constant 2008 dollars and, where applicable, existing cost information. Where cost information was not directly applicable, relevant data were scaled to estimate costs, or, where appropriate, scoping-level cost estimates were developed.

However, because there is currently no specific path forward for final disposition of IHLW, an associated cost basis for disposal of this material is not available for inclusion in this EIS. Accordingly, the cost estimates are valid for the purpose of understanding the relative costs of the alternatives, but do not represent complete life-cycle costs. Nonetheless, DOE anticipates the costs associated with disposal of HLW may be excessive under any of the clean closure alternatives. Cost was one of many factors used to determine the Preferred Alternatives identified in the *Draft TC & WM EIS*. Clean closure of the tank farms would require construction and use of containment structures during the removal of 149 SSTs, ancillary equipment, and deep soil. There is substantial uncertainty as to the costs associated with these clean closure activities.

The Tank Closure alternatives were developed to compare the potential long-term impacts on groundwater of closing the SST system. Proposed closure options range from clean closure or selective clean closure/landfill closure to landfill closure with or without any contaminated soil removal. The EIS analyses indicate that total short-term and peak short-term environmental impacts of SST farm closure activities would exceed total facility construction impacts under most alternatives, and would substantially add to short-term environmental impacts overall, especially in terms of emissions, worker doses, and resource demands.

In terms of land resources, clean closure would allow future use of the tank farm areas, but, unlike all other Tank Closure alternatives, would require significant

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new, permanent land disturbance for new facilities to treat, store, and dispose of tank waste. In addition, geologic resource demands under the clean closure alternatives would be higher than those under the landfill closure alternatives. A significant uncertainty of clean closure in terms of technical feasibility and risk is the depth of excavation and soil exhumation that would be required. For some SST sites, excavation to depths of up to 78 meters (255 feet) below the land surface may be required to remediate contaminant plumes from past-practice discharges that have migrated through the vadose zone soils and sediments and possibly to the water table.

Because an effort of this scale in a radioactive environment has never been undertaken in the United States, it is unclear whether this operation could be conducted with adequate considerations for worker safety. The peak workforce for clean closure would be twice that for the landfill closure alternatives. Also, worker population radiation dose would increase by up to a factor of 10 in association with clean closure activities. Moreover, as indicated in the *TC & WM EIS* analyses, human health impacts (radiological risk to the drinking-water well user) at the Core Zone Boundary would depend on the closure actions.

The releases from the six sets of cribs and trenches (ditches) and the past leaks from the SSTs also show that clean closure of the SST farms would provide some beneficial long-term impacts on the groundwater after calendar year 6000. However, because of the early releases from past leaks and cribs and trenches (ditches) contiguous to the SST farms, clean closure would provide little, if any, reduction in long-term impacts on the groundwater before calendar year 6000. The EIS analyses further show that clean closure of the SST farms and contaminated soil would not reduce the concentrations of iodine-129 and technetium-99 below their respective benchmark concentrations for at least the first 2,000 years. Thus, groundwater impacts would persist under the clean closure alternatives due to the early releases from past leaks and from the intentional discharges to the soil column through the cribs and trenches (ditches) that occurred from the 1940s through the 1970s.

As a result of the conclusions discussed above, DOE believes that clean closure may not be a viable alternative. Therefore, DOE prefers landfill closure.

215-37 Ecological risk information analogous to the human health risk information is presented for the purpose of assessing and comparing the alternatives analyzed in this EIS. This information includes risk estimates for every chemical and radionuclide analyzed using the models of releases to air and groundwater

and subsequent discharge to the Columbia River at the point of maximum concentration at discharge. This EIS does not state or assume that biota in any portion of the Hanford Reach of the Columbia River are not potentially exposed to contaminants released to air or groundwater. Chapter 2, Section 2.9.1.1, Water Quality, discusses the long-term environmental impacts on groundwater quality from tank closure sources (i.e., tank farm past leaks, discharges to cribs and trenches [ditches] closely associated with the tank farms, tank farm residuals, retrieval losses, and ancillary equipment). Long-term impacts on groundwater quality from FFTF decommissioning and waste management sources are discussed in Sections 2.9.2.1 and 2.9.3.1, respectively.

Groundwater impacts are described in terms of the concentrations of COPC drivers such as hydrogen-3 (tritium), iodine-129, technetium-99, uranium-238, chromium, nitrate, and total uranium. These are all considered conservative tracers and, therefore, representative of potential long-term contamination. The magnitude of the impacts, including their extent, area, and duration, has been represented in terms of the total amounts of the COPC drivers released to the vadose zone from all sources related to a particular alternative.

As stated in Appendix P, Section P.2.1, comparing alternatives is the primary purpose of the ecological risk analysis in this *TC & WM EIS*. The most important pathways from sources to receptors (air emission and the subsequent deposition on soil, releases to groundwater) that are evaluated in this EIS are common to all of the alternatives, but vary in magnitude under different alternatives. The amounts released via these pathways and the resulting concentrations in the different media to which receptors are directly or indirectly exposed also vary under the different alternatives, but the extent to which receptors are exposed to the different media does not vary. Therefore, the risk to receptors under the different alternatives does not change if common parameters such as the magnitude of dilution in the nearshore environment are over- or underestimated as long as the risk estimates for all alternatives are calculated in the same way for the same set of exposures and receptors.

Given the parameters and assumptions used in the risk analysis, the magnitudes of exposures over the important pathways were judged to be conservative estimates and these were compared with the benchmark exposures associated with no impact, resulting in conservative Hazard Quotients. Statements addressing Hazard Quotients greater than 1 acknowledge the deliberate conservatism of some of the parameters used in the risk analysis and the

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uncertainty associated with interpreting Hazard Quotients greater than 1, which are indicative of likely adverse impacts.

This EIS does not unequivocally state that there are no risks to ecological receptors under the various alternatives. As stated in Appendix P, a more precise evaluation would be required to resolve the uncertainties in the long-term risk characterization.

215-38 The rationale for presenting the results of the drinking-water well user only in the key environmental findings is discussed in the Summary, Section S.5.5, and Chapter 2, Section 2.10. In this context, the use of a generic EPA agricultural scenario is not the best choice. The scenario should be site specific to the extent practicable, reflecting factors such as location and lifestyle. The resident farmer scenario analyzed in this EIS is intended to be representative of an agricultural scenario in the Hanford region and, as such, will differ from a generic EPA scenario as might be used in preliminary human health analyses at a site. The intent of the American Indian scenarios was to collectively reflect American Indian lifestyles for the purpose of comparison. DOE acknowledges that other scenarios may be postulated, but it was never the intent to analyze all possible scenarios.

215-39 In response to comments that not enough summary information on long-term impacts was provided in the *Draft TC & WM EIS*, DOE added a more extensive discussion of long-term impacts analysis to the Summary, Section S.5.4, and Chapter 2, Section 2.9, of this *Final TC & WM EIS*. The Summary is intended to provide a brief overview of the information contained in the *TC & WM EIS* and cannot, by nature, include all topics of interest to individual parties. To assist the public in navigating through the information presented in this *TC & WM EIS*, DOE issued a Reader's Guide. This guide serves as an introduction and guide to the contents of this EIS, highlights the key features of the reasonable alternatives, and provides references to specific sections of the document to assist the reader in reviewing the technical analyses presented. Recognizing that many people may not read beyond the EIS Summary, the information presented in both the Summary and the Reader's Guide attempts to strike a balance between those readers interested in the technical details regarding DOE's proposed actions and alternatives and readers seeking a simple overview.

To address the confusion over the use of "unitless" in the presentation of radiological risk in this *Final TC & WM EIS*, DOE revised the depictions in the graphics located in the Summary and Chapter 5, as well as other locations

Commentor No. 215 (cont'd): Ken Niles, Nuclear Safety Division Administrator, Oregon Department of Energy

within the document to remove the term "unitless." In addition, a text box that addressed "radiological risk" was edited and placed earlier in the Summary. This term is also defined in the Glossary for this EIS. Radiological risk, as used in the long-term impacts analysis, is the incidence of cancer and the risk is expressed in these graphs as the probability over a lifetime of developing cancer. Therefore, no unit is necessary for this measurement. In response to requests for more-extensive collaboration in the *TC & WM EIS* public hearing planning process, DOE stakeholder teleconferences were held on December 30, 2009, and January 5 and 6, 2010. Public hearing dates and locations were identified and discussed, and it was agreed that additional public hearings would be held in Spokane, Washington, and La Grande and Eugene, Oregon.

The purpose of the mailers is to notify interested parties of scheduled hearings (date, time, location). DOE's public hearing format included holding a 1-hour open house prior to each public hearing to allow the public to meet informally with members of the *TC & WM EIS* team, ask questions, and learn more about this EIS. Informative factsheets were provided at each open house.

Commentor No. 216: Doug Heiken, Oregon Wild

From: dh.oregonwild@gmail.com on behalf of Doug Heiken [dh@oregonwild.org]
Sent: Thursday, March 18, 2010 12:49 PM
To: tc&wmeis@saic.com
Subject: Comments on the Hanford Tank Closure & Waste Management DEIS

OREGON WILD
PO Box 11648 | Eugene OR 97440 | xxx-xxx-xxxx | fax xxx-xxx-xxxx
dh@oregonwild.org | http://www.oregonwild.org/

18 March 2010

TO: TC&WMEIS@saic.com

Subject: comments on the Hanford Tank Closure & Waste Management DEIS

Dear DOE:

Please accept the following comments from Oregon Wild concerning the Hanford Tank Closure & Waste Management DEIS. Oregon Wild represents about 7,000 members and supporters who share our mission to protect and restore Oregon's wildlands, wildlife, and water as an enduring legacy.

1. All cleanup activities should be planned so as to meet the standard of long term protection of the Columbia River, other surface and ground water, soil health, terrestrial ecosystems, air quality, farmland, and the health of the people in nearby communities and the entire Pacific northwest.
2. The waste contamination problem at Hanford has been lingering too long. Please start clean-up promptly and accelerate the pace of clean-up. Do not adopt a process that results in further delay. Two top priorities include: removing waste from single-shelled tanks, and cleaning up waste that has already leaked from it's containment. Plans should be made to store waste more securely while it awaits vitrification. *216-1*
3. The clean-up should be high effective and efficient. More than 99% of the waste should be retrieved and properly treated. Do not settle for incomplete clean-up. All clean-up plans, contracts, agreements, must have stringent mechanisms for accountability so that the public is assured that promises will be kept. *216-2*
4. Hanford is already one of the most pollute places on earth. Please do not increase the waste burden at Hanford by shipping waste from other locations to Hanford. Those who generate dangerous waste materials must be responsible for their own waste production. They should not be able to shift their waste problems to Hanford. Transporting highly toxic and/or radioactive waste across highways will endanger public heath and the environment. *216-3*

216-1 One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

216-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*. DOE would monitor all work related to tank closure as it takes place. Also, postclosure monitoring would continue for at least 100 years (see Chapter 2, Section 2.2.2.4.1).

216-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 216 (cont'd): Doug Heiken, Oregon Wild

5. Waste that is disposed of on site must be monitored until the wastes are no longer harmful to humans and the ecosystems. *216-4*
6. Tank farm wastes in cribs and trenches should be treated via "remove-treat-dispose" methods, rather than by using short lived "caps" to cover the material and divert run-off. There is an important aquifer under Hanford that feeds the Columbia River. Capping wastes does little to protect the aquifer and the Columbia River. *216-5*
7. EIS should include an alternative which does not rely on Hanford as a national radioactive and mixed radioactive hazardous waste dump.

Sincerely,
/s/

Doug Heiken, Oregon Wild
PO Box 11648, Eugene OR 97440
dh@oregonwild.org, xxx.xxx.xxxx

216-4 This *TC & WM EIS* assumes several different types of end-state management, as described in Chapter 2, the Glossary, and the Summary. These include administrative controls, institutional controls, and postclosure care, as appropriate. Each of these end-state management options would take place at the completion of an action and is assumed to occur for 100 years following the end of the action. For disposal facilities licensed by NRC for the disposal of Class A and Class B low-level waste without special provisions for intrusion protection, institutional control of access to the site is required for up to 100 years. For hazardous waste management disposal units, RCRA and Ecology hazardous waste regulations require a 30-year postclosure care period; however, due to the types of waste planned for disposal, it was assumed that this period would be extended to 100 years.

216-5 As noted in Chapter 1, Section 1.4.2, the six sets of cribs and trenches (ditches) that are contiguous to the SSTs are CERCLA past-practice units. These would fall under the barriers placed over the SSTs during closure. They are evaluated in this EIS as part of a connected action because they would be influenced by barrier placement. However, closure of these CERCLA past-practice units is not part of the proposed actions for this EIS. Closure of these units would be addressed at a later date.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 217: Ted Hunter

From: Ted Hunter [huntertp@aol.com]
Sent: Thursday, March 18, 2010 1:01 PM
To: tc&wmeis@saic.com
Subject: Comment on Hanford Waste Site

Please include me as an interested party when considering shipping additional radioactive waste to Hanford. I was involved as Counsel to the Washington Legislature in the review of the suitability of Hanford as a High Level waste site during the 1980s, when the nuclear industry was actively seeking a permanent disposal site under the Nuclear Waste Policy Act. We determined it was not a suitable site, and thought the process for seeking to put additional waste at Hanford would then end. The site is not suitable because of the groundwater flows toward the Columbia River and the small 'earthquake swarms' that create fissures for flow of groundwater. We also noted that vitrification requires storage of materials prior to processing and that any storage of materials would threaten the Columbia River. *217-1*

Please do not allow an increase of radioactive material to Hanford.

Please keep me informed of what you are doing:

Ted Hunter
4500 Ninth Avenue NE, Suite 300
Seattle, WA 98105
=

217-1 Regarding the commentor's concern about the disposition of HLW, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Public input is important to DOE and DOE appreciates the public's participation in the preparation of this EIS. All comments made during the public comment period, whether given orally at hearings or sent via mail or email, were considered equally by DOE. All comments received on the *Draft TC & WM EIS* and their approved responses are included in this CRD, a volume of this final EIS. DOE has posted this *Final TC & WM EIS*, including this CRD, on the Hanford website (http://www.hanford.gov) and on the DOE NEPA website (http://energy.gov/nepa), and a Notice of Availability will be published in the *Federal Register*.

Commentor No. 218: Susan Leckband, Chair, Hanford Advisory Board

HANFORD ADVISORY BOARD

A Site Specific Advisory Board, Chartered under the Federal Advisory Committee Act

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Ex-Officio
Confederated Tribes of the Umatilla
Washington State Department of Health

Environment:
Hanford Project Office
713 Jadwin, Suite 3
Richland, WA 99352
Phone: (509) 942-1908
Fax: (509) 942-1926

March 4, 2010

Inés Triay, Assistant Secretary for Environmental Management
EM-1/Forestal Building
U.S. Department of Energy
1000 Independence Avenue
Washington, D.C. 20585

Shirley Olinger, Manager
U.S. Department of Energy, Office of River Protection
P.O. Box 450 (H6-60)
Richland, WA 99352

David Brockman, Manager
U.S. Department of Energy, Richland Operations Office
P.O. Box 550 (A7-75)
Richland, WA 99352

Dennis Faulk, Manager
U.S. Environmental Protection Agency, Region 10
309 Bradley Blvd., Suite 115
Richland, WA 99352

Jane Hedges, Program Manager
Washington State Department of Ecology
3100 Port of Benton Blvd.
Richland, WA 99354

Re: Tank Closure and Waste Management Environmental Impact Statement

Dear Ms. Triay, Olinger, Messrs. Brockman, Faulk and Ms. Hedges,

Introduction

The Hanford Advisory Board (Board) recognizes the importance of the draft Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS) in supporting cleanup decisions at Hanford. This draft TC&WM EIS will provide the basis for cleanup decisions with impacts far into the future. The Board has a long standing interest in this

Response side of this page intentionally left blank.

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

draft since before 2002, when we provided advice regarding the Draft Hanford Solid Waste Environmental Impact Statement (SWEIS), the predecessor of the current draft TC&WM EIS. We thank the U.S. Department of Energy (DOE) for engaging the Board during the development of the current draft TC&WM EIS and for heeding our recommendation to provide the public opportunities to comment on the document in multiple locations in Washington, Oregon and Idaho.

This draft TC&WM EIS is incredibly complicated and the Board does not support in total the package of options contained in any of the alternatives that were presented in the draft document. Instead we will provide you with values-based advice on both the positive and negative elements in the draft document. We have also provided comments and divided the comments and advice into categories that seem appropriate for clarity. Please do not interpret our silence on any given element of the draft TC&WM EIS as an expression of concurrence with that element. The Board expects to continue to engage in an active dialogue with DOE as they respond to and incorporate comments received. *218-1*

OVERARCHING COMMENTS

Background

The Board has used its independent contractor's analysis of the draft TC&WM EIS to formulate many of the following comments and advice.[1]

The draft TC&WM EIS analyzes a series of potential actions. Many of the actions discussed are integral to the cleanup of the site and are governed by state and federal environmental laws. The full investigation, analysis and decisions on these actions will be made by the regulatory agencies [Washington State Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA)] and not by DOE as a result of this draft TC&WM EIS. This draft will and should support their analyses and decisions. *218-2*

It is incumbent on both the DOE Richland Field Office (DOE-RL) and the DOE Office of River Protection (DOE-ORP) in proposing various actions in this draft TC&WM EIS, to show that their proposals will conform to the policy and specific directions provided by the National Environmental Policy Act (NEPA) to:
"...prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man"; "...recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man".

1 K.D. Anderson & Associates, LLC. (March 4, 2010). *Hanford Tank Closure & Waste Management Environmental Impact Statement: External Independent Review Team Preliminary Assessment Report.*

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218-1 During the development of this *TC & WM EIS*, HAB submitted the following pieces of advice specific to this EIS: Advice #144 *"Tank Waste Retrieval and Closure Environmental Impact Statement (EIS) Scoping,"* Advice #184 *"Tank Closure & Waste Management Environmental Impact Statement Scoping Process,"* and Advice #185 *"Tank Closure &Waste Management (TC&WM) Environmental Impact Statement (EIS)."* Embedded in the three letters were 53 pieces of advice. DOE accepted 49 pieces of advice, partially accepted 1 piece of advice, and did not accept the 3 remaining pieces of advice. In all cases, DOE provided HAB with an explanation of how DOE addressed the advice.

218-2 Ecology has been a cooperating agency on this EIS for the purpose of fulfilling the SEPA requirements as identified by its MOU (see Chapter 1, Section 1.2.7). In addition, information can be found in this EIS on how the data in this EIS will support decisions and permitting. Ecology also has a foreword in both the draft and this final EIS that expresses how it will use this EIS to support its processes.

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

"... without degradation, risk to health or safety, or other undesirable and unintended consequences"; "The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall –"; "...insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations;"
(40 CFR 1508.7) "Cumulative impacts ...the impact on the environment which results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions..."
Most tank closures and the waste management alternatives appear to lack necessary actions to ensure that the soil and groundwater are not further contaminated, that risk to the environment and human health does not increase in the future, and that the soil and groundwater are restored.

Per Board Advice #197 *Groundwater Values*, and Board Advice # 173 *Central Plateau Flowchart*, the preferred alternative should not harm groundwater, should return groundwater throughout the entire plume to best use in the near future, and capping waste sites should be considered as a last resort and then only if retrieving, treating and disposing waste is not technically feasible. Treatment waste forms should ensure protection of these values and should minimize contamination of groundwater. The Board has a long-standing belief that DOE should not claim that any shallow soil, vadose zone or groundwater is irretrievably and irreversibly committed to a restricted use category. *218-3*

Advice

- Considering the breadth and depth of comments to the current draft TC&WM EIS and the potential impact on cleanup decisions based on the TC&WM EIS, the Board advises DOE to issue a revised draft TC&WM EIS for public review before finalizing the TC&WM EIS. *218-4*

Decisions on cribs, trenches and tile fields should continue to follow Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) processes. Cumulative and composite impact analysis of the 200 Area vadose zone should be done to inform future RCRA and CERCLA decisions. Points of compliance should be established at the boundaries of the waste management unit. *218-5*

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218-3 Although this *TC & WM EIS* does not make decisions specific to groundwater remediation, as it is covered by CERCLA, regarding groundwater remediation in Advice #197, DOE has provided information in Appendix U on the activities done to date and information on future activities related to CERCLA operable units on the Central Plateau. Regarding Advice #173, which provides a detailed flowchart illustrating how remediation decisions could be made on site, these types of questions could be similar to the more detailed closure process that will be followed for the tank farm waste management areas. This regulatory process is described in Chapter 7, Section 7.1. Irreversible and irretrievable commitments of resources are discussed in Section 7.3.

218-4 DOE has satisfied NEPA requirements by responding to public comments on the draft EIS in this CRD and by making changes to the draft EIS where appropriate and necessary. Subsequent to the issuance of the *Draft TC & WM EIS*, DOE prepared an SA to analyze 14 topics it identified where it is unclear whether updated, modified, or expanded information warrants preparation of a supplemental or new draft EIS. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* is not required. See Chapter 1, Section 1.8.2, for more information.

Early stakeholder participation in the EIS planning and development process is important to DOE, which has provided many opportunities for such interaction. For example, DOE has met with HAB on numerous occasions where the board provided extensive input to the *TC & WM EIS* development process and analyses. Chapter 8 of this *TC & WM EIS* identifies the process for these interactions and includes a description of the outcomes of the stakeholder meetings.

218-5 The commentor brings up the issue of integration and cleanup of CERCLA and RCRA units, which could influence each other. As stated in Chapter 1, Section 1.4.2, of this *TC & WM EIS*, groundwater contamination in the non-tank-farm areas of the 200 Areas (which include cribs, trenches [ditches], and tile fields), as well as sources of plutonium, is being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous

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- Transparency of quality assurance and quality control is either lacking or not presented. The Board recommends that during the revision and incorporation of comments to the draft TC&WM EIS, DOE use more recent available data to enhance the accuracy of the draft. *218-6*
- The Board recommends the draft TC&WM EIS should discuss Washington State's environmental exposure standards for both toxic chemicals and radiation dose in a manner that is understandable by the public. *218-7*
- The draft TC&WM EIS should discuss Washington State's regulatory philosophy for limiting the overall lifetime cancer risk for the most highly exposed member of the public that is likely to accrue from all components of exposure (chemical and radiation). *218-8*
- The Board recommends that DOE focus its future decisions on detailed considerations of the maximum likely drinking water contamination and individual radiation dose for each cleanup alternative as a means of ranking each alternative in terms of potential health risk. *218-9*
- The Board recommends that DOE-RL and DOE-ORP use consistent exposure scenarios in all of their environmental impact statements. *218-10*
- The draft TC&WM EIS should present estimates for full life cycle cost analysis using both current year and present value dollars (including estimated costs for natural resource restoration) and risk analyses in all of the alternatives. *218-11*
- In addition to and preceding the executive summary, the Board recommends DOE include a two or three page high-level summary, in language the public can understand, describing the short and long term impacts of each alternative and why DOE selected its preferred alternatives. *218-12*
- DOE should include an alternative that meets established standards that are protective of human health and the environment. *218-13*
- Each alternative presented in the draft TC&WM EIS should be amended to identify mitigation to protect the soil, groundwater, environment and uncounted future generations. *218-14*
- DOE should document how Quality Assurance/Quality Control (QA/QC) procedures and protocols were used in the performance of the draft TC&WM EIS analysis. *218-15*

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Waste Management Act corrective action requirements. Contamination in the vadose zone resulting from tank farm past leaks will be addressed during the SST closure process. The cumulative impacts analysis for this *TC & WM EIS* (see Appendix U and Chapter 6) includes the vadose zone of the 200 Areas in addition to other areas of Hanford. The alternatives analyses and the cumulative impacts analysis use points of analysis to allow comparison of alternatives in a similar fashion, as required by NEPA. These points of analysis include, as appropriate, the tank farm barriers, FFTF barrier, IDF-East barrier, IDF-West barrier, RPPDF barrier, Core Zone Boundary, and Columbia River. The points of analysis were identified in the *Technical Guidance Document* (DOE 2005), signed in March 2005 by DOE and Ecology.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

218-6 DOE applies quality management systems to its NEPA document preparation process and is committed to developing NEPA documents of the highest quality and technical accuracy. This *TC & WM EIS* was prepared in compliance with the requirements of DOE Order 414.1D, *Quality Assurance*, as well as project-specific quality management plans and procedures that govern data management, calculations and analyses, and analytical software development and use. As a result of DOE's January 6, 2006, Settlement Agreement with the State of Washington (as amended on June 5, 2008) regarding *State of Washington v. Bodman* (Civil No. 2:03-cv-05018-AAM), signed by DOE, Ecology, the Washington State Attorney General's Office, and DOJ, ending litigation concerning the *HSW EIS* (DOE 2004a), Ecology conducted its own quality assurance reviews of the *Draft* and this *Final TC & WM EIS* to ensure that quality assurance processes were in place and being followed. Ecology's foreword to the *Draft* and this *Final TC & WM EIS* states Ecology's belief that the document benefited from the quality reviews and quality assurance procedures followed during its preparation.

Quality assurance was identified wherever relevant and appropriate throughout the *Draft* and this *Final TC & WM EIS*. For example, Chapter 1, Section 1.2.7, and Chapter 8, Section 8.1.1, plainly identify and discuss DOE's quality assurance review that was initiated for the *HSW EIS* and resulted in a revised scope for the then-pending "Environmental Impact Statement for Retrieval,

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

- DOE should revise the draft TC&WM EIS to evaluate cumulative risk in a rigorous way, examining a broader and more representative range of the ninety-eight potential combinations of alternatives evaluated for cumulative risk. This revision will ensure sufficient precision to make decisions among the various combinations of alternatives. *218-16*
- As part of the cumulative risk analysis, DOE should present alternatives that are based on the present and reasonably foreseeable remediation actions for the vadose zone and groundwater conducted under CERCLA and RCRA (such as pump and treat and vapor extraction). *218-17*
- As noted by the Board's independent contractor's analysis, there appears to be a number of unit conversion or data errors. These errors raise serious doubts about the quality of the analysis. DOE should thoroughly review the draft TC&WM EIS and the revised draft TC&WM EIS to ensure that such errors are found and corrected. *218-18*

TANKS

Background

Waste has leaked from the tanks, pipelines and related facilities, along with hundreds of millions of gallons that have been discharged from the tanks system. Much of this contamination has moved deeply into the soil. This contamination, combined with more recent contamination, and with residual wastes which may remain in tanks, pipelines, and related facilities, constitute the source term for the tank waste portion of the draft TC&WM EIS analysis. The characterization of the vadose zone contamination is limited which imposes limits on how well the TC&WM EIS team can estimate the waste impacts. The Board is concerned that the analysis may understate the degree of contamination in the vadose zone and give false assurance to decision makers and the public about how much is known about the location, amount and movement of these wastes.

This contamination, particularly in the deep vadose zone, is moving. This leads the Board to conclude that there is great urgency to understand where it all is, how it is moving, and what can be done to remedy that, as well as how to protect the groundwater directly beneath the tank farms and waste sites as well as everywhere on site. The Board believes DOE will likely have to treat the soil to remove various contaminants either in place (through soil washing or other means) or after exhumation.

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Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site, Richland, Washington." Appendix S, Section S.3.2, describes the quality assurance process followed for each step of the cumulative impacts inventory development process.

Whenever available and appropriate, the latest data and information were included in this *Final TC & WM EIS*. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

218-7 In this *Final TC & WM EIS*, DOE revised the draft EIS graphs of radiological risk in the Summary, Chapter 5, and other locations to clarify the term "unitless," which seemed to confuse readers and commentors. In addition, the Washington State statutes and regulations, including requirements and standards, that are potentially applicable to the proposed actions are discussed in Chapter 8 of this EIS.

218-8 Ecology's foreword, located in the front section of the *Draft TC & WM EIS*, provides information on Ecology's role as a cooperating agency and also includes Ecology's insights on the development of the draft EIS. The foreword presented in this final EIS provides additional insights from Ecology as a result of DOE's responses to Ecology's comments on the draft EIS and on DOE's decisions to be made. Federal and state laws and regulations are described in Chapter 8 of this EIS.

218-9 Under NEPA, agencies must conduct and present the results of a comparative analysis of the alternatives; consider the cumulative impacts of the alternatives when added to other ongoing actions; and identify potential mitigations that could be used to offset the impacts identified by the NEPA analysis. The goal is to consider the best-available information at the time of the agency's decisionmaking process. However, NEPA does not require that an agency ultimately select the environmentally preferred alternative based on a "ranking" process. Therefore, DOE disagrees that each alternative needs to be ranked based on a specific methodology or certain potential health risks. DOE does believe that there are specific aspects of each alternative that illuminate key issues or concerns; these are described in the key environmental findings sections of the Summary (Section S.5.5) and Chapter 2 (Section 2.10) of this EIS. DOE used these key findings to assist in identifying the Preferred Alternatives.

218-10 The same exposure scenarios were consistently used for all alternatives analyzed in this *TC & WM EIS*.

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

Because the single shell tanks (SSTs) and related facilities are already at twice their original design life and as there is inherent uncertainty in how much longer they may be relied on to contain the wastes, it is urgent that the wastes currently in SSTs be removed as expeditiously as possible. The current plan relies on the Waste Treatment Plant (WTP) to process tank wastes starting in 2019, thereby providing space in the double-shell tanks (DSTs) to retrieve the remaining SSTs. *218-19*

Historical precedent in the agency for such complex facilities suggests that DOE should not depend entirely upon the immediately successful operation of WTP on the planned schedule.

Comments

As stated in the draft TC&WM EIS, there is "considerable" uncertainty in the composition of the waste in SSTs. The sampling of the tanks was limited and complicated by the liquid and solid makeup of the tank waste. These limited data do not allow for the high confidence in the estimates of the tank waste compositions used in the draft TC&WM EIS.
The draft TC&WM EIS modeled impacts from leaving waste in the tanks as if the contents are homogenous, but they are not. The impacts modeled for DOE's preferred alternative to allow one percent of the volume to remain as a heel are based on the contaminant inventory when the tanks were full of liquid and solid waste. The final one percent may contain far more than one percent of heavy metal radionuclides of concern. Conversely, a smaller fraction of the soluble contaminants may be present in the tank residuals. *218-20*

The estimates of tank waste in the vadose zone consider only known leaks from tanks, pipelines and surface releases. These estimates probably understate the real size of the releases.[2345] The estimates appear to omit significant non-leak tank release events, such as tank overflows, other miscellaneous releases, and the quantity of waste in auxiliary equipment appears to be an extrapolation of an estimate which may differ greatly from the actual contents. *218-21*

2 TC&WM EIS D.1.4 "Historical Leaks and Other Releases." Estimates of tank waste in the vadose zone consider only known leaks from tanks. The estimate does not include or estimate non-leak tank events, such as overflows (e.g. Tank T-101).
3 Presentation to Hanford Advisory Board on Behalf of the Nez Perce Tribe, Feb. 16, 2010, "TC&WM EIS Chemical Cumulative Impact Does Not Take Into Account 96% of the Uranium on Site" – Comparison of PNNL 15829 – 3610.43 Ci to TC&WM EIS for non-EIS (cumulative impact Appendix S) sites cited – 3,220 Ci.
4 Bernhard, et al for the Nez Perce calculates total uranium from PNNL 15289 = 6.69 x 10^8 kg. TC&WM EIS reports total uranium as 2.73 10^8 kg.
5 TC&WM EIS Appendix S reports 1,820 curies of uranium disposed in US Ecology. PNNL 11800 (1998) reports greater than 10,800 curies disposed – a difference of an entire magnitude.

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218-11 Chapter 2, Section 2.11, of this *TC & WM EIS* summarizes and compares the relative consolidated costs of continued operation of existing facilities; construction, operation, and deactivation of new or modified facilities; and associated activities in support of the proposed actions, including administrative controls, institutional controls, and postclosure care. Cost estimates for other environmental restoration activities or risk analyses are considered beyond the scope of this EIS. For analysis purposes, these cost estimates were calculated using constant 2008 dollars and, where applicable, existing cost information. Where cost information was not directly applicable, relevant data were scaled to estimate costs, or, where appropriate, scoping-level cost estimates were developed.

However, because there is currently no specific path forward for final disposition of IHLW, an associated cost basis for disposal of this material is not available for inclusion in this *TC & WM EIS*. Accordingly, the cost estimates are valid for the purpose of understanding the relative costs of the alternatives, but do not represent complete life-cycle costs.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

218-12 Given the large number of alternatives and options analyzed in this *TC & WM EIS*, a two- to three-page summary of both the short- and long-term impacts would be at such a high level that it would not provide the reader with any useful information. DOE believes it has provided a useful summary of impacts in the EIS Summary in Section S.5.3, Summary of Short-Term Environmental Impacts; Section S.5.4, Summary of Long-Term Impacts; and Section S.5.5, Key Environmental Findings. DOE has also issued a Reader's Guide to this EIS that is intended to assist the public in navigating through information of interest to individuals. This guide serves as an introduction and guide to the contents of this EIS, highlights the key features of the reasonable alternatives, and provides references to specific sections of this EIS to assist the reader in reviewing the technical analyses presented.

218-13 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

The draft TC&WM EIS reports that only relatively clean cooling water was disposed to ponds. Yet, surface contamination in the ponds and ditches was severe. Characterization of the vadose zone beneath the trenches and ponds is needed to establish the severity of the problem. Significant amounts of vadose zone contamination beneath the ponds and ditches do not appear to be included in the draft TC&WM EIS. *218-21 cont'd*

The draft TC&WM EIS indicates that high volume streams containing modest levels of contaminants were discharged to cribs and trenches.[6] However, the waste stream disposed in the cribs and tile fields on the west side of the T Tank Farm was tank supernate that flowed from the third tank in a three tank cascade. It is unlikely that 150 million gallons of tank supernate contributed less than a curie of technetium to the vadose zone (Table D-28). The trenches, cribs, and tile fields around the TX and TY Tank Farms received considerable amounts of waste. 216-T-25 received 3 million gallons of evaporator concentrates containing more than 200 curies of technetium. Table D-28 reports total technetium 99 disposed in the TX Trenches as 1.62 curies. The T-19 crib and tile field at the south end of TX-TY received an estimated 120 million gallons of evaporator condensate containing high concentrations of tritium and iodine. These substantial waste volumes appear to have been omitted from the draft TC&WM EIS. *218-22*

The Board is concerned that these problems may be indicative of a larger and more systemic underestimation of the levels and amounts of vadose zone contamination.

Advice

In its revised draft TC&WM EIS, the Board recommends DOE should:

- Evaluate the actual composition (radionuclides and hazardous constituents), mass and volume that are likely to exist in each tank heel, and between the inner steel tank and the concrete shell of each tank on a tank by tank basis. Analyze the impacts from DOE's preferred alternative to leave one percent of the tank waste volume as a heel in the tanks based on a more conservative assumption than the waste is homogenous. The analysis in the current draft likely misinterprets the impacts by assuming that the concentration of contaminants in the heel is in the same proportion in the overall waste volume. *218-20 cont'd*
- Consider a reasonable alternative for providing additional tank capacity and/or other new facilities to allow for continued retrieval of SSTs prior to the WTP beginning full operation, and after operation when current projections are that retrieval will have to halt. *218-19 cont'd*

6 RPP-23405, Revision 0, "Tank Farm Vadose Zone Contamination: Volume Estimates For Risk Assessments," J. G. Field, T. E. Jones, December 2004.

sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

218-14 Chapter 7, Sections 7.1 and 7.5, discuss mitigation measures that could be used to avoid or reduce potential impacts on all resource areas. Many of the mitigation measures discussed would apply across all alternatives because of the similar nature of some of the activities analyzed in this EIS (e.g., construction of facilities). However, the resource subsections of Section 7.1 do acknowledge specific alternatives where only certain mitigation measures would apply or where additional mitigation consideration may be warranted.

218-15 DOE applies quality management systems to its NEPA document preparation process and is committed to developing NEPA documents of the highest quality and technical accuracy. See response to comment 218-6 for a discussion of quality assurance in development of this EIS.

218-16 As described in Chapter 5, Section 5.4, several hundred impact scenarios could result from the potential combinations of the 11 Tank Closure, 3 FFTF Decommissioning, and 3 Waste Management alternatives when factored with their associated option cases and waste disposal groups. For analysis purposes, three combinations of alternatives were chosen to represent key points along the range of actions and associated overall impacts that could result from full implementation of the three sets of proposed actions. DOE believes that these three combinations adequately represent the range of impacts presented by the hundreds of possible impact scenarios.

218-17 Cleanup decisions regarding the non-tank-farm contamination sites will be made in accordance with RCRA, CERCLA, and/or the TPA and in consultation with Federal and state agencies. These non-tank-farm contamination sites are considered in the *TC & WM EIS* cumulative impacts analysis. As described

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

- Do more characterization of the fate and extent of contamination from wastes leaked or released from tank farms and related pipelines, transfer boxes and cribs or other structures that may have discharged tank wastes to the soil. *218-21 cont'd*
- Should also have estimates of non-leak tank release events, such as tank overflows, other miscellaneous releases, and undated leak events in the draft TC&WM EIS. The draft should include the uncertainty in that estimation. These estimates should be found in the broad scale uncertainty estimates in the modeling.
- Evaluate an alternative for tank waste management that results in compliance with all applicable standards. *218-23*
- Reassess the discharge estimates for the cribs and tile fields associated with T, TX and TY tank farms to ensure that the best available information was used and that uncertainties in those estimates are fully addressed. If significant data were missed for these facilities, the draft TC&WM EIS should reassess the discharge estimates for such facilities associated with all tank farms. *218-22 cont'd*
- Include an estimate of the contamination beneath ponds, ditches and other release sites contaminating the vadose zone and the uncertainties in the risk estimates as part of the cumulative analysis. *218-24*

WASTE MANAGEMENT

Background *(Waste Management)*

NEPA requires that environmental impact statements present a reasonable range of alternatives and disclose and consider the impacts of all related pending federal agency proposals for action, including cumulative impacts.
The Board opposes further consideration or implementation of the importation and disposal of off-site low-level waste (LLW) and mixed waste (MW) at Hanford due to the high impacts to groundwater and risk from existing wastes, and the documented increase in impacts projected from offsite waste. *218-25*

Advice *(Waste Management)*

- The draft TC&WM EIS should present an alternative which does not use Hanford as a national radioactive waste disposal site for LLW or MW.

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in Section S.3.5 of Appendix S, 403 waste sites are included as part of the other past, present, and reasonably foreseeable future actions considered in the cumulative impacts analysis. Appendix S describes the development of the waste site characteristics for the cumulative impacts analysis, including key characteristics such as the current or future end state.

The current or future end state helps to determine how the waste sites were factored into the cumulative impacts analysis. For instance, for waste sites subject to "landfill closure," the inventory of contaminants would be disposed of in place. For waste sites subject to "remove, treat, and, dispose," the inventory of contaminants would be removed to the extent possible, treated (if needed), and disposed of in the ERDF or an IDF. The groundwater modeling incorporates the disposition locations for the contaminant inventories from each waste site; therefore, the long-term cumulative impact analyses reflect the current or future end states to the extent possible.

Even after the consideration of future end states, this EIS is not able to fully reflect the effectiveness of all remediation activities. There are significant uncertainties in estimating the degree of cleanup to be achieved by the remediation activities. These include: (1) the inventories of contaminants released to the ground at many of the sites; (2) for liquid release sites, the portion of the contaminants originally disposed of that remains in the vadose zone and the portion that has migrated into the groundwater; (3) the selection of specific cleanup/containment methods for some sites; and (4) the effectiveness of the cleanup/containment methods. Therefore, the cumulative impacts analysis for this *TC & WM EIS* is conservative in that it does not account for: (1) cleanup/containment of waste and contaminated soil at liquid release sites, and (2) cleanup/containment of current or future groundwater contamination.

In recognition of concerns about the effects of remedial actions, DOE added a sensitivity analysis of the impacts that may occur if certain remediation activities are conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

218-18 In response to this comment, DOE did a thorough review of the draft EIS and identified some errors where data were incorrectly input into the text of the document. These errors have been corrected in this *Final TC & WM EIS*.

218-19 All 29 SSTs have now been interim stabilized, and all work required to be performed under the Interim Stabilization Consent Decree (No. CT-99-5076-EFS,

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

- The draft TC&WM EIS should present an alternative which will exhume and dispose off-site significant quantities of Hanford's long-lived radioactive waste (e.g. pre-1970 buried transuranic waste). *218-26*
- DOE should withdraw its February 2000 Record of Decision (ROD) which designated Hanford as a national waste disposal site for LLW and MW. *218-27*

Comments ***(Groundwater)***

The draft TC&WM EIS identifies unacceptably high impacts to human health and the environment from contamination which will reach the groundwater from on-site disposal of existing waste and wastes which are projected to be created during Hanford cleanup. These impacts are compounded by existing high levels of contaminated groundwater and future groundwater contamination from the vadose zone, as projected from the draft TC&WM EIS alternatives presented. Secondary waste disposal from the WTP and tank farm closure activities are also expected to cause significant groundwater impacts. Technetium and iodine are drivers for elevated impacts. Adding off-site waste greatly increases these impacts. The Board has a long held value for DOE to return groundwater quality to its highest beneficial use. *218-28*

Advice ***(Groundwater)***

- Choose a preferred alternative that will restore all groundwater to beneficial use throughout the plumes.
- For the combined groundwater analysis, DOE should consider an alternative which would remove and treat long-lived, extremely radioactive or mixed chemical hazardous wastes for disposal in deep geologic repositories or regulated off-site landfills which are not projected to cause contamination in excess of relevant standards [e.g. remove and dispose in a deep geologic repository radioactive or mixed wastes buried before 1970 or in soil discharge sites; and, remove and dispose of tank farm equipment, piping, equipment and residues as Greater Than Class C (GTCC) – like waste in a geologic repository]. The combined groundwater analyses should also be presented with and without the contribution from a "closed" U.S. Ecology landfill. *218-29*
- The draft TC&WM EIS should examine additional treatment processes for immobilization for technetium storage and/or disposal options to minimize release to the groundwater. *218-30*

September 30, 1999, as amended) has been completed and confirmed. As a result, the court granted the joint motion to terminate the Consent Decree on March 8, 2011. DOE does not believe that the construction of additional DSTs prior to WTP operation would be warranted. The 28 existing DSTs at Hanford are active components needed to complete waste treatment. The construction of additional DSTs was only considered under alternatives where the existing DST capacity was insufficient to support the proposed treatment schedule (Tank Closure Alternative 5) or required replacement because the design life of these facilities would be exceeded (Tank Closure Alternatives 2A and 6A).

218-20 With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks, residual waste, and surrounding waste in the soil, requires preparation of detailed performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

218-21 DOE undertook a detailed review of the tank past leaks inventory evaluated in the draft EIS and determined that the inventory for a number of unplanned releases (e.g., overflows) needed to be revised. This inventory is relatively minor, but the inventory estimates in Appendix D and the groundwater human health dose and risk analysis in Appendix Q were updated in this *Final TC & WM EIS*. However, as noted by the commentor and discussed in Appendix D of the draft EIS, due to lack of supporting data, there is uncertainty regarding the volume of tank waste leaked. To provide additional insight, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5. DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

- The draft TC&WM EIS should adequately report all chemical inventories from all disposal sites at Hanford (including non-DOE Environmental Management (EM) disposal sites, e.g. U.S. Ecology) to ensure a credible analysis of the actual and potential cumulative impact to groundwater. **218-31**
- Points of compliance should be established at the boundaries of the waste management unit. **218-32**
- Points of analysis should be established at unit boundaries, geographic area boundaries, along the Columbia River, and other points of concern.
- To inform decision-makers and the public of the impacts from potential actions, the Board advises that the revised draft TC&WM EIS provide current concentrations and estimate future maximum concentrations for all potential contaminants, not just concentrations in groundwater which occurred in the past. **218-33**
- In the revised draft TC&WM EIS, DOE should analyze and disclose cumulative impacts for exposure to all sources at the point of highest contamination, where it is foreseeable that there will be future wells, buildings or intrusions. **218-34**
- DOE should:
- Revise the draft TC&WM EIS to address groundwater remediation in accord with Board Advice #197. **218-35**
- Revise the draft TC&WM EIS to evaluate how remediation of waste sites may alter groundwater flow patterns and movement of groundwater contamination. **218-36**
- Emphasize the potential impacts on human health and the environment from the largest predicted sources of impacts: B/C cribs, past-practice discharges to cribs, trenches, ditches, ponds, and past leaks and releases from SSTs, pipelines and transfer boxes. **218-37**
- Not portray lesser impacts that fail to meet regulatory standards as insignificant. All of these impacts should be remedied. **218-38**
- Address and include anticipated new technology development and use for addressing groundwater and vadose zone contamination. **218-39**

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still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

In addition, the regulatory process for closing tanks is extensive and involves a number of checks and balances. For example, once the waste in the tanks within a waste management area is retrieved, the actual residuals will be evaluated as part of the closure process for that waste management area. Activities will include detailed examinations of the tanks and residual waste, as well as preparation of long-term performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

218-22 DOE used the latest, most credible and referenceable inventory data available in preparing this EIS. For the referenced cribs and trenches (ditches), the primary source of inventory information was the Hanford Soil Inventory Model, Revision 1 (Corbin et al. 2005), commonly referred to as "SIM." SIM generates inventory and uncertainty estimates for 46 radionuclides and 29 chemicals using 196 waste streams applied to 377 liquid waste disposal sites, unplanned releases, and tank leaks over their operating lifetimes in intervals of 1 year, from 1944 to 2001. SIM acknowledges that limited data are available to estimate waste site inventories from many waste sites. Consequently, for waste sites with no basis for waste composition, SIM often uses data that have been applied to nearby sites. SIM data differ from the commentor's estimates. For example, for trench 216-T-25, SIM estimates the volume of liquid received in 1954 was approximately 2,990,475 liters (790,000 gallons), which contained approximately 0.64 curies of technetium-99. For the 216-T-19 Crib, SIM estimates the volume of liquid to be approximately 454 million liters (120 million gallons); however,

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

Comments ***(Waste Importation)***

The Board believes that DOE contradicts itself in the draft TC&WM EIS by seeking to include the import and burial of 82,000 cubic meters of off-site waste (approximately 3 million cubic feet of waste) while also saying that it will honor a moratorium on importing waste until the WTP is operational – projected for the year 2022. Importation of this waste is projected in the draft TC&WM EIS to increase the contamination levels in groundwater by as much as tenfold above the impacts projected for key contaminants of concern for on-site waste. It could reach a cancer risk level for groundwater in excess of one hundred times Washington State's cancer risk standard for cleanup and landfills.

The draft TC&WM EIS does not include a reasonable alternative to adding more waste to Hanford. The draft TC&WM EIS analysis presents two alternatives for disposal of imported waste at the Integrated Disposal Facility in 200 East and for both 200 East and West. The draft document clearly shows both alternatives have contaminants above legal standards due to quantities and composition of the projected wastes disposed. DOE should have and did not consider an alternative that did not import waste for disposal at Hanford. The appendix notes that a significant portion of the off-site waste may be extremely radioactive remote-handled wastes and contain large amounts of transuranic (TRU) elements whose concentrations are just below the threshold which would require disposal in a deep geologic repository. ***218-40***

Advice ***(Waste Importation)***

- DOE should adopt a ROD that it will not add more waste to Hanford, for reasons including the projected contamination levels in groundwater from existing wastes.
- The Board advises DOE and Ecology to bar receipt, from off-site, of any unvitrified or "good as glass" technetium or iodine bearing waste streams that could be released to the soil. ***218-41***
- The draft TC&WM EIS should include specific conditions to mitigate impacts from all waste supposed for disposal, which include treatment methods and waste acceptance criteria, to prevent contamination of groundwater above standard from any landfill. ***218-42***
- DOE should revise and reissue the draft TC&WM EIS with analysis of the direct and cumulative impacts of the pending proposal to import and bury GTCC wastes at Hanford. ***218-43***

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it reports no iodine-129 inventory and only a small inventory of technetium-99 (7.9×10^{-3} curies). Without a referenceable document, DOE cannot evaluate the commentor's estimates further.

218-23 See response to comment 218-13 for information regarding the alternatives' compliance with applicable standards.

218-24 As described in Section S.3.5 of Appendix S, 403 waste sites are involved in the other past, present, and reasonably foreseeable future actions considered in the cumulative impacts analysis. Appendix S also describes the development of the waste site characteristics for the cumulative impacts analysis, including such key characteristics as the inventories of radioactive and chemical contaminants and the mass or volume of waste disposed of. Because the groundwater modeling requires stipulation of the contaminant inventories from each waste site, the long-term cumulative impact analyses reflect these inventories.

Appendix N, Section N.5, analyzes how travel times through the vadose zone change when infiltration rates are changed. Infiltration rates of 0.9, 3.5, 50, and 100 millimeters per year were included in this analysis. Additional sensitivity analyses have been included in Section N.5 to characterize the following model uncertainties:

- The dependence of solute flux at the water table on the magnitude of aqueous discharge at the source
- The dependence of solute flux at the water table on the thickness of silt layers
- The role of the tilting of layers in directing flow
- The role of dikes in directing or focusing flow
- The dependence of estimates of impacts on the recharge rate for sitewide and IDF conditions
- The dependence of impacts on the magnitude of the distribution coefficient of iodine in the vadose zone
- The role of the efficiency of capture of iodine in ILAW glass

Appendices L, M, and N describe the sensitivity of the results to uncertainties in key parameters. The analyses include sensitivity to the Base and Alternate Case flow fields, and contaminant inventory and release.

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

- DOE should revise the draft TC&WM EIS to update the 2004 SWEIS analysis and to present route specific transportation impacts and enable the public along all potential truck routes to have notice of potential shipments. *218-44*
- The draft TC&WM EIS should include the transportation impacts of all pending proposed shipments (e.g. including GTCC wastes and sodium contaminated wastes) along with route specific potential, accident or terrorist caused impacts. *218-45*

Comments ***(Retrieval/Capping)***

The draft TC&WM EIS's cumulative impact analysis projects that the Hanford Site will persist in re-contaminating groundwater and the Columbia River over thousands of years. Persistent contamination will continue long after current allocated budgets and identified cleanup are done. There is no acknowledgement within the current draft of the potential to drive down cumulative impacts by initiating additional retrieval from burial grounds, tank leaks, tank bottoms and other sources where there are significant amounts of waste discharges and buried waste. Lack of characterization data pose a problem for a defense of leaving the waste in place. *218-46*

The Board has clearly advised that the agencies utilize remedies which remove, treat and dispose of waste (Advice #197). The impacts from relying on caps without prior remediation are shown to exceed relevant standards in the draft TC&WM EIS modeling. Within the draft document, DOE does not discuss Washington State requirements to remove contamination to the degree practicable before capping. *218-35 cont'd*

The estimated risk arising from the quantity of waste already in the ground at Hanford and from the proposed volumes to be buried in shallow landfills after being generated during vitrification and other processes exceeds Model Toxicity Controls Act (MTCA) standards. Mitigation actions should be identified to reduce this risk to meet regulatory standards. These risks would be further compounded by DOE's intention to add more waste to the site. *218-47*

Advice ***(Retrieval/Capping)***

- The draft TC&WM EIS should evaluate the potential to reduce the cumulative impacts by exploratory exhumation of buried waste sites, to the degree practical, before capping. *218-46 cont'd*
- The draft TC&WM EIS should contain an evaluation of the need for further characterization of wastes proposed to remain buried under caps. *218-48*

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218-25 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

218-26 The scope of this *TC & WM EIS* does not include the remediation of the burial grounds as part of the proposed action evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates. However, Appendix S includes DOE's inventory estimates for the burial grounds and Appendix U provides supporting information on the long-term cumulative impact analyses that includes the burial ground inventories.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

218-27 See response to comment 218-25 for a discussion on the transport and disposal of offsite waste.

218-28 Cleanup of Hanford is a major goal of implementing the Preferred Alternatives presented in this *TC & WM EIS*. The commentor is referred to Chapter 2, Section 2.12, for a discussion of the Preferred Alternatives for tank closure, FFTF decommissioning, and waste management. While implementation of the Preferred Alternatives would go a long way toward achieving cleanup of the site, not all actions related to cleanup are addressed in this *TC & WM EIS*. As stated in Chapter 1, Section 1.4.2, of this EIS, the groundwater contamination in the non-tank-farm areas in the 200 Areas (including the burial grounds, cribs, and trenches [ditches]) is being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements. Contamination in the vadose zone resulting

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

- The draft TC&WM EIS should consider reasonable alternatives which would remove and treat long-lived, extremely radioactive or mixed chemical hazardous wastes for disposal in deep geologic repositories or regulated off-site landfills. *218-49*
- The draft TC&WM EIS should consider and disclose to the public for comment mitigation actions that could be applied to landfills and other waste management units to achieve compliance. *218-50*

Comments (*Chemical Inventory*)

The chemical inventory appears to be incomplete as reported in the draft TC&WM EIS. Certain chemicals are missing or under-reported from the non-tank inventories (e.g. numerous volatile organic chemicals in burial grounds, metals and uranium volumes)[7]. Certain chemical analyses seem to be lacking as well. Uranium, which has to be considered a toxic metal as well as a radionuclide, is under-reported for tank discharges and leaks[8][9][10]. It is also missing from the chemical toxicity inventory for proposed imported wastes along with volatile organic chemicals.

Advice (*Chemical Inventory*) *218-51*

- The draft TC&WM EIS should include documentation of all hazardous chemical constituents (e.g. chemicals known to be disposed in or releasing from landfills; total uranium).
- The draft TC& WM EIS should adequately report all chemical inventories from all disposal sites at Hanford (including non-EM disposal sites, e.g. U.S. Ecology) to ensure a credible analysis of the actual and potential cumulative impact to groundwater.

7 While hard data on the quantities disposed is impossible to determine without characterization, the draft TC&WM EIS ignores all the VOCs with the exception of Carbon Tetrachloride – comparing WA MTCA investigation of US Ecology to chemical inventory data in Appendix S; comparison of Appendix S Burial Ground data for Uranium in Curies to reported kilograms Ur for chemical inventory (e.g., US Ecology, W-3, W-4A, W-5 burial grounds) – by Richard Heggen for Heart of America Northwest.
8 Ibid - TC&WM EIS D.1.4 "Historical Leaks and Other Releases." Estimates of tank waste in the vadose zone consider only known leaks from tanks. The estimate does not include or estimate non-leak tank events, such as overflows (e.g. Tank T-101). Comparing RPP-7494, Rev. 0, (2001) to TCWMEIS for intentional releases to cribs, trenches, etc... from A, AX and C Farms.; and, Floyd Hodges, Ph.D. memo to HAB regarding estimates of tank waste in the vadose zone (D.14) failing to report non-leak events such as T-101 overflow.
9 Ibid - Presentation to Hanford Advisory Board on Behalf of the Nez Perce Tribe, Feb. 16, 2010, "TC&WM EIS Chemical Cumulative Impact Does Not Take Into Account 96% of the Uranium on Site" – Comparison of PNNL 15829 (3610.43 Ci) to TC&WM EIS (3,220 Ci) for non-EIS (cumulative impact Appendix S) sites cited.
10 Ibid - Bernhard, et al for the Nez Perce calculates total uranium from PNNL 15829 = 6.69×10^6 kg. TC&WM EIS reports total uranium as 2.73×10^6 kg.

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from tank farm past leaks will be addressed in the SST closure process. The cumulative impacts analysis for this *TC & WM EIS* (see Appendix U and Chapter 6) includes the vadose zone of the 200 Areas in addition to the other areas of Hanford.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

DOE also recognizes the potential negative impacts on Hanford groundwater that the offsite waste poses. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, particularly iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this final EIS.

218-29 The scope of this *TC & WM EIS* does not include the remediation of the burial grounds or soil discharge sites as part of the proposed action evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates. However, Appendix S includes DOE's inventory estimates for the burial grounds, soil discharge site, and US Ecology. Appendix U provides supporting information on the long-term cumulative impact analyses that includes the burial ground, soil discharge site, and US Ecology inventories.

See response to comment 218-26 for a discussion of remediation at Hanford and associated model sensitivity analysis.

Regarding the removal of the tank farm equipment and piping and management of the removed materials as GTCC waste, Tank Closure Alternatives 6A and 6B assumed that the materials removed during clean closure activities would be managed as HLW as appropriate and stored on site pending disposition.

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

Comments ***(Modeling)***

The alternatives analysis is based on one deterministic model, with limited model runs and lack of documentation. The draft TC&WM EIS applies the model site-wide, although it does not appear to be comprehensive in quantifying all needed criteria for analysis. ***218-52***

Additionally, there is no concerted or documented attempt to address the propagation of uncertainties between the various parts of the draft TC&WM EIS important to analyzing long-term consequences within the draft TC&WM EIS subject areas of Environmental Consequences
and Cumulative Impacts. ***218-53***

New sample modeling data show contamination levels higher than projected in the draft TC&WM EIS's model (e.g. chromium upwelling into the Columbia River and contamination spreading from tank leaks and discharges). The Board believes the draft TC&WM EIS model is not conservative. ***218-54***

Advice ***(Modeling)***

- The draft TC&WM EIS should be transparent so a reader can follow the modeling development and documentation of input/output process controls and modeling uncertainties. ***218-55***
- The draft TC&WM EIS should document propagation of uncertainties between the various parts of the draft TC&WM EIS and attempt to quantify their consequences. ***218-53 cont'd***
- The draft TC&WM EIS should incorporate more recent sampling data and inventories which have been identified as incomplete or missing to reduce model uncertainty. ***218-56***
- The draft TC&WM EIS should recognize and report on the uncertainty in the tank waste compositions. ***218-57***
- DOE should revise the draft TC&WM EIS to base it on the International Standard Features, Events and Processes. DOE has already identified this basis as a standard approach to identify the conceptual issues needing to be evaluated and modeled to include all important factors that may influence how contaminants may move in the environment and how people may be impacted. ***218-58***

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218-30 As noted by the commentor, technetium-99 is a risk driver, which is one of the reasons for its removal from the ILAW; its immobilization in IHLW is analyzed under Tank Closure Alternatives 2B and 3C. One mitigation measure, recycling technetium-bearing secondary-waste streams into the primary-waste-stream feeds within the WTP to increase technetium-99 capture in ILAW and bulk vitrification, is discussed in Chapter 7, Section 7.5, of this EIS. In addition, Section 7.5.2.8 and Appendix E include discussions on the secondary-waste workshop held at Hanford to identify the risks and uncertainties associated with treatment and disposal of secondary waste generated during HLW and LAW treatment and disposal and to develop a roadmap for addressing the associated risks and uncertainties.

See response to comment 218-26 for a discussion of remediation at Hanford and associated model sensitivity analysis.

218-31 As discussed in Appendix Q ("Long-Term Human Health Dose and Risk Analysis"), Section Q.2, DOE estimated drinking water impacts for each chemical constituent and chose those chemical constituents that contributed more than 99 percent of the impacts for detailed analysis. This resulted in reduction of the original set of chemical constituents to a final set of 26 chemical constituents, which were used in both the alternatives and the cumulative impacts analysis, which includes non-DOE sites (like US Ecology). The list of chemicals and radionuclides used in the EIS analysis is presented in Appendix Q, Table Q–1.

218-32 The alternatives analysis and the cumulative impacts analysis both use points of analysis so that the alternatives can be compared with each other in a similar fashion, as required by NEPA. These points of analysis include, as appropriate, the tank farm barriers, FFTF barrier, IDF-East barrier, IDF-West barrier, RPPDF barrier, Core Zone Boundary, and Columbia River. The points of analysis were identified in the *Technical Guidance Document* (DOE 2005), signed in March 2005 by DOE and Ecology.

218-33 Chapter 6, Table 6–11, of this *TC & WM EIS* provides information in tabular form on the peak cumulative concentrations of the COPCs. The table footnotes state that, for some constituents, this peak occurred in the past. However, the relationship of past-to-future cumulative constituent concentrations is presented in the time-versus-concentration plots, also provided in this chapter.

218-34 Chapter 6, Section 6.4.2, of this *TC & WM EIS* provides the results of the long-term cumulative impact analyses for human health. Four measures of human health impacts were considered in this analysis: lifetime risks of

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- Analyses of impacts to groundwater should be considered by the potential effects of increased water infiltration due to climate change or actions such as construction of Black Rock Dam. *218-59*

Comments ***(Applicable Law)***

The draft TC&WM EIS does not discuss and consider the relevant state cleanup standards from MTCA in comparing projected contamination levels to what are referred to in the draft TC&WM EIS as "benchmark standards." MTCA standards are ten times more protective of human health for cancer risk than the levels shown in the draft TC&WM EIS. Additionally, Washington State's State Environmental Policy Act (SEPA) requires that an agency disclose for comment specific conditions that will mitigate projected impacts to bring a facility into compliance, and requires enforceable commitments as part of SEPA. NEPA requires that DOE disclose and consider a range of reasonable alternatives. In the Board's opinion, the draft TC&WM EIS does not present a range of reasonable alternatives to: a) using Hanford as a national waste disposal site or, b) retrieving, treating and removing wastes from Hanford for disposal in geologic repositories and landfills which are not projected to cause impacts to groundwater and would meet compliance standards. *218-60* *218-61* *218-25 cont'd* *218-26 cont'd*

Advice ***(Applicable Law)***

- Revise the draft TC&WM EIS to conform to the new draft guidance from the Council of Environmental Quality requiring all NEPA analyses to consider long-term impacts of climate change. *218-62*
- The Board recommends revision and reissuance of the draft TC&WM EIS for public comment with identification of specific mitigation efforts that could bring proposed landfills and other waste management units into compliance with relevant state and federal standards. *218-61 cont'd*
- The Board advises Ecology that it: a) should not accept the draft TC&WM EIS for use in RCRA/Hazardous Waste Management Act permit decisions under SEPA if it is not revised for additional opportunities for public comment to identify mitigation conditions which would prevent landfills and units from exceeding state and federal standards; b) should not accept the draft TC&WM EIS for SEPA purposes if it is not revised and reissued for comment to consider state health based cleanup standards under MTCA in *218-63*

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developing cancer from radioactive constituents, lifetime risks of developing cancer from chemical constituents, doses from radioactive constituents, and Hazard Indices from chemical constituents. These measures were calculated for each year over a span of 10,000 years for applicable receptors at four locations. The onsite locations of analysis were the Core Zone Boundary, the Columbia River nearshore, and the Columbia River. Offsite locations of analysis included population centers downstream from Hanford. Because this resulted in a large amount of data, the presentation method chosen was to present the dose for the year of maximum dose, the risk for the year of maximum risk, and the Hazard Index for the year of maximum Hazard Index. This choice was based on regulation of radiological impacts as dose and the observation that peak risk and peak noncarcinogenic impacts expressed as a Hazard Index may occur at times other than that of peak dose.

218-35 As stated in DOE's September 20, 2007, response to HAB Advice #197, DOE appreciates HAB's time and thoughtful discussion concerning development of the groundwater values flowchart. Protection of groundwater remains a priority for DOE, and DOE remains committed to prioritizing increased funding for groundwater activities. The Hanford groundwater strategy is reflected in the *Integrated Groundwater and Vadose Zone Management Plan*. DOE's strategy is currently focused on preventing key contaminants from reaching the Columbia River. DOE is in the process of implementing systems to contain the plumes as part of ongoing CERCLA processes to remediate groundwater contamination. DOE believes this strategy is consistent with HAB's groundwater values advice. Chapter 8 of this *TC & WM EIS* discusses potentially applicable laws, regulations, and other requirements. In Section 8.1, a discussion is provided regarding the need to meet applicable Washington State and RCRA requirements for closing hazardous waste tank systems. In addition, Tank Closure Alternatives 2B, 3A, 3B, 3C, 4, and 6C address the removal of 4.6 meters (15 feet) of soil from the tank farms and replacing it with clean soil prior to placement of a landfill barrier.

218-36 DOE agrees with the supposition that techniques for remediating waste sites or mitigating their impacts may influence groundwater flow and, consequently, movement of contamination. For example, groundwater pump-and-treat methods both remove contaminant mass from the unconfined aquifer and alter flow patterns during the lifetime of the pump-and-treat operations. The effects on the flow field from this sort of remediation are expected to occur over a relatively short timeframe starting in the mid-1990s and extending approximately 100 years

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comparison to projected contamination levels; and, c) discuss potential benefits from meeting state regulations requiring removal of contamination to the extent practicable prior to use of caps and a landfill closure remedy. **218-63 cont'd**

- The draft TC&WM EIS should show the public and decision-makers how the proposed actions and alternatives will impact groundwater when evaluated against MTCA which should be applied for landfill permits or cleanup decisions. **218-60 cont'd**

PUBLIC INVOLVEMENT

Background

The draft TC&WM EIS is a very significant opportunity for the public to understand the range of actions for major Hanford cleanup decisions relating to high-level nuclear waste tanks and waste management and disposal, and the impacts of those potential alternative decisions. The process began in 2009 with great hope when DOE joined the Board in recognizing this significant potential and Assistant Secretary Triay committed to an extended public comment period. This extended public comment period has enabled DOE to hold eight public hearings around the Northwest, which the Board applauds and hopes will set a precedent to enable the public across the region to discuss and comment on major Hanford cleanup decisions in the future.

However, the Board notes that DOE did not prepare and provide meaningful notice and it did not significantly change the notice despite input from Board members and citizen groups. The notice prepared by DOE was difficult to read, and failed to provide impacts from proposed actions. The burden of providing notice to encourage turnout fell upon citizen groups and the State of Oregon. Hundreds of people attended public hearings, yet Heart of America Northwest's evaluation forms showed that many were not aware of DOE's notices. **218-64**

Comments

Since the draft TC&WM EIS was, in relation to the waste management scope, a re-do of the SWEIS, DOE was asked repeatedly to provide summaries of the draft TC&WM EIS and notice of hearings to the thousands of people who asked to be on the notice list, commented on, and/or attended hearings on the SWEIS. We believe that most people did not receive notice from DOE, which undermines the public participation goals for the TC&WM EIS.

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into the future. Alternatives dealing with storage, retrieval, and disposal of waste from and closure of the SST system have long-term impacts that begin approximately 100 years in the future and extend up to 10,000 years into the future. DOE's view is that the best way to inform the decision concerning these long-term impacts is to exclude the short-term effects from the analysis. The results provided in the *Draft TC & WM EIS* were prepared accordingly. In response to this and other, related comments, DOE decided to revise the draft EIS to include an explicit demonstration of the relationship between the short-term influences on the groundwater flow field and the long-term consequences of waste storage, retrieval, and disposal and tank closure options. This analysis is presented in Appendix L and Chapter 7, Section 7.5, of this *Final TC & WM EIS*.

218-37 Chapter 6, Section 6.4.2, of this *TC & WM EIS* provides the results of the long-term cumulative impact analyses for human health, including the impacts of past, present, and reasonably foreseeable future actions due to releases from non–*TC & WM EIS* sources, such as the BC Cribs, as well as past-practice discharges to cribs, trenches (ditches), and ponds. A listing of these sites is provided in Appendix S of this *TC & WM EIS*. The long-term alternatives analyses for human health presented in Chapter 5, Section 5.1.2, discuss results from three types of releases. The first is from past-practice activities, which include releases from the six sets of contiguous cribs and trenches included in the alternatives analyses. The second is past leaks from damaged tanks. The third involves future activities, including leaks during retrieval of waste from the tanks and long-term leaching of waste material from tanks and ancillary equipment.

218-38 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. NEPA's purpose and its focus are to ensure agencies take a "hard look" at the potential environmental impacts associated with a proposal and the reasonable alternatives to that proposal. Agencies must conduct and present the results of a comparative analysis of the alternatives; consider the cumulative impacts of the alternatives when added to other ongoing actions; and identify potential mitigations that could be used to offset the impacts identified by the NEPA analysis. This *TC & WM EIS* provides information on the results of DOE's analyses and compares those results to existing standards. For example, regarding the

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The summary document in the draft TC&WM EIS did not present the long-term impacts of the preferred alternatives and other reasonable alternatives for those wanting to review and comment on the draft document without reading 6,000 pages. The document had a significant bias by presenting short-term impacts from retrieving wastes and contamination without a section discussing the long-term health and environmental impacts from not retrieving wastes. *218-65*

The draft TC&WM EIS also does not present in an easy to understand comparison the potential impacts of each element of an alternative. The alternatives instead overlap making it difficult to discern incremental impacts from each action.
Each alternative combination within the draft TC&WM EIS, which included cleanup actions recommended by the Board such as remediating to the extent practical for tank leaks and discharges, contain unacceptable proposed actions on other decisions. The summary and DOE presentations also discouraged public comment by insisting that DOE would not consider alternative combinations of remedial actions. *218-66*

Advice

- The draft TC&WM EIS should be revised and reissued for public comment with a clear description of the long term impacts and benefits from preferred alternatives presented in the summary and in notices, including comparisons of state standards to projected impacts and, full disclosure and consideration of related pending proposals with cumulative impacts. *218-67*
- DOE should take comment on a revised draft TC&WM EIS which allows the public to easily comment on each individual proposed action separately. *218-68*
- DOE should work closely with the Board and stakeholder groups in designing effective public notices and hearing locations for a revised draft TC&WM EIS. The Board recommends this collaboration should be part of all Tri-Party Agreement (TPA) and DOE notice processes, and a 45-day notice should be provided to stakeholders prior to hearings so they can prepare and mail notices and conduct other public turnout and education activities. *218-69*
- DOE should add everyone who signed in at the TC&WM EIS hearings to the TPA Hanford Clean-Up mailing and email lists, unless they opt out. *218-70*

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long-term impacts analysis for groundwater, the risk driver's contaminant concentration results from the groundwater modeling run are compared with the benchmark value, which in most cases is the MCL (the standard for drinking water).

218-39 It is DOE's intent to treat and manage the Hanford wastes as effectively as current technology supports. If new technologies become available for remediation, they will be evaluated as part of the Vadose Zone Remediation program for potential implementation. DOE expects this *TC & WM EIS* to assist DOE decisionmakers in determining solutions for these and other issues at Hanford. Specifically, this EIS analyzes potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. DOE continually monitors and supports the development of new groundwater and vadose zone contamination remediation technologies and applies such technologies as they mature, if applicable. However, this EIS could evaluate only remediation technologies that are currently known to be effective for particular waste streams and conditions at Hanford.

218-40 DOE recognizes the potential negative impacts on Hanford groundwater that the offsite waste poses. See response to comment 218-25 for a discussion on the transport and disposal of offsite waste.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East. As can be seen in the sections above, the radiological risks increase by an approximate factor of six.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

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- DOE should record both the presentation and question and answer periods at the hearings, to ensure consistency and accuracy in the information relied upon by the public to comment.
- DOE and the TPA agencies should continue to provide for alternative viewpoint presentations and availability of tables and presentation space for pre-hearing workshops, which significantly aid the public in commenting. *218-71*
- DOE should prepare summaries (fact sheets) of each proposed action and the long-term impacts for alternatives under each action for use by the public before DOE issues the final TC&WM EIS. Summary documents showing potential impacts and mitigation measures should be developed for each element of the pending RCRA permit. DOE and Ecology should work with the Board's Public Involvement Committee and stakeholder groups to design these and plan for dissemination. *218-72*

Sincerely,

Susan Leckband

Susan Leckband, Chair
Hanford Advisory Board

This advice represents Board consensus for this specific topic. It should not be taken out of context to extrapolate Board agreement on other subject matters.

cc: Steve Pfaff, Co-Deputy Designated Official, U.S. Department of Energy, Office of River Protection
Doug Shoop, Co-Deputy Designated Official, U.S. Department of Energy, Richland Operations Office
Mary Beth Burandt, U.S. Department of Energy, Office of River Protection
Dennis Faulk, U. S. Environmental Protection Agency
Jane Hedges, Washington State Department of Ecology
Catherine Brennan, U.S. Department of Energy, Headquarters
The Oregon and Washington Delegations

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218-41 See response to comment 218-25 for a discussion on the transport and disposal of offsite waste.

218-42 Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives. Sensitivity analyses that evaluate improvements in IDF performance (e.g., infiltration rates) and in secondary- and supplemental-waste-form performance (e.g., release rates) were performed and are included in this final EIS.

218-43 Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

218-44 The *TC & WM EIS* Summary, Section S.7.3, and Chapter 2, Section 2.12.3, Waste Management, states that the Preferred Alternative for waste management includes limitations on, and exemptions for, offsite waste importation at Hanford, at least until the WTP is operational. These limitations and exemptions are defined in DOE's January 6, 2006, Settlement Agreement with the State of Washington (as amended on June 5, 2008) regarding *State of Washington v. Bodman* (Civil No. 2:03-cv-05018-AAM), signed by DOE, Ecology, the Washington State Attorney General's Office, and DOJ. This *TC & WM EIS* contains analysis of the transportation impacts that would be associated with transporting radioactive waste to and from Hanford that is independent from the analysis performed for the *HSW EIS* (DOE 2004a). Appendix H of this *TC & WM EIS* also contains an updated analysis of the transportation routes from specific origination sites to specific destinations that would most likely be used. The actual routes used could vary due to changes in route characteristics and highway construction, but the risk results are expected to remain essentially the same. DOE complies with all Federal and state requirements regarding notification of state and tribal governments of radioactive material and waste shipments. For security reasons, DOE only provides advance notification to state governors and law enforcement officials who are responsible for regions and communities along the transportation routes. At a national level, DOE uses its National Transportation Stakeholders Forum (NTSF) to communicate with states and tribes concerning shipments of radioactive waste and materials, as well as occasional high-visibility, nonradioactive shipments. The purpose of NTSF is to bring transparency, openness, and accountability to DOE's offsite transportation activities through collaboration with state and tribal governments. DOE provides

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information about ongoing or planned high-visibility shipment campaigns at annual NTSF meetings and semiannual briefings and through reports to NTSF.

218-45 This *TC & WM EIS* presents the results of analysis of the impacts of transporting waste expected to be shipped to or from Hanford due to the activities proposed under the Tank Closure, FFTF Decommissioning, and Waste Management alternatives. Specific origination and destination sites and corresponding routes analyzed in this EIS are shown in Appendix H. The risks of transporting waste between Hanford and other DOE sites are summarized in the Summary, Section S.5.3, and Chapter 2, Section 2.8.3.10, which show very small overall risks to the workers and the general public. DOE has a national strategy for disposing of radioactive waste that requires transportation between DOE sites. This strategy was analyzed in the *WM PEIS* (DOE 1997). As part of this strategy, radioactive waste could be transported to Hanford for disposal and transported from Hanford for treatment and disposal at other DOE sites. As shown in Sections S.5.3 and 2.8.3.10, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs. An analysis of the transport of GTCC waste is being performed under DOE/EIS-0375. A site for the disposal of GTCC waste has not been selected. Information from the *Draft GTCC EIS* (DOE 2011a) was incorporated into the *Final TC & WM EIS* cumulative impact analyses (see Chapter 6 and Appendix T). DOE considers the threat of terrorist attack to be credible and makes all efforts to reduce any vulnerability to this threat. DOE considers, evaluates, and plans for potential terrorist attacks that could occur during transportation and storage of radioactive materials. The details of DOE's plans for terrorist countermeasures and the security of its facilities and transports are classified. DOE addresses acts of sabotage or terrorism related to the transport of radioactive materials and waste in this *TC & WM EIS*, Appendix H, Section H.6.6. DOE considers the analyses of sabotage events described in the *Yucca Mountain EIS* (DOE 2002) and its SEIS (DOE 2008a) to be enveloping analyses for this *TC & WM EIS*. The consequences of such acts were calculated to result in a dose to the MEI of 40 to 110 rem (at 140 meters [460 feet]) for events involving a truck- or rail-sized cask, respectively. These events would lead to an increase in risk of fatal latent cancer to an MEI of about 2 to 7 percent, or from 2 in 100 to 7 in 100 (DOE 2002).

218-46 The scope of this *TC & WM EIS* includes non-groundwater remediation activities for tank closure and FFTF decommissioning. As described in Section S.1.3.1 of the *Final TC & WM EIS* Summary, and Chapter 1, Section 1.4.1, various

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retrieval technologies and benchmarks are evaluated. The four waste benchmarks analyzed are 0, 90, 99, and 99.9 percent retrieval of tank waste. Other Hanford remediation activities as required under RCRA, CERCLA, and/or the TPA are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation.

Cleanup decisions regarding the non-tank-farm contamination sites will be made in consultation with applicable Federal and state agencies. These other Hanford remediation activities are considered in the *TC & WM EIS* cumulative impacts analysis. Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

218-47 The "benchmark standards" used in this *TC & WM EIS* represent dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL if an MCL is available. For example, the benchmark for iodine-129 is 1 picocurie per liter; for technetium-99, it is 900 picocuries per liter. These benchmark standards for groundwater impacts analysis were agreed upon by both DOE and Ecology as the basis for comparing the alternatives and representing the potential groundwater impacts. In addition, this approach is consistent with the MTCA standards Method A, which is used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs listed in Table 720-1 of the MTCA.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

218-48 The tank closure process, which includes detailed examinations of the tanks and residual waste, requires preparation of a site-specific radiological performance assessment and a closure plan. These documents will provide the information

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and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

218-49 Regarding the commentor's concern about the disposition of HLW, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

218-50 See response to comment 218-42 for a discussion of mitigation measures.

218-51 Appendix S of this *TC & WM EIS* explains the process used to develop the inventory data set for the cumulative impact analyses. All disposal sites for which inventories were identified and considered to be potential contributors to cumulative impacts on groundwater are included in the inventory listing provided in Appendix S and, therefore, were modeled. The inventories listed in Appendix S represent the radionuclide inventories (measured in curies) and chemical inventories (measured in kilograms), including total uranium, that were identified for those sites and for those constituents that were screened (described in Section S.3 as COPCs, i.e., those constituents that control groundwater impacts).

The source cited in this final EIS for the information listed in the Appendix S tables is SAIC 2011, which is a more extensive database of the inventory information used by DOE to accomplish the screening and identify the COPCs. These COPCs, as well as other constituents determined not to be COPCs, particularly other volatile organic chemicals, can be found in this source documentation for the sites noted. As explained in Appendix S, the inventories for the sites were identified using the most recent information available.

Regarding the lack of uranium chemical inventories in the cumulative impacts analysis inventories (including for US Ecology) provided in Appendix S, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

218-52 Although a single Base Case flow model was selected for use in the *Draft TC & WM EIS* analysis, thousands of model runs were evaluated prior to

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selecting the Base Case. The Monte Carlo optimization and uncertainty analysis, as described in Appendix L, Section L.9, of the draft EIS, evaluated over 6,000 Base Case model runs, with each model run having a different set (within a reasonable range) of hydraulic conductivity values for each of the 13 material zones. The Monte Carlo analysis results were used to narrow the field of model runs down to a smaller set of 26 Base Case model runs. These 26 runs had the lowest amount of error when model-simulated heads were compared with historical field-observed heads across the model domain.

This set of 26 of the "best" model runs was further evaluated using particle pathlines analyses. The initial pathlines analysis involved releasing particles in the 200-East Area to simulate the tritium plume originating from the PUREX waste site. These pathlines results were compared with the field-observed tritium plume from the sources at PUREX (see Appendix L, Section L.10, of the draft EIS). A second pathlines analysis called for releasing particles across the 200 Areas within the area confined by what is generally referred to as the "Core Zone Boundary." The number of particles moving north through Gable Mountain–Gable Butte Gap (Gable Gap) were subsequently measured and compared with the number moving east toward the Columbia River (see Section L.10 of the draft EIS).

After selecting the Base Case flow model using the previously mentioned Monte Carlo and pathlines analyses, transport analysis runs were completed to determine the transport models' sensitivity to a variety of transport parameters (see Appendix O, Section O.2.6, of the *Draft TC & WM EIS*). After all testing was completed, the final transport model configuration was selected, which included the selected flow model, and this model was used to perform all Base Case groundwater analyses for the *Draft TC & WM EIS*.

218-53 DOE disagrees with the commentor's assertion that there was no concerted or documented effort to address the propagation of uncertainties along the modeling chain in the *Draft TC & WM EIS*. As described in Appendices L, N, and O, an integrated test of the entire groundwater modeling system was performed on the complex series of sources that produced extensive, regional-scale groundwater plumes. In this analysis, uncertainties regarding inventory, vadose zone flow and transport, and groundwater flow and transport are described and the effect of those uncertainties on specific metrics is discussed. The model calculations were compared with field results, and the factors governing the degree of agreement were identified.

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DOE's view is that NEPA requires a comparison of the impacts of the various alternatives in the context of the cumulative impacts; that the comparison be technically sound and traceable to reliable sources of data; and that important sources of uncertainties in the analyses be identified and their potential implications for decisions and alternatives impacts discussed.

218-54 DOE's view is that the long-term groundwater analysis should provide an unbiased evaluation of the alternatives in the context of the cumulative impact sources (the essential point of a NEPA analysis), and provide a technically defensible analysis based on traceable and referenceable data sources. In addition, a NEPA analysis must describe the assumptions underlying the analysis, and elucidate their relevance to the decisions that are in question.

In this *TC & WM EIS*, a variety of assumptions were required to complete the analyses. The assumptions include some that may be considered pessimistic (e.g., release from grouted tank residuals is primarily convective in nature, waste canisters do not impede the release of the waste they contain, carbon tetrachloride does not degrade in the subsurface), some that may be considered optimistic (e.g., how might impacts be reduced if a deep vadose zone technology were to be deployed that would reduce the flux of contaminants to the aquifer) and some that are neutral (e.g., natural infiltration over the 10,000-year period of analysis is probably around 3.5 millimeters per year).

The point of a NEPA analysis is to compare alternatives and provide information that has bearing on important decisions. DOE also points out that the use of conservative parameters and assumptions may actually weaken a NEPA analysis by damping down or muting differences among the alternatives. Finally, DOE notes that the *TC & WM EIS* groundwater analysis does actually predict upwelling of groundwater and discharge of contaminants, including chromium, into the Columbia River (see Appendix U) and also includes impacts of approximately 1,000,000 gallons of tank waste known or suspected to have leaked from the SST system (see Appendix M, Section M.3.1.1).

218-55 In response to this and other comments, the presentation of input and output data is expanded in Appendix L, which discusses the model development process.

218-56 The *Draft TC & WM EIS* long-term groundwater analyses were based on data through 2006. This *Final TC & WM EIS* contains updates to sampling data and inventory through 2010.

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218-57 The commentor is referred to Appendix D, Section D.1.1.4, Uncertainty in Best-Basis Inventories. This section discusses the uncertainties in the tank waste inventory estimates used in this EIS.

218-58 The International Standard Features, Events, and Processes approach is being addressed by DOE through the site-specific tank closure activities; this includes the preparation of a performance assessment and a closure plan. DOE is currently in the initial process of tank closure for Waste Management Area C.

218-59 DOE has reviewed and revised, as necessary, its analyses on the effects of climate change on various resources at Hanford and the possible effects on environmental impacts of the *TC & WM EIS* alternatives. As described in Chapter 6, Section 6.3.4, DOE has reviewed climate studies that forecast general trends in Hanford regional climate change. However, there are no reliable methodologies for projections of specific future climate changes in the Hanford region, and thus such changes have not been quantified in this EIS. To account for this uncertainty, Appendix O, Section O.6.2, describes the effects of enhanced infiltration such as that which may occur during a wetter climate. In the *Draft TC & WM EIS*, Appendix V focused on the potential impacts of a rising water table from a proposed Black Rock Reservoir. Following the retraction of this proposal, the focus of Appendix V was changed in this final EIS to analysis of potential impacts of infiltration increases resulting from climate change under three different scenarios. Appendix V includes sensitivity analyses of potential impacts at Hanford that could result from climate changes that may increase model boundary recharge parameters and the rise of the groundwater table. Additional qualitative discussion of the potential effects of climate change on human health, erosion, water resources, air quality, ecological resources, and environmental justice has been added to Chapter 6 of this final EIS. Additional discussion of the types of regional climate change that could be expected has also been added to Chapter 6, Section 6.5.2, Global Climate Change. The potential impacts of the alternatives on climate change are addressed in Chapter 6, Section 6.5.2, and Appendix G, Section G.5, of this *TC & WM EIS*.

Chapter 1, Section 1.10, describes the results of the *Final Planning Report/ Environmental Impact Statement, Yakima River Basin Water Storage Feasibility Study, Yakima Project, Washington* (BOR 2008), stating that the U.S. Bureau of Reclamation has identified the No Action Alternative, including activities currently planned or under construction, as the Preferred Alternative. This would not involve construction and operation of the Black Rock Reservoir.

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

218-60 The "benchmark standards" used in this *TC & WM EIS* represent dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL if an MCL is available. For example, the benchmark for iodine-129 is 1 picocurie per liter; for technetium-99, it is 900 picocuries per liter. These benchmark standards for groundwater impacts analysis were agreed upon by both DOE and Ecology as the basis for comparing the alternatives and representing the potential groundwater impacts. In addition, this approach is consistent with the MTCA standards Method A, which is used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs listed in Table 720-1 of the MTCA. The State of Washington's Dangerous Waste Regulations (WAC 173-303) implement the Hazardous Waste Management Act of 1976. These regulations provide requirements for cleanup- and permit-related decisionmaking.

These regulations ensure that, as cleanup begins, public input will be sought and state MTCA cleanup standards will be considered. For tank farm closure actions and decisions, there will be other forums to provide additional information that DOE and the State of Washington should consider before developing the proposed decision documents. Now that this *Final TC & WM EIS* has been published, the State of Washington will begin developing RCRA/Hazardous Waste Management Act permits and permit modifications to the Hanford sitewide permit and obtaining public comments on the proposed actions, including the application of MTCA standards for cleanup. The permitting process will consider the mitigation measures proposed in this *TC & WM EIS* and may include other measures that the State of Washington determines are necessary to protect human health and the environment.

218-61 As a "cooperating agency" (as defined under CEQ regulations) in DOE's preparation of this *TC & WM EIS*, Ecology has independently reviewed the *Draft TC & WM EIS* and will review this *Final TC & WM EIS* for the express purpose of ensuring that this EIS satisfies Ecology's SEPA needs. The State of Washington has agreed that the alternative descriptions identify the information needs necessary to meet SEPA requirements. Ecology expects that the analysis provided in this *Final TC & WM EIS* will provide enough information to adequately inform its permitting requirements.

Permits needed to implement the actions identified in the ROD would be processed under Washington State's Hazardous Waste Management Act and other applicable authorities, which generally require a separate opportunity for public

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

comment on any proposed permits developed by Ecology. SEPA authorizes (but does not require) Ecology to include enforceable mitigation measures in its future permitting decisions for the IDF(s). Following completion of the mitigation action plan, Washington State RCRA/Hazardous Waste Management Act permit decisions will be made to ensure that the necessary mitigation measures are implemented. The permitting process will consider the mitigation measures provided in this *TC & WM EIS* and may include other measures that the State of Washington determines are necessary for protection of human health and the environment. The State of Washington's Dangerous Waste Regulations (WAC 173-303) implement the Hazardous Waste Management Act of 1976 and provide the requirements for cleanup and permit decisionmaking. These regulations ensure that, as cleanup begins, public input will be sought and the state MTCA cleanup standards will be considered.

218-62 DOE has reviewed and revised, as necessary, its analyses on the effects of climate change on various resources at Hanford and the possible effects on environmental impacts of the *TC & WM EIS* alternatives. As described in Chapter 6, Section 6.3.4, DOE has reviewed climate studies that forecast general trends in Hanford regional climate change. However, there are no reliable methodologies for projections of specific future climate changes in the Hanford region, and thus such changes have not been quantified in this EIS. To account for this uncertainty, Appendix O, Section O.6.2, describes the effects of enhanced infiltration such as that which may occur during a wetter climate. In the *Draft TC & WM EIS*, Appendix V focused on the potential impacts of a rising water table from a proposed Black Rock Reservoir. Following the retraction of this proposal, the focus of Appendix V was changed in this final EIS to analysis of potential impacts of infiltration increases resulting from climate change under three different scenarios. Appendix V includes sensitivity analyses of potential impacts at Hanford that could result from climate changes that may increase model boundary recharge parameters and the rise of the groundwater table. Additional qualitative discussion of the potential effects of climate change on human health, erosion, water resources, air quality, ecological resources, and environmental justice has been added to Chapter 6 of this final EIS. Additional discussion of the types of regional climate change that could be expected has also been added to Chapter 6, Section 6.5.2, Global Climate Change. The potential impacts of the alternatives on climate change are addressed in Chapter 6, Section 6.5.2, and Appendix G, Section G.5, of this *TC & WM EIS*.

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

218-63 Now that this *Final TC & WM EIS* has been published, there will be further opportunities for the public to provide comments when the State of Washington proposes RCRA/Hazardous Waste Management Act permit modifications to the Hanford sitewide permit. In addition, regarding tank farm closure decisions, there will be other forums where the public will have an opportunity to provide additional information that DOE and the State of Washington should consider before developing the proposed decisions and obtaining public comments on the proposed actions.

Based on several discussions among DOE, Ecology, and EPA, additional information has been provided in this *Final TC & WM EIS*. For example, DOE and its regulators recognize the potential negative impacts on Hanford groundwater that the offsite waste poses. The *Draft TC & WM EIS* analysis shows that receipt of offsite waste streams containing specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. A discussion of this mitigation measure is provided in this *Final TC & WM EIS*. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this final EIS.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

Following issuance of this *Final TC & WM EIS* and its associated ROD, DOE is required to prepare a mitigation action plan that addresses mitigation commitments expressed in the ROD. This plan would be prepared before DOE would implement any action related to a specific mitigation commitment. Copies of any mitigation action plan developed by DOE will be made available for inspection in appropriate DOE public reading room(s) and will also be available upon request. Following completion of the mitigation action plan, Washington

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

State RCRA/Hazardous Waste Management Act permit decisions will be made to ensure the necessary mitigation measures are implemented. The permitting process will consider the mitigation measures provided in this *TC & WM EIS* and may include other measures that the State of Washington determines are necessary for protection of human health and the environment. The State of Washington's Dangerous Waste Regulations (WAC 173-303) implement the Hazardous Waste Management Act of 1976 and provide the requirements for cleanup and permit decisionmaking. These regulations ensure that, as cleanup begins, public input will be sought and the state MTCA cleanup standards will be considered.

218-64 DOE worked with HAB's Public Involvement Committee to develop additional notification materials beyond those required by NEPA. DOE worked to provide the public with timely and useful information on the *TC & WM EIS* project and meetings. Notices of the comment period and hearings were published in the *Federal Register*. Notices providing the dates, times, and locations of hearings were placed in local newspapers and mailed directly to individuals on DOE's mailing list. Informative posters and factsheets were provided to attendees at the open houses that preceded the public hearings. Project information is also available to the public on Hanford's website (http://www.hanford.gov). Public input is important to DOE, and DOE appreciates the public's participation in these hearings.

DOE mailed copies via Federal Express to all individuals who requested one. For those individuals who requested only a printed copy of the Summary, a CD containing the complete *Draft TC & WM EIS* and a Reader's Guide was attached to the inside cover.

218-65 In response to comments that there was not enough summary information on long-term impacts in the draft EIS, DOE added a more extensive discussion of the long-term impacts analysis to the Summary of this *Final TC & WM EIS*.

218-66 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites. Analysis of ongoing remedial actions taking place at Hanford under the TPA is not part of the proposed actions and alternatives; however, these remedial actions are considered as part of the cumulative impacts analysis.

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

Because several hundred impact scenarios could result from the potential combinations of the 11 Tank Closure, 3 FFTF Decommissioning, and 3 Waste Management alternatives, DOE analyzed a reasonable number of combinations of alternatives to represent key points covering the full spectrum of potential actions and associated overall impacts that could result from full implementation. The analyses of potential environmental impacts are presented in detail in Chapters 4 ("Short-Term Environmental Consequences") and 5 ("Long-Term Environmental Consequences") of this *TC & WM EIS*, allowing an indepth comparison of the alternatives by resource area. The impact analyses presented in Chapter 2, Sections 2.8 and 2.9, are summaries of the short- and long-term impacts presented in Chapters 4 and 5, respectively. In addition, Section 2.10 presents an overview of the key environmental findings associated with the Tank Closure, FFTF Decommissioning, and Waste Management alternatives and discusses the key drivers contributing to these impacts.

DOE disagrees that the EIS Summary and DOE's presentations at the public meetings discouraged public comment. The Summary is intended to provide a brief overview of the material contained in this *TC & WM EIS* and cannot, by nature, include all topics of interest to individual parties. To assist the public in navigating through the information presented in this *TC & WM EIS*, DOE also issued a Reader's Guide. This guide serves as an introduction and guide to the contents of this EIS, highlights the key features of the reasonable alternatives, and helps readers review the technical analyses presented. Recognizing that many people may not read beyond the EIS Summary, DOE attempted, with

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

the information presented in both the Summary and Reader's Guide, to strike a balance between those readers who want more-technical details about DOE's proposed actions and alternatives and those who seek a simpler overview. As a NEPA document, this *TC & WM EIS*, including the Summary, was prepared in an open manner with opportunities for public input provided at both the scoping meetings and public hearings on the draft EIS. The public hearings on the draft EIS were intended not only to collect comments, but to inform and educate the public as well. In addition to a DOE presentation at the beginning of each public meeting, an hour was provided before each meeting to allow the public to ask questions of staff who supported the development of the draft EIS. Posters and factsheets were made available at each meeting as well. The Hanford website is also available to the public (http://www.hanford.gov) that informs the public of project activities, including development of this *TC & WM EIS*.

218-67 See response to comment 218-4 for information on DOE's preparation of an SA and stakeholder involvement in the EIS planning and development process.

218-68 DOE has satisfied NEPA requirements by responding to public comments on the draft EIS in this CRD and by making changes to the draft EIS where appropriate and necessary. Subsequent to the issuance of the *Draft TC & WM EIS*, DOE prepared an SA to analyze 14 topics it identified where it is unclear whether updated, modified, or expanded information warrants preparation of a supplemental or new draft EIS. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* is not required. See Chapter 1, Section 1.8.2, for more information.

The public was afforded the opportunity to comment on any portion of the draft EIS as often as desired and in whatever format was preferred. All comments made during the public comment period, whether given orally at the public hearings or sent via mail or email, were considered equally by DOE. All comments received on the *Draft TC & WM EIS* and their approved responses are included in this CRD, a volume of this *Final TC & WM EIS*. DOE has posted

this final EIS, including this CRD, on the Hanford website (http://www.hanford.gov) and on the DOE NEPA website (http://energy.gov/nepa), and a Notice of Availability will be published in the *Federal Register*.

218-69 DOE's public involvement process for this EIS was based on CEQ and DOE regulations for implementing NEPA; DOE Order 451.1B requirements; and applicable DOE NEPA guidance (available at http://energy.gov/nepa). While DOE is not bound by the terms of the TPA Public Involvement Plan in conducting NEPA processes at Hanford, DOE is well aware of those procedures and factored them into the *TC & WM EIS* Public Involvement Plan, which was prepared in collaboration with Ecology, a cooperating agency.

In response to the commentor's request for more-extensive collaboration in the *TC & WM EIS* public hearing planning process, as well as DOE's desire to communicate with and involve the public in this process, DOE stakeholder teleconferences were held on December 30, 2009, and January 5 and 6, 2010. Public hearing dates and locations were identified and discussed, and it was agreed that additional public hearings would be held in Spokane, Washington, and La Grande and Eugene, Oregon. Pre-hearing workshops were also discussed. In addition, DOE held a 1-hour open house prior to each public hearing to allow the public to meet informally with members of the *TC & WM EIS* team, ask questions, and learn more about this EIS. Informative factsheets were provided at these open houses. It was further agreed during the DOE stakeholder teleconferences that no workshops other than the HAB workshop held on December 15, 2009, would be held.

A suggestion was made during one of the teleconferences to move the planned January 26, 2010, public hearing in Richland, Washington, to meet the 30- to 45-day notification goal under the TPA Community Relations Plan (the January/February timeframe for public hearings was announced at the December 15, 2009, HAB meeting). During the call, the Hanford communities indicated their support for the January 26 public hearing date and their opposition to changing it.

218-70 DOE has added the names of all people who submitted comments during the public comment period to the EIS distribution list. The *TC & WM EIS* mailing list was developed using the Hanford mailing list and is specific to those individuals who are interested in NEPA. Not everyone interested in this EIS may be interested in TPA activities and, therefore, they are not automatically added. However, DOE sends out postcards and electronic announcements and posts

Commentor No. 218 (cont'd): Susan Leckband, Chair, Hanford Advisory Board

information on the DOE-HQ and site websites in an effort to reach out to people who are interested in Hanford activities.

218-71 Both the open house and question and answer period preceding each *TC & WM EIS* hearing were provided by DOE as a mechanism to educate the public on this EIS and to provide mechanisms for alternative viewpoint presentations as well as tables and presentation space for pre-hearing workshops. They were not meant to be mechanisms for collecting comments. All comments made during the public comment period, whether given orally at hearings or sent via mail or email, were considered equally by DOE. All comments received on the *Draft TC & WM EIS* and their approved responses are included in this CRD, a separate volume of this *Final TC & WM EIS*. DOE has posted this final EIS, including this CRD, on the Hanford website (http://www.hanford.gov) and on the DOE NEPA website (http://energy.gov/nepa), and a Notice of Availability will be published in the *Federal Register*.

218-72 To facilitate public comment, DOE and Ecology prepared numerous posters and factsheets summarizing various aspects of the *Draft TC & WM EIS*, which were made available at each of the public hearings. DOE, upon request, has also provided HAB updates on the EIS since the draft was issued. Additional information on project activities, including the development of this EIS, was also posted on Hanford's website (http://www.hanford.gov).

Commentor No. 219: Susan Perkins

From: SUSAN PERKINS [susanperkins@msn.com]
Sent: Thursday, March 18, 2010 3:47 PM
To: tc&wmeis@saic.com
Subject: comments on draft Tank Closure & Waste Management EIS

I have the following comments on the draft Tank Closure & Waste Management EIS:

1. Treat the waste from the FFTF nuclear reactor on-site. The draft EIS's recommendation to ship the most radioactive components to Idaho is unacceptable due to the extreme danger posed in case of an accident. *219-1*

2. The Single Shell Tanks should be removed. Soil that has been contaminated by Single Shell Tank waste or High-Level Nuclear Waste from should be cleaned up to prevent contaminating shallow groundwater off the Hanford Reservation. The preferred alternative in the draft EIS fails to meet requirements of Washington state's hazardous waste law. *219-2*

3. The 200 East landfill proposed for Hanford's nuclear waste and imported waste from off-site would leach nuclear waste to the Columbia River and to groundwater, causing very high cancer rates for 1000 years or longer to future users of groundwater along the river. This is unacceptable. Waste that is capable of leaching should be exported from the Hanford Reservation and disposed of in a deep geologic repository. The 200 East landfill should only be used for waste products that are not susceptible to leaching. *219-3*

4.Importing nuclear waste to Hanford from off-site should not be allowed. The existing vitrification plant will only be able to treat half of the existing waste that needs to be cleaned up already. *219-4*

As a geologist, I am well aware of the potential for groundwater contamination and find the proposed alternatives in the draft Tank Closure & Waste Management EIS a shocking disregard for public health. *219-5*

Sincerely,

Susan Perkins, LG
7731 14th Ave. NW.
Seattle, WA 98117

219-1 Under the Idaho Option, RH-SCs would be shipped to INL for treatment and then disposed of at either Hanford or NNSS; however, an analysis of the transportation risks associated with this option found those risks to be very small (see Chapter 4, Section 4.2).

219-2 Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*. This *TC & WM EIS* addresses the potential laws and requirements that would apply, depending on the alternative. Issues concerning the ability to meet legal standards or requirements are also discussed, along with the potential mitigation measures that may be needed and that are feasible for DOE to implement. Additional mitigation measures could be required in future permits issued by the State of Washington, or could be addressed under the scope of the TPA as part of future remedial actions that are subject to CERCLA.

219-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Commentor No. 219 (cont'd): Susan Perkins

219-4 See response to comment 219-3 for a discussion on the transport and disposal of offsite waste.

As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

219-5 DOE has fully considered the impacts of its proposed alternatives on groundwater contamination and subsequent impacts on both human and ecological receptors. The commentor is directed to Chapter 5 of this *TC & WM EIS*, which addresses groundwater, human health, and ecological impacts of the various Tank Closure, FFTF Decommissioning, and Waste Management alternatives. Detailed discussions of these topics and the supporting analysis are presented in Appendices K, L, M, N, O, P, and Q.

Commentor No. 220: Angela Woodward

Angela Woodward
4008 NW Lavina St
Vancouver, WA 98660

March 18, 2010

Mary Beth Burnadt
Office of River Protection
US Department of Energy
via fax 888-785-2865

Dear Ms. Burnadt,

I attended the public hearing at the Doubletree hotel in Portland, Oregon on February 10, 2010 regarding Hanford. I did not speak at the hearing. At this time I am writing to provide my comments. While the EIS covered many issues, the items that received the most attention were tank cleanup and bringing additional waste to Hanford.

I moved to the area from Southern California four years ago. I had heard about the mess at Hanford, but before the hearing I did not understand the extent of the mess. At the public hearing, I was hearing for the first time that there are 149 single shell tanks, buried 40 to 50 feet underground holding 53 million gallons of nuclear waste with known leaks. This information, conveyed casually by the speakers, including yourself, shocked me.

The Department of Energy's preferred alternative is landfill closure rather than clean closure. Under landfill closure the tanks will be pumped out as much as possible and then capped. Under clean closure, the tanks and the contaminated dirt would be removed and treated. The Department of Energy's own data shows that over long periods of times, thousands of years, landfill closure will result in toxins reaching the river. It was different periods of times for different toxins. In a nutshell, if we chose landfill closure we will be knowingly causing great harm to the environment. Because of the future impacts, this is a moral decision. The correct choice in my opinion is clean closure. *220-1*

The Department of Energy said that landfill closure was chosen out of a need to balance the short term exposure to the workers doing the clean up against the long term damage to the environment. I do not find this argument convincing.

220-1 As required by NEPA, this *TC & WM EIS* addresses the impacts on both the short- and long-term human environment. Workers related to the activities being analyzed are part of the human environment, and impacts on workers are presented in Appendix K, Section K.3.10, and Chapter 4, Sections 4.1.10, 4.2.10, and 4.3.10, of this EIS.

The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture the contaminants that may have already reached the water table due to past practices, i.e., past leaks and use of contiguous cribs and trenches (ditches).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 220 (cont'd): Angela Woodward

On questioning you stated that we should understand that the Department has "never done anything to this scale before." The lack of prior experience does not impress me as a reason not to proceed with clean closure. *220-1 cont'd*

The suggestion to bring additional waste to the site is adding insult to injury to the environmental activist at the hearing and elicits an emotional reaction. I understand that if we are going to generate nuclear than we need a place to store it. However, on balance, I agree with the environmentalist that nuclear waste should not be stored by a river. *220-2*

I trust that in making your decision you will take into consideration my urging that we as a society "Do the Right Thing." In this case, "Doing the Right Thing" means clean closure of the tanks and rejecting the idea of bringing additional nuclear waste to Hanford. *220-1 cont'd*

Sincerely,

Angela Woodward

cc: Governor Gregoire
Via fax 360-753-4110

220-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 221: Marian Grebanier

From: Marian Grebanier [mgrebanier@gmail.com]
Sent: Thursday, March 18, 2010 4:44 PM
To: tc&wmeis@saic.com
Subject: comment on TC & WM EIS re Hanford

Having read summaries of the TC & WM EIS, I am appalled, first of all, that the USDOE is proposing to dump more radioactive wastes at the already overloaded Hanford site. Not only is it overloaded, but the USDOE still has not dealt with the huge amount of problems related to radioactive wastes currently present at the site. This site is unfortunately located over groundwater and next to a major river.....terrible, indeed. *221-1*

Also, to think of driving these truckloads of wastes (estimated at 17,00) is total folly. Driving on major routes throughout the country, with the certainty of some accidents occuring, is irresponsible and unacceptable. The amount of radiation spread over hundreds of square miles (and near my city of Portland, Oregon) in such an event would cause a thousand fatal cancers. Just driving down the highways would expose citizens along the way to increased rates of cancer. I am sure the drivers would also be at great risk. *221-2*

Then, what I see the DOE is suggesting as solutions to the existing problems at Hanford such as increasingly rapid rates of pollution of groundwater and seepage to the Columbia River, is largely a do-nothing attitude. Not to find out what is in the 40 miles of unlined ditches containing highly radioactive and chemical wastes and never attempt to clean them up is unacceptable. *221-3*

I know there are a number of other major concerns at Hanford such as the high-level nuclear wastes contained in aging underground leaky Single Shell Tanks (99.9% tank wastes must be removed if technically possible, treated and dispose of them in a waste facility not near a river nor over groudwatern); the suggested entombing the FFTF as a way of decommissioning the FFTF (no, no--remove it like we did the Trojan reactor); the slow rate at which the vitrification program is being built and (of course way over budget) and the need for at least another LAW to be scheduled to be built within the next year or so. *221-4*

So, a big NO to having more waste added to Hanford. The treatment of what is there is way behind and is still being figured out. *221-1 cont'd*

Sincerely,

Marian Grebanier
4549 NE 20 Ave.
Portland, OR 97211

221-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

221-2 On average, up to 2 trucks per day for 20 years would be involved in transporting about 14,200 truck shipments of LLW and MLLW to Hanford under the Waste Management alternatives, as presented in this *Final TC & WM EIS*, Chapter 4, Section 4.3, Public and Occupational Health and Safety—Transportation. As shown in the Summary of this EIS, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs. Rail transport would lead to lower doses to the general population due to the smaller number of transports and lower exposure to populations in the vicinity of stations where reclassification and inspections would take place. In addition, no additional LCFs are expected as a result of an accident involving a rail or truck shipment. Transportation workers (including drivers and escorts) would be monitored for radiation exposure. DOE would administratively limit the radiation exposure of these workers to no more than 100 millirem per year, unless the individual is a trained radiation worker, in which case the administrative limit would be 2 rem annually (DOE Standard 1098-2008). Each individual escort's exposure would be administratively limited to no more than 2 rem per year (DOE Standard 1098-2008).

221-3 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 221 (cont'd): Marian Grebanier

221-4 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Under DOE's Preferred Alternative for FFTF decommissioning (Alternative 2: Entombment), some below-grade structures would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment. In addition, this EIS analyzed supplemental LAW treatment capability by building new treatment facilities that are either part of (expanded LAW capacity) or separate (bulk vitrification, steam reforming, or cast stone) from the WTP. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

Commentor No. 222: Ralph Johnson

From: Ralph Johnson [linktech@ix.netcom.com]
Sent: Friday, March 19, 2010 1:01 AM
To: tc&wmeis@saic.com
Cc: linktech@ix.netcom.com; thesecretary@hq.doe.gov; warrenmiller@nuclear.energy.gov; mark.gilbertson@em.doe.gov; denise.freeman@hq.doe.gov; ighotline@hq.doe.gov
Subject: COMMENTS ON TC&WMEIS [FFTF INCLUDED] due March 19,2010
Attachments: COMMENTS ON EIS-Mar 2010.doc

COMMENTS ON EIS

TC&WMEIS (Hanford)

Comments due March 19, 2010

My comments are short and to the point. They come from a long background of intimate personal knowledge of Hanford and its assorted programs; career service with both contractors and government.

1. The only option worthy to be considered in the draft as written is NO ACTION.
2. My strong recommendation is to provide a mission and put the entire facility back in use. Its suitability for such was determined by specific study completed in the last few years; funded by DOE. Three missions come immediately to mind:
   - Production source for medical isotopes in the cancer fight. Today's sources are limited and of questionable quality.
   - Test reactor for advanced nuclear power development. Believed to be one of the best fast test reactors currently available.
   - Provide a source for Pu240 as a vital defense material and of course there is always a vital need for research of all kinds-medical, energy, etc.
3. Clarify the EIS role of the FFTF as a commercial support entity and remove it from a defense environmental EIS that encompasses much of the past Hanford Project. Its environmental authority and traceability via the Environmental Protection Act should fit into the chain of required events and decisions in full regard to satisfying the requirements of the Environmental Protection Act that requires a NEPA process; and not a defense waste removal process. A fully justified Record of Decisions path needs to be made in full compliance with the Act. Past environmental and NEPA documentation appears to be very muddled and perhaps in some cases illegal.

222-1 **222-1** DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. As discussed in Chapter 1, Section 1.4.2, Decisions Not to Be Made, DOE is not considering restarting FFTF, only decommissioning it. Thus, regardless of the alternative selected (including No Action), FFTF would not be available for future use.

Commentor No. 222 (cont'd): Ralph Johnson

4. The cost to continue with Deactivation – NO ACTION option – is only $1.2 million per year. This status has been apparently supported by the Washington Ecology and EPA having written, "It is our view that FFTF work should proceeded only until it can be placed in a min-safe configuration...." This is the current status –Deactivation, Surveillance and Maintenance.

Once broken free of the Hanford Defense Mantle, the FFTF could be one of the USA's largest contributions to the World's nuclear non-proliferation programs [a negotiation chip]. It could also well be an advance leader in getting the USA back into a leadership position within the world nuclear market..rej 3-18-10

222-1 cont'd

Ralph Johnson

xxx-xxx-xxxx
4456 41st Ave SW
linktech@ix.netcom.com
Seattle WA 98116

Response side of this page intentionally left blank.

Commentor Number 223 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 218.

Commentor No. 224: Lynn R. and Stephen Schott

Mr Stephen Schott
867 Mingo Mountain Rd
Kettle Falls, WA 99141

3/13/10

To whom it May concern —

I am angry + outraged at recent DOE decisions to ship + store radioactive waste at Hanford. The citizens of Wash. State are opposed to this + have waited years for the DOE to do proper cleanup on the highly contaminated site. It is insane + immoral to dump even more waste when the government has not safely contained the current mess. 224-1

Enough is enough!

The cancer rate in E. Wash. is sky-high already. Please — do not pollute the Columbia River any more, + do your duty to clean up the current waste. 224-2

Any additional investment of federal dollars in nuclear weapons or power is utterly wrong + misguided. 224-3

The voters of WA rejected DOE's proposal some years back, + our wishes must be honored. 224-4

Sincerely, Lynn R. Schott
Stephen Schott

[redacted]

224-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

224-2 The potential doses to, and health impacts on, the public and workers from past Hanford operations have been the subject of a number of studies. Summaries of these studies are presented in Chapter 3, Section 3.2.10.3, of this EIS. As indicated in that section, the question of whether the population around Hanford has elevated cancer incidence or cancer mortality is unresolved. One past study showed no elevated levels of cancer around nuclear facilities, including Hanford; another study of 16 counties near Hanford determined that cancer incidence in white males and females was below the national average in most counties. The counties in which the incidences of cancer were higher than the national average were not those downwind of Hanford.

The Hanford Dose Reconstruction Project evaluated doses to, but not health effects on, members of the public from releases from 1944 through 1972. Airborne releases of iodine-131 from 1944 through 1957 were responsible for most of the dose from air emissions. The largest organ doses of 24 to 350 rad were to the thyroid. The maximum total effective dose equivalent to an adult from air emissions over the period from 1944 through 1972 was estimated to be 1 rem. The risk of a fatal cancer associated with a dose of 1 rem is about 1 in 1,600. The maximum dose through releases to the Columbia River (from eating nonmigratory fish) was estimated to be 1.4 rem.

DOE is concerned about protecting the Columbia River and has invested a considerable effort in this EIS to understand the movement of contaminants

through the environment and the potential impacts on groundwater and the Columbia River. This *TC & WM EIS* analyzes potential environmental impacts associated with a specific set of proposed actions and reasonable alternatives for the storage, retrieval, treatment, and disposal of tank waste generated from defense materials production activities; closure of SSTs containing HLW; decommissioning of FFTF; and continued management of LLW and MLLW at Hanford. As indicated in Chapter 1, Section 1.3, part of the purpose and need for agency action is to treat tank waste and close the SSTs in a manner that protects human health and the environment and permanently reduces the risk posed by the tank waste. Different technologies for retrieving and treating the tank waste are analyzed and compared in this EIS. Although the actions being considered in this EIS include disposal of LLW and MLLW at Hanford, as described in Chapter 2, all future LLW and MLLW disposal, including the treated tank waste forms, would be in lined trenches.

224-3 Nuclear weapons and nuclear energy production are not within the scope of this EIS. The purpose of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites.

224-4 Initiative 297, known as the Cleanup Priority Act, was passed by Washington State voters in November 2004. This act would have restricted the importation of offsite waste to Hanford, among other things. DOJ challenged the initiative, arguing it violated the U.S. Constitution. The Federal District Court agreed and ruled the initiative "invalid in its entirety." The State of Washington appealed the ruling, but the Ninth Circuit Court of Appeals affirmed the lower court, declaring the initiative was preempted by the Atomic Energy Act of 1954.

See response to comment 224-1 for a discussion on the transport and disposal of offsite waste.

Commentor Number 225 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 182.

Commentor No. 226: Margaret Carnegie

Margaret Carnegie
11259 126th Ave. N.E.
Kirkland, WA 98033

Tank Closure & Waste Management Environmental Impact Statement
P.O. Box 1178
Richland, WA 99352

March 14, 2010

Department of Energy,

I find it abhorrent that you are even considering such things at the Hanford Site such as not properly cleaning up radioactive waste, leaving unlined soil trenches and leaving nuclear waste in unsafe underground tanks. The health dangers now and far into the future must dictate proper storage. Contaminating the land and water even more than the current conditions must not be an option. The "healthiest" options must be the only solutions. *226-1*

Thank you for listening and making safety the top priority.

Sincerely,

Margaret Carnegie

Margaret Carnegie

226-1 Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 227: Darol Streib

1457 Grant Street
Bellingham, WA 98225-4920
March 15, 2010

Tank Closure and Waste Management
Environmental Impact Statement
P.O. Box 1178
Richland, WA 99352

I have been a Washington state resident 59 years.

I understand that our country's nuclear power plants generate 4½ million pounds of waste per year that must be stored at those sites.

Since that Hanford Reserve already has at least 150 huge tanks and thousands of buried barrels of radioactive waste, it should not become a repository for additional such detritus. *227-1*

Waste for porocessing should be accepted only when the vitrification plant is operational, with incoming not more than half the output quantity.

Just because Yucca Mt facility has been shelved should not make the Columbia River Basin our country's waste site by default.

There have been excessive delays and overspending on the vitrification plant. Why isn't there competition among several companies? After all, we are certainly going to need more than one such plant. *227-2*

All electric ratepayers have contributed for decades to fund solutions to the problem of radioactive waste, and the mess increases with no end in sight. This is a great disappointment for all citizens and no persons or corporations are held accountable.

Sincerely,

Darol Streib

227-1 Nuclear energy production and its resulting waste are not within the scope of this *TC & WM EIS*. Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

227-2 DOE is working diligently to bring the WTP online to treat the tank waste at the site as soon as possible. Chapter 1, Section 1.2, provides a brief history and background on DOE's efforts to reduce costs and speed up Hanford cleanup efforts. As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies. Therefore, DOE has no plans to build "more than one such plant."

Commentor Number 228 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 200.

Commentor No. 229: Preston A. Sleeger, Regional Environmental Officer, Office of Environmental Policy and Compliance, U.S. Department of the Interior

From: Mandy Stanford [m-stanford@qwestoffice.net]
Sent: Friday, March 19, 2010 1:54 PM
To: tc&wmeis@saic.com
Cc: 'Preston Sleeger'
Subject: DOI Comments - DEIS for the Tank Closure & Waste Management for the Hanford Site
Attachments: ER09_1129_deis.pdf

Attached, please find the Department of the Interior's comments on the subject DEIS.

Thank you,
Mandy

Mandy Stanford
Regional Environmental Protection Assistant
United States Department of the Interior
620 SW Main Street, Suite 201
Portland, OR 97205
Phone: (503) 326-2489
Fax: (503) 326-2494

Response side of this page intentionally left blank.

Commentor No. 229 (cont'd): Preston A. Sleeger, Regional Environmental Officer, Office of Environmental Policy and Compliance, U.S. Department of the Interior

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
620 SW Main Street, Suite 201
Portland, Oregon 97205-3026

9043.1
IN REPLY REFER TO:
ER09/1129

Electronically Filed

March 19, 2010

Mary Beth Burandt
EIS Document Manager
DOE Office of River Protection
P.O. Box 1178
Richland, Washington 99352

Dear Ms. Burandt:

The U.S. Department of the Interior (Department) has reviewed the Draft Environmental Impact Statement for the Tank Closure and Waste Management for the Hanford Site, Richland, Benton County, Washington. The Department offers the following comments for use in developing the Final Environmental Impact Statement for the project.

Section 3.3.6.1.1

- There is no USGS reference for the 100 year floodplain map for the Big Lost River that was stated as having been published in 1998 (page 3-141, bottom of page). *229-1*
- There is no USGS reference for surface water flow estimates attributed to the USGS (page 3-142, top of page). *229-2*

Section 3.3.6.3.1

- There is no USGS reference for aquifer and groundwater flow estimates attributed to the USGS throughout the general site description. *229-3*
- Suggest that the authors check to see if there is an available USGS reference for the water quality data from the network mentioned on page 3-144; it is preferable to cite an original reference rather than a second order reference to a DOE document, if possible. *229-4*

229-1 As referenced by the commentor, the discussion regarding the Big Lost River floodplain and flood hazard to INL facility areas presented in Chapter 3, Section 3.3.6.1.1, of this EIS relates to historical information attributed to the U.S. Geological Survey (USGS) and others. DOE incorporated this discussion by reference into this *TC & WM EIS* as originally presented in DOE's *Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement* (DOE/EIS-0287). This source document is cited as "DOE 2002a" at the end of the paragraph in the *Draft TC & WM EIS* cited by the commentor.

229-2 The discussion that includes flood discharge estimates attributed to USGS, as presented in Chapter 3, Section 3.3.6.1.1, of this EIS, was summarized from DOE's *Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement* (DOE/EIS-0287). As indicated in DOE's response to comment 229-1, this source document is cited as "DOE 2002a" at the end of the paragraph in the *Draft TC & WM EIS* cited by the commentor.

229-3 The reference source for the hydrogeologic characterization presented in the second half of Chapter 3, Section 3.3.6.3.1, of the *Draft TC & WM EIS* is cited as "ANL 2003" at the end of the paragraph. The full reference is entitled, "ANL (Argonne National Laboratory), 2003, *ANL-W Standardized Documented Safety Analysis*, DSA-001-SW, Rev. 0, University of Chicago, Chicago, Illinois, September 5." It is listed in Chapter 3, Section 3.4, of this EIS. USGS is credited in the referenced document as the primary source for the information regarding the thickness of the Snake River Plain Aquifer.

229-4 DOE assumes that the commentor's suggestion relates to the statement in Chapter 3, Section 3.3.6.3.1, of the *Draft TC & WM EIS* that notes that INL has a groundwater-quality monitoring network maintained by USGS. The source for this statement is in fact a primary source, the *Idaho National Laboratory Site Environmental Report, Calendar Year 2006*, wherein monitoring results are reported. This source document is cited as DOE 2007d at the end of Chapter 3 in the *Draft TC & WM EIS*. However, applicable discussions and reference citations throughout Section 3.3 of this final EIS have been updated to reference the latest Idaho National Laboratory Site Environmental Report.

Commentor No. 229 (cont'd): Preston A. Sleeger, Regional Environmental Officer, Office of Environmental Policy and Compliance, U.S. Department of the Interior

Appendices

- There is no reference for the USGS computer program MODFLOW in Appendix N and O. Because there are several versions of the computer program MODFLOW it should be referenced, similarly to the references in Appendix L, so that the reader is aware of the version of MODFLOW used. *229-5*

Thank you for the opportunity to review and comment on the DEIS. If you have any questions concerning our comments, please contact Gary LeCain, USGS Coordinator for Environmental Document Reviews, at (303) 236-5050 x229 or at gdlecain@usgs.gov. If you have any other questions, please contact me at (503) 326-2489.

Sincerely,

Preston A. Sleeger
Regional Environmental Officer

229-5 The purpose of Appendix L is to explain how the groundwater flow field was developed for this *TC & WM EIS*. The discussion focuses on the development and use of MODFLOW, and thus a complete reference to the model version is provided. Appendix N discusses the vadose zone flow and transport model and analysis; Appendix O, development of the groundwater transport analysis. These two appendices explain how the analysis interacts with the version of MODFLOW discussed in Appendix L and include references to Appendix L. DOE believes that repeated reference to the specific version of MODFLOW is unnecessary.

Commentor No. 230: Dan Doyle, Project Manager, Division of License Renewal, U.S. Nuclear Regulatory Commission

From: prvs=68759cd89=Daniel.Doyle@nrc.gov on behalf of Doyle, Daniel [Daniel.Doyle@nrc.gov]
Sent: Friday, March 19, 2010 2:23 PM
To: TC&WMEIS@saic.com
Cc: Rikhoff, Jeffrey; Imboden, Andy; Pham, Bo
Subject: NRC comments on TC&WM EIS
Attachments: EJ Comments on TC & WM EIS.doc

Attached please find the U.S. Nuclear Regulatory Commission comments on the Draft Tank Closure and Waste Management Environmental Impact Statement.

Thank you,

Dan Doyle
Project Manager
Division of License Renewal
U.S. Nuclear Regulatory Commission
daniel.doyle@nrc.gov
(301) 415-3748

Response side of this page intentionally left blank.

Commentor No. 230 (cont'd): Dan Doyle, Project Manager, Division of License Renewal, U.S. Nuclear Regulatory Commission

ENVIRONMENTAL JUSTICE

1. **Comment:** DOE's *TC & WM EIS* misinterprets NRC's "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions" (*69 FR 52040*) (NRC 2004) in Sections 3.2.11 and J.5.

   Section 3.2.11, Page 3–95

   "A community in the impacted area is designated minority or low-income if the percentage of minority or low-income persons in that area significantly exceeds [emphasis added] the percentage of such persons in the general geographic area (defined here as the potentially affected counties and states) in which the impacted area is located. NRC guidance defines "significant" as 20 percentage points above the population of the general geographic area. Yet NRC criteria also allow for designation as a minority or low-income population if minority or low-income persons constitute more than 50 percent of the population of the impacted area (69 FR 52040). The NRC definition is used in this *TC & WM EIS*."

   Section J.5, Page J–4

   "Minority populations and low-income communities were identified where the percentage of minority and low-income population in the impacted areas significantly exceeded [emphasis added] the general population percentage in other reasonable geographic areas of comparison, defined here as the potentially affected counties and states in which the impacted areas are located. The U.S. Nuclear Regulatory Commission considers such percentages "significant" when the total minority or low-income population percentage exceeds the general population by 20 points, or when either the minority or low-income population percentage exceeds 50 percent (69 FR 52040). Table J–1 displays the thresholds used to determine minority and low-income populations."

   The use of the terms "significantly exceeds" and "significantly exceeded" to determine minority and low-income populations is incorrect. CEQ "Environmental Justice Guidance Under the National Environmental Policy Act" (CEQ 1997) identifies Minority populations on the basis of "either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority percentage of the affected area is meaningfully greater [emphasis added] than the minority population percentage in the general population or other appropriate unit of geographic analysis." NRC's "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions" (*69 FR 52040*) is consistent with this definition. NRC's Policy Statement reads (on page 52048 of the *FR* [see Section 2. Identifying Low-Income and Minority Communities]), "Under current NRC staff guidance, a minority or low-income community is identified by comparing the percentage of the minority or low-income population in the impacted area to the percentage of the minority or low-income population in the County (or Parish) and the State." (NRC 2004)

   These statements misinterpret NRC's Policy Statement (69 FR 52040) by asserting that NRC guidance defines the term "significant" and determines the existence of minority or low-income populations based on "significant" percentages. NRC guidance does not define the term "significant" in its Policy Statement. However, on page 52048 of the *FR* (see Section 2. Identifying Low-Income and Minority Communities), the term "significantly" is defined by "staff guidance to be 20 percentage points." The purpose for this percentage is to determine whether "EJ will be considered in greater detail." It is not

230-1 **230-1** The language in Appendix J, Section J.5, and Chapter 3, Section 3.2, of this *TC & WM EIS* has been modified to reflect current CEQ and NRC guidance.

and should not be used to determine the existence of minority or low-income populations.

Basis:

NRC's Policy Statement reads, "Under current NRC staff guidance, a minority or low-income community is identified by comparing the percentage of the minority or low-income population in the impacted area to the percentage of the minority or low-income population in the County (or Parish) and the State. If the percentage in the impacted area significantly exceeds that of the State or the County percentage for either the minority or low-income population then EJ will be considered in greater detail. "Significantly" is defined by staff guidance to be 20 percentage points. Alternatively, if either the minority or low-income population percentage in the impacted area exceeds 50 percent, EJ matters are considered in greater detail." (NRC 2004, see page 52048 of the *FR* [see Section 2. Identifying Low-Income and Minority Communities])

CEQ's EJ Guidance reads, "Minority population: Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis." (CEQ 1997, see page 25)

230-1 cont'd

Recommendation:

DOE should revise text in both sections as necessary to accurately reflect current NRC and CEQ guidance.

Reference:

NRC. "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions." Federal Register 69: 52040-52048. August 24, 2004.

CEQ. "Environmental Justice Guidance Under the National Environmental Policy Act." Available on-line at http://ceq.hss.doe.gov/nepa/regs/ej/justice.pdf. December 10, 1997.

2. **Comment:** Total population growth from 1989 to 1999 of 39 percent and 27 percent for 10-county area in Section 3.2.11.2.1 could not be replicated based on total population numbers presented in Table 3-19 and 3-20. Total population growth over the same period for the two-state region of Washington and Oregon could be replicated.

Section 3.2.11.2.1, Page 3–104

"From 1989 to 1999, the total population of the 10-county area increased by approximately [redacted] percent, while the low-income population increased by approximately [redacted] percent. Over the same period, the two-state region of Washington and Oregon saw an increase in total population of approximately [redacted] percent, with an increase in low-income population of approximately [redacted] percent over the 10-year period."

230-2

230-2 The text has been revised to reflect total population and low-income population increases of 23 percent and 13 percent, respectively, from 1989 to 1999.

Commentor No. 230 (cont'd): Dan Doyle, Project Manager, Division of License Renewal, U.S. Nuclear Regulatory Commission

The numbers in the tables below are from Table 3–19 and Table 3–20 in DOE's *TC & WM EIS*, Section 3.2.11.2.1, page 3–104.

Counties Surrounding the Hanford Site	Total population	Low-income population
Total population in 1999 (Table 3–20)	676,966	109,693
Total population in 1989 (Table 3–19)	551,349	96,773
Difference	125,617	12,920
Percent		

Washington and Oregon	Total population	Low-income population
Total population in 1999 (Table 3–20)	9,112,868	1,001,110
Total population in 1989 (Table 3–19)	7,516,910	862,800
Difference	1,595,958	138,310
Percent	.2	.0

Basis:
N/A

Recommendation:

DOE should verify and validate numbers in the tables are correct and revise text as necessary.

230-2 cont'd

Response side of this page intentionally left blank.

Commentor No. 231: Harry Smiskin, Chairman, Yakama Tribal Council, Confederated Tribes and Bands of the Yakama Nation

From: Callie Ridolfi [callie@ridolfi.com]
Sent: Friday, March 19, 2010 2:45 PM
To: tc&wmeis@saic.com; David Brockman
Cc: Russell Jim
Subject: Tank Closure & Waste Management EIS Comments
Attachments: ERWM_EIS_Comments_100319.pdf

Dear Mr. Brockman and Ms. Burandt:

On behalf of Russell Jim and the Yakama Nation ERWM Program, this is to submit the comments of the Yakama Nation related to the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site dated October 2009. Please find them attached.

Thank you.

Callie A. Ridolfi, P.E., LEEDAP
Director

RIDOLFI
science + engineering

1011 Western Avenue, Suite 1006, Seattle, WA 98104
tel xxx.xxx.xxxx | fax xxx.xxx.xxxx
www.ridolfi.com

Response side of this page intentionally left blank.

Commentor No. 231 (cont'd): Harry Smiskin, Chairman, Yakama Tribal Council, Confederated Tribes and Bands of the Yakama Nation

Confederated Tribes and Bands of the Yakama Nation

Established by the Treaty of June 9, 1855

March 19, 2010

David A. Brockman, Manager
Richland Operations Office
U.S. Department of Energy
P.O. Box 550
Richland, Washington 99352

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
Post Office Box 1178
Richland, WA 99352
TC&WMEIS@saic.com

Dear Mr. Brockman and Ms. Burandt:

Thank you for the opportunity to comment on the Draft Tank Closure and Waste Management Environmental Impact Statement (Draft TC & WM EIS) for the Hanford Site, Richland, Washington (DOE/EIS-0391-D) prepared by the U.S. Department of Energy (USDOE). This letter, including the attachments, summarizes and transmits the Yakama Nation's comments and concerns regarding the alternatives presented in the Draft TC & WM EIS.

The Yakama Nation's vision for the cleanup and closure of the Hanford Site includes the following objectives:

1. Compliance with Yakama Nation Treaty Rights, including full access to cultural resources by the Yakama Nation and its members within its ceded land and aboriginal territory, including on the Hanford Site. *231-1*
2. Protection of the health of Yakama Nation tribal members and the environment in the following ways:
   - The Hanford Site and all its resources (including, but not limited to, the Columbia River, the islands in the Columbia River, other surface waters, geologic resources, groundwater, air, and biological resources including plants, fish, and wildlife) are safe for all exposure scenarios and tribal uses. *231-2*
   - The cleanup actions must achieve cleanup goals that are protective based on the exposure parameters and lifestyle described in the Yakama Nation exposure scenario[1]. *231-3*

[1] Yakama Nation Exposure Scenario for Hanford Site Risk Assessment, Richland, Washington, prepared for the Yakama Nation ERWM Program by RIDOLFI Inc., September 2007.

Post Office Box 151, Fort Road, Toppenish, WA 98948 (509) 865-5121

231-1 DOE recognizes that some tribes have treaty-protected and other federally recognized rights to resources and resource interests located within reservation boundaries and outside reservation and jurisdictional boundaries. DOE will appropriately protect these treaty and trust resources and resource interests and related concerns in these areas. DOE works closely with the tribes to ensure that reasonable access is provided to traditional cultural properties located at Hanford to allow tribes to conduct important religious ceremonies. Tribes are also invited to participate in field surveys associated with Hanford ecological and cultural resources programs. DOE conducts quarterly Cultural Resources Management Program meetings to discuss topics of interest and importance to the tribes and the status of ongoing or planned activities at Hanford. As part of the TPA process, DOE program and senior managers travel to meet with tribal councils and representatives to solicit input and engage in government-to-government consultations. These are examples of some of the ways DOE attempts to honor its relationship with, and responsibilities to, American Indian tribes in the vicinity of Hanford.

231-2 DOE does not believe that all resource areas could be safe for all tribal scenarios at all locations at Hanford. This *TC & WM EIS* presents a comparison of impacts on surface water (including the Columbia River), geologic resources, groundwater, air, and biological resources (ecological resources) under the alternatives considered.

231-3 This *TC & WM EIS* presents a comparison of impacts under the alternatives considered. Specific cleanup goals will be implemented in the future when a specific course of action has been decided upon. In response to this comment and others, a new appendix (i.e., Appendix W) was added to this *Final TC & WM EIS*. In Appendix W, Section W.3, exposure data provided by the tribes are used to estimate peak impacts on a Yakama hunter-gatherer and on a Confederated Tribes of the Umatilla Indian Reservation (CTUIR) hunter-gatherer for a representative alternative combination, Alternative Combination 2, without non–*TC & WM EIS* sources. Inclusion of these scenarios does not mean DOE agrees with the Yakama Tribe that all cleanup must be protective for exposure parameters and lifestyles described in the tribal scenarios for Hanford. The comparison of those analyses to those for the *TC & WM EIS* hunter-gatherer described in Appendix Q suggests that both the exposure pathways modeled and the parameter values used for the *TC & WM EIS* hunter-gatherer are representative for use in the EIS analyses. In addition, one or two exposure pathways account for essentially all of the peak impacts (and variability) across the hunter-gatherer scenarios.

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- The cleanup actions must be protective of all ecological resources that have been or may be affected by Hanford releases and activities. *231-2 cont'd*

3. Cleanup actions must comply with all applicable or relevant and appropriate federal and state regulatory requirements. *231-4*
4. Cleanup actions must be compatible with clean closure of the tanks. For example, cleanup actions such as grouting of the tanks, which would preclude clean closure, should not be implemented.
5. Cleanup actions are complete and permanent and must not rely on long-term stewardship and institutional controls to address long-lived radionuclide contamination at the Hanford site. Long-term stewardship and institutional controls will not be effective for wastes that remain dangerous for hundreds or thousands of years. *231-5*
6. The Draft TC & WM EIS clearly shows that importing wastes from off-site would result in drinking water standards being exceeded. USDOE should abandon plans to resume importation of wastes from off-site. *231-6*
7. The Draft TC & WM EIS also clearly shows that risks associated with contamination in the vadose zone and groundwater will exceed protective levels for thousands of years. USDOE should indicate what kinds of concurrent actions it intends to take in regard to groundwater and the vadose zone to ensure that the cleanup of the site reduces risks to levels that are protective of Tribal subsistence uses without relying on long-term stewardship and permanent institutional controls. *231-7*

The description of alternatives provided in the Draft TC & WM EIS does not present overall alternatives in a straightforward way that allows for the direct comparison of the various alternatives and their impacts, and does not provide a clear basis for choice among the numerous combinations of options. We respectfully request that you revise the EIS to identify preferred alternatives that meet the cleanup objectives described above and address the attached specific comments, and that a revised EIS be circulated for public review and comment. *231-8*

Sincerely,

Harry Smiskin, Chairman, Yakama Tribal Council

cc/enc: Moses Squeochs, General Council Chairman
Donald Isadore, Jr., Yakama Tribal Council
Warren Spencer, Jr., Yakama Tribal Council
Lavina Washines, Yakama Tribal Council
Sam Jim, Sr., Yakama Tribal Council
Phil Rigdon, YN DNR Deputy Director
Russell Jim, Manager, ER/WM Program

231-4 This EIS is not being prepared under CERCLA; therefore, the applicable or relevant and appropriate requirements (ARARs) process does not apply. The scope of the proposed actions evaluated in this *TC & WM EIS* does not include CERCLA remedial actions. Chapter 6 addresses cumulative impacts, including CERCLA activities. All environmental restoration actions conducted at Hanford under CERCLA must evaluate the "legally applicable, relevant and appropriate requirements of Federal and State laws and regulations" to establish the appropriate cleanup level that must be achieved at an individual cleanup site.

Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives and identify where standards may be exceeded. This is not the same as an "ARARs analysis" under CERCLA, and it serves a different purpose. The identification of legal requirements in a NEPA document assists an agency in its planning, funding, and decisionmaking process. It also provides full disclosure to members of the public, stakeholders, and other agencies regarding the potential scope of an agency's effort to implement a proposed action (or an alternative) in terms of the subsequent permitting, other approvals, consultations, and coordination requirements.

231-5 This *TC & WM EIS* indicates that over the long term, removal of the waste from the SSTs and closure of the tanks has long-term benefits over not closing the SSTs. Following completion of the mitigation action plan and before implementing closure actions, DOE will develop a tank farm system closure plan that will be implemented for each of the waste management areas. The first waste management area to be addressed is Waste Management Area C. The TPA has a milestone for the completion of a soil investigation for Waste Management Area C (M-045-61), submittal of a closure plan (M-045-82), and completion of Waste Management Area C closure (M-045-83). DOE will complete the soil investigation to determine the nature and extent of the contamination. To inform the decision process for closure, DOE will complete a Waste Management Area C performance assessment and risk assessment. Following completion of the tank retrievals, data collection activities for residuals in the pipelines, ancillary equipment, and soil, the performance assessment will be revised to include all data. This revised performance assessment and closure plan, which will address any needs for long-term stewardship and institutional controls, will be presented for public review and comment, and the Waste Management Area C closure plan will be modified and incorporated into the Hanford sitewide permit.

231-6 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision

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Attachment 1

Yakama Nation ERWM Program General Comments on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (USDOE/EIS-0391).

This Attachment 1 presents the Yakama Nation Environmental Restoration and Waste Management (ERWM) Program's general comments on the U.S. Department of Energy's (USDOE) Draft Tank Closure and Waste Management Environmental Impact Statement (hereinafter referred to as "the EIS") for the Hanford Site, Richland, Washington. The general comments presented here summarize the major issues and concerns identified by ERWM on behalf of the Yakama Nation. Attachment 2 presents targeted comments keyed to specific sections or pages in the EIS. Attachment 3 provides additional detailed information prepared by the Institute for Energy and Environmental Research (IEER, 2010).

ERWM finds that all of the proposed alternatives are deficient in numerous ways. Primarily, none of the alternatives would achieve compliance with environmental regulations or important criteria such as the drinking water standards. It is our position that key elements of the EIS should be reanalyzed and reevaluated in a substantially revised EIS that meets the criteria identified by the Yakama Nation in its letter to the USDOE dated March 12, 2010, to which this document is an attachment. Those criteria are expanded upon below. *231-9*

Overview: The EIS Is Deficient in Numerous Ways

Insufficient Detail, Poor Organization

Overall, the EIS is difficult to follow and does not provide adequate information for evaluating environmental impacts and risks to human health and ecological resources. The EIS is incomplete and inconsistent in many respects. For instance, the reader is directed to numerous other reports for the parameters and concentrations used as inputs in groundwater modeling, air emissions modeling, and risk analysis equations. This makes it impossible to construct a coherent technical picture of the analysis underlying the alternatives in the EIS. Also lacking is a clear explanation of the process for screening contaminants of potential concern and the rationale for determining receptors of concern and exposure pathways. The USDOE should provide this information in a concise and consistent format throughout the EIS and its appendices. *231-10*

In addition, the EIS does not facilitate straightforward comparison of the environmental and health impacts of each alternative. Instead, a number of alternatives are grouped together as "preferred," although their impacts could differ widely and some of this grouping is not technically appropriate. Further, some alternatives seem to be preferred for reasons unrelated to *231-11*

on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections illustrate the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

231-7 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

231-8 The alternatives presented in this *TC & WM EIS* were developed under NEPA to address the essential components of DOE's three sets of proposed actions and to provide an understanding of the differences among the potential environmental impacts and the range of reasonable alternatives. Because several hundred impact scenarios could result from the potential combinations of the 11 Tank Closure, 3 FFTF Decommissioning, and 3 Waste Management alternatives, DOE analyzed a reasonable number of combinations of alternatives to represent key points covering the full spectrum of potential actions and associated overall impacts that could result from full implementation. The analyses of potential environmental impacts are presented in detail in Chapters 4 ("Short-Term Environmental Consequences") and 5 ("Long-Term Environmental Consequences") of the *Draft TC & WM EIS*, allowing an indepth comparison of the alternatives by resource area. The impacts analysis presented in Chapter 2 (in tabular form for ease of comparison) is a summary of the short- and long-term impacts presented in Chapters 4 and 5, respectively. Decisions made by DOE on the proposed actions

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environmental or compliance considerations. For example, the USDOE appears to have rejected Alternative 6B based on a policy aversion to treating all tank waste as high-level waste, even though it is currently defined as such under the Nuclear Waste Policy Act of 1982.

The USDOE should present each alternative as a comprehensible set of actions for tank waste management, including tank waste storage, retrieval, treatment, and closure, plus the associated impacts of low-level waste and mixed waste streams generated in the process. For all alternatives, future post-remediation impacts should be clearly presented in tables and graphs showing the future variation over time of concentrations of all major contaminants and the evolution of compliance with applicable or relevant and appropriate requirements (ARARs).[1] ***231-11 cont'd***

Unacceptable Environmental Consequences

Most important, all of the alternatives fail to meet drinking water standards for groundwater—even the standards for single radionuclides—even when institutional controls are assumed to be in effect inside the core zone. ***231-12***

A revised EIS should present at least one alternative that meets all applicable drinking water standards for groundwater within the core zone without the need for institutional controls following cleanup actions for both tank farm and non-tank-farm 200 Areas.

The preferred alternative of landfill closure for the single-shell tank system would result in chemical and radiological groundwater contamination that would persist at concentrations above federal and state standards for the entire 10,000-year analysis period presented in the EIS. Selecting this preferred alternative would result in adverse environmental impacts to groundwater of sufficient magnitude and duration that they would be unacceptable from the standpoint of public health or welfare and environmental quality. ***231-13***

A revised EIS should include clean closure as the preferred alternative.

Cumulative Impacts

The cumulative impacts of the proposed actions, in combination with other past, present, and reasonably foreseeable future actions, would be environmentally unacceptable, and mitigation measures necessary to meet federal and state laws and regulations and to protect human health and the environment are not included in any of the proposed alternatives. ***231-14***

[1] Additional detailed information provided in Attachment 3.

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will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

DOE has satisfied NEPA requirements by responding to public comments on the draft EIS in this CRD and by making changes to the draft EIS where appropriate and necessary. Subsequent to the issuance of the *Draft TC & WM EIS*, DOE prepared an SA to analyze 14 topics it identified where it is unclear whether updated, modified, or expanded information warrants preparation of a supplemental or new draft EIS. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* is not required.

231-9 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

See response to comment 231-8 for information regarding the SA issued by DOE.

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A revised EIS should include mitigation measures that address these issues. **231-14 cont'd**

The EIS Does Not Comply with Yakama Nation Treaty Rights

The Yakama Nation holds treaty-reserved rights to resources on and affected by the Hanford Site. It is the responsibility of both the Yakama Nation and the federal government to ensure that those resources are protected and maintained for current and future generations. Through its *American Indian Policy* (USDOE, 2006), the USDOE indicates that the most important doctrine arising from the relationship between the federal government and tribal governments is "the trust responsibility of the United States to protect tribal sovereignty and self-determination, tribal lands, assets, resources, and treaty and other federally recognized and reserved rights." Further, the USDOE indicates that it "will pursue actions that uphold treaty and other federally recognized and reserved rights of the Indian nations and peoples…and will, to the extent of its authority, protect and promote these treaty and trust resources and resource interests." Unfortunately, this policy is not reflected in the EIS. Not only does the EIS fail to adequately consider the impacts of the proposed actions on the Yakama Nation's treaty-reserved rights and resources, it actively denies that many of those rights exist. **231-15**

All statements included in the EIS that convey the USDOE's "beliefs" or "positions" regarding the extent of tribal treaty rights, including repeated statements that it is the USDOE's position that Hanford is not "open and unclaimed land," should be removed from this document. All potential impacts to treaty-reserved rights and resources should be thoroughly evaluated and considered in a revised EIS, and the preferred alternative should be consistent with the USDOE's American Indian Policy, with the federal trust responsibility, and with the terms of the Treaty of 1855.

The EIS Does Not Adequately Identify or Protect Yakama Nation Cultural Resources

There is no issue of greater importance to the Yakama Nation than protection of, and respect for, its treaty-reserved rights. The Hanford Site lies within the ceded area of the Confederated Tribes and Bands of the Yakama Nation. Within this ceded area, the Yakama Nation retains the rights to natural and cultural resources, including areas of ancestral use, archaeological sites, and burial grounds. These resources are sacred and sensitive to the Yakama Nation, and they must be managed to preserve, protect, and perpetuate the resources that are inseparable from its way of life. **231-16**

Only the Yakama Nation can determine what is significant to its people or, in the words of the USDOE, the "American Indian Interest." Many cultural and geographic features within the site are of significant cultural value to the Yakama Nation. The USDOE cannot speak on its behalf by assigning an arbitrary value to these resources. As an example, we point to the statement that "culturally important geographic features include Rattlesnake Mountain, Gable Mountain, Gable

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Early stakeholder participation in the EIS planning and development process is important to DOE and the agency has provided numerous opportunities for such interaction. Hanford-area tribes have had the opportunity to provide, and have provided, extensive input to the *TC & WM EIS* preparation process and analysis. Chapter 8, Section 8.3, and Appendix C, Section C.3, of this *TC & WM EIS* identify the process for tribal interaction and the primary occasions for DOE's interactions with the tribes on the subject of the *TC & WM EIS* preparation process. In addition, Chapter 8 of this *Final TC & WM EIS* includes a description of the outcomes of the meetings with the tribes, and a new appendix, Appendix W, describes the tribal perspective as provided by the Hanford-area tribes.

231-10 DOE disagrees that the information is not adequate for evaluating environmental impacts and risk to human health and the environment. To assist the public in navigating through the information presented in this *TC & WM EIS*, DOE has issued a Reader's Guide. This guide serves as an introduction and guide to the contents of this EIS, highlights the key features of the reasonable alternatives, and provides references to specific sections of the document to assist the reader in reviewing the technical analyses presented. Recognizing that many people may not read beyond the EIS Summary, the information presented in both the Summary and the Reader's Guide attempts to strike a balance between those readers interested in the technical details regarding DOE's proposed actions and alternatives and readers seeking a simple overview.

DOE has provided more information in Appendix Q of this final EIS to clarify the process for screening COPCs and the rationale for determining receptors of concern and exposure pathways. All references cited in this EIS are available upon request or at reference libraries (e.g., the Hanford Public Reading Room).

231-11 See response to comment 231-8 regarding the EIS alternatives and future DOE decisions. In addition, see response to comment 231-4 for a discussion of ARARs and CERCLA with regard to this EIS.

231-12 See response to comment 231-9 for a discussion of the development of the alternatives presented in this *TC & WM EIS*.

Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives. As discussed in Chapter 5 of this *TC & WM EIS*, DOE acknowledges that benchmark standards could be exceeded in groundwater at the Core Zone Boundary and/or at the Columbia River nearshore at various dates. The term "benchmark standards" as used in

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Butte, Coyote Rapids and the White Bluffs portion of the Columbia River" (Section 3.2.8.3.1). In fact, the entire Columbia River is culturally significant to the Yakama Nation, as are many other features within the site that the USDOE has entirely failed to identify. Such a simple example makes clear that these determinations can and should be made only by the people of the Yakama Nation.

Further, the "American Indian Interest" sections of the EIS are significantly deficient because of failures to address the loss of tribal cultural activities and resources.

The Yakama Nation cannot be separated from its natural and cultural resources. It is therefore incumbent on the USDOE to present a clear and definitive plan for restoring both the resources and the Yakama Nation's access to them to a state that will allow the people of the Yakama Nation to continue their way of life without concern for their safety or health.

231-16 cont'd

The EIS Must Comply with Federal and State Environmental Laws

National Environmental Policy Act (NEPA)

Issues related to compliance with NEPA requirements are discussed in the following sections. We believe that significant revisions will be required to adequately address these issues.

Alternatives Analysis

The Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508) for implementing NEPA state that the analysis of alternatives is "the heart of the environmental impact statement" and should "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public."

The presentation of alternatives in Chapter 2 of the EIS does not allow for direct comparison of the alternatives and their impacts and does not provide a clear basis for choice among the numerous combinations of options.

A revised EIS that complies with NEPA regulations and allows for direct comparison of the alternatives as a basis for decision making should be prepared.

231-17

Reasonable Alternatives

The CEQ regulations for implementing NEPA require that an EIS "rigorously explore and objectively evaluate all reasonable alternatives." Among other things, this means that reasonable alternatives should meet the purpose of and need for the proposal. One of the purposes of the EIS is "to treat the waste and close the single-shell tank…system in a manner that complies with

231-18

this *TC & WM EIS* represents dose or concentration levels that correspond to known or established human-health effects. For groundwater, the benchmark is the MCL, provided it is available. This *TC & WM EIS* does incorporate vadose zone remediation in some of its Tank Closure alternatives, which did indicate improvement in the vadose zone and groundwater modeling results: Alternative 4 includes deep soil remediation under two tank farms and Alternatives 6A and 6B include deep soil remediation under the tank farms and cribs and trenches (ditches).

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, particularly iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this final EIS.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

It should be noted that it is DOE policy (DOE Policy 454.1, April 9, 2003) to use institutional controls as essential components of a defense-in-depth strategy that uses multiple, relatively independent layers of safety to protect human health and the environment (including natural and cultural resources). DOE will implement institutional controls, along with other mitigating or preventive measures as necessary, to provide a reasonable expectation that if one control temporarily fails, other controls will be in place, or other actions will be taken, to mitigate significant consequences.

231-13 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of

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Federal and applicable Washington State laws and USDOE directives to protect human health and the environment." It is the position of the Yakama Nation that none of the proposed alternatives complies with federal and state laws or is protective of human health and the environment.

A revised EIS should present alternatives that meet the definition of reasonable by better addressing the purpose and need of the proposed action.

231-18 cont'd

Compliance with Other Laws

The CEQ regulations for implementing NEPA require that an EIS "shall state how alternatives considered in it and decisions based on it will or will not achieve the requirements of…other environmental laws and policies." The EIS does not adequately discuss how the alternatives considered will or will not comply with other federal or state environmental laws or policies, including among others the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act, Nuclear Waste Policy Act, and Atomic Energy Act and Washington State's Model Toxics Control Act (MTCA). While most environmental permitting and cleanup decisions based on those environmental laws will be made by regulatory agencies other than the USDOE, the decisions made by the USDOE in a NEPA Record of Decision (ROD) for this EIS should not prejudice or limit the ability of other environmental regulators to independently carry out their responsibilities for cleanup and closure.

A revised EIS should provide sufficient information to support informed decisions by environmental regulators, including clearly stating whether actions proposed in the EIS will or will not comply with federal and state environmental laws.

231-19

Other Environmental Regulations

CERCLA/MTCA Integration

When evaluating the extent to which various alternatives considered in the EIS comply with CERCLA requirements, the USDOE should also comply with the requirements of MTCA. Section 120(a)(4) of CERCLA states that "State laws concerning removal and remedial action, including State laws regarding enforcement, shall apply to removal and remedial action at facilities owned or operated by a department, agency, or instrumentality of the United States." Based on this provision, MTCA requirements are legally applicable to CERCLA cleanups at federal facilities in Washington State, including the Hanford Site.

While the USDOE's practice has been to apply MTCA risk requirements only to non-radiological contaminants, MTCA defines radionuclides as hazardous substances. Although

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the tank waste and clean closure of all or part of the SST system. See response to comment 231-8 regarding future DOE decisions.

231-14 DOE disagrees that mitigation measures have not been included in any of the proposed alternatives. The NEPA evaluation process is conducted early in agency planning, when details of the proposed project are not yet well enough defined for specific mitigation measures to be developed. Chapter 7, Section 7.1, discusses potential mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives. As discussed in Chapter 5 of this *TC & WM EIS*, DOE acknowledges that benchmark standards could be exceeded in groundwater at the Core Zone Boundary and/or at the Columbia River nearshore at various dates. The term "benchmark standards" as used in this *TC & WM EIS* represents dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL, provided an MCL is available.

In response to comments received on the *Draft TC & WM EIS* concerning potential long-term impacts on groundwater resources, additional sensitivity analyses were performed and are included in this final EIS. The additional analyses evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. Furthermore, sensitivity analyses that evaluate improvements in IDF performance (e.g., infiltration rates) and in secondary- and supplemental-waste-form performance (e.g., release rates) were performed and are included in this EIS. Chapter 7, Section 7.5, was added to discuss and summarize these results.

231-15 DOE's *American Indian & Alaska Native Tribal Government Policy* outlines seven principles DOE uses in its decisionmaking and interaction with federally recognized tribal governments. Under the policy, all departmental elements are to ensure tribal participation and interaction regarding pertinent decisions that may affect the tribes. There is no dispute that the actions proposed in this EIS could affect Yakama Nation interests. The Yakama Nation properly cites the policy language, but the policy continues and states: "When internal policies, regulations, and statutes, or other barriers prohibit or hinder the DOE trust protection actions or participation in eligible program initiatives, the Secretary will direct the agency to seek corrective protection measures and tribal government program inclusion." This EIS identifies the relevant laws, regulations, policies and the tribal nation treaties that would be involved in implementing the proposed actions and alternatives. DOE sought and encouraged tribal participation

MTCA does not include cleanup levels for individually named radionuclides[2], it clearly states that "radionuclides are hazardous substances under the act." [Washington Administrative Code (WAC) 173-340-200]. Radionuclides are carcinogens, and MTCA defines the maximum allowable incremental cancer risk level for individual carcinogens as $1x10^{-6}$. It defines the maximum allowable incremental lifetime cancer risk level for multiple carcinogens and multiple exposure pathways as $1x10^{-5}$.

MTCA's inclusion of both chemicals and radionuclides in assessing cancer risks is consistent with U.S. Environmental Protection Agency (USEPA) guidance on establishing cleanup levels for CERCLA sites with radioactive contamination (USEPA, 1997). That guidance states that:

- The USEPA uses a consistent methodology for assessing cancer risks at CERCLA sites no matter the type of contamination.
- The USEPA classifies radionuclides as known carcinogens.
- Cancer risks for radionuclides should generally be estimated using the slope factor approach.
- Cancer risks from radiological and non-radiological contaminants should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants.
- The USEPA is aware of "no technical, policy, or legal rationale for treating radiation risks differently from other risks addressed under CERCLA."

Based on the requirements of MTCA and CERCLA regulations the radiological and non-radiological cancer risks should be combined and compared to the standard that Washington State has determined is protective of human health. This standard has an upper limit of lifetime risk for carcinogens of $1x10^{-5}$.

231-20 cont'd

Radiation Protection Standards and ARARs[3]

The EIS uses 100 millirem (mrem) per year whole body total effective dose equivalent as the reference value for its health protection dose calculations. This appears to be at odds with USDOE Order 5400.1, which requires program plans to meet drinking water standards. Further, this reference value is inappropriate because it yields a lifetime fatal cancer risk of 1 in 238, which is far higher than the upper bound CERCLA risk level of 1 in 10,000 or the MTCA upper

231-21

[2] MTCA includes groundwater cleanup levels for radium and for gross alpha and gross beta particle activity.
[3] Additional detailed information provided in Attachment 3.

and interaction throughout the lengthy timeframe for development of this *TC & WM EIS*, consistent with the principles of the *American Indian & Alaska Native Tribal Government Policy* as well as with the NEPA statute and regulations, as more fully described in Appendix C of this *TC & WM EIS*. DOE has also carefully considered the views and input from the Yakama Nation and other tribes as well as the public, to whom DOE also has resource responsibilities. A copy of the Yakama Nation's positions and views is provided in Appendix W of this *Final TC & WM EIS*. There may be barriers, including technical and financial barriers, to protecting and restoring all of the resources on Hanford. DOE has and will continue to seek and consider any corrective protection measures that the Yakama Nation and others identify as DOE proceeds to implement decisions reached based on this EIS's analyses.

Regarding the Yakama Nation's perspectives about tribal treaty rights and its request that DOE remove all statements in this *TC & WM EIS* concerning DOE's beliefs or positions regarding the extent of tribal treaty rights at Hanford, DOE respectfully disagrees. This *TC & WM EIS* presents relevant and essential information important to the evaluation of potential environmental impacts, consistent with NEPA's primary goal of full disclosure to the public as well as agency decisionmakers. This includes discussion of the history of the settlement of Hanford and the treaties entered into between tribal nations and the U.S. Government. There is substantial documentation indicating that the tribes understood at the time these treaties were signed that the lands were no longer "unclaimed" when they were claimed for the purposes of the white settlers' activities. DOE is not aware of any judicially recognized mechanisms that would allow these lands to revert to "unclaimed" status merely through the process of being acquired by the Federal Government. The portion of Hanford that remained in the public domain in 1943 (those lands now having underlying U.S. Bureau of Land Management ownership), as well as all the acquired lands, were closed to all access initially under authority of the War Powers Act and then under authority of the Atomic Energy Act. It is, therefore, DOE's position that the Hanford lands are neither "open" nor "unclaimed."

231-16 See response to comment 231-15 regarding treaty rights.

DOE recognizes that the Yakama Nation feels a strong connection and association with its surrounding environment, including Hanford and the entire Columbia River. DOE agrees that only the Yakama Nation can determine what is significant to it, and DOE is grateful that the tribe has shared that information with DOE. DOE developed the discussions in this *TC & WM EIS* regarding American Indian

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bound risk level of 1 in 100,000. In addition, CERCLA indicates that when considering many radionuclides and hazardous materials, a $1x10^{-6}$ risk level should be used as a starting point.

The EIS states that the remediation of the "non-tank-farm 200 Areas is being addressed under CERCLA." However, it does not reconcile how risk levels at least two orders of magnitude greater for radionuclides alone are compatible with a CERCLA cleanup for the non-tank-farm 200 Areas or how the tank farm cleanup can be made compatible with CERCLA when no alternative in the EIS meets those requirements.

231-21 cont'd

The CERCLA framework indicates that the USDOE should use a $1x10^{-6}$ lifetime cancer incidence risk for individual chemicals and radionuclides, as required by law. The lifetime cancer risk level should not exceed $1x10^{-5}$, an upper bound value required by MTCA when multiple carcinogens are present.

Tank Closure and Waste Management Options Must Be Compatible with Clean Closure[4]

Tank Storage and Waste Retrieval Alternatives

The technologies for retrieving waste from the tanks are complex and pose a variety of technological risks. The assumption made in the EIS that the amount of residual radionuclides is proportional to residual volume does not take into account the technical history of the tanks, specifically the effects of waste neutralization. Residuals of strontium-90, plutonium, and several other radionuclides are likely to be far greater than assumed while residual cesium-137 may be far less.

231-22

At least 99 percent of the waste volume should be removed. Approaches that could create more hazardous wastes and increase the risk of new tank leaks and tank corrosion should be deemphasized or avoided. Residual radionuclide amounts should be carefully characterized. No actions should be taken that would make waste retrieval beyond 99 percent impossible. This precludes alternatives such as grouting. (Grouting would also make clean closure by tank removal, part of Alternative 6B for instance, impossible.) Yakama Nation does not support the construction of new double-shell tanks (DSTs).

Waste Treatment

Certain core elements of the waste treatment plant (WTP)—notably, pretreatment of the waste and glass melters—are common to all alternatives[5]. A common mode failure is therefore

231-23

[4] Additional detailed information provided in Attachment 3.
[5] In this discussion, the term "all alternatives" excludes the no-action alternative.

interests to capture and explain the information provided by the Yakama Nation and other tribes, including information regarding the tribal use scenarios.

The Yakama Nation and others have requested in several forums a plan for restoring Hanford resources. It is DOE policy to integrate natural resource and restoration concerns through the CERCLA cleanup process. This process is being conducted at Hanford under the TPA and provides multiple opportunities for tribal governments and other interested parties to participate in cleanup decisionmaking. The *U.S. Department of Energy American Indian & Alaska Native Tribal Government Policy* (Bodman 2006) recognizes there may be circumstances where corrective protection measures will be needed to ensure tribal government inclusion in DOE's initiatives to protect and restore resources on Hanford. The CERCLA injury assessment process is also ongoing, and DOE appreciates the Yakama Nation's participation in the natural resource injury assessment. The Hanford Natural Resource Trustee Council has discussed a restoration plan at various times. The Yakama Nation has represented in that forum that a restoration plan is premature pending an injury assessment. A restoration plan is not part of the scope of this EIS, but could be a part of the council activities.

DOE does not anticipate that the tank farms will be an appropriate location for American Indian access for use of cultural resources or cultural activities, but continues to allow access to the parts of Hanford that are appropriate. DOE has taken, and is continuing to take, substantial actions to reduce DOE's "footprint" on Hanford. Those efforts are consistent with the Yakama Nation's goals for restoration and access.

231-17 See response to comment 231-9 for a discussion on the development of the alternatives presented in this *TC & WM EIS*.

The analyses of potential environmental impacts are presented in detail in Chapters 4 ("Short-Term Environmental Consequences") and 5 ("Long-Term Environmental Consequences") of this *TC & WM EIS*, allowing an indepth comparison of the alternatives by resource area. The impacts analysis presented in Chapter 2 (in tabular form for ease of comparison) is a summary of the short- and long-term impacts presented in Chapters 4 and 5, respectively.

231-18 See response to comment 231-9 for a discussion on the development of the alternatives presented in this *TC & WM EIS*.

231-19 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three

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possible. In this context, the concerns of Defense Nuclear Facilities Safety Board (DNFSB, 2009) regarding accidental criticalities, build up of explosive gases, non-uniform settling of particles, and possible failure of pulse jet mixers are especially worrisome. Further, the present design of the WTP does not include provisions for incorporation of technetium-99 (Tc-99) or iodine-129 (I-29) into immobilized high-level waste (IHLW). On-site disposal of much or most of these radionuclides would likely eventually violate drinking water standards. Finally, the results in Appendix Q and Appendix U for Tc-99 and I-129 water contamination are inconsistent; this indicates that at least one set of calculations is incorrect; it may be that both are incorrect.

The revised EIS should include provisions for the full implementation of the DNFSB's recommendations. There should be no onsite disposal of immobilized low-activity waste (ILAW) or any treatment option such as bulk vitrification or stone casting that would result in any tank waste being disposed of onsite. All tank waste should be immobilized either as IHLW or ILAW. The approach in Option 2B for two high-level waste and six low-activity waste melters would meet this goal. Treatment should include alternatives for incorporating almost all Tc-99 (as in Alternative 2B) and iodine-129 (not presently in any alternative) in IHLW. The calculations for Tc-99 and I-129 need to be carefully checked for consistency, quite apart from issues associated with the validity and accuracy of the models.

231-23 cont'd

Treatment of the Cesium and Strontium Capsules

All alternatives include vitrifying the cesium and strontium in the capsules with IHLW.

The cesium and strontium capsules should be moved into dry storage and a wider range of alternatives to treatment in the WTP should be considered.

231-24

Tank and Tank Farm Closure

The tanks are likely to have large residual source terms for radionuclides such as strontium-90 and plutonium-239/240, even in the case of 99 percent volume retrieval. Grouting the tanks or simply abandoning the tanks after a period of surveillance (the year 2193 is suggested in Alternative 2A) would be inappropriate.

The "Option Case" for Alternative B, including removal soil and ancillary equipment and clean closure of six cribs and trenches, is broadly acceptable for tank closure, provided that on-site secondary waste disposal meets the overall lifetime cancer risk criterion of $1x10^{-5}$ as an upper limit for multiple carcinogens in all other wastes to be disposed of on site. Additionally, clean closure of the DSTs and associated ancillary equipment should be considered in a revised EIS.

231-25

sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on the compliance with regulatory requirements, see the CRD, Section 2.7, Topics of Interest.

231-20 See response to comment 231-4 for a discussion of ARARs and CERCLA with regard to this EIS.

231-21 See response to comment 231-4 for a discussion of ARARs and CERCLA with regard to this EIS.

The commentor brings up the issue of integration and cleanup of CERCLA and RCRA units, which could influence each other. As stated in Chapter 1, Section 1.4.2, of this *TC & WM EIS*, groundwater contamination in the non-tank-farm areas of the 200 Areas (which include cribs, trenches [ditches], and tile fields), as well as sources of plutonium, are being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements. Contamination in the vadose zone resulting from tank farm past leaks will be addressed during the SST closure process. The cumulative impacts analysis for this *TC & WM EIS* (see Appendix U and Chapter 6) includes the vadose zone of the 200 Areas in addition to other areas of Hanford.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

231-22 As described in Appendix D, Section D.1.3, DOE identified three methods for estimating the residual waste in the storage tanks following retrieval and chose the first method: multiply the existing total tank inventory by a ratio of the final waste volume to the current waste volume (volume retrieval). DOE considers

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Waste Management and Disposal

The waste in the Hanford tanks is high-level waste by law and cannot be disposed of as transuranic waste. All tank waste should be converted into IHLW or ILAW. Adequate provision must be made for on-site storage of all IHLW, because there is no high-level waste repository on the horizon. ILAW waste should be managed as high-level waste when stored on site (as proposed in Alternative 6B) and disposed in a deep geologic repository off site as Greater than Class C (GTCC) waste; the latter is not currently part of any alternative. There should be no shallow land disposal of GTCC waste at any site, including the Hanford Site. ***231-26***

Waste Importation

The USDOE's source terms for radionuclides in imported waste are incomplete and speculative. Nonetheless, they still indicate that the majority of I-129 and Tc-99 impacts on groundwater would derive from waste imported from off site. Other major source terms are the wastes generated as a result of remediation elsewhere on the Hanford Site, such as the 100 and 300 Areas, and disposed of in the Environmental Restoration Disposal Facility (ERDF). As with imported wastes, some ERDF source terms would by themselves cause exceedances of drinking standards in groundwater. ***231-27***

There should be no import of off-site wastes onto the Hanford Site. It will eventually be essential to clean-close the ERDF as one in a series of steps to fully remediate the site. Plans for doing so should be part of the CERCLA process for the Central Plateau.

Central Plateau Cleanup

None of the tank farm closure alternatives meets CERCLA and MTCA requirements. Further, the EIS does not address an intensive cleanup of the non-tank-farm 200 Areas in compliance with CERCLA (including drinking water standards).

A plan that addresses the removal of the contamination in the non-tank-farm 200 Areas is an essential complement to a preferred alternative that will meet all ARARs, including drinking water standards for groundwater, and allow use of the Hanford Site without institutional controls after remediation is complete. ***231-28***

A revised EIS should contain an alternative in which the tank farm cleanup occurs in an overall context of meeting CERCLA requirements, including drinking water standards, for all parts of the Central Plateau and the rest of the Hanford Site.

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this method for estimating the residual waste characteristics appropriate for use in this EIS.

With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks, residual waste, and surrounding waste in the soil, requires preparation of detailed performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

231-23 DOE is not clear if the commentor is referring to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2009-1 "Risk Assessment Methodologies and Defense Nuclear Facilities," which is stated in the comment, or meant DNFSB Recommendation 2010-2 "Pulse Jet Mixing at the Waste Treatment and Immobilization Plant." In either case both recommendations are open and DOE is working with the DNFSB on implementation plans. This EIS uses a baseline set of operational plans, facility designs, effluent projections, and safety analysis information to compare the environmental impacts of several alternative courses of action, which is not inconsistent with either recommendation.

DOE does not agree with the commentor's view that the results in Appendix Q and Appendix U for technetium-99 and iodine-129 concentrations are inconsistent. DOE is also not of the view that one or both of the calculations are incorrect. In Appendix U, the alternative combination tables that include non–*TC & WM EIS* sources are dominated by the impacts of these sources. In Appendix Q, only tank closure, FFTF decommissioning, and waste management sources are considered. In Appendix U, impacts from 1940 through 11,940 are shown. In Appendix Q, the presentation is limited to impacts occurring between 2050 and 11,940. Because both the sources considered and the timeframes involved are different, results in Appendix U are not directly correlatable to results presented in Appendix Q.

With respect to the comment regarding potential groundwater exceedances of technetium-99 and iodine-129, DOE agrees that groundwater concentrations at

Reliance on Institutional Controls for Thousands of Years is Unrealistic[6]

The EIS closure strategy places unwarranted reliance on the use of institutional controls and long-term stewardship. As the National Research Council (NRC) Board on Radioactive Waste Management has stated (NRC, 2000):

> The committee believes that the working assumption of USDOE planners must be that many contamination isolation barriers and stewardship measures at sites where wastes are left in place will eventually fail, and that much of our current knowledge of the long-term behavior of wastes in environmental media may eventually be proven wrong. Planning and implementation at these sites must proceed in ways that are cognizant of this potential fallibility and uncertainty.

231-29

Rather than adopt the stance that some areas such as the Central Plateau will be irretrievably sacrificed (either through institutional controls or to severe and extensive contamination or both), it would be prudent to focus on cleaning up the site to a standard that will allow for future unrestricted access and be fully protective of human health and the environment. In fact, the USDOE did just this in the 2003 Tank Closure EIS Notice of Intent, which included clean closure alternatives that "supported future use on an unrestricted basis and that did not require post-closure care" [68 Federal Register 1052].

We support incorporation of a clean closure alternative into a revised EIS.

The EIS appears to assume institutional control for 10,000 years. No government on Earth, let alone a government department, has existed for anything close to that time. The NRC, in reviewing USDOE cleanup plans, has explicitly advised the USDOE on this point in the past and said that "DOE's intended reliance on long-term stewardship is at this point problematic" (NRC, 2000). The EIS does not address the risk of technical failure over such long periods.

231-30

The USDOE should not rely on institutional controls significantly beyond the cleanup period. A reasonable approach is to assume institutional controls for the duration of the cleanup required by a given alternative, with complete release thereafter. Such an approach is consistent with the advice of the NRC, with historical and technical realities, and, assuming a thorough cleanup, with the unrestricted exercise of treaty rights by the Yakama Nation.

[6] Additional detailed information provided in Attachment 3.

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the IDF-East barrier are projected to be near and above benchmark standards for substantial periods of time under Waste Management Alternative 2, Disposal Group 1, Subgroup 1-A (which contains waste generated from Tank Closure Alternative 2B and FFTF Decommissioning Alternative 2 or 3; see Chapter 5, Table 5–94, of this *Final TC & WM EIS*). DOE does not agree that these radionuclides are not incorporated into IHLW glass, or that the exceedances projected for the Preferred Alternative are a consequence of the lack of incorporation of technetium-99 and iodine-129 into IHLW glass. Each Tank Closure alternative incorporates, to some degree, technetium-99 and iodine-129 into IHLW glass. The estimated inventories of each of these radioactive constituents of concern in IHLW glass are included in Appendix D, Tables D–35 through D–70. As discussed in Chapter 7, Section 7.5, of this EIS, the degree of incorporation of technetium-99 and iodine-129 in IHLW glass is subject to some uncertainty; the EIS base case analysis took a conservative view of the degree of incorporation, and assumed that recycling the secondary-waste stream back into the primary WTP waste-stream feeds could be an effective mitigation measure. DOE is also of the view that the projected technetium-99 and iodine-129 exceedances at the IDF-East barrier could be mitigated by other means, including improved secondary-waste-form performance and restriction of the inventories of technetium-99 and iodine-129 associated with offsite waste disposal. As discussed in Section 7.5, DOE is actively investigating these potential mitigation measures.

The scenario of immobilization of all tank waste as either IHLW or ILAW and no onsite disposal of tank waste at Hanford is evaluated under Tank Closure Alternatives 6A and 6B. Under both of these alternatives, ILAW is managed as IHLW for disposal. The results of the analyses of these two alternatives should provide the commentor with the necessary insight.

231-24 As noted by the commentor, the *Draft TC & WM EIS* included one option for the disposition of the capsules—preparation of the capsules for treatment in the WTP and disposal of the inventory as IHLW. Based on production rates, it was calculated that treatment of the capsule inventory would require a separate campaign in the WTP that would last 1 year and produce approximately 340 IHLW canisters. In response to comments received on the *Draft TC & WM EIS*, DOE provided information on dry storage of the capsules at a new facility in the 200-East Area; this final EIS compares potential impacts of this option with those associated with vitrifying and disposing of the capsules as IHLW. The short- and long-term environmental impacts of storing the capsules were analyzed and are summarized in Appendix E, Section E.1.2.3.4.5, of this final EIS. As stated in

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Barriers are not Designed to Last for Thousands of Years[7]

The EIS closure strategy places unwarranted reliance on the use of barriers as a primary component. As quoted above, this is also a concern of the NRC Board on Radioactive Waste Management.

Available evidence suggests that there is no verified barrier design that can ensure proper functionality over the period during which the covered wastes will remain dangerous without extensive monitoring, maintenance, and periodic replacement. Furthermore, while a properly functioning barrier may protect against surface infiltration, by design such a barrier does not mitigate lateral subsurface flow, which would reach and mobilize remaining contamination. *231-31*

We oppose the USDOE's proposal to leave large volumes of leaked, spilled, and intentionally discharged tank wastes in place and cover it with a barrier.

Vadose Zone Modeling Is Deficient

The model used in the EIS has deficiencies that require additional attention, of which the most significant is the persistent reduction in uncertainty as modeled results are passed from the source to vadose and ultimately to groundwater models. These uncertainties directly affect risks and impacts predicted for the site and should be carefully accounted for throughout the model, as well as presented with the modeled results to provide context. Values entered for waste source geometry should be explicitly identified and compared with characterization data. Model sensitivity analysis should incorporate distribution coefficients and discuss the additional uncertainty introduced by assigning a singular assumed value for this parameter, since it is known to change with environmental variables.

In addition, the revised EIS should include: *231-32*

- A detailed description of the constituent solubility limited release model.
- Results for and discussion of sensitivity analyses performed for all other chemical and constituent distribution coefficients in addition to I-129.
- Discussion of the selection process used to assign the distribution coefficient to plutonium in contaminated soil of 150 ml/g (Table M-10). This value does not reflect the more conservative values measured by Delegard and Barney (1983) that are still used today (PNNL-13895). Many Delegard's measured values are significantly lower than the value selected for the EIS model indicating more rapid movement in the subsurface.

[7] Additional detailed information provided in Attachment 3.

the *TC & WM EIS* Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, DOE is not making a final decision on the disposition of the capsules at this time; their ultimate disposition will be determined at a later date subject to appropriate NEPA review.

231-25 The disposal of secondary waste on site will be dependent upon the final risk analyses and a comparison with the established risk criterion. Closure of the disposal facilities would require detailed examination of the disposed waste to support the preparation of site-specific radiological performance assessments and closure plans. These analyses would require detailed waste sampling and sample analyses and assessments of the structural stability of the tanks and risk to human health and the environment. These documents would provide the information and analysis necessary for DOE and regulators to make decisions on what levels of waste are acceptable in terms of short- and long-term risks.

See response to comment 231-8 regarding future DOE decisions.

Regarding the closure of DSTs and ancillary equipment that support the DST waste system, Section S.1.3.2 of the Summary and Chapter 1, Section 1.4.2, define the facilities and operations at Hanford that are not within the scope of this *TC & WM EIS* and for which decisions will not be made. Included is the closure of the DSTs and the WTP, all of which would be subject at a later date to the appropriate NEPA review.

231-26 As stated in the Alternatives in Chapter 2, Section 2.12, of this *Final TC & WM EIS,* DOE prefers to consider the option to retrieve, treat, and package waste that may be properly and legally designated as mixed TRU waste from specific tanks for disposal at WIPP, as analyzed in Tank Closure Alternatives 3, 4, and 5. DOE would not, however, generate a waste stream without a clear path to disposal. Initiating retrieval of tank waste identified as mixed TRU waste would be contingent on DOE's obtaining the applicable disposal and other necessary permits, and ensuring that the WIPP Waste Acceptance Criteria and all other applicable regulatory requirements have been met. Retrieval of tank waste identified as mixed TRU waste would commence only after DOE had issued a *Federal Register* notice of its preferred alternative and a ROD.

Regarding the onsite storage of IHLW, this EIS assumed the IHLW canisters would not be shipped immediately after the IHLW generation and analyzes interim storage of all the IHLW canisters. Storage capacity for the IHLW canisters was analyzed under the short-term impacts analysis for onsite IHLW interim storage. This EIS analyzes three Tank Closure alternatives, 6A, 6B, and 6C, under which

- Additional justification for the discrepancy between the chemical constituents addressed in the source release models and vadose zone transport models.

231-32 cont'd

Uncertainties should be carried forward into the groundwater model and presented with modeled results in a revised EIS. As listed above, other revisions should be made in performance of the modeling and in discussion of modeled results.

The Vadose Zone Must Be Remediated

Contamination within the vadose zone continues to provide a source term for groundwater contamination. Previous remedial actions at the Hanford Site have frequently been limited to identified process waste facilities (e.g., cribs and trenches) and restricted to usually less than 20 feet below the ground surface. To support groundwater remediation efforts, the vadose zone must also be appropriately addressed. While the USDOE has pursued some experimental technologies, the best approach uses mature and proven methods that permanently remove contamination. We do not favor *in situ* methods for vadose zone remediation for the following reasons:

- *In situ* methods frequently require contact with a reducing agent or other catalyst to reduce contaminant mobility. It is difficult to ensure an appropriate time for the reaction between the two species.
- Placement of the treatment chemical and verification of its delivery to the zone of contamination cannot be ensured.
- The permanence of many *in situ* methods has not been proven; long-term monitoring is required.
- Changes in subsurface aqueous chemistry or geochemistry cannot be accurately predicted or accounted for, necessitating a more experimental approach than may be appropriate for field-scale remediation.

231-33

Future remedial actions in the vadose zone should address the full extent of contamination, both inside and outside of waste structures. Additional characterization data should be gathered to minimize uncertainty in the selection and design of the remedial actions.

Groundwater Modeling Is Deficient

The groundwater model used in the EIS has deficiencies that require attention:

- Model uncertainty is not adequately addressed. Modeled results are frequently reported with a level of precision that cannot be fully justified.

231-34

all tank waste would be managed as HLW. These alternatives allow DOE to examine the benefits and impacts of not implementing the DOE Manual 435.1–1 waste incidental to reprocessing evaluation determination process, which supports the separation of the tank waste into two fractions, high-level and low-level. Separation and treatment of tank waste is one of the decisions to be made by DOE.

Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

231-27 Chapter 5 of this *TC & WM EIS* discusses the iodine-129 and technetium-99 groundwater impacts as they relate to the alternative sources. The commentor is correct in the assertion that, over the long term (i.e., more than several hundred years in the future), imported waste would be a major contributor to the impacts. Chapter 6, Section 6.4.1, of this *TC & WM EIS* discusses the iodine-129 and technetium-99 groundwater impacts as they relate to the cumulative impact sources, including the 100 and 300 Areas, the ERDF, and over 400 additional source areas. Chapter 6 clearly identifies non-tank-farm-related sources (including the ERDF) as contributing significantly to long-term groundwater impacts. This *Final TC & WM EIS* provides this information as context for the comparison of the Tank Closure, FFTF Decommissioning, and Waste Management alternatives. Any potential future decisions or actions taken with respect to ERDF are not within the scope of this *Final TC & WM EIS*.

231-28 As stated in Chapter 1, Section 1.4.2, of this *TC & WM EIS*, groundwater contamination in the non-tank-farm areas of the 200 Areas (including cribs, trenches [ditches], and unlined solid-waste trenches) is being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements. Contamination in the vadose zone resulting from tank farm past leaks will be addressed during the SST closure process. The cumulative impacts analysis for this *TC & WM EIS* (see Chapter 6 and Appendix U) includes the vadose zone of the 200 Areas in addition to other areas of Hanford.

See response to comment 231-4 for a discussion of ARARs and CERCLA with regard to this EIS.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed

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- The model does not account for the many subsurface heterogeneities at the Hanford Site or interactions between geologic strata[8], which can result in significant model error that may be difficult to quantify or left unquantified.
- Even within individual geologic units, hydraulic parameters can vary over orders of magnitude (Shannon & Wilson, 2009), which the model does not address. Rather, each geologic unit is assigned a single set of hydraulic parameters assumed to apply throughout each layer. *231-34 cont'd*
- Source terms are frequently defined using broad but unjustified or incorrect assumptions. An example is the unrealistic assumption that tank waste residual radionuclides and residual volume are directly proportional. There could be significant ramifications for the modeled results if estimated source terms do not accurately reflect site conditions. *231-35*
- Long-term predictions for contaminant fate and transport are based on speculative underlying assumptions about climate and site conditions (for instance, future rainfall) that cannot be verified. The natural variability in several of these parameters adds to the uncertainty, but is not directly addressed in the modeled results. *231-36*

In addition, significant discrepancies in solutions to the Base and Sensitivity (referred to as the Alternate) cases result from relatively small differences in input parameters. An example is illustrated in Table 1, which shows that a small change in the top-of-basalt surface results in significant change in hydraulic conductivity (affecting groundwater flow patterns, travel times, and simulated contaminant concentrations). *231-37*

[8] The USDOE has previously provided hydraulic conductivity values for the Ringold Gravels as low as less than 1 meter per day (PNNL-17439, 2008) and for Hanford Gravels as high as more than 2,000 meters per day (PNNL-16435, 2007).

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a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

231-29 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B; selective clean closure is represented by Tank Closure Alternative 4. For both Base Cases of Tank Closure Alternatives 6A and 6B, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use.

See response to comment 231-28 for a discussion of the new sensitivity analysis.

231-30 Although this *TC & WM EIS* analyzes the long-term impacts for 10,000 years, it assumes institutional control for only 100 years after the last action. This EIS assumes several different types of end-state management, as described in Chapter 2, the Glossary, and the Summary. These include administrative controls, active institutional controls, and postclosure care, as appropriate. Each of these end-state management options would take place at the completion of an action and is assumed to occur for 100 years following the end of the action (e.g., active institutional controls would be maintained for 100 years following final placement of waste in a storage facility). The 10,000-year time period described in this *TC & WM EIS* represents the period of analysis used for the long-term impact analyses for groundwater, human health, and ecological risk; it does not represent the assumed period of institutional controls. For clarity, the definition of "10,000-year period of analysis" is included in this final EIS in Chapter 2, the Glossary, and the Summary, as appropriate.

231-31 One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone. A full description of the modified RCRA Subtitle C and Hanford barriers, both of which are considered in the EIS analysis, is provided in Appendix E, Section E.1.2.5.4.1.

As discussed in Chapter 2, Section 2.5.1.1, Tank Closure Alternatives, the end-state management of the tank farm systems after placement of a barrier includes

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Table 1. Comparison of calibrated hydraulic conductivity values (in meters per day) for the Base and Alternate models.*

Parameter	Base Case	Alternate Case	Difference
Hanford mud	0.171	0.481	181%
Hanford silt	6.8	21.8	221%
Hanford sand	123.6	30.4	-75%
Hanford gravel	156	222.1	42%
Ringold sand	3.57	0.83	-77%
Ringold gravel	19.2	18.7	-3%
Ringold mud	1.514	1.958	29%
Ringold silt	1.51	0.77	-49%
Plio-Pleistocene sand	96.8	84.2	-13%
Plio-Pleistocene silt	5.81	6.87	18%
Cold Creek sand	99.13	39.4	-60%
Cold Creek gravel	62.7	5.6	-91%
Highly conductive Hanford gravel	3982	4331	9%

***The change in hydraulic conductivity for each unit that results from a small adjustment in the top-of-basalt surface by approximately 3 meters. Data taken from Tables L-20 and L-24 of USDOE/EIS-0391.**

Although they appear modest when compared with natural variability in hydraulic conductivity, these differences significantly influence the model because of the large area modeled and the assumption made in the modeling that each stratigraphic layer is homogeneous.

The USDOE's decision to promote model stability by fixing boundary inflows is also a concern, especially because this is one of the parameters to which the model is more sensitive. Additional information is needed to justify the value of 49 million cubic meters annually, which is more than twice any input value used recently by others (Pacific Northwest National Laboratory [PNNL]-11801, 1997; PNNL-13447, 2001; PNNL-13623, 2001; PNNL-14753, 2006).

Selection of the Base case result over the Alternate case result is insufficiently justified. The Alternate case fits the measured head data better than the Base case, and so is more defensible based on the data. In its singular application to one-time, point-source releases of Tc-99 in the year 2100, modeled results for the Alternate case indicate significantly greater concentrations of technetium at the Columbia River than in the Base case. This difference justifies further effort to determine which model provides the most reasonable and conservative evaluation of future site conditions.

231-37 cont'd

postclosure care. Postclosure care is identified as the monitoring and management activities that must be conducted during the period following closure of a hazardous waste disposal system (e.g., a landfill) to preserve the integrity of that disposal system and continue preventing or controlling releases from the disposal unit. For analysis purposes, in this EIS it was assumed that the postclosure care period following landfill closure of the SST system would be extended to 100 years. The postclosure care program proposed for Hanford is described in Appendix E, Section E.1.2.5.4.2, Postclosure Care.

After this assumed 100-year period of institutional control the caps are assumed to degrade and rate of recharge through the cap is assumed to increase to the background condition for the Hanford site identified in the *Technical Guidance Document* (DOE 2005). That is, the barriers are not assumed to maintain design function indefinitely, but are assumed to degrade after 100 years. In addition, the *TC & WM EIS* analysis was a three-dimensional modeling approach that reflects lateral movement consistent with conditions of an individual source and local geologic conditions appropriate for that source.

231-32 DOE disagrees with the commentor's concern that this EIS was deficient with respect to the propagation of uncertainties along the modeling chain in the *Draft TC & WM EIS*. As described in Appendices L, M, N, and O, an integrated test of the entire groundwater modeling system was performed on the complex series of sources that produced extensive, regional-scale groundwater plumes. In this test, uncertainties regarding inventory, vadose zone flow and transport, and groundwater flow and transport were described, and the effect of those uncertainties on specific metrics was discussed. The model calculations were compared with field results, and the factors governing the degree of agreement were identified.

DOE's view is that NEPA requires a comparison of the impacts of the various alternatives in the context of the cumulative impacts; that the comparison be technically sound and traceable to reliable sources of data; and that important sources of uncertainties in the analyses be identified and their potential implications for decisions and alternatives impacts discussed.

The constituent solubility limited-release model was not used in the *TC & WM EIS* analysis. To avoid confusion, the detailed description of the constituent solubility limited-release model in Appendix M has been deleted in this *Final TC & WM EIS*.

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There is considerable specific and cumulative uncertainty associated with many of the model parameters, including source terms, boundary inflow, geologic parameters, and interactions as well as more general variables such as site topography and annual precipitation. However, the uncertainty has not been explicitly recognized and incorporated into the model or the dose and risk calculations. Together, the factors demonstrate that the degree of precision presented in the EIS is not currently justified.

These deficiencies are also noted by the USDOE itself in its Quality Assurance Follow Up to the EIS (USDOE, 2008), which states that:

The evaluation was "limited by insufficient documentation in many areas including model development, input/output process controls, and modeling uncertainties" (p. 4).

There are omissions in the quality assurance materials such as "…the appendices containing details of the groundwater modeling" and "a number of yet-to-be-developed SAIC calculations and analyses packages" are lacking (p. 7).

A revised EIS should address the following points:

- ***Concentrations, doses, risks, and hazard quotients should be calculated with the Alternate case model as well as the Base case model.***
- ***Appendix L should include specific information regarding water balances and boundary inflows, which should be compared to previously modeled results for the Hanford Site. Any differences should be justified or resolved.***
- ***Boundary inflows either should be estimated as part of model calibration or used to develop alternate models, similar to the approach used to develop the alternate model for the cutoff elevation in the Gable Gap area.***
- ***Approaches for combining uncertainties and risks associated with multiple alternate models (e.g., Meyer et al., 2007) should be used to combine predictions of the Alternate and Base models.***
- ***The USDOE's quality assurance team should review all appendices, calculations, and analyses that were not available for its October 2008 review. The team should be provided with public comments on the EIS for use in this review.***

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231-38

231-33 DOE is in agreement with the comment that the distribution coefficient for contaminant in soil for plutonium-239 does not reflect the values measured by Delegard and Barney as referenced in PNNL-13895. DOE's view is that PNNL-13895 discusses the 1983 Delegard and Barney results in the context of a variety of measurements of distribution coefficients for plutonium-239 applicable to Hanford. The concluding sentence summarizing recommendations for the distribution coefficient for plutonium-239 in PNNL-13895 is "Based on the limited data available for Pu, it appears that Pu will be fairly immobile except at very low pH values or high ethylenediaminetetraacetic acid concentrations." The distribution coefficients used in this *TC & WM EIS* are consistent with this recommendation.

The difference between the number of chemical constituents addressed in the source release model results (Appendix M, Section M.4) and those addressed in the vadose zone transport model results (Appendix N, Section N.4) has been clarified in this *Final TC & WM EIS* to ensure consistency in the constituents addressed in the two appendices.

DOE notes the commentor's concern regarding the interrelation of the contaminants in the vadose zone and groundwater contamination at Hanford.

Regarding the use of methods that would permanently remove contamination instead of in situ approaches, in situ soil remediation (freezing of soil and contaminants) is discussed in Appendix E, Section E.1.3.5.2. This technology was reviewed, but not evaluated, in this EIS for reasons described in Section E.1.3.5.2.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5. The Section 7.5 mitigation discussion acknowledges uncertainties concerning the technical implementation of mitigation measures and references current development efforts. The analysis was formulated in general terms, using flux reduction to account for specific uncertainties in deployment and implementation of various technologies.

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Groundwater Remediation Must Be Integrated with Remediation of the Vadose Zone

The USDOE acknowledges that groundwater at the Hanford Site interacts directly with the Columbia River. During high flows, the river recharges groundwater in the banks of the channel. During low flows, groundwater seeps into the channel to support baseflow. Groundwater at the Hanford Site must be protected against further contamination and restored to the highest beneficial use possible, whether as drinking water or to support aquatic life in the Columbia River, a significant cultural resource for the Yakama Nation.

Groundwater remediation is unlikely to be successful in the absence of protection against future contamination. For this reason, groundwater remediation should be closely tied to remediation of the overlying vadose zone. Previous attempts using an *in situ* approach have suffered in part because contamination of groundwater is ongoing, not static. Additional concerns regarding *in situ* approaches include:

- The target zone is deep in the subsurface and placement of remedial agents is uncertain and unverifiable.
- Many *in situ* precipitates have not proven stable and permanent.[9]
- All *in situ* approaches require ongoing monitoring and often maintenance. Plans and funding for these actions have not been provided.
- The time periods over which monitoring and maintenance would be required surpass even the most extensive institutional memory on record.

The Yakama Nation supports a more conventional and mature approach to remediating subsurface contamination that will permanently remove contamination and does not require long-term monitoring or maintenance.

231-39

Human Health Must Be Protected Under All Exposure Scenarios and Tribal Uses

The human health risk analysis does not adequately address potential risks to the Yakama Nation.

Short-Term Risk Analysis

The short-term risk analysis in Appendix K is inadequate because it does not evaluate an appropriate Native American Indian scenario.

231-40

[9] Most notably, *in situ* treatments that attempted to produce autunite in the 300 Area (PNNL-17480, 2008).

Regarding the availability and adequacy of site characterization data and the limitations of vadose zone remediation technologies, DOE's view is that the groundwater model predictions for current conditions presented in the *Draft TC & WM EIS* are within an order of magnitude of recent field measurements. The discussion of areas of agreement and disagreement regarding this issue are expanded in Appendix U, Section U.1.3, of this *Final TC & WM EIS*. DOE also believes that the expanded mitigation section in Chapter 7, Section 7.5, of this final EIS addresses some of the questions regarding the near-, mid-, and long-term mitigation actions that could support the decisionmaking process.

231-34 DOE agrees with the commentor's assertion that hydraulic parameters can vary by orders of magnitude within individual geologic units. DOE does not agree that the groundwater models do not address this variability. The models do not assign single sets of hydraulic parameters to each geologic unit. Single sets of hydraulic parameters are assigned to specific texture types within each geologic unit, and the spatial distribution of the texture types within each geologic unit is determined by the boring log data for that unit. For example, the hydraulic properties of the Ringold Formation (a geologic unit in the model) vary from place to place across the model depending on the relative proportions of gravel, sand, silt, and mud within the unit.

231-35 DOE notes that NEPA analysis is a comparison of the alternatives under consideration; that assumptions used in the analysis must be clearly identified and the uncertainties discussed; and that the assumptions underlying the analyses should not bias one or more alternatives relative to the others. In Appendix D, Section D.1.1, of this *TC & WM EIS*, the derivation of the inventory in the SSTs is discussed. In Appendix M, Section M.3, modeling assumptions are discussed, including those related to the portrayal of tank farm residuals. It should be noted that the same modeling assumptions were used to derive environmental consequences for all alternatives.

231-36 Future rainfall (i.e., infiltration), as well as a number of other parameters and assumptions, was agreed upon by DOE and Ecology. These agreements are documented in the *Technical Guidance Document*, dated March 25, 2005. Uncertainties in model parameters were analyzed in the draft EIS. For example, Appendix M, Section M.5.4 (including Figure M–127), analyzes how a grouted waste form would vary its release of technetium-99 based on changes in the infiltration rate. Infiltration rates of 0.9, 3.5, 50, and 100 millimeters per year were included in this analysis. In another example, Appendix N, Section N.5, analyzes how travel times through the vadose zone change when infiltration rates

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Members of the Yakama Nation are much more dependent on natural resources for their way of life than are members of the general public. What's more, they pursue their way of life within the areas evaluated in the short-term analysis:

- 50-mile radius of the site: The Yakama Reservation is located 20 miles west of the Hanford Site.
- Maximally exposed individual: The Yakama people hunt and fish in and along the Columbia River, just outside of the boundary representing the "maximally exposed individual."
- Site workers: Staff of the Yakama Nation evaluate on-site cultural resources as part of investigation activities.

In its evaluation of short-term risks, the EIS does not consider exposure to contaminants from ingestion of wild plants, game, and fish, all of which are consumed by members of the Yakama Nation for medical, nutritional, and cultural reasons, potentially resulting in disproportionate impacts to this highly exposed population. The EIS also does not consider exposure to contaminated water, which could occur via drinking and inhalation during traditional sweat-lodge ceremonies. The inhalation, soil contact and/or ingestion, and food ingestion exposure rates used to represent the general population and on-site workers for the short-term risk analysis are too low to reflect a traditional tribal member engaged in hunting, fishing, plant gathering, and other cultural activities.

A revised EIS should evaluate an Native American Indian scenario for short-term risks under each alternative to reflect the lifestyle and exposure rates described in the Yakama Nation Exposure Scenario (Ridolfi, 2007), which was provided to the USDOE in 2007.

231-40 cont'd

Long-Term Risk Analysis

The long-term risk analysis in Appendix Q is inadequate because the American Indian scenarios—American Indian resident farmer and American Indian hunter-gatherer—do not fully represent the Yakama Nation. Pathways presented in the EIS appropriately included exposure to radionuclide and chemical contamination from inhalation of fugitive dust; ingestion of soil, water, fish, meat, and plants; and participation in a sweat lodge, however, some exposure scenarios were incomplete. The resident farmer was assumed to consume domestic meat, milk, and garden plants and either groundwater or surface water; however, an evaluation of both water sources would be more complete. The hunter-gatherer was evaluated based on exposure to both groundwater and surface water and was assumed to consume game and wild plants. However,

231-41

are changed. This analysis used the same infiltration rates as the Section M.5.4 analysis. Additional sensitivity analyses to characterize model uncertainties were included in Section N.5, including: (1) the dependence of solute flux at the water table on the magnitude of aqueous discharge at the source, (2) the dependence of solute flux at the water table on the thickness of silt layers, (3) the role of the tilting of layers in directing flow, (4) the role of dikes in directing or focusing flow, (5) the dependence of estimates of impacts on the recharge rate for sitewide and IDF conditions, (6) the dependence of impacts on the magnitude of the distribution coefficient of iodine in the vadose zone, and (7) the role of the efficiency of iodine capture in ILAW glass. Other examples of sensitivity analyses to characterize model uncertainties are included in Appendix L, Section L.7, and Appendix O, Section O.6.

231-37 The first part of this comment questions the differences between the hydraulic conductivities arrived at for the Base Case and Alternate Case flow models. DOE does not consider it a discrepancy that the optimized hydraulic conductivity values are different for the Base Case and Alternate Case flow models. The optimized hydraulic conductivity sets for each model are unique to each model and it is reasonable to expect differences given a different top of basalt. DOE does not agree the differences in optimized values are alarming given the range of reasonable hydraulic conductivity values for each material type.

The second part of this comment questions fixing boundary inflows to enhance model stability. It is assumed that this refers to the Generalized Head Boundary (GHB) boundary conditions encoded in the western region of the model. The modeled head values are more sensitive to changes in GHB head when GHB conductance values are high. This is as expected because the influence of the GHB increases with increasing conductance values. In addition, it was found that model stability increased with increased conductance values. Therefore, it was determined that the EIS modeling process would fix the GHB conductances at a high value to achieve both model stability and more control over modeled heads when making adjustments to GHB heads. This approach allowed the calibration process to proceed more smoothly in an area where there is uncertainty.

The commentor's reference to "49 million cubic meters annually" could not be found; therefore, no response is provided to this part of the comment. DOE does not have this number in its analysis.

The last part of this comment appears to make the assumption that the intent of comparing the Base Case and Alternate Case flow model results included

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the hunter-gatherer lifestyle does not preclude the consumption of domestic products (e.g., meat, milk, garden plants).

The exposure parameters in the American Indian scenarios are generally too low to represent a a Yakama Nation lifestyle as described in the Yakama Nation Exposure Scenario (Ridolfi, 2007). For example, the inhalation, soil contact and/or ingestion, and food ingestion rates and fraction of time spent outdoors do not reflect a subsistence lifestyle that includes active hunting, fishing, and gathering of wild plants and cultural activities such as ceremonies performed on dirt floors. The Yakama people consume more meat and plants than the general population. They also consume much more fish from local sources, including the Columbia River, as a primary part of their diet. *231-41 cont'd*

Comparison of Yakama, USDOE, and EIS Exposure Parameters

Prior to release of the EIS, the USDOE developed a tribal scenario in which some exposure parameters for the Yakama Nation and the Confederated Tribes of the Umatilla Indian Reservation[10] were merged and proposed for use in Hanford Site risk assessment. Table 2 compares the USDOE-developed exposure parameters with Yakama Nation parameters documented in Ridolfi (2007) as well as with those used in Appendix K and Appendix Q of the EIS. The table illustrates that generally lower rates are assumed in the EIS than were developed by either the Yakama Nation or the USDOE; in particular, the fish consumption rate used in the long-term risk assessment is about one-third of the Yakama Nation subsistence rate. *231-42*

Table 2. Native American Indian adult exposure parameters.

Exposure Parameter	Unit	Yakama Nation[a]	USDOE Pre-EIS White Paper[b]	USDOE EIS Short Term[c]	USDOE EIS Long Term[d]
Inhalation rate	m^3/hr	1.08	1.08	0.83	0.96
Soil ingestion rate	mg/day	200	400	120	120
Water ingestion rate	L/day	4(1)	4(1)	--	2
Fish consumption rate	g/day	519	620	--	170
Meat consumption rate	g/day	704	125	508	422
Plant consumption rate	g/day	1,417	1,350	836	1,082(2)
Milk ingestion rate	L/day	1.2	--	--	0.6

[10] Developed using frequency and duration assumptions not agreed to or accepted by the Yakama Nation and Umatilla Indians.

determining which case should be propagated forward and used to perform the draft EIS groundwater analysis for the alternatives and cumulative impacts. This is not a valid assumption. The Base Case and Alternate Case are required by the March 25, 2005, *Technical Guidance Document* (DOE 2005), which is an agreement between DOE and Ecology that provides guidance on a variety of modeling parameters. The Alternate Case is provided to allow comparison of a finite set of modeling results (run in both the Base and Alternate Cases) so that the reader can understand how the uncertainty in the top-of-basalt cutoff elevation in Gable Gap affects model results. The results of this comparison are included in Appendix O, Section O.6. It was intended from the start that the Base Case, which represents predominant flow to the east, would be used as the primary draft EIS flow model. The *Technical Guidance Document* implies this direction as well by its naming conventions used to identify the two flow models (Base Case versus Alternate Case). It should also be noted that the *Draft TC & WM EIS* groundwater model development process included structured independent reviews by a Technical Review Group made up of modeling experts from academia and industry. In addition to this review group's participation, which included reviewing and commenting on each stage of the model development process and then reaching agreement with the modeling team on resolution of comments, a Local Users' Group (local users of groundwater modeling tools at Hanford) was also included in a review and comment process at each stage of model development. This process of Technical Review Group and Local Users' Group review and comment assisted the modeling team in viewing the model development process from a wide variety of perspectives and resulted in an improved model for use in this *TC & WM EIS*.

231-38 Calculation and analysis packages were required to be completed before publication of the *Draft TC & WM EIS*. The timing of the quality assurance review (noted in the first part of this comment) was prior to completion of all calculation and analysis packages. As part of the quality assurance review, the team evaluated draft documents and, although no issues were found, the report acknowledges that some of the quality assurance documentation was incomplete at the time of the quality assurance review. All quality assurance documents were completed prior to publishing the *Draft TC & WM EIS* in October 2009.

There are no plans to perform any additional analysis using the Alternate Case flow model. The development and analysis of this model were included in Appendices L and O of the draft EIS, per the requirements of the *Technical Guidance Document* (DOE 2005), and no further development or analysis is planned.

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Notes:

[a] Yakama Nation Exposure Scenario (Ridolfi, 2007)

[b] U.S. Department of Energy Tribal Scenario (USDOE, 2009)

[c] The EIS, Appendix K

[d] The EIS, Appendix Q
Includes water consumption during sweat lodge use
Includes grain consumption
m^3/hr = cubic meters per hour; mg/day = milligrams per day; L/day = liters per day;
g/day = grams per day

231-42 cont'd

Yakama Nation Exposure Scenario Chronology

To fully understand our objection to exposure parameters used in the EIS, it is important to understand how the Yakama Nation Exposure Scenario was developed. The process began with a facilitated meeting on January 18, 2006, that was attended by representatives of the Yakama Nation, the USDOE, and the USEPA. The purpose of the meeting was to discuss the technical work necessary to improve the risk assessment process for the Hanford Site. At this meeting, the parties agreed on the need for an exposure scenario that reflected the unique pathways and risks to the Yakama people and resources. Subsequently, a scope of work was developed for the Yakama Nation and approved by the USDOE in 2006. The majority of the work, including literature research and interviews with Yakama members, was conducted in 2007. The Yakama Nation Exposure Scenario was completed on September 7, 2007, and submitted to the USDOE for use in the Hanford Site risk assessment.

On November 14, 2007, the USDOE Office of River Protection posed questions about the scenario to the Yakama Nation, which responded with further clarification on December 11, 2007. At about the same time, the USEPA Office of Environmental Assessment submitted comments on the Yakama Nation Exposure Scenario in a memorandum dated January 3, 2008.

231-43

In a submittal dated December 19, 2007, the USDOE's subcontractor, Neptune and Company, Inc., presented an approach for applying the scenario to the risk assessment process. This approach, which was provided to the Yakama Nation on January 16, 2008, included exposure assumptions not identified in the scenario but recommended by the USEPA. The Yakama Nation agreed to these assumptions and has since been anticipating application of the scenario in Hanford Site risk assessments.

The USDOE has failed to apply the Yakama Nation Exposure Scenario in any of its risk evaluations and analyses, including the EIS. The Yakama Nation Exposure Scenario should be applied in a revised EIS.

Water balance and some boundary inflow data are included in Appendix L of the draft EIS for both the Base Case model (Figures L–54 and L–55 and related text) and the Alternate Case model (Figures L–86 and L–87 and related text). No comparability studies (to prior or ongoing work) are planned for any of the groundwater pathway model inputs or results. Boundary inflows, with the exception of natural recharge, which was specified by the *Technical Guidance Document*, and artificial recharge, which was developed using site waste discharge data, were treated as calibration parameters. The GHB inflows along the western boundary of the model were estimated and then adjusted to achieve preliminary model calibration (see Appendix L, Section L.7, of the *Draft TC & WM EIS*).

As stated above, the Alternate Case model was developed and analyzed in the *Draft TC & WM EIS* per the requirements of the *Technical Guidance Document*. No additional development or analysis of the Alternate Case model is planned. The Base Case model was updated based on emerging data and this updated Base Case model was used in the *Final TC & WM EIS* analysis. DOE will perform future quality assurance reviews and/or audits as appropriate, per the *TC & WM EIS* project quality assurance procedures.

231-39 See response to comment 231-33 for a discussion of in situ approaches and the expanded sensitivity analysis in this *Final TC & WM EIS*.

231-40 As the commentor states, a purely American Indian exposure scenario such as that described in Ridolfi (2007) was not included in evaluating short-term impacts. However, Appendix J, Section J.5.7, includes a number of analyses that estimate that any doses to individuals exposed during the period defined as short term in this EIS would remain low and that the average dose to an American Indian is similar to, or lower than, the average dose to a member of the total population. Section J.5.7 presents the incremental impact on an MEI who lives at the boundary of the Yakama Reservation, about 20 miles west of Hanford. Due to prevailing winds and the distance from Hanford, the dose to this individual would be much lower than the dose presented in Chapter 4, Section 4.1.10, for the hypothetical MEI living along the Columbia River.

An analysis of the potential incremental impacts on the hypothetical individual who lives a subsistence lifestyle in which he consumes food grown on a family farm as well as wild game and fish is presented in Section J.5.7. This individual was assumed to consume surface water, fish, and a larger portion of potentially contaminated meat. During the operational phase, the alternatives considered in this EIS would not result in any significant water contamination. Therefore, exposure from participating in a sweat-lodge ceremony was not considered in the

Cumulative Risk

A comprehensive cumulative risk assessment should consider exposures to both chemical and radiological contaminants (which are present in all Hanford Site media, including the vadose zone), taking into account the sum of all contaminant exposures. In addition, a cumulative risk assessment should evaluate all possible pathways, including such pathways as drinking water wells drilled by individuals for their own use. **231-44**

Contaminant Selection

Potential exposure to radiological and hazardous chemical contaminants was evaluated for both the short- and long-term human health risk analyses presented in the EIS. Appendices D, K, and Q refer to an initial inventory of 46 radionuclides that was screened to arrive at a final set of constituents retained for detailed analysis. The complete inventory list is not presented in the EIS, and the EIS does not provide a thorough description of the screening process used to retain the final set. **231-45**

As stated in the EIS, radioactive inventories were also not adjusted to account for differences in the duration of each alternative; the justification for this is that radioactive decay over time will only reduce the radioactivity. To the contrary, however, some radionuclide concentrations will actually increase over time (e.g., the decay of plutonium-241 will lead to an increase in its daughter product, americium-241, until equilibrium is reached). Another limitation occurred in the evaluation of direct intrusion into residual contamination, in which hazardous chemicals were not evaluated because of an assumed limited exposure time. In addition, the drinking water pathway was not evaluated. **231-46** **231-47**

Human Health Risk Analysis Results

The results of the short-term human health risk analysis in the EIS indicate that the average project impact for a full-time worker with a 40-year exposure period is at least 10 times the USEPA's maximum acceptable lifetime cancer risk of $1x10^{-4}$ for every alternative.[11] **231-48**

The analysis results demonstrate that no proposed alternative is adequately protective of worker health.

[11] In the short-term risk analysis, only latent cancer fatality rates (as opposed to cancer risk incidence) were presented for the general population and maximally exposed individual.

short-term scenarios. However, the potential for exposure is assumed to increase in the long term, when it is assumed that individuals would have more access to Hanford.

Appendix Q, Section Q.3, presents an analysis of potential human health impacts for a number of long-term exposure scenarios. Among these are an American Indian resident farmer who uses onsite groundwater or surface water domestically, for irrigation, and in ceremonial sweat-lodge/sauna ceremonies, and an American Indian hunter-gatherer who is exposed to both groundwater and surface water; consumes game, fish, and wild plants in a more traditional American Indian lifestyle; and participates in sweat-lodge/sauna ceremonies. As shown in this appendix, these traditional lifestyles could result in higher doses than those received by the typical resident farmer.

231-41 DOE notes the concerns expressed by the Confederated Tribes and Bands of the Yakama Nation regarding the American Indian scenarios evaluated in the *Draft TC & WM EIS*. All hunter-gatherer scenarios in this EIS should be considered American Indian hunter-gatherer scenarios. As noted in the comment, both the resident farmer and hunter-gatherer scenarios consider a reasonable range of exposure pathways. In response to this comment, DOE has reviewed regulatory guidance and tribal recommendations regarding this scenario and has increased the fish intake and sweat lodge use for the American Indian hunter-gatherer alternative analyses. In Appendix W, Section W.3, exposure data provided by the tribes are used to estimate peak impacts on a Yakama hunter-gatherer and on a CTUIR hunter-gatherer for a representative alternative combination, Alternative Combination 2, without non–*TC & WM EIS* sources. The comparison of those analyses to those for the *TC & WM EIS* hunter-gatherer described in Appendix Q suggests that both the exposure pathways modeled and the parameter values used for the *TC & WM EIS* hunter-gatherer are representative for use in the EIS analyses. In addition, one or two exposure pathways account for essentially all of the peak impacts (and variability) across the hunter-gatherer scenarios.

231-42 DOE notes the concerns expressed by the Confederated Tribes and Bands of the Yakama Nation regarding the exposure parameters used in the American Indian scenarios. DOE does feel that the discussions held between DOE and the Yakama Nation staff between November 2004 and January 2005 to discuss the American Indian scenario used in the draft EIS were conducted in good faith by both parties. The intent of those scenarios was to reflect American Indian lifestyles for the purpose of comparing the alternatives. Both the activities and parameters used in those scenarios are based on existing reports and compilations. For example,

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Every alternative also shows a long-term radiological risk above the maximum cancer risk level in at least one location (core zone boundary, river nearshore, and barriers), with the core zone boundary showing unacceptable cancer risks under all alternatives.

For the drinking water well user, all tank closure alternatives for B Barrier, T Barrier, and the core zone boundary exceed the 10 mrem per year criteria used in the EIS. Further, doses to an American Indian "intruder" engaged in residential agriculture following well drilling at the tank farms exceed the USDOE dose guideline of 500 mrem per year in at least one tank farm for every alternative. The EIS acknowledges these exceedances, but does not discuss how this issue might influence decision making or alternative selection. ***231-49***

No alternative presented in the EIS is adequately protective in the long term for groundwater use. Other alternatives must be considered in a revised EIS.

Ecological Resources Must Be Protected Under All Exposure Scenarios and Tribal Uses

None of the tank closure alternatives presented in the EIS is protective of ecological resources. Each alternative or combination of alternatives shows an unacceptable risk to aquatic biota, including salmonids exposed to hexavalent chromium via groundwater discharging to the Columbia River at the nearshore area. Each also shows unacceptable risk to terrestrial resources exposed to contaminants such as mercury, xylene, and formaldehyde via air deposition. And, although the EIS has a 10,000-year horizon, it does not address how conditions at the site will more than likely change over time as a result of climate change, dam alterations, or river channel migration.

Although the EIS concludes that a few ecological resources will be impacted by unacceptable risks, even this evaluation is inadequate. Many integral elements of the ecosystem are not included in the impacts evaluation and risk analyses. In addition, impacts to numerous receptors are not evaluated, nor are all exposure pathways. For example, the only exposure pathway evaluated for terrestrial receptors is air releases; the exposure pathway via ingestion of plants and invertebrate and vertebrate prey by salmonids is not evaluated; and plants are not included as riparian or aquatic receptors. ***231-50***

A revised EIS must take into consideration all relevant ecological receptors and exposure pathways.

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the fish consumption rates are in the 95th percentile for the "Native American Subsistence Populations" as presented in the EPA's *Exposure Factors Handbook* (EPA 1997).

See response to comment 231-41 regarding the American Indian exposure scenarios analyzed in Appendix W.

231-43 See response to comment 231-41 regarding the American Indian exposure scenarios analyzed in Appendix W.

231-44 The radioactive and chemical constituents used in the *TC & WM EIS* analysis are the product of extensive database compilations, reviews, and a drinking-water-based preliminary human health risk assessment, as described in detail in Appendix S. The preliminary risk assessment determined that many of the radioactive and chemical constituents in the initial compilations would not contribute significantly to either the alternative or cumulative impacts in this *TC & WM EIS*. Thus, radionuclides contributing less than 1 percent of impacts under drinking-water well scenarios were eliminated from the detailed analyses, as were chemicals present in the inventories at levels at or below health-based limits. The screening resulted in reduction of the original set of radioactive and chemical constituents to the final set of 14 radioactive constituents and 26 chemical constituents for use in the final analysis.

There are other scenarios that may be postulated, but it was not DOE's intent to analyze all possible exposure scenarios and pathways. The scenarios were selected for analysis in this EIS to inform a relevant comparison of EIS alternatives. The scenarios chosen accommodate lifestyles representative of the region and incorporate exposure pathways originating from groundwater contamination, but also involving the other environmental media. Both long-term and intruder receptors were considered. Four types of long-term receptors were analyzed. The first type, a drinking-water well user, was assumed to use groundwater as a source of drinking water. The second type, a resident farmer, was assumed to use groundwater for drinking water, livestock drinking water, and irrigation of crops and fodder. It was assumed that garden size and crop yield would be adequate to produce approximately 25 percent of the receptor's average requirements for crops and animal products. The third type, an American Indian resident farmer, was also assumed to use groundwater for drinking water consumption, ceremonial sweat lodge/sauna ceremonies, and irrigation of crops. Garden size and crop yield were assumed to be adequate to produce the entirety of the receptor's average requirements for crops and animal products. There are also scenarios in which the resident farmer and American Indian receptors use surface

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Aquatic Resources

The EIS excludes the Columbia River from evaluation (excepting a small portion of nearshore habitat), despite the fact that the Columbia River and the Hanford Reach provide habitat for a wide range of aquatic and terrestrial species.[12] Both the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service and the U.S. Fish and Wildlife Service (USFWS) have designated critical habitat for salmonid species throughout the Columbia River basin, which includes the Hanford Reach.[13]

The EIS assumes that exposure of ecological resources to contaminated groundwater is inconsequential because there are few seeps along the river and discharges occur under water or flow through the riparian zone for only 16.6 feet. This assumption is subjective and provides inadequate basis for discounting the risks to aquatic resources. During the fall, seasonal water levels in the river are at their lowest; as a result, undiluted contaminated groundwater discharging from the seeps is more accessible to ecological resources (Fabre, 2007). Additionally, seeps in the nearshore area are not the only points where contaminated groundwater discharges to the river. Preliminary results from a recent study (Tiller et al., 2009) show hexavalent chromium concentrations in excess of USEPA water quality criteria at several groundwater upwelling locations in the Hanford Reach. **231-51**

The Columbia River, the Hanford Reach, and their biological resources must be considered in a revised EIS because these resources will be affected by the discharge of contaminated groundwater for the foreseeable future.

Terrestrial Resources

The only exposure pathway evaluated for terrestrial species is air deposition. However, as acknowledged in the EIS, plants and animals are routinely observed in the upland portions of the Hanford Site. Numerous springs, vernal pools, and ponds in the upland habitats provide an important source of water for terrestrial animals. The EIS states that mammals and waterfowl have been observed using ponds and upland aquatic habitats in the core zone. The EIS also **231-52**

[12] The riverbanks along the Hanford Reach are vegetated with riparian plant species typical of Columbia Basin shrub-steppe ecosystems as well as introduced species. The riparian and upland portions of the Hanford Reach are used by numerous plants, insects, mollusks, amphibians, reptiles, birds, and mammals. The Hanford Reach, part of a National Monument, is characterized by diverse riverine habitats consisting of cobble substrates, riffles, deep pools, backwater sloughs, islands, and gravel bars. The Hanford Reach provides spawning, rearing, and migratory habitat for salmonids and other fish species, including white sturgeon. Critical spawning and rearing habitat for fall Chinook salmon is also found in the Hanford Reach (USFWS, 2008).

[13] Critical habitat has been designated for upper and mid-Columbia River steelhead, upper Columbia River Chinook, and bull trout (NOAA, 2010; USFWS, 2010).

water instead of groundwater. These scenarios differ from the groundwater scenarios in that they include fish consumption. The fourth long-term type, an American Indian hunter-gatherer, would be impacted by both groundwater and surface water because he or she was assumed to drink surface water and consume game animals, which use surface water, and wild plant materials, which use groundwater. Both groundwater and surface water are used in ceremonial sweat lodge/sauna ceremonies. Also in Appendix W, Section W.3, data provided by the tribes are used to estimate peak impacts on Yakama and CTUIR hunter-gatherers for a representative alternative combination, Alternative Combination 2, without non–*TC & WM EIS* sources.

Three types of intruder scenarios were analyzed. The home construction intruder was assumed to excavate a foundation for a home, spending a specified length of time in the excavation. The excavation work would generate airborne dust that would be inhaled by the worker. The worker was also assumed to be simultaneously exposed to direct radiation emitted from radioactive material in the surrounding soil. The well-drilling intruder was assumed to complete a well, to inhale dust mobilized by the drilling activity, and to be exposed to direct radiation emitted by waste brought to the surface in the drilling mud. The residential agriculture intruder was assumed to be an individual that lives in a home and cultivates a garden on soil containing residual contamination, resulting in exposure to radionuclides through ingestion, inhalation, and direct exposure.

231-45 The complete inventory list that was used prior to screening is provided in the references listed in each of the noted appendices. Appendix Q, Section Q.2, of this *Final TC & WM EIS* has been revised to provide a more detailed discussion on the screening process.

231-46 DOE agrees with the commentor's observation that the concentration of daughter products can increase with time and that, given enough time, a closed system will attain a state of secular equilibrium. This was considered in developing the screening process for determining the COPCs used in this *TC & WM EIS*; the rate of production of the daughter products turns out to be small (for the conditions relevant to a 10,000-year groundwater analysis). A discussion of this issue has been added to Appendix Q, Section Q.2, of this *Final TC & WM EIS*.

231-47 The discussion in Appendix Q, Section Q.2.3, Intruder Scenario Models, indicates that, in the case of chemicals, acceptance criteria are yet to be established. Explanation of why doses due to ingestion of drinking water are not included in the intruder analysis was provided in Section Q.2.3.2.3 of the *Draft*

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states that dense blooms of watercress (an aquatic plant) occur in springs in the upland area and that these springs support aquatic insect populations in greater numbers than do mountain streams. This information supports the need for consideration of these habitats and their associated receptors.

A revised EIS must evaluate groundwater as an exposure pathway for terrestrial resources. Additionally, the assumption that institutional controls will preclude plants and animals from entering the upland terrestrial habitat in the core zone for 10,000 years is inadequate to provide for the protection of ecological resources. *231-52 cont'd*

Fast Flux Test Facility

The EIS also presents alternatives for the Fast Flux Test Facility (FFTF). The Yakama Nation supports implementation of Alternative 3 using the Idaho Options for treatment of bulk sodium and remote handled special components (RH-SCs). We support disposal of the RH-SCs at the Nevada Test Site as presented in the EIS. Based on estimates provided by the USDOE, the difference in cost between Alternative 3 and Alternative 2, the USDOE's preferred alternative, is less than 3 percent. However, implementation of Alternative 3 would result in significant improvement of the 400 Area's end state. As part of Alternative 3, the USDOE should remove subgrade concrete and other rubble from the site before backfilling with clean material to leave as little residual contamination in place as possible.

FFTF operations have not yet resulted in the type of extensive and severe environmental contamination pervasive throughout much of the Hanford Site. Implementing Alternative 2 would be a significant step away from appropriate closure of the site. The Yakama Nation does not support Alternative 2 for the following reasons: *231-53*

- Entombment (i.e., grouting waste in place) makes future remedial actions difficult if not impossible.
- Entombment of waste will ultimately lead to heavy contamination of an area that is not now as severely impacted as other portions of the Hanford Site.
- Alternative 2 relies on institutional controls and barriers to temporarily prevent contamination from mobilizing and migrating into the environment. However, the EIS acknowledges that this contamination will ultimately be released into the environment.
- Constructing a new sodium reaction facility (i.e., exercising the Hanford Reuse Option for bulk sodium) will commit significant resources to building, operating, and then destroying a facility that is redundant of a nearly identical existing facility at the Idaho National Laboratory.

TC & WM EIS. The reasoning is that intrusion impacts result from transport of waste to the surface due to human activity and occur primarily in the near term. Impacts for the drinking water pathway involve transport of radionuclides through the vadose zone to groundwater and occur in the future, with reduction of dose due to decay of short-lived radionuclides. Therefore, doses due to ingestion of drinking water are not included in the intruder analysis and are reported in the long-term impacts analysis.

231-48 The commentor cites the wrong criterion for evaluating proper protection of DOE radiation workers. Protection of worker health from radiation exposure is established by 10 CFR 835. Chapter 4, Sections 4.1.10, 4.2.10, and 4.3.10, of this EIS explains that a full-time equivalent worker is a worker assumed to have a 2,080-hour worker year. In the context of worker dose, the full-time equivalent worker is used as a mechanism for comparing occupational doses for the different EIS alternatives. In actual practice, the number of individuals involved in an activity may exceed the estimated number of full-time equivalent workers used in the analysis. Therefore, the doses received by individual workers would be lower than the doses calculated for each full-time equivalent worker.

Section 4.1.10 also explains that worker dose would be limited to levels lower than the regulatory limit of 5 rem per year and further constrained by engineering and administrative controls (such as using more workers to perform an activity with a high dose rate) designed to keep worker doses ALARA. Such controls and worker protection practices would maintain doses to individual workers within established limits and lower than the doses calculated for the average full-time equivalent worker.

As the commentor notes, the short-term impact assessment uses LCFs based on a nominal risk factor of 0.0006 LCFs per rem or person-rem of exposure as the measure for evaluating impacts. The EIS tables that present health impacts of normal operations and hypothesized facility accidents give both the doses and the resulting risk to an exposed individual or the number of LCFs in an exposed population. Appendix K, Section K.1.1.6, discusses the scientific evidence relating radiation exposure to incidence of cancers, both fatal and nonfatal. This discussion indicates that use of the fatal cancer risk factor of 0.0006 is conservative, but also provides the reader with the information from which the incidence of nonfatal cancers can be estimated.

231-49 A conservative approach was taken to calculate the maximum concentrations used to estimate the human health impacts of the alternatives. DOE reviewed

Implementing Alternative 3 with both Idaho Options would meet the USDOE's vision of responsibly shrinking the Hanford footprint by not leaving residual contamination in place. The USDOE acknowledges that preferred Alternative 2 will ultimately lead to the release of significant contamination into the environment, resulting in further impacts to human health and the environment. Given that Alternative 3 with both Idaho Options results in minimal future impacts to the environment, it is supported by the Yakama Nation with the stipulations stated above.

231-53 cont'd

this approach for this final EIS and determined that, as a result of advances in computational machinery, a less-conservative approach was available (i.e., an approach that was able to pick the highest concentration in a single point at the barrier, rather than a cumulative concentration along the barrier). This less-conservative, but more-realistic, approach was implemented for the analysis performed for this *Final TC & WM EIS*.

In the *Draft TC & WM EIS*, it was observed that many times the concentration plumes often tended to overlap and the highest concentrations at any given time were limited to a few locations. Hence, for each species, an expedient and conservative approach—summing the (barrier) perimeter concentrations—was adopted to arrive at a conservative upper-bound concentration for each year in the 10,000-year simulation. Thus, the reported "maximum" for each contaminant was simply the maximum summed value from the simulation. In this *Final TC & WM EIS*, for each year, a maximum concentration along the barrier is determined for each species; the maximum for the simulation is determined from that set of values.

See response to comment 231-8 regarding future DOE decisions.

231-50 The analysis does not analyze every exposure pathway and the incremental contribution to potential impacts are not quantified. The most important pathways from sources to receptors (air emissions and subsequent deposition on soil, releases to groundwater) evaluated in this EIS are common to all alternatives, but vary in magnitude between alternatives. The amounts released via these pathways and the resulting concentrations in different media to which receptors are directly or indirectly exposed vary under the different alternatives, but the extent to which receptors are exposed to the different media does not vary between alternatives. Therefore, the risk to receptors from the different alternatives does not change if common but minor exposure routes are not included in the risk estimates for receptors as long as the risk estimates for all alternatives are calculated in the same way for the same set of exposures and receptors. See Appendix P for more information on the analysis of ecological resources.

231-51 Ecological risk information used to assess and compare the alternatives is presented in this EIS, including risk estimates for every chemical and radionuclide included in the models of releases to air and groundwater and subsequent discharge to the Columbia River at the point of maximum concentration at discharge. This EIS does not state or assume that biota in any portion of the Hanford Reach of the Columbia River are not potentially exposed to contaminants

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released to air or groundwater. As stated in Appendix P, Section P.2.1, comparing alternatives is the primary purpose of the ecological risk analysis in this *TC & WM EIS*. Seep and sediment pore water concentrations were assumed to equal the modeled peak annual average groundwater concentration at the Columbia River. Seep concentrations were used to assess potential impacts on wildlife receptors drinking water in the riparian zone. Peak annual average nearshore surface water concentrations were used to estimate adverse impacts on aquatic biota in the Columbia River. Exposure estimates assumed discharge to shallow low-flux areas, where dilution would be small relative to midchannel high-flux areas.

231-52 Potential impacts on terrestrial ecological resources were evaluated for multiple exposure pathways and sources (air emissions and subsequent deposition on soil, releases to groundwater). Impacts on terrestrial receptors were evaluated at the maximum onsite location (air deposition only) and offsite/Columbia River location (air deposition and groundwater discharge). For consistency with other *TC & WM EIS* assessments of long-term impacts, the line of analysis for the maximum terrestrial exposure location was the Core Zone Boundary in the predominant downwind direction. This EIS does not state or assume that terrestrial receptors are never exposed to groundwater in upland habitats; however, discharge of contaminated groundwater beneath the Core Zone to upland habitats is considered a minor pathway.

The most important pathways from sources to receptors that are evaluated in this EIS are common to all of the alternatives, but vary in magnitude under different alternatives. The amounts released via these pathways and the resulting concentrations in the different media to which receptors are directly or indirectly exposed also vary under the different alternatives, but the extent to which receptors are exposed to the different media does not vary. Therefore, the risk to receptors under the different alternatives does not change if common but minor exposure routes are not included in the risk estimates for the receptors as long as the risk estimates for all alternatives are calculated in the same way for the same set of exposures and receptors.

231-53 Regarding FFTF Decommissioning Alternative 3 and treating or processing the associated RH-SCs and bulk sodium at INL, although nearly all elements of FFTF and the two adjacent support facilities would be removed under this alternative, the lower portion of the Reactor Containment Building concrete shell would remain. This would be backfilled with either soil or grout to minimize void space. The area would be regraded and revegetated, with no need for a barrier.

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DOE's preference is for FFTF Decommissioning Alternative 2. Under this alternative, some below-grade structures would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment.

Regarding the effectiveness of institutional controls and barriers, it is DOE policy (DOE P 454.1, April 9, 2003) to use institutional controls as essential components of a defense-in-depth strategy that uses multiple, relatively independent layers of safety to protect human health and the environment (including natural and cultural resources). DOE would implement institutional controls, along with other mitigating or preventive measures as necessary, to provide a reasonable expectation that, if one control temporarily fails, other controls will be in place, or other actions will be taken, to mitigate significant consequences. Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that include developing better-engineered landfill barriers and waste-form performance, among other potential measures.

See response to comment 231-8 regarding future DOE decisions.

Commentor No. 231 (cont'd): Harry Smiskin, Chairman, Yakama Tribal Council, Confederated Tribes and Bands of the Yakama Nation

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Attachment 2
Hanford Tank Closure and Waste Management EIS
Yakama ERWM Program Targeted Comment Compilation
March 12, 2010

Comment ID No.	Section	Subsection	Page	Figure, Map or Table Number	Comment	
1	General				Remediation approaches that leave pipes, valves and other high level waste-handling equipment in place are incompatible with the Nuclear Waste Policy Act, which requires high level waste to be disposed in a deep geologic repository. The removal of the facilities and equipment that have handled high level waste and have residuals in them needs to be evaluated in a revised EIS.	231-54
2	General				Please address the fact that USDOE's preferred alternatives do not include removing source material that could result in groundwater being restored to a usable condition in a reasonable time frame.	231-55
3	General				Cleanups based on a specific risk level which is derived from known contamination at the site cannot be implemented effectively at many areas because there is too much uncertainty or unknowns regarding the site (e.g., wastes and contaminated media are not sufficiently characterized to make informed decisions). Provide a plan to resolve these data gaps.	231-56
4	General				Disposing of wastes from other USDOE sites at Hanford will adversely affect the environment and significantly increase site-related risks, particularly with respect to groundwater as a source of drinking water. This is particularly significant for disposal of off-site wastes containing I-129 and Tc-99. At least one Alternative should be provided that excludes the import of off-site waste and meets all drinking standards and aquatic life criteria.	231-57
5	General				Provide justification that the two points of compliance included in the EIS (core-zone boundary and the Columbia River) are sufficient, and address the possible need for evaluation at other locations on the site.	231-58
6	General				Please address the fact that there is a significant amount of variability in the time series graphs of the groundwater modeling results presented in the EIS and the affects this may have on the reliability of results.	231-59
7	General				The document cites compliance with potentially applicable regulatory requirements. Clarify that all actions will comply with all ARARs.	231-60
8	General				State Environmental Protection Act (SEPA) requirements may not have been met under this NEPA action. Clarify how SEPA requirements will be met where they are found to apply.	231-61
9	General				Clarify and define the term selective clean closure.	231-62
10	General				Clarify how failure of institutional controls will impact the projected risk evaluation.	231-63
11	General				Permitting of a new solid-liquid separations facility will require SEPA coverage. Clarify how this EIS would be adequate to meet the needs of the SEPA checklist for this facility.	231-64
12	General				Clarify whether air emissions from steam reforming facilities are included in the risk evaluation.	231-65

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231-54 The commentor states that contaminated ancillary equipment, piping and valves are HLW and must be disposed in a deep geologic repository. DOE disagrees and does not believe that this issue needs to be evaluated in a revised EIS. As stated in the *TC & WM EIS*, at Hanford, the requirements for management of DOE HLW, LLW, TRU waste, and the radioactive component of mixed waste are provided in DOE Order 435.1 and its associated manual and guidance, which are compatible with the Nuclear Waste Policy Act, and are described in Chapter 8 of this *TC & WM EIS*. Furthermore, as discussed in the *TC & WM EIS* Summary, Section S.5.2.1.4, the final waste classifications of certain waste streams, including those listed above, have not yet been determined. Nevertheless, to ensure consideration of the full range of alternatives, this EIS analyzes two alternatives, Tank Closure Alternatives 6A and 6B, both of which assume that the tank waste is all managed as HLW, including the ancillary equipment, either because (a) the waste has been determined to be HLW, or (b) the historical processing data for the waste streams do not support management of the waste as non-HLW. It is also important to note that DOE is not making decisions based on this *TC & WM EIS* on the ultimate disposition of waste streams that are currently managed as HLW at Hanford, and will make those decisions in accordance with applicable law.

231-55 As stated in Chapter 1, Section 1.4.2, this *TC & WM EIS* is not making a decision on CERCLA groundwater remediation as part of the proposed actions evaluated, but it does address alternatives for retrieval of tank waste, past leaks, and spills. Tank farm past leaks and associated contamination in the vadose zone are being evaluated under the RCRA Facility Investigation/Corrective Measures Study process. As such, the vadose zone contamination associated with tank farm past leaks is considered an RCRA operable unit.

With regard to the scope of this *TC & WM EIS*, DOE believes that its Preferred Alternatives, as discussed in Chapter 2, Section 2.12, address these considerations even as DOE continues to work to characterize past leaks and spills and to address uncertainties in contamination fate and transport through RCRA facility investigations and conceptual groundwater models, such as that developed for this *TC & WM EIS*. Regardless, Tank Closure Alternatives 4, 6A, and 6B, as analyzed in this *TC & WM EIS*, are representative of remediation that results in removal of the source of contamination from the vadose zone (i.e., contaminated soils beneath the tank farms to the groundwater). This type of remediation could include the use of subsurface barriers. A more complete discussion on the potential remediation actions to achieve vadose zone remediation is described in Chapter 7, Section 7.5.

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13	General				Explain how risks and impacts will be calculated and included for temporary storage of high-level waste (HLW) on the Hanford site, define the timetable for storage and include this in the risk and impact calculations.	*231-66*
14	General				Provide the site conceptual hydrogeologic model for review including specific assumptions used in the model, such as data selection, qualification and justification.	*231-67*
15	General				Provide a more detailed explanation of how transuranic (TRU) waste can/will be stored on site until it can be shipped to Waste Isolation Pilot Plant. Include the location and specifications of the TRU Waste Interim Storage Facility in particular.	*231-68*
16	General				Bulk vitrification test demonstrations have shown it is not suitable for low-activity waste (LAW) that contains Tc-99. Revise the alternatives to exclude the use of this technology.	*231-69*
17	General				Address the need for plans to conduct a thorough characterization in every tank farm where a leak or release has occurred to identify the contaminants. Explain how plans will be developed for removing residual contamination, sampling and analysis of residual waste, radiological assessment of the structural steel of the tanks, assessment of risk to human health and the environment from future releases of radiation due to tank degradation.	*231-70*
18	General				Include plans for sampling waste transfer lines between facilities and evaluating residual waste solidified in place. Leaving these lines in place threatens the vadose zone and groundwater in the future as contaminants are remobilized. As such, a work plan for vadose zone remediation should be developed.	*231-71*
19	General				Revisit the alternatives for removing tanks which overlay known areas of contamination and provide a more detailed analysis of the feasibility of removing all single-shell tanks (SST). Include an estimate of the time to completion for full removal and identify sources for clean fill material.	*231-72*
20	General				The EIS states the Resource Conservation and Recovery Act (RCRA) barrier can last 500 years before needing maintenance, and the Hanford barrier can last 1,000 years. However, the National Research Council has noted that existing test results cannot be reliably extrapolated out to these lengths of time (National Research Council, 2000). Provide justification for these predictions including any assumed maintenance and monitoring activities which will be conducted.	*231-73*
21	General				Include plans to conduct sampling and analysis of residual waste that will be left in the tanks, including radiological assessment of the structural steel.	*231-74*
22	General				Provide a cost analysis for long-term institutional controls. Include in the comparison the cost of future remediation as a result of residual waste mobilization versus the cost of clean closure in present day dollars.	*231-75*

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231-56 Information on how each waste management area will be closed, which will address these issues, has been added to Chapter 7, Section 7.1.

231-57 DOE recognizes the potential negative impacts on Hanford groundwater that the offsite waste poses. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, particularly iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures are discussed in Chapter 7, Section 7.5, of this final EIS.

231-58 For the alternatives groundwater impacts analysis, multiple lines of analysis were considered: the tank farm barriers, FFTF barrier, IDF-East barrier, IDF-West barrier, RPPDF barrier, the Core Zone Boundary, and the Columbia River nearshore. The peak groundwater contaminant concentrations (during the 10,000-year period of analysis) and maximum contaminant concentrations as a function of time are reported for these lines of analysis. Information on the spatial distributions of contaminants for the entire unconfined aquifer is provided in Chapter 5 of this *TC & WM EIS*. These lines of analysis were chosen to: (1) represent the potential near-field, mid-field, and far-field groundwater impacts, (2) meet Ecology's SEPA requirements, and (3) provide a point of comparison with anticipated future analyses for permitting requirements. DOE's views are that the lines of analysis allow a comparison of the potential impacts of the alternatives, meet the anticipated needs of the cooperating agencies, and provide a reasonable point of comparison for future studies.

231-59 A guide to interpretation of the concentration-versus-time plots has been added to this *Final TC & WM EIS* in response to this and other related comments. The reader will find this guide at the start of Chapter 5.

231-60 This EIS is not being prepared under CERCLA. See response to comment 231-4 for a discussion of ARARs and CERCLA with regard to this EIS.

231-61 Please see Ecology's foreword to this *Final TC & WM EIS.*

231-62 A definition for this term has been added to Chapter 9, "Glossary," and a text box in Chapter 2, Section 2.2.2.4.

231-63 The EIS risk assessment assumed that institutional control would be maintained for 100 years, after which it was assumed that institutional control would be lost.

231-64 See response to comment 231-61.

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23	General				Reliance on process records and institutional knowledge cannot substitute for appropriate site characterization data. Reliance on historic records and process knowledge frequently does not identify all contamination. Provide a plan for conducting comprehensive site characterization in each alternative.	231-76
24	General				Provide a comprehensive suite of parameters that ensure proper characterization of extent of contamination.	231-77
25	Section 2	2.3.3.2.2	2-44		Provide the details of the remote handled special components (RH-SCs) storage facility within Hanford, including location, dimensions, shielding and emergency systems, beyond the site near the sodium storage facility (page 2-110). These specifics are not addressed in the Environmental Assessment of Sodium Residuals Reaction/Removal (USDOE/EA-1547F).	231-78
26	Section 2	2.3.3.3.2	2-47		The Idaho National Labs (INL) Sodium Processing Facility (SPF) has day tanks that are 2,570 liters each (page E-202). The proposed day tanks for the Hanford Sodium Reaction Facility (SRF) are significantly larger than INL's SPF (16,300 liters each-page 2-46). The estimate for 7,600 liters per day of 50% weight sodium hydroxide solution is justified for SPF based on past operating experience at INL (E-209), but appears to be applied to the proposed Hanford facility as well (2-47) without proper justification or accounting for the fact that the new facility tanks are approximately 6 times larger than the existing facility's. Justify these differences and address the operational and facility lifespan consequences as part of the Hanford SRF Option.	231-79
27	Section 2	2.3.3.3.2	2-47		Address in detail the transfer of the caustic sodium hydroxide solution produced at the Hanford SRF to the Waste Treatment Plant (WTP). According to the Hanford Site Sodium Disposition Evaluation Report (HNF-33211 R0), the WTP's Pretreatment facility will be equipped with an exterior flanged pipe connection for routing from truck deliveries to the site. This should be included as part of the EIS.	231-80
28	Section 2	2.5.3	2-105	2-3, 2-6	Both tables incorrectly indicate that Alterative 3 will include onsite disposal of the reactor vessel and depleted uranium shield in the reactor containment building (RCB). Revise the tables presented with Alternative 3 to be consistent with the text of the EIS.	231-81
29	Section 2	2.5.3.1	2-107		Provide more detail regarding the specific waste to be left within the subgrade portion of the RCB in this description. In particular, explain the final disposition of the reactor vessel and depleted uranium shielding, and estimate the amount of internal piping which would be treated in place and left on site. While facility disposition (p. 2-109) notes the reactor vessel remains in place with Alternative 2, this is not revisited in detail. Address disposal of depleted uranium shielding in particular within the text and correct the tables on pages 2-105 and 2-135, which incorrectly specify Alternative 3 for its onsite disposition.	231-82

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231-65 Steam reforming (thermal supplemental treatment) was evaluated as part of Tank Closure Alternative 3C, which included air emissions. Nonradiological impacts on the public are discussed in Chapter 4, Section 4.1. Criteria and toxic pollutant nonradioactive emissions estimates from steam reforming used in the analysis are presented in Appendix G, Section G.2. Concentrations of the evaluated toxic pollutants to which the public could be exposed would be less than the Acceptable Source Impact Levels and therefore were not evaluated further.

231-66 This final EIS analyzes the impacts and risks of storing all of the IHLW canisters under each of the Tank Closure alternatives for the length of WTP operations. This information is in Appendix E, Section E.1.2.4.1.1.

231-67 A site conceptual hydrogeologic model has been added to Appendix L, Section L.2, of this *Final TC & WM EIS*. The conceptual model is depicted at a general/summary level. Additional details regarding data selection, qualification, and justification are included in appropriate sections within this EIS and/or in EIS calculation and analysis packages.

231-68 Details of the TRU Waste Interim Storage Facility can be found in Appendix E, Section E.1.2.3.11.4.

231-69 DOE included bulk vitrification as one of several representative supplemental treatment technologies to analyze the impacts of its construction, operation, and deactivation, as well as the long-term impacts of its waste form. As discussed in Appendix E, Section E.1.2.3.5.1, Supplemental Technology Selection, technologies for treating Hanford tank waste have been researched and evaluated for a number of years. For example, in 2002, DOE evaluated over 50 options for potential supplemental technologies, with the results being that seven representative technology options warranted a more detailed evaluation. From this list of seven, three technologies met the study goals, selection criteria, and measures: bulk vitrification, cast stone, and steam reforming. Thus, this EIS analyzes these three supplemental LAW treatment technologies, which are considered representative of both thermal and nonthermal technologies. Also as discussed in Appendix E, Section E.1.2.3.6.5, the capture of several select radionuclides in the final waste form product is an important consideration when evaluating the performance of the bulk vitrification process as a potential supplemental thermal LAW treatment option. Engineering-scale testing of the bulk vitrification process suggests that some modifications to the final production facility design may be required to eliminate some unfavorable waste-form characteristics. During engineering- and large-scale testing, results suggested

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30	Section 2	2.5.3.2	2-109		No mention of institutional controls other than the surface barrier is made regarding facility disposition in Alternative 2. Identify additional institutional controls beyond the landfill barrier and specific post-closure security and maintenance activities (if any).	231-83
31	Section 2	2.5.3.2	2-110		Bulk sodium is described as being stored in solid form in Section 2.3.3.3, whereas this section describes all Fast Flux Test Facility (FFTF) sodium to be in liquid form. Resolve this inconsistency, and correct the rest of the text.	231-84
32	Section 2	2.7.2	2-135	Table 2-6	Table 2-6 indicates on site disposal of the reactor vessel and attached depleted uranium shield for Alternative 3: Removal. Resolve this inconsistency in the text of the EIS. Include more detail and subcategories for post-closure care and administrative/institutional controls which will be implemented. The information currently provided for these categories are too broad and vague to be properly evaluated.	231-85
33	Section 2	2.7.4	2-142		Appendix E (E-193) estimates that complete processing of all available bulk sodium currently stored at the FFTF and 200-West will produce less than 40% of the total sodium hydroxide solution needed for the WTP pretreatment process. Justify the statement that there is some uncertainty as to whether all of the caustic solution would be used, and provide further explanation.	231-86
34	Section 2	2.9.2.1	2-230	2-24, 2-25	Include the radioactively contaminated bulk sodium as a contaminants of potential concern (COPC) under Alternative 1. The large inventory of bulk sodium would be left on-site and available for environmental release.	231-87
35	Section 3	3.2.5.1.1	3-28		There is inadequate documentation and citation of original sources in this discussion (Figure 3-9 for example). Provide references to original source documents for all materials including figures which are cited from other sources. Perform a thorough check for all references throughout the EIS.	231-88
36	Section 3	3.2.5.2	3-37		Format this section to follow the same basic organization and nomenclature as the previous sections. Include basic physical and hydrogeologic information and data used to prepare the models. Revise the EIS so that separate sections are consistent and complementary to one another.	231-89
37	Section 3	3.2.5.4	3-38		Format this section to follow the same basic organization and nomenclature as the previous sections. Include basic physical and hydrogeologic information and data used to prepare the models. Revise the EIS so that separate sections are consistent and complementary to one another.	
38	Section 3	3.2.6.2.1 & 3.2.6.2.4	3-46 & 3-48		Provide the reader with useful, accurate, and documented information on vadose zone conditions and properties (e.g., bedding and other heterogeneities) in this Section.	231-90

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that technetium-99 might present itself in a more soluble form when deposited as a vesicular glass layer on top of the bulk vitrification melt. This would affect the release rates from the final waste form in an IDF. The very high temperatures associated with bulk vitrification would volatilize and drive off technetium-99 from the waste feed prior to its incorporation into the vitrified glass matrix. The volatilized technetium-99 would then condense on the surface of the melt prior to being carried away in the offgas. As shown in the Summary, Section S.5.5; Chapter 2, Section 2.10; and Chapter 5, Section 5.3, of this EIS, the bulk vitrification waste forms are problematic in the long term. These issues will be addressed in DOE's ROD.

231-70 Following the completion of a mitigation action plan and before implementing any closure actions, DOE will develop a tank farm system closure plan that will be implemented for each of the waste management areas. For details of this process, see Chapter 7, Section 7.1.

Prior to tank closure, waste remaining within the tanks, as well as the tanks themselves, would undergo detailed examinations to support preparation of site-specific radiological performance assessments and closure plans. These examinations would require detailed waste sampling and analyses, assessments of the structural stability of the tanks, and assessments of risk to human health and to the environment. These documents would provide the information and analysis necessary for DOE and regulators to make decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks. Tank farm past leaks and associated contamination in the vadose zone are being evaluated under the RCRA Facility Investigation/Corrective Measures Study process. As such, the vadose zone contamination associated with tank farm past leaks is considered an RCRA operable unit rather than a CERCLA operable unit and is assessed in this *TC & WM EIS*.

231-71 The scope of this *TC & WM EIS* does include the transfer lines and ancillary equipment that are within the SST and DST farm systems. The Tank Closure alternatives take into account the closure of these lines and ancillary equipment, along with the tanks themselves. The old transfer lines that are not part of the SST and DST systems were included in the waste inventories discussed in Appendix S, "Waste Inventories for Cumulative Impact Analyses," and in the long-term impacts discussed in Appendix U, "Supporting Information for the Long-Term Cumulative Impact Analyses."

231-72 DOE disagrees the alternatives need to be revisited. DOE believes that it has fully analyzed all aspects of those Tank Closure alternatives that would remove

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39	Section 3	3.2.6.3.1	3-49		In this Section a water table map, geologic cross-section with superimposed water table, and a paragraph description of the suprabasalt aquifer system are provided, but no conceptual groundwater model is discussed. Aquifer property information useful to the analysis is not provided. Revise this section to include the conceptual hydro model, and provide the basic data and information useful for the numerical modeling in the appendices.	231-91
40	Section 5	5.2.1.1.2	5-373		Consider COPC concentrations driving risk/hazards for water from a well which is drilled directly through the FFTF Barrier near or through the entombed waste as well as at the edge of the barrier. Such a scenario is highly plausible over the course of the 10,000-year period of analysis in which most, if not all, institutional controls should be expected to fail.	231-92
41	Section 5	5.2.1.2	5-379		For Alternative 2, provide a spatial distribution of groundwater tritium concentrations at the time of peak concentration.	231-93
42	Appendix D	D.1.4	D-24		Include all recorded tank leaks in this section, specifically address tank overflow events and other unplanned releases. For example, the overflow event at tank T-101, which was probably as large or larger than the T-106 leak.	231-94
43	Appendix D	D.1.5	D 24-27		Revisit and revise the Section that describes the past practice of disposal to cribs and trenches and correct factual errors to more accurately estimate the magnitude of materials disposed in this manner.	231-95
44	Appendix D	D.1.5	D-24		Clarify that discharge to ponds was frequently contaminated. In particular explain that the original ditch leading to T- Pond was abandoned and covered because of very high surface radioactivity.	231-96
45	Appendix D	D.1.5	D-24	Table D-28	Reconcile the low radionuclide contents reported in Table D-28 with the history of discharges to the T cribs and tile fields that included large quantities of tank supernatant overflow at the end of tank cascades.	231-97
46	Appendix D	D.1.5	D-26	Table D-28	Correct errors and omissions in the grouping on this page (including that 216-T-23 should be listed with T and not TY, TY should include 216-T-27, the 216-T-19 crib and tile field located at the south end of TY should be included. T-19 received approximately 455 million liters of evaporator condensate containing very high concentrations of tritium and I-129).	231-98
47	Appendix D	D.2.1.6	D-110	Table D-28	This section identifies 37,694 kilograms of depleted uranium as part of the hazardous materials inventory which is not in the bulk sodium residuals. Clarify whether this uranium comprises the depleted uranium shielding which is part of the reactor vessel, or if it is in addition to it. Specifically address the disposal of the depleted uranium shielding within each action alternative, and reconcile inconsistencies between the EIS text and Appendices regarding depleted uranium disposition.	231-99
48	Appendix D	D.2.3.3	E-191		Provide a detailed description of the "monitoring program" which would be established under Alternative 3. Include details of any institutional controls and future land use plans.	231-100

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the SSTs (Alternative 4 for the BX and SX tank farms and Alternatives 6A and 6B for all tank farms), including the actual removal of the tanks. The commentor is directed to Chapter 2, Section 2.2.2.4.2, for a discussion of the activities that would take place under clean closure. A summary of short-term impacts is provided in Chapter 2, Section 2.8.1; of long-term impacts, in Section 2.9.1. A detailed analysis is provided in Chapters 4 and 5 (for short- and long-term impacts, respectively). Timelines for closure under Tank Closure Alternatives 4, 6A, and 6B are presented in Chapter 2, Section 2.5.2. In all cases, clean fill material would come from Borrow Area C (see Chapter 2, Section 2.2.2.4.4).

231-73 A full description of the modified RCRA Subtitle C and Hanford barriers is provided in Appendix E, Section E.1.2.5.4.1. As noted in that section, the modified RCRA Subtitle C barrier is designed to provide long-term containment and hydrologic protection for a performance period of 500 years, while the Hanford barrier is designed to provide containment and protection for 1,000 years. As discussed in Chapter 2, Section 2.5.1.1, Tank Closure Alternatives, the end-state management of the tank farm systems after placement of a barrier includes postclosure care. Postclosure care is identified as the monitoring and maintenance activities conducted during the period following closure of a hazardous waste disposal system (e.g., a landfill) to preserve the integrity of the disposal system and continue preventing or controlling releases from the disposal unit.

For analysis purposes, in this *TC & WM EIS* it was assumed that the postclosure care period following landfill closure of the SST system would be extended to 100 years. The postclosure care program proposed for Hanford is described in Appendix E, Section E.1.2.5.4.2, Postclosure Care. As discussed in this section, it is recognized that although these monitoring activities would not be performed for many years, it is important that general information on the various technologies and alternatives for monitoring be identified in this EIS. This section is provided as a general overview and description of the postclosure care program; specific design details (e.g., fencing) and administrative control details (e.g., access restrictions) are to be developed in the future.

The principal evidence for the potential longevity of engineered caps is provided by natural analogues. Data in reports from the International Atomic Energy Agency (IAEA 2001, page 16) and NRC (Schmidt et al. 2006) provide evidence that constructed earthen covers can survive for long periods of time (between 1,000 and 5,000 years). In addition, evidence on the service life of individual components of engineered caps is available. For example, the National Institute of Standards and Technology (Clifton and Knab 1989, page xii) and Atomic

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49	Appendix D	D.2.4	D-115		Itemize the ancillary buildings and their internal equipment and components which will be left onsite as part of this action alternative description.	231-101
50	Appendix D	D.2.4.2	D-116		Indicate specifically what is expected to be included as part of the uncontaminated material classification. Identify process components specifically included or excluded from this group.	231-102
51	Appendix D	D.2.4.2.9	E-199		Provide estimates of operating emissions which will be produced during conversion of bulk sodium to sodium hydroxide at the Hanford SRF, including estimates of radionuclides included in the exhaust and the volume of exhaust expected to pass through the filtration system.	231-103
52	Appendix D	D.2.4.3.8.8	E-207		Provide operating records for the Idaho National Labs SPF.	231-104
53	Appendix D	D.2.4.4	D-116		The text incorrectly states that demolition waste handling would be the same between Alternatives 2 and 3. One of the major differences between the Alternatives is the disposition of demolition and radioactively contaminated waste onsite inside the RCB and adjacent building foundations in Alternative 2 while Alternative 3 calls for the removal of all this waste to an integrated disposal facility (IDF). Clarify this text throughout the document and provide additional descriptive detail.	231-105
54	Appendix D	D.2.4.4.1	E-210		The text of this section is inconsistent with the flow charts provided in Figures 2-65 and 2-68, both of which exclude disposal of Hanford treated RH-SCs at the Nevada Test Site (NTS). Explain this discrepancy specifically (that is, why Hanford treated RH-SCs cannot be sent to NTS).	231-106
55	Appendix D	D.2.4.4.2.8	E-218		It is not clear that the irradiated and contaminated metal components which will be delivered to the induction melter in the RH-SC processing facility will meet the typical induction melter requirements such as charge materials be of known composition and clean of oxidation products. Include specific text explaining how these challenges will be met.	231-107
56	Appendix D	D.2.4.4.2.8	E-219	E-48	Provide dimensions for the induction melter on Figure E-48.	231-108
57	Appendix D	D.2.4.5	D-117		Provide a detailed description of the planned post-closure care program planned for the site; including any barriers not already mentioned, fencing, access restrictions or other institutional controls as well as funding available to maintain these facilities.	231-109
58	Appendix K	K.1.1.1	K-2		The details provided in the example (i.e., half-lives and emissions) are only accurate for the U-238 decay chain. The example should specify the isotope of uranium in order to be accurate and complete.	231-110
59	Appendix K	K.1.1.3	K-7		The rationale for multiplying the health risk factor by 2 for individual doses > 20 rem was not discussed. Indicate how this factor was selected (research, arbitrarily selected for a more conservative estimate of cancer risk, etc.)	231-111

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Energy Research Establishment (Atkinson and Hearne 1984, page i) report that the service life of concrete and cement would be on the order of 500 years and 500 to 1,000 years, respectively. Rowe and others (Rowe et al. 2004, pages 99 and 423) report estimates of the service life of drainage layers between 135 and 750 years and service life of geomembrane liners on the order of 300 years.

231-74 Prior to tank closure, waste remaining within the tanks, as well as the tanks themselves, would undergo examinations to support preparation of site-specific radiological performance assessments and closure plans. These examinations would require waste sampling and analyses, assessments of the structural stability of the tanks, and assessments of risk to human health and to the environment. These documents would provide the information and analysis necessary for DOE and regulators to make decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

231-75 Chapter 2, Section 2.11, of this *TC & WM EIS* summarizes and compares the relative consolidated costs of continued operation of existing facilities; construction, operation, and deactivation of new or modified facilities; and associated activities in support of the proposed actions, including administrative controls, institutional controls, and postclosure care.

231-76 DOE and Ecology believe there is sufficient characterization information to proceed with the EIS. NEPA is applied early in the process, before all information may be known. This EIS also identifies data uncertainty throughout the document and explains how certain information should be evaluated.

231-77 Regarding further characterization of waste sites, defining such a suite of parameters to ensure the proper characterization of a waste site is beyond the scope of this EIS. Such detail would be defined in follow-on activities such as performance assessments and closure plans once characterization activities are complete.

231-78 Additional details on the Sodium Storage Facility, including location and dimensions, are provided in Appendix E, Section E.2.4.2.1, of this *TC & WM EIS*. Figure E–46 in Appendix E shows the location within the 400 Area, and Figure E–47 is a photograph of the exterior of the storage facility.

231-79 In the *Draft TC & WM EIS*, Chapter 2, Section 2.3.3.3.1, the second bullet incorrectly referred to carbon steel sodium day tanks, each with a volume of 16,300 liters (4,300 gallons). As discussed in Appendix E, Sections E.2.4.2 and E.2.4.3, the day tanks have a capacity of 2,760 liters (730 gallons) and 2,570 liters (680 gallons) for Hanford's proposed Sodium Reaction Facility

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60	Appendix K	K.1.2.4	K-8		Occupational exposure to chemicals must be maintained within OSHA permissible exposure limits [29 CFR 1910]. The American Conference of Governmental Industrial Hygienists threshold limit values are recommendations or guidelines rather than regulatory requirements, and should not be used.	231-112
61	Appendix K	K.1.2.6	K-9		The exposure assessment assumes air is the only medium and inhalation is the only exposure pathway for a chemical impact assessment. This assumes any incident will result only in an air release. Address chemical incidents that may result in a release to soil or water (such as a liquid spill) and potential exposure via dermal contact or ingestion.	231-113
62	Appendix K	K.2	K-11		Human receptors for radiological exposure include: 1) a member of the general population within 50 miles of the site, 2) a maximally exposed individual (MEI) hypothetical member of the public located just outside the site boundary (with the highest yield impacts), and 3) an MEI onsite worker at specific locations. None of these scenarios includes Native Americans, who are considered a exposure population unique from the general public or site workers, and may be exposed to releases during normal operations and accidents during cleanup actions. Also, the onsite MEI only considers workers at the Columbia Generating Station and Laser Interferometer Gravitational-Wave Observatory. Consider and include exposure scenarios for workers at US Ecology, ERDF, or other waste management areas; and include an exposure scenario for Native Americans.	231-114
63	Appendix K	K.2.1.1.1	K-11/13	Figure K-1	When first introducing the off-site MEI (as shown on the figure), indicate how the off-site MEI locations were determined from the assumed emission sources.	231-115
64	Appendix K	K.2.1.1.1	K-13	Figure K-1	Include the onsite MEI locations.	231-116
65	Appendix K	K.2.1.1.1.1	K-14		Regarding the internal dose, also account for wild plants, game, and fish, which are harvested by Native Americans, as well as, water used during traditional sweats, via ingestion, inhalation, and dermal contact. Any of these activities may be practiced by Native Americans within 50 miles of the site and in the hypothetical off-site MEI locations during normal operations and accidents. Consider utilizing the GENII computer code ENV module, which has the capacity to calculate exposure based on multiple media sources and pathways, or address reasons for not utilizing this module.	231-117

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and INL's Sodium Processing Facility (SPF), respectively. A separate sodium storage tank (which precedes the day tanks) in the INL SPF has the 16,300-liter (4,300-gallon) capacity and receives sodium from the Experimental Breeder Reactor II (EBR-II) sodium boiler building. This bullet has been revised accordingly in this final EIS.

231-80 The decision regarding sodium reuse will be made through this EIS and after the ROD, approval of design will follow. This level of construction detail on the exterior flanged piping connection to the truck is not necessary to support the analyses in this *TC & WM EIS*, or to compare impacts among the EIS alternatives.

231-81 Chapter 2, Tables 2–3 and 2–6, indicates that the reactor vessel, internal piping and equipment, and attached depleted-uranium shield would be disposed of on site. This is consistent with the text within Chapter 2, Sections 2.5.3 and 2.7.2, which indicates that onsite disposal of these items would be in an onsite IDF.

231-82 Regarding the commentor's identification of an inconsistency between Chapter 2 and Appendix D, DOE has reviewed these two sections of the draft EIS and revised Appendices D and E in this final EIS. Specifically, the descriptions in Sections D.2.1.6, D.2.2.2, D.2.3.2, and D.2.4.2 were revised in this final EIS to reflect that the depleted uranium shielding would remain in FFTF following deactivation activities for all the FFTF Decommissioning alternatives. Therefore, under FFTF Decommissioning Alternatives 1 and 2, the depleted uranium shielding would remain with the FFTF reactor vessel; under FFTF Decommissioning Alternative 3, the depleted uranium shielding would also remain with the reactor vessel, but would be eventually removed and disposed of in an IDF. In addition, Tables D–73, D–74, and D–75 and Figures D–64, D–65, and D–66 were revised to reflect in this final EIS the inventory of depleted uranium remaining in FFTF. The narrative in Appendix E, Sections E.2.1, E.2.3.1, and E.2.3.2, were revised as well. These revisions did not result in any changes to the conclusions drawn from the EIS analyses. No associated change was required to the facility disposition description presented in Chapter 2, Section 2.5.3.2, as the discussion already indicated that a modified RCRA Subtitle C barrier would be constructed over the reactor vessel and depleted uranium shield under FFTF Decommissioning Alternative 2. Similarly, the depleted uranium shield information presented in Tables 2–3 and 2–6 was correct and required no change. Regarding an estimate of the internal piping that would be left under each alternative, such a level of detail was not available during preparation of this EIS. However, Appendix D, Tables D–69 through D–72, provides estimates of the FFTF radionuclide inventory and associated contamination.

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66	Appendix K	K.2.1.1.3.1	K-16		Justify the reasoning that, in this section, a 30-foot height was assumed for evaluating meteorological data to model transport of releases from the Supplemental Treatment Technology Site-East and West (vs. a 200-foot stack emission from the WTP) to an off-site MEI. This is inconsistent, however, with Section K.2.1.1.1.1 that states that the emission would be assumed to be at ground level (resulting in a reduced dispersal, and a more highly concentrated plume) for these supplemental treatment sites. Revise the document to be consistent where necessary.	231-118
67	Appendix K	K.2.1.1.3.3	K-23	Table K-5	The footnote to this table states that "food consumption rates represent the portion of the diet consisting of contaminated food." Explain how this portion is calculated, consider a worst case scenario where 100% of the diet is contaminated for a MEI. Include fish consumption since off-site MEI locations are along the Columbia River.	231-119
68	Appendix K	K.2.1.1.3.3	K-23	Table K-5	Provide parameter inputs to reflect a traditional tribal member as presented in the tribal lifestyle described in the Yakama Nation Exposure Scenario provided to USDOE in 2007 (Ridolfi, 2007). Correct the assumption that the MEI would be exposed only 50% of the time (i.e., provide a 100% scenario) because it is unlikely that individuals spend half of their time elsewhere.	231-120
69	Appendix K	K.2.1.1.3.3	K-24		The MEI was assumed to consume a larger portion of their diet from fruits & vegetables grown in a family garden. Native Americans with a traditional tribal lifestyle would ingest wild foods and medicines (plant, fish, and animal origins) hunted or harvested from locations closer to the source term than the location of a residential garden.	231-121
70	Appendix K	K.2.1.1.3.4	K-24		Provide the source and location of the screening analysis that was conducted for each Alternative to identify key radionuclides that would be released during normal operations. For example, explain how neptunium-237 and thorium-232 (which are site contaminants and which were included in the detailed analysis in Appendix Q) were eliminated.	231-122
71	Appendix K	K.2.1.1.3.4	K-25		The Best-Basis Inventories include radionuclide estimates for 46 radionuclides. Appendix K indicates a total of 14 radionuclides were included in the air pathway dose analysis. Appendix K should identify the complete list of 46 radionuclides, and a thorough description of the criteria used to eliminate radionuclides from the detailed analysis.	231-123
72	Appendix K	K.2.1.1.4	K-33		For the radionuclide analysis, radioactive inventories should be adjusted to account for differences in the duration of the alternatives. Radioactive decay over time would reduce the radioactivity of each radionuclide. Both plutonium (Pu)-241 and its daughter, americium (Am)-241, are included in the air pathway dose analysis. The half-life of Pu-241 (14.4 years) is significantly shorter than that of Am-241 (432.7 years) resulting in an increase in the Am-241 concentration until equilibrium conditions are reached.	231-124

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231-83 Chapter 2, Section 2.5.3.2, has been clarified to identify that postclosure care and institutional controls would be maintained for 100 years following revegetation of the site. Information on postclosure care activities is presented in Appendix E, Section E.1.2.5.4.2.

231-84 Chapter 2, Section 2.5.3.2, has been revised to indicate that bulk sodium would be stored in solid form in the Sodium Storage Facility.

231-85 Chapter 2, Tables 2–3 and 2–6, indicates that the reactor vessel, internal piping and equipment, and attached depleted-uranium shield would be disposed of on site under FFTF Decommissioning Alternative 3. This is consistent with the text within Chapter 2, Sections 2.5.3 and 2.7.2, which also indicates that onsite disposal of these items would be in an onsite IDF. An overview of administrative and institutional controls is presented in Chapter 2, Section 2.5.1. Detailed information on postclosure care activities is presented in Appendix E, Section E.1.2.5.4.2, of this *TC & WM EIS*.

231-86 As discussed in Appendix E, Section E.1.2.3.1.7, WTP Assumptions and Uncertainties, the volume of sodium required at the WTP depends on a number of treatment operations, e.g., caustic leaching and sodium hydroxide recycling implemented in the WTP. The use of sodium hydroxide projected in this *TC & WM EIS* is based on the best information available at the time of its publication.

231-87 Appendix Q, Section Q.2, of this *TC & WM EIS* describes how the COPCs were identified for the long-term impacts analysis. The bulk sodium contaminants were screened out during this process and thus were not included in the list of COPCs. DOE would like to note that the Preferred Alternative for FFTF decommissioning (Alternative 2) would reuse the bulk sodium for WTP operations and that only under the No Action Alternative (Alternative 1) would the bulk sodium be stored on site and not utilized.

231-88 For all figures not specifically generated by the *TC & WM EIS* alternatives analysis, including Figure 3–9, the source for each figure is listed, typically at the bottom of the figure, identifying the reference. The details of the reference are listed at the end of the applicable chapter or appendix.

231-89 In the *Draft TC & WM EIS*, DOE presented analysis results consistent with DOE guidance contained in its *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements* (DOE 2004b), in which DOE expands on CEQ instructions for preparing EISs (40 CFR 1502.2 and 1502.15)

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73	Appendix K	K.2.1.2.1	K-48		In the assessment of doses to radiation workers, dose was calculated based on a 2,080-hour work year. In the case of the noninvolved workers, dose was calculated based on a 2,000-hour work year. These exposure durations are inconsistent and should be resolved.	231-125
74	Appendix K	K.2.1.2.1	K-49	Table K-48	The average project impact for a full-time worker with a 40-year exposure period is at least 10 times the maximum acceptable increased lifetime cancer risk for every Alternative. Provide incidence rates as well, and compare to an acceptable risk level for each Alternative being proposed including the No Action Alternative.	231-126
75	Appendix K	K.2.2.1.1	K-57		For the FFTF decommissioning Alternatives, ground-level radiological emissions were assumed, and the statement was made that "this conservative assumption resulted in overestimation of the impacts." Indicate whether a sensitivity analysis was done to determine if a more dispersed plume would impact a larger population.	231-127
76	Appendix K	K.2.2.1.4	K-64		Impacts under FFTF Alternative 1 (No Action) are not evaluated here because they are considered part of the "Hanford Baseline." Revise to evaluate impacts under every Alternative, including No Action.	231-128
77	Appendix K	K.3.9.1	K-127	Table K-102	It is insufficient to evaluate only those chemicals used in the waste treatment process (vitrification plant) and supporting operations to determine chemical impacts from an accident, and not include those contained within the process streams or process byproducts. Although the quantities may not be as great, these additional chemicals may be extremely hazardous; there is no way of knowing from Table K1-102 what chemicals are not considered here. Identify and evaluate the chemicals contained within process streams or process byproducts to determine chemical impacts from an accident.	231-129
78	Appendix K	K.3.9.3.1	K-137	Table K-106	Provide the criteria used to condense the list of 400 hazardous materials to 24 that could potentially result in significant impacts on workers and clearly explain the process for eliminating chemicals. Provide the elimination criteria and explain the screening evaluations which were performed for all chemicals.	231-130
79	Appendix K	K.4	K-153		Justify the use of industrial safety impact rates only between 2001 and 2006. This "recent history" provides a low-end estimate of recordable cases and fatality rates (2 per 200,000) that may not be reflective of actual incident rates. This is particularly true as construction activities (private industry total recordable rate of 6.7 per 200,000) will likely increase with the implementation of Alternatives. As such, the occupational safety impacts calculated for each of the Alternatives may currently be underestimated.	231-131
80	Appendix L	L.1	L-1		Define and use consistent geologic terminology. Distinguish the difference in the EIS analysis between silt, mud and clay. Specific information should include grain size information and geochemistry as appropriate.	231-132

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by stating that affected environment discussions should be no longer than necessary to understand the effects of the alternatives; data and analyses should be commensurate with the importance of the impacts; and impacts should be discussed in proportion to their significance.

231-90 Detailed hydrogeologic data relative to the Hanford vadose zone and its use in building the groundwater flow model for this *TC & WM EIS* are presented in Appendices M and N, rather than in Chapter 3. The commentor is also referred to DOE's response to comment 231-89 for additional discussion.

231-91 The purpose of Chapter 3, Section 3.2, of this *TC & WM EIS* is to provide a succinct discussion of the Hanford affected environment as a whole and as relevant to the entire scope of proposed actions and alternatives considered in this EIS. Such is the case with the level of detail presented in the groundwater section (Section 3.2.6.3) of Chapter 3. Detailed hydrogeologic data that were compiled and used in developing the groundwater flow model are presented in Appendix L, rather than in Chapter 3. The commentor is also referred to DOE's response to comment 231-89 for additional discussion. Additional hydrogeologic data specific to the evaluation of long-term impacts on the vadose zone are presented in Appendices M and N, with data and interpretation specific to the groundwater transport analysis included in Appendix O. The results and discussion of the analytical modeling performed to evaluate long-term impacts on groundwater are presented in Chapter 5. The detailed technical data are presented in the aforementioned appendices in accordance with CEQ direction and guidance for preparing EISs (40 CFR 1502.18), which state that material that is analytic in nature, such as that composed of lengthy technical discussions and modeling methodology, is best reserved for an appendix so as to aid the readability of the main body of the document.

231-92 The long-term analyses do consider drinking water well impacts (e.g., maximum dose, risk, Hazard Index) at the boundaries of the facility areas, including FFTF. Given the finite extent of the source, one would anticipate the maximum drinking water dose to occur near this location. Please see Appendix Q, Sections Q.2.3, Intruder Scenario Models, and Q.3.2.1.4, FFTF Decommissioning Intruder Scenario, for more information.

231-93 As discussed in Chapter 5, Section 5.2.1.2.2 of this *Final TC & WM EIS*, the COPC driver that is discussed in detail in this section is technetium-99. Technetium-99 is mobile (i.e., moves with groundwater) and long lived (relative to the 10,000-year period of analysis). It is essentially a conservative tracer. The

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81	Appendix L	L.2	L-3		The USDOE notes: "In the Gable Gap area near Gable Mountain and Gable Butte, the elevation of the basalt/suprabasalt sediment interface is uncertain." There are more than 800 boring logs which reach the top of basalt in the Hanford site (page L-19). The USDOE should provide the specific data (e.g., well logs) which were used, along with measurement uncertainty which was assigned, to better estimate the elevation of the basalt/suprabasalt sediment interface. Discuss the sensitivity of the model to basalt elevation and explain how uncertainty in determining this surface is carried forward to model results.	231-133
82	Appendix L	L.2	L-4		"For the purpose of this regional-scale model, the water balance in the unconfined aquifer beneath Hanford is assumed to have remained relatively constant since 1940, except for anthropogenic recharges resulting primarily from operations at Hanford." Provide data and discussion of how pumping at Hanford impacted the water balance in the unconfined aquifer. Data should note whether pumping has increased or decreased over the years. Also, explain the impacts of the basalt aquifer pumping and alluvial recharge associated with irrigated farming in Cold Creek Valley.	231-134
83	Appendix L	L.4.1	L-7		Provide the slice maps (e.g., elevation layers) in the report that show how elevation layers vary across the model domain.	231-135
84	Appendix L	L.4.1.2	L-8		"The model domain is divided into a 200- by 200-meter (656- by 656-foot) horizontal grid, with a "fringe" of partial cells on the northern, eastern, and southern sides." Provide justification for these grid dimensions.	231-136
85	Appendix L	L.4.2	L-11		Near the northern boundary of the 200-East Area a series of erosional windows through the Elephant Mountain Member of the Saddle Mountains Basalt are known to occur. While for many areas within the model the basalt may be accurately modeled as a no-flow boundary, this area needs to be addressed in detail. Provide discussion of how erosional unconformities are handled in the model, and where they are included (if at all).	231-137
86	Appendix L	L.4.2.2	L-13		"The EIS MODFLOW groundwater flow model sets streambed thickness at 2 meters (6.6 feet) and conductivity at 0.0004 meters (0.0013 feet) per second." Provide specific justification for these values, including any site data which was used in their determination.	231-138
87	Appendix L	L.4.2.5	L-15	Figure L-4	Identify all layers which contain, and the corresponding position of the mountain front recharge zone. Explain if it only occurs at Earth's surface, or if it is represented in subsurface as well.	231-139
88	Appendix L	L.4.3.2	L-18		Provide the criteria used to interpret the logs, and identify geologic units. Explain the interpretation process and why previous subsurface interpretations were not used.	231-140
89	Appendix L	L.4.3.2.1	L-19		Explain why the top of basalt was remapped. A number of highly credible top of basalt maps and grid models have been generated previously. Provide well data used in the remapping process.	231-141

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other COPCs that were analyzed do not significantly contribute to drinking water risk or hazard at the FFTF barrier during the period of analysis because of low inventories, low release rates, high retardation factors (i.e., retention in the vadose zone), short half-lives (i.e., rapid radioactive decay), or a combination of these factors.

231-94 Regarding the overflow that occurred at tank T-101, in Appendix D, Section D.1.4, if the reader is interested in more information concerning leaks and overflows, the reference cited in Appendix D (*Waste Tank Summary Report for Month Ending December 31, 2002*, [Hanlon 2003]), is available upon request or at reference libraries (e.g., the Hanford Public Reading Room).

231-95 DOE believes the data evaluated in this EIS are the most-accurate and best-available data. DOE conducted an extensive evaluation of the discharges to the cribs and trenches (ditches) and determined that the best source for volume and inventory estimates was SIM, Revision 1 (Corbin et al. 2005). However, DOE acknowledges there is uncertainty in the inventory estimates because a majority of the discharges to the cribs and trenches (ditches) occurred in the 1950s and 1960s, when the standards for recordkeeping were not up to current standards. The commentor also is reminded that Appendix D, Section D.1.5, only presents the inventory for 33 cribs and trenches (ditches) that are near the B/BX/BY and T/TX/TY waste management areas. The proximity of these cribs and trenches (ditches) to the tank farms warrants their inclusion in the tank closure analysis. The remaining cribs and trenches (ditches) at Hanford are included in the cumulative impacts analysis sections of this EIS, and their inventories are provided in Appendix S.

231-96 DOE acknowledges that discharges to ponds were frequently contaminated; however, Appendix D, Section D.1.5, does not include the T Pond inventory. This section of the appendix includes only the 33 cribs and trenches (ditches) near the B/BX/BY and T/TX/TY waste management areas. The inventory for the T Pond WIDS No. 216-T-4A) is presented in Appendix S, "Waste Inventories for Cumulative Impact Analyses," Tables S–44a and S–44b (radionuclide inventory), and Tables S–70a and S–70b (chemical inventory). The inventory for this pond is evaluated as part of the cumulative impact analyses in Chapter 6 and Appendix U of this EIS.

231-97 DOE has undertaken a detailed review of the tank past leaks inventory evaluated in the draft EIS and determined that the inventories for a number of unplanned releases within the tank farm boundaries needed to be revised. These inventories

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90	Appendix L	L.4.3.2.2	L-23		Provide justification for the subsurface model provided, and the reason for not employing a more traditional method for building the geologic framework for the model such as using structure contour surface maps.	231-142
91	Appendix L	L.4.3.2.2	L-24		"Remove incongruities due to extrapolation from borehole out to edge of transect (seam)." This is an unavoidable artifact of extensive extrapolation from limited data. Provide a description of the process used to resolve these discrepancies between transects.	231-143
92	Appendix L	L.5.2	L-26		"Anthropogenic inputs are applied in 1-year stress periods beginning in 1944." Include an explanation of stress periods here.	231-144
93	Appendix L	L.5.3	L-26		"Outer iterations vary the preconditioned matrix of hydrogeologic parameters of the flow system, e.g., transmissivity, saturated thickness, in an approach toward the solution. Inner iterations continue until the user-defined maximum number of inner iterations has been executed or the final convergence criteria are met." Provide a brief explanation of the convergence criteria, and how closely they must be met with this text.	231-145
94	Appendix L	L.7.2.3	L-32	Table L-13	The model needs to be revised so that the highly conductive Hanford gravel and activated basalt are encoded within the preliminary calibration.	231-146
95	Appendix L	L.7.2.4	L-32		The hydraulic conductivity values used might generally be low, especially for the coarser units. It should be noted that most Hanford Site aquifer tests have been done in 4-inch wells, completed in approximately 8-inch borings. Given other observations made about gravelly deposits in the region, it is likely that the wells are too small to pump hard enough to adequately stress the aquifer. Please discuss the limitations of the data sources and quality used in this section.	231-147
96	Appendix L	L.10	L-63	Figures L-49 & L-82	The x-axis in these graphs are reported as observed head. If this is observed data it should be noted as such; however, this does not seem sensible since the time plotted reaches 2015.	231-148
97	Appendix L	L.10.2.3	L-93		The path line analysis appears to have generated some results that do not seem to make sense. All of the maps show particle traces that parallel water level contours, rather than traversing across them. The maps certainly suggest that either the tracks or the water table maps are incorrect. Reconcile this error and provide an explanation of the mechanics for constructing path lines.	231-149
98	Appendix M				The release models described in Appendix M include parameters that describe assumptions related to the geometry of waste sources. List and describe all parameters included in the release models and provide the values assigned to them and their associated uncertainty.	231-150

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are relatively minor, but were updated in this *Final TC & WM EIS* in the inventory estimates and the groundwater analysis. However, DOE is not aware of any discharges to the "T cribs and tile fields" beyond those reported in Appendix D, Section D.1.5. The commentor is reminded that this section does not include all the cribs and trenches (ditches) within the T/TX/TY waste management areas—only those whose proximity to the tank farms warranted inclusion. A list of the remaining cribs and trenches (ditches) within the T waste management area that are evaluated in this EIS as part of the cumulative impacts analysis is included in Appendix S, Table S–19.

231-98 Trench 216-T-23 is adjacent to the TX tank farm and, therefore, is listed with the TX trenches. Crib 216-T-27 is not included in Appendix D, Table D–30, because, for analysis purposes in this EIS, this crib is not considered to be in the proximity of the T/TX/TY tank farms' waste management areas. Crib 216-T-27 is included in the cumulative impacts analysis sections of this EIS and is listed in Appendix S, Table S–18. Trench 216-T-19 is included in Table D–30 and is listed with the T trenches, although it is actually closer to the south end of the TX tank farm than it is to the T tank farm. (Note: The groupings provided in Appendix D are for information only and do not impact the analysis.) It was estimated that trench 216-T-19 received 455 million liters (119 million gallons) of liquids, including 5,120 curies of tritium, but no iodine-129. Maps providing the location of the cribs and trenches (ditches) are included in Appendix S, Section S.3.6.

231-99 The cited mass of depleted uranium, 37,694 kilograms (83,100 pounds), includes the shielding for the FFTF reactor head compartment, center island, branch arm piping, and fuel transfer ports. The removal and disposition of this shielding is not within the scope of this *TC & WM EIS*. As stated in Appendix D, Section D.1.6, this depleted uranium would remain in the facility under FFTF Decommissioning Alternatives 1 and 2 and would be removed under FFTF Decommissioning Alternative 3.

231-100 The comment refers to Appendix E, Section E.2.3.3. Under FFTF Decommissioning Alternative 3, the FFTF RCB and support facilities would be demolished to 0.91 meters (3 feet) below grade, and the lower portion of the RCB concrete shell would be backfilled and/or grouted, as described in Chapter 2, Section 2.5.3.3. The site would not be covered with a barrier, but would be contour graded and revegetated. Although postclosure care of a landfill barrier would not be required as under FFTF Decommissioning Alternative 2, some level of institutional controls would still be necessary. Under FFTF Decommissioning Alternative 3, institutional controls would include intruder control and inspection

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99	Appendix M				The uncertainties in the distribution coefficients and their effects on uncertainties in release rates are at least as significant as the effects of the variables that were included in the sensitivity analysis. Revise the sensitivity analyses for the release models to consider the effects of uncertainties in distribution coefficients. Revise the range of values used in these sensitivity analyses to be consistent with published ranges.	231-151
100	Appendix M				The uncertainties that are identified through the release model sensitivity analyses are not carried forward into subsequent modeling or analyses. This ultimately translates into uncertainty in the vadose zone transport model and into uncertainties in the groundwater flow models. These uncertainties ultimately translate into uncertainties in risks and impacts. Revise to carry forward the uncertainties identified in the sensitivity analyses into subsequent modeling and analyses.	231-152
101	Appendix M				Five models for simulating releases from solid sources are described in Appendix M. The scenarios for which the models are used are described for four of the release models. Applications for the fifth release model (constituent solubility limited release) are not described. Describe the applications of the constituent solubility limited release model, remove the fifth model from the appendix if it is not used to describe releases.	231-153
102	Appendix M	M.2.2.5	M-12	Equation M-28	The equation presented to describe releases for the constituent solubility limited release model (Equation M-28, page M-12) appears to be in error. The listed equation gives the release rate per unit area (grams/year/square meter). Review the equation and determine if an area term on the right side of the equation is necessary to give the release rate in grams per year.	231-154
103	Appendix M	M.3	M 13 - M14	Table M-2	Please model more variable scenarios, update infiltration rates to reflect current conditions (rather than falling back on 3.5 millimeters per year, which is apparently a value arrived at for undisturbed Hanford desert). Account for global warming or climate change as needed to provide a more appropriate long-term model. Discuss uncertainty associated with model results.	231-155
104	Appendix M	M.5.2.4	M-90	Figure M-109	The label for the vertical axis in Figure M-109 (page M-90) is incorrect. The graph shows the cumulative release of Tc-99 in curies. Correct the label for the vertical axis in Figure M-109 (page M-90).	231-156
105	Appendix N				A large number of bar charts showing the mass of chemical and radiological constituents that reach the water table are included in Appendix N. Because of the logarithmic scales used on these charts, they do not provide an accurate accounting of mass. Provide mass balances in tabular form to compare the releases to the vadose zone (from Appendix M) with the releases to the aquifer (from Appendix N); discuss any discrepancies.	231-157

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and maintenance of revegetation efforts. A crew would inspect the site to ensure intrusion control is effective. Site fencing and facility access points would be inspected for integrity and repairs would be performed as needed. Other controls may involve some measure of vadose zone and groundwater monitoring. Future land use plans are not known at this time, but would be evaluated upon completion of the 100-year period of institutional control.

231-101 Appendix E, Table E–15, of this *TC & WM EIS* provides the requested detailed information on how each FFTF building and its internal equipment and components would be arranged under FFTF Decommissioning Alternatives 2 and 3.

231-102 Details of material and equipment expected to be uncontaminated at the time of FFTF decommissioning are not yet available. For analysis purposes, this EIS assumed that the entire inventory (e.g., concrete, structural steel, rubble, soil, equipment) is radioactively contaminated and would be disposed of on site in an IDF. If the decision is made to decommission FFTF, DOE will conduct detailed surveys of this material to ensure that it is addressed appropriately and in compliance with Federal and state requirements.

231-103 Tables G–141 through G–144 in Appendix G of this *TC & WM EIS* provide the maximum criteria and toxic pollutant concentrations of peak Hanford activity periods for the conversion of bulk sodium at Hanford's proposed Sodium Reaction Facility.

231-104 Following is the operating information requested for the SPF at INL (Burandt 2010).

General.

The SPF, currently located at the Materials and Fuels Complex at INL, was originally constructed in the mid-1980s to convert sodium coolant from the commercial Enrico Fermi Nuclear Generating Station (Fermi) into 50 weight-percent sodium hydroxide to be used at a DOE facility in Hanford. This use was abandoned after the SPF was constructed, but before it began operations. Once the EBR-II, a sodium-cooled reactor built and operated by Argonne National Laboratory for 30 years, was shut down, defueled, and prepared for deactivation, the SPF was resurrected as a means of preparing the approximately 303,000 liters (80,000 gallons) of Fermi sodium and 379,000 liters (100,000 gallons) of EBR-II sodium for disposal in an authorized landfill. This would be accomplished by converting the sodium into a solid, greater than 70 weight-percent sodium

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106	Appendix N				The sensitivity analyses considers I-129 distribution coefficients in the range of 0 to 0.2 milliliters per gram. Sensitivities to distribution coefficients for other chemical and radiological constituents are not included. Revise the sensitivity analysis to consider the effects of uncertainties in distribution coefficients for additional radiological and chemical constituents use a range of values in these sensitivity analyses that is consistent with published ranges.	231-158
107	Appendix N				The uncertainties that are identified through the release model sensitivity analyses are not included in the vadose zone models. The uncertainties in the vadose zone transport model are carried forward into the groundwater flow models. These uncertainties ultimately translate to evaluation of risks and impacts. Revise to carry forward the uncertainties identified in the sensitivity analyses into subsequent modeling and analyses.	231-159
108	Appendix N				The vadose zone transport simulations are conducted for a subset of the radiological and chemical constituents released from the sources. The number of radiological and chemical constituents included in the vadose zone transport models is smaller than the number used in the source release models. Provide the rationale and selection criteria applied when deciding which constituents to include and which to exclude from the release models.	231-160
109	Appendix N	N.1.1.2	N-2		The parameters presented do not appear to be consistent with 3D analysis that is presumably performed by STOMP. It is additionally unclear if release and receiving areas between models are consistent. Provide additional detail regarding the parameters used and the selection of boundary conditions.	231-161
110	Appendix N	N.1.2	N 2 - 8		Revise models to utilize actual measured precipitation and infiltration rates, rather than averaging unusual large-scale events or large areas of geologic strata.	231-162
111	Appendix N	N.1.2	N-10	Figure N-8	Clarify the apparent relationship shown in the figure between BY Cribs contamination and Tc-99 contamination at the Tank Farms in 200-West. It does not seem plausible that the BY Cribs is responsible for Tc-99 contamination at the Tank Farms in 200-West.	231-163
112	Appendix N	N.1.2	N-3		"In an initial step, values of vadose zone parameters were determined for the 16 soil types by matching moisture content profiles predicted using the Van Genuchten relationship to moisture content profiles measured in 140 undisturbed vadose zone boreholes." Explain the uncertainty involved in the Van Genuchten determination of vadose material hydraulic properties (i.e., hydraulic conductivity) and how this uncertainty is carried through to the modeled result.	231-164
113	Appendix N	N.1.2	N-9	Figure N-7	Clarify the meaning of the isolated lobe on the contour map, located to the northeast and whether it is related to the BY Crib plume or contamination from Gable Mountain Pond or some other source.	231-165

hydroxide product (caustic), which had been determined to be an acceptable waste form for disposal at the Radioactive Waste Management Complex, located at the then–Idaho National Engineering and Environmental Laboratory.

A permit was granted to operate the facility and process under Federal and state RCRA regulations, and a Permit to Construct was issued by EPA for the airborne emissions. Initial testing of the process, conducted with nonradioactive sodium, was successfully completed in November 1998. Production operations with Fermi sodium began on December 20, 1998. Processing of Fermi sodium was interrupted in July 1999 to process the EBR-II secondary (nonradioactive) sodium. At this time, approximately half of the Fermi sodium had been processed. Processing of EBR-II secondary sodium was completed on August 24, 1999, and the SPF was shut down to perform maintenance and modifications necessary to increase product concentration reliability. The facility was restarted in May 2000. The approximately 326,000 liters (86,000 gallons) of EBR-II primary (low-radioactivity) sodium was processed between September 2000 and February 2001. The last 60,566 liters (16,000 gallons) of Fermi sodium was subsequently processed before placing the facility in a standby condition in May 2001. At that point, approximately 662,000 liters (175,000 gallons) of sodium had been processed in the SPF. The resultant product, a hard, rock-like material, was contained in 3,342 poly-lined, steel drums (each loaded with approximately 500 kilograms [1,000 pounds] of caustic) and was sent to the Radioactive Waste Management Complex for subsequent burial.

General Process Description.

The SPF was equipped to receive sodium in the following ways: (1) in 208-liter (55-gallon) barrels where they can be melted and then drained to a 19,000-liter (5,000-gallon) sodium storage tank in the SPF (this is how the Fermi sodium was received and initially stored) or (2) via a heated transfer pipeline from a 64,000-liter (17,000-gallon) secondary sodium drain tank located in the EBR-II Secondary Sodium Boiler Building basement. This second method was used to transfer EBR-II primary and secondary sodium.

In the SPF, sodium was transferred from the sodium storage tank to one of two day tanks, each having a working volume of 2,570 liters (680 gallons), by pressurizing the sodium storage tank with nitrogen gas. During normal operations, one day tank was filled from the sodium storage tank while the other was used to supply sodium to the reaction vessel, which was also done by pressurizing nitrogen gas. In the reaction vessel, the sodium reacted with the water in the caustic solution

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114	Appendix N	N.2.1.2	N-51	Figure N-80	The label for the vertical axis in Figure N-80 (page N-51) is incorrect. The graph shows release of chemical constituents in kilograms. Correct the label for the vertical axis in Figure N-80 (page N-51).	231-166
115	Appendix N	N.3.2	N-91		"The case evaluated in this section, discharge of a volume of liquid to the vadose zone, is comparable to a past leak at a tank farm, with aqueous discharge ranging from 4 cubic meters (1,057 gallons) to 400 cubic meters (105,700 gallons). This range corresponds to current estimates of volumes of past leaks (Hanlon 2003) and reflects the degree of uncertainty in estimates of leak volumes that is related to difficulty in measurement of volume of material in large underground tanks." The Hanlon (2003) document does not adequately describe how the tank leakage estimates were determined. Provide additional information on how the leaked volumes and total activities were estimated. Include in this information the uncertainty associated with the estimate.	231-167
116	Appendix O	O.2.3	O-6		"The dispersivity increases linearly with distance from the source location up to a specified threshold." Explain how the threshold was determined or selected.	231-168
117	Appendix O	O.3.1	O-33	Table O-6 & O-9	Review and reconcile the results of the fate and transport modeling, since they do not seem to make sense. For example, COPC concentrations related to releases from cribs and trenches are shown for Alternative 1 (Table O-6) and Alternative 2A (Table O-9). The model output results are different for events that happen in the past. This suggest the model is not stable enough to reliably replicate past events. It is implausible that analysis for future closure scenarios will therefore be appropriately representative.	231-169
118	Appendix O	O.6.1.2	O-18		"These results suggest that regional-scale contaminant plumes (i.e., areas of groundwater contaminated above benchmark values) from the EIS cumulative analysis sources in the 200-East Area are somewhat different for the Base and Alternate Case flow fields." Explain the reason for the discrepancy between the Base and Alternate cases, include information on the plume's sensitivity to parameters which were changed.	231-170
119	Appendix O	O.6.3	O-19		"These values resulted in retardation factors (R) of approximately 1 and 3 for the bulk density (2.6 grams per cubic centimeter) and porosity (0.25) assumed for the unconfined aquifer." Provide the uncertainty associated with the assumed bulk density and porosity when used in calculating the retardation factors. Provide a comparison with measured values for these parameters and describe the uncertainty introduced by using assumed values.	231-171
120	Appendix O	O.6.4	O-104		"It is uncertain whether peak concentrations of U-238 were captured during this standard analysis period of 10,000 years." Provide an explanation as to why it cannot be determined whether peak concentrations have passed. Include discussion of why the U-238 concentration does not appear to diminish significantly over time at the core zone boundary.	231-172

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used to initially charge the vessel. This reaction releases heat, which increased the temperature of the bulk caustic solution in the reaction vessel until it reached the control set point. As part of a saturated boiling system, the end caustic product concentration (weight-percent) is determined by this temperature set point. Water is injected into the reaction vessel intermittently to maintain the control set point within +/– 0.5 degrees Fahrenheit.

For the EBR-II and Fermi sodium, a solution of greater than 70 weight-percent sodium hydroxide was transferred from the reaction vessel to the drum fill station, where the solution was packaged in 269-liter (71-gallon) drums (approximately 500 kilograms [1,000 pounds]). Once the drums were filled, sampled, capped, and surveyed, they were placed on spill pallets in RCRA-regulated storage. While in storage, the greater than 70 weight-percent hydroxide solution cooled and became a very hard solid. Once the hydroxide became solid, the drums were disposed of as RCRA LLW.

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121	Appendix O	O.6.4	O-105		Indicate whether the modified STOMP analysis results listed on this page are from Base or Alternate case scenarios.	231-173
122	Appendix Q				The dose guidelines for the evaluation of groundwater, surface water, and intruder scenarios should be summarized in a single location for ease of interpretation of results.	231-174
123	Appendix Q				To allow for comparison, revise the graphs in this chapter to be consistent or comparable in type (logarithmic versus linear) and range for each alternative.	231-175
124	Appendix Q	Q.2	Q-2	Table Q-1	Americium is listed as one of the radionuclides selected for detailed analysis in Table Q-1. Pu-241 is not listed as one of the plutonium isotopes in the table. Contributions from the decay of Pu-241 will increase the Am-241 concentration over time. Clarify whether the increase in Am-241 from the decay of Pu-241 is considered in the analysis.	231-176
125	Appendix Q	Q.2.2.2	Q-15		Include all exposure pathways that are applicable to each individual. Do not assume exposure pathways are mutually exclusive (e.g., the American Indian hunter-gatherer and the resident farmer are each potentially exposed to radiological and chemical contamination via both groundwater and surface water, etc.).	231-177
126	Appendix Q	Q.2.3	Q-18		Include both radiologic and chemical exposure (short- and long-term).	231-178
127	Appendix Q	Q.2.3.2.3	Q-18 & Q-22		It is stated that the drinking water pathway is not assessed because it involves transport through the vadose zone to groundwater, which would occur in the future after short-lived radionuclides have decayed. This fails to address extensive contamination with long-lived radionuclides that continue to decay for thousands to millions of years. Revise to address short-term exposures to high concentrations via the drinking water pathway in the intruder scenario, where well water is used immediately after the well is drilled and provide a short-term impact analysis.	231-179
128	Appendix Q	Q.2.4.2	Q-26	Table Q-9	Include the parameter inputs provided in the Yakama Nation Exposure Scenario to adequately reflect time spent outdoors on site by a traditional tribal member. (Ridolfi 2007)	231-180
129	Appendix Q	Q.2.4.2	Q-28		Revise the section to include the fish consumption rate, that is representative of a tribal diet, as shown in the Yakama Nation Exposure Scenario. (Ridolfi 2007)	231-181

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Key Processing and Performance Data Achieved at the Sodium Processing Facility

Timeframe[a]	Number of Hours of Processing	Plant Factor Percent[b]	Total Sodium Processed[c]	Caustic Drums Filled[d]	Note
Dec. 20, 1998–Mar. 24, 1999	249	11	5,793	180	Part of initial startup and checkout period.
Mar. 25, 1999–Aug. 24, 1999	861	23	36,731	762	Processed 40 percent of Fermi and all secondary sodium. Facility shut down to improve product quality.
June 15, 2000–Aug. 31, 2000	747	40	33,356	552	Resumed processing Fermi sodium.
Sept. 2000	465	65	16,855	313	Began EBR-II primary sodium processing.
Oct. 2000	578	78	20,630	383	EBR-II primary sodium processing.
Nov. 2000	374	52	13,945	264	EBR-II primary sodium processing.
Dec. 2000	462	62	16,625	318	EBR-II primary sodium processing.
Jan. 2001	462	62	13,827	258	EBR-II primary sodium processing.
Feb. 2001	335	50	12,350	238	EBR-II primary sodium processing completed; resumed processing Fermi sodium.
Mar. 2001	108	N/A	3,960	74	Completed sodium processing on Mar. 5, 2001.
Totals	4,641		174,072	3,342	

[a] Period of time considered.
[b] Defined here as the number of hours processing/total hours available during this timeframe.
[c] Number of gallons of sodium processed during the timeframe, as per the sodium injection flowmeter.
[d] Number of 269-liter (71-gallon) drums filled during the timeframe with >70 weight-percent caustic.
Note: To convert gallons to liters, multiply by 3.7854.
Key: EBR-II=Experimental Breeder Reactor II; Fermi=Enrico Fermi Nuclear Generating Station; N/A=not available.
Source: Burandt 2010.

231-105 The text in Appendix D, Section D.2.4.4, reads, "…waste would be handled in the same manner under both FFTF Decommissioning action alternatives; only the disposition of the volume of waste would change." The impact analysis and conclusions in the draft EIS took the differences in the volume of waste under the two FFTF Decommissioning action alternatives into account. The intent of the

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130	Appendix Q	Q.3	Q-32	Tables Q-16 & Q-17	Table Q-16, *Summary of Radiological Dose at Year of Peak Dose for Drinking-Water Well User (millirem per year)* , provides the dose for the year of peak dose and the calendar year of the peak dose. Table Q-17, *Summary of Radiological Risk at Year of Peak Radiological Risk for Drinking-Water Well User (unitless)* , provides the radiological risk for the year of peak radiological risk and the calendar year of the peak radiological risk. The year of peak radiological risk should not precede the year of the peak dose or peak concentration. For example, for U Barrier, Scenario 2A, the year of peak dose is calendar year 11,763 while the year of peak radiological risk is calendar year 2096. This discrepancy should be addressed in the text of the EIS.	231-182
131	Appendix Q	Q.3	Q-32	Table Q-16	All tank closure alternatives for B Barrier, T Barrier, and the Core Zone Boundary for the Drinking-Water Well User exceed the 10 millirem per year criteria. There is no acceptable Alternative proposed. A revised EIS should provide at least one Alternative which meets the stated criteria.	231-183
132	Appendix Q	Q.3.1.1	Q-33	Table Q-17	Every Alternative proposed shows a radiological risk above the maximum acceptable increased lifetime cancer risk level (3 x 10^{-4} per EPA) in at least one location (core zone boundary, river near shore, and at barriers); the core zone boundary, in particular, shows unacceptable cancer risks from every alternative and should be reconsidered. Provide an Alternative that is adequately protective of human health and against cancer risk in the long term and meets legal requirements.	231-184
133	Appendix Q	Q.3.1.1.8	Q-236	Table Q-209	Table Q-209, Doses to an American Indian Engaged in Residential Agriculture Following Well Drilling at the Tank Farms, indicates multiple situations in which the USDOE Intruder dose guideline of 500 millirem is exceeded. The text mentions that some of these situations exceed the guideline, but it does not discuss how this issue might influence decision-making. This discussion should be included in a revised EIS.	231-185
134	Appendix U				Revise the estimates for dose and risk for the "American Indian Resident Farmer" to include all the pathways relevant to the Yakama lifestyle.	231-186
135	Appendix U	U.1.3	U-5	Figure U-1	Appendix U does not explain the incidental increases in tritium concentration after calendar year 2240. The concentration of tritium is expected to decrease over time as a result of radioactive decay. Provide an explanation for this discrepancy.	231-187
136	Appendix U	U.1.3	U-6	Figure U-3	Appendix U should explain the increases in Sr-90 after calendar year 2690. The concentration of Sr-90 is expected to decrease over time as a result of radioactive decay.	231-188
137	Summary				Clarify how risks under the Alternatives presented can address cumulative impact analyses accurately without an overall Hanford Site Baseline Risk Assessment.	231-189

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statement is to say that the volume of waste would be different between the two alternatives, but the waste streams would be managed in the same manner. No further clarification is considered necessary.

231-106 Under the Hanford Option, disposal of the decontaminated RH-SCs was assumed to occur at Hanford. Disposal at NNSS was considered but, because the RH-SCs' remaining radioactivity is estimated to be very low, shipping them off site to NNSS was deemed unnecessary, as well as cost prohibitive.

231-107 Appendix E, Section E.2.4.4.2.8, describes the induction melter. As discussed in this section, the induction melter is used to consolidate irradiated and contaminated metal components, including zircaloy and stainless steel, and would improve volumetric packaging in waste containers without creating particulate contamination created by other mechanical-size-reduction techniques. There is operating experience at INL with such induction melters and waste streams, and the Hanford induction melter design would follow that of INL's Hot Fuel Examination Facility Metal Waste Melter. In addition, as noted in Section E.2.4.4.2.7, a waste-sorting station would be used to segregate the waste before it entered the melter into items into that can be charged to the melter and those that cannot, based on characterization data.

231-108 Appendix E, Figure E–52, provides a sketch of a typical induction melter. DOE does not consider detailed dimensions of equipment necessary to support the NEPA analysis in this EIS. Specific details of equipment and facility design would be prepared apart from this EIS if FFTF Decommissioning Alternative 3, Removal, were chosen.

231-109 As discussed in Chapter 2, Section 2.5.1.1, Tank Closure Alternatives, the end-state management of the tank farm systems after placement of a barrier includes postclosure care. Postclosure care is identified as the period following closure of a hazardous waste disposal system (e.g., a landfill), during which monitoring and maintenance activities must be continually conducted to preserve the integrity of the disposal system and prevent or control releases from the disposal unit. For analysis purposes in this *TC & WM EIS*, it was assumed that the postclosure care period following landfill closure of the SST system would be extended to 100 years. The planned postclosure care program proposed for Hanford is described in Appendix E, Section E.1.2.5.4.2, Postclosure Care. Section E.1.2.5.4.1 provides a detailed description of surface barriers; postclosure care is detailed in Section E.1.2.5.4.2. As discussed in these sections, it is recognized that, although these monitoring activities would not be performed

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138	Summary				Please identify the six sets of cribs and trenches (ditches) that are contiguous to the SST. Indicate whether any of these would be permitted treatment, storage, and disposal units or RCRA past practice units.	231-190
139	Summary				WAC 173-303-610 dangerous waste regulations require clean closure first be attempted before a decision is made to close as a landfill. Washington State regulations also require corrective action be performed for leaks and spills. Revise the EIS to provide at least one Alternative that meets this requirement.	231-191
140	Summary				Clarify the impacts to effluent treatment facility as a result of WTP operation in terms of additional waste and ability to treat the waste delivered appropriately.	231-192
141	Summary	S.1.2.1	S-5		It is stated on S-5 that the disposal pathway for both failed and spent melters will require further evaluation than presented in this document. If a separate EIS is expected to be required this should be stated. Provide additional detail regarding how the failed and spend melters will be addressed.	231-193
142	Summary	S.2.1.3	S-23		Please provide an easily understood comparison of the WTP configuration changes between Alternatives as well as the design elements common to all Alternatives.	231-194
143	Summary	S.2.1.5	S-27	Table S-1	Clarify whether or not an additional facility would be constructed and if it was included in the cumulative impacts assessment.	231-195
144	Summary	S.2.3.3	S-31	Table S-4	Please provide rationale for choosing only 100 years of post closure care.	231-196
145	Summary	S.3.1.3	S-36		Regarding tank waste transfers, recirculation of sluicing liquids back to the tanks could create characterization problems for WTP waste streams. This issue should be addressed in detail.	231-197
146	Summary	S.4.1.2	S-50		Regarding the statement, "Although the following technologies were ultimately not considered reasonable for detailed analysis in this EIS, that does not preclude their future consideration as potentially viable approaches for retrieving waste from the SSTs," please clarify under what circumstances these technologies would be considered, and whether another EIS would be performed to address their impacts.	231-198
147	Summary	S.5.1	S-53		Please clarify whether combined impact analyses were performed for noise or facility accidents to meet NEPA requirements.	231-199
148	Summary	S.5.4.1	S-93		USDOE's preferred Alternative for tank closure includes landfill closure which does not address past leaks. USDOE acknowledges that past leaks are major contributors to long-term groundwater impacts. These impacts should be addressed.	231-200

for many years, it is important that general information regarding the various technologies and alternatives for monitoring be identified in this EIS. This section is provided as a general overview and description of the postclosure care program; specific design details (e.g., fencing) and administrative control details (e.g., access restrictions) will be developed in the future. Identification of funding for this program is not within the scope of this *TC & WM EIS*.

231-110 The text has been revised in this final EIS as suggested by the commentor by specifying that the uranium isotope at the start of the example decay chain is uranium-238.

231-111 A reference to the basis for doubling the risk for higher doses has been added at the end of the sentence in this final EIS. The reference is the National Council on Radiation Protection and Measurements Report Number 115, *Risk Estimates for Radiation Protection*.

231-112 As DOE and its contractors implement any of the alternatives, they will comply with applicable OSHA permissible exposure limits. Reference to the American Conference of Governmental Industrial Hygienists threshold limit values is included in Appendix K because they cover a broader range of chemicals than the OSHA limits and can provide more-protective levels. Therefore, in practice, employers comply with OSHA permissible exposure limits, but may impose more-protective criteria from other sources, such as the American Conference of Governmental Industrial Hygienists threshold limit values.

231-113 Appendix K, Section K.1.2.6, describes the approach for evaluating the potential impacts of accidental chemical releases. At distances of more than a few meters from the point of release or spill, the air (inhalation) pathway has much greater potential to cause human health impacts than any other pathway. This is because the sites of hypothesized accidents are remote from the public, bodies of water, and agricultural lands. The section was revised to more clearly explain why the air pathway is the most appropriate for evaluating impacts of accidents involving chemicals. The consequences of dermal contact or ingestion may be severe, even fatal, for persons very near the release point. However, the degree of exposure and the resulting health impacts would depend on circumstances that cannot be predicted with any confidence (e.g., the number of workers, their proximity to the spill or leak, the effectiveness of protective equipment). Because any modeling of such workplace exposures would be based almost entirely on assumptions, the results would not be particularly useful for distinguishing between alternatives.

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149	Summary	S.5.4.3	S-100	Table S-8, S-9	EIS Tables S-8 and S-9 demonstrate that the Alternatives presented are not expected to meet drinking water standards if waste from other USDOE sites is disposed at Hanford. In both Alternatives 2 and 3 shown in Table S-8, the calculations assume that imported waste would be disposed in an IDF. Table S-9 indicates that almost the entire impact on groundwater in the IDF would come from imported waste. This is reiterated when Alternative 2 is compared with Alternative 3 in Table S-9, which assumes no imported waste is disposed in an IDF. In the no imported waste case, the drinking water standard is met for Tc-99 and exceeded for I-129. In the case of imported waste, the drinking water standard for Tc-99 is exceeded by more than 20 times for and more than 170 times for I-129. Please address this issue in greater detail and revise the EIS to include at least one alternative which is expected to meet drinking water standards. Disposal of imported waste in an IDF should be excluded from all Alternatives.

231-201

Burke, T.M. 2007. *Hanford Site Sodium Disposition Evaluation Report* (HNF-33211). Prepared for the U.S. Department of Energy Assistant Secretary for Environmental Management by Flour Hanford Inc, May.

National Research Council (NRC). Board of Radioactive Waste Management, Commission on Geosciences, Environment, and Resources, 2000. *Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites*. Washington, DC: National Academy Press, pages 3-5.

RIDOLFI Inc. (Ridolfi), 2007. *Yakama Nation Exposure Scenario for Hanford Site Risk Assessment, Richland, Washington* . Prepared for the Yakama Nation ERWM Program. September.

U.S. Department of Energy (USDOE). 2006. *Environmental Assessment, Sodium Residuals Reaction/Removal and Other Deactivation Work Activities, Fast Flux Test Facility Project, Hanford Site, Richland, Washington* . March.

Hanlon, B.M. 2003. *Waste Tank Summary Report for Month Ending December 31, 2002* (HNF-EP-0182). Rev. 177, CH2M HILL Hanford Group, Inc., Richland, Washington. February.

Health impacts resulting from accidents in occupational settings are assessed in the industrial safety sections of Chapter 4. In addition to the direct, short-term human health impacts resulting from releases, Appendix K, Section K.3.9, also assesses the secondary impacts, including impacts on vegetation, soil, and water.

231-114 See response to comment 231-40 regarding consideration of American Indian exposure scenarios. This EIS considers a number of different public and occupational receptors. As explained in Appendix K, Section K.2.1.1.1.1, the onsite MEI is a member of the public (as opposed to a DOE or DOE contractor worker). A worker at US Ecology was added to the analysis of doses to onsite members of the public because such a worker is not employed by DOE or a DOE contractor. Workers at the ERDF or other DOE operations areas are not considered members of the public. However, Appendix K evaluates potential doses to noninvolved workers. The noninvolved worker is assumed to be at a facility near the operating facilities evaluated in this EIS. Because of the direction and proximity of the ERDF from the 200-West Area Supplemental Treatment Technology Site, the ERDF is one of the locations at which doses to a noninvolved worker were evaluated. The potential doses to a noninvolved worker at the ERDF are presented in Appendix K, Section K.2.1.2.2.

231-115 The discussion explaining how the location of the MEI was determined is included in Appendix K, Section K.2.1.1.1.1, following the figure referred to by the commentor.

231-116 DOE appreciates the suggestion that the location of the onsite MEI be shown on the figure in Appendix K. The locations specifically evaluated for an onsite MEI, as discussed in the appendix, have been added to the figure.

231-117 Please see response to comment 231-40 regarding consideration of American Indian exposure scenarios.

231-118 The two heights mentioned in Appendix K, Section K.2.1.1.3, 30 feet and 200 feet, are set elevations at which meteorological data are collected at the Hanford Meteorological Station. As discussed in Section K.2.1.1.3.1, the stack height at the WTP is known since the plant is designed and under construction. Consequently, meteorological data collected at that same height were used in the modeling. Other possible sources of radiation emissions in the 200-East and 200-West Areas are tank farm operations, waste retrieval, and supplemental treatment technologies. Tank farm emissions are generally near ground level. Designs of the supplemental treatment technology facilities are not currently known, but it was assumed that their emissions too would be at or near ground

Commentor No. 231 (cont'd): Harry Smiskin, Chairman, Yakama Tribal Council, Confederated Tribes and Bands of the Yakama Nation

ieer

INSTITUTE FOR ENERGY AND ENVIRONMENTAL RESEARCH

6935 Laurel Avenue, Suite 201
Takoma Park, MD 20912

Phone: (301) 270-5500
FAX: (301) 270-3029
e-mail: ieer@ieer.org
http://www.ieer.org

Attachment 3

Detailed Comments on *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (*TC & WM EIS*) (DOE/EIS-0391), EIS October 2009

Arjun Makhijani, Ph.D.

prepared by the Institute for Energy and Environmental Research

March 18, 2010

The following comments on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*[1] were prepared by the Institute for Energy and Environmental Research to feed into overall comments being submitted by the Environmental Restoration and Waste Management program of the Yakama Nation.

A. Institutional Controls

The DOE appears to assume institutional control for 10,000 years – the entire period of assessment of impacts in the TC&WM EIS. Indeed, it states explicitly that consequences of its onsite impact calculations are "hypothetical" because it does not expect to lose control of it:

> Consistent with DOE guidance (DOE Guide 453.1-1), the potential consequences of loss of administrative or institutional control are considered by estimation of impacts on onsite receptors. Because DOE does not anticipate loss of control of the site, these onsite receptors are considered hypothetical and are applied to develop estimates for past and future periods of time. [2]

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[1] United States Department of Energy. *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington* (*TC & WM EIS*) (DOE/EIS-0391), October 2009. Hereafter TC&WM EIS 2009.
[2] TC&WM EIS 2009, Vol. 2, p. Q-31.

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level. One of the inputs to the GENII [Hanford Environmental Radiation Dosimetry Software System, Generation II] program used to model potential impacts of normal operations is the height at which the meteorological data are collected. The GENII program accounts for the difference between the height of the emissions and the height at which the data were collected.

231-119 The portion or quantity of different food groups was not calculated per se, but was based on accepted and recognized sources; these sources are included in the right-hand column of Table K–6 in Appendix K. The MEI is assumed to be exposed at a higher rate than members of the general public, and to have consumed more food grown in a family garden. Appendix J includes an analysis of the potential dose to a subsistence consumer during the operational period of the proposed actions. As shown in Table J–25, this EIS includes a scenario wherein an individual subsists on a diet from local sources. Although not focused specifically on an American Indian living a traditional tribal lifestyle, this scenario does reflect someone who derives essentially all of his/her food, including fish, from potentially contaminated sources.

231-120 Please see response to comment 231-40 regarding consideration of American Indian exposure scenarios. The assumption referred to by the commentor reflects time spent outdoors versus time spent indoors. The MEI is assumed to be exposed to the plume of contaminated air all of the time, but to be exposed to radionuclides deposited on the ground only half of the time. It is not assumed that the individual spends half of his/her time elsewhere, as stated in the comment.

231-121 As shown in Table J–25 of Appendix J, this EIS includes a scenario wherein an individual subsists on a diet from local sources. Although not focused specifically on an American Indian living a traditional tribal lifestyle, the scenario does reflect someone who derives essentially all his/her food from potentially contaminated sources. This individual is assumed to consume local game at a much higher rate than the typical MEI, and to consume local fish, drink additional milk from locally raised cows, and consume surface water that may have been contaminated. Appendix Q, Section Q.3, also evaluates the long-term doses to an American Indian resident farmer and to a person living a traditional tribal lifestyle, an American Indian hunter-gatherer.

231-122 The commentor is referred to Appendix D for a discussion of the BBI, and to the *Inventory and Source Term Data Package* (DOE 2003b), cited in Appendix D, Section D.1.1.2, for full details on the BBI. Following mention of the BBI in Appendix K, a reference to Appendix D was added. Appendix K, Section K.2.1.1.3.4, Source Terms, discusses the method used to select

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There are a number of problems with the DOE assumption that the onsite exposure cases are just hypothetical because it will retain institutional control for 10,000 years. No government, not to speak of a government department has lasted anything close to that time. The DOE assumption does not even take into account the history of the site for the last 1,000 years let alone a period ten times that. Various Indian tribes have used the site freely, including for subsistence hunting, fishing, and gathering for both food and medicines; wars have taken place at or near the site; and subsequent to those wars, a complex and evolving pattern of use prevailed until the site was taken over for plutonium production during World War II.

Compliance with treaty requirements, historical facts, as well as technical reality demand that the baseline assumption in evaluating and comparing alternatives and compliance with laws and regulations should be that institutional controls will not last a few decades beyond the time that the site is declared cleaned up. The National Research Council, in reviewing DOE cleanup plans, has explicitly advised the DOE on this point in the past. Specifically, in a report on long-term management it stated:

> The Committee on Remediation of Buried and Tank Wastes finds that much regarding DOE's intended reliance on long-term stewardship is at this point problematic….
>
> […]
>
> Other things being equal, **contaminant reduction is preferred to contaminant isolation and imposition of stewardship measures whose risk of failure is high.**
>
> […]
>
> *The committee believes that the working assumption of DOE planners must be that many contamination isolation barriers and stewardship measures at sites where wastes are left in place will eventually fail, and that much of our current knowledge of the long-term behavior of wastes in environmental media may eventually be proven wrong. Planning and implementation at these sites must proceed in ways that are cognizant of this potential fallibility and uncertainty.*[3]

Given that so many of the major geologic features of the area are on the order of 10,000 years old, the baseline assumption for contamination isolation measures, such as caps and barriers, should also be that their risk of failure is high. And, as noted above, the assumption of long-term institutional control is not compatible with either local or global historical reality. In view of that, the DOE should discard the assumption of institutional controls significantly beyond the cleanup period for its analysis of the alternatives, and for its choice of the preferred alternatives.

A reasonable plan would be to assume institutional control for the duration of cleanup required by the alternative under consideration, with a free release after that. Such an approach would be consonant with the advice of the National Research Council and with historical and technical

[3] National Research Council, Board on Radioactive Waste Management, Commission on Geosciences, Environment, and Resources, *Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites,* Washington, DC: National Academy Press, 2000, on the Web at http://www.nap.edu/catalog.php?record_id=9949, pp. 3-5. Original italics; bold added.

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231-202 cont'd

radionuclides from the BBI for detailed consideration in the short-term impacts analysis.

Exposure during the operational phase of the project would be from radioactive air emissions, the dominant exposure mode being inhalation of radionuclides. The airborne inventory was estimated assuming that 1-millionth of the BBI becomes airborne and that the air treatment systems are effective in removing 99.95 percent of the particulates from the air; gaseous radionuclides were assumed to be unaffected by the air treatment systems. The potential dose from inhalation of the radionuclide mixture was calculated by multiplying the amount of each radionuclide released to the air by the radionuclide-specific dose conversion factor for inhalation. The radionuclides that accounted for the largest doses were included in the detailed analysis; together they account for more than 99 percent of the potential dose from inhalation of the mixture.

For the long-term impacts analysis discussed in Appendix Q, Section Q.2, screening was also performed to identify the radionuclides to include for detailed analysis. The exposure scenarios considered were for radionuclides released to groundwater and for those attributable to direct human intrusion. Screening for radionuclides released to groundwater was based on a drinking water pathway and used ingestion dose conversion factors. For the intrusion scenario, inadvertent soil ingestion and inhalation pathways were used for screening. Neptunium-237 and thorium-232 were identified as important dose contributors for the pathways considered in the long-term impacts analysis, but not for those considered in the short-term impacts analysis.

231-123 The commentor is referred to Appendix D, Section D.1.1, for a detailed discussion of the BBI. Please see response to comment 231-122 regarding the screening of radionuclides for inclusion in the analysis of short-term impacts.

231-124 As indicated by the commentor, radioactive decay would decrease the quantities of most radionuclides over time. In the case of plutonium-241, decay could increase the amount of americium-241. The decrease over time would not be significant because the air pathway dose evaluated for short-term impacts is dominated by long-lived radionuclides. Regarding the ingrowth of americium-241, it is noted that the waste in the tanks is already aged. The effects of ingrowth of americium-241 were evaluated considering the relative amounts of plutonium-241 and americium-241 in the tank waste inventory; it was determined that there would be less than a 3 percent change in impacts as a result of ingrowth over the duration of the alternatives.

realities. With the proviso of thorough cleanup (see below), it is also the only assumption that is consonant with the unrestricted exercise of treaty rights by the Yakama Nation.

We note here that in the past, the DOE had included such an alternative in the tank waste EIS Notice of Intent of 2003:

> *Closure*: Clean closure reflects minimal residual waste in tanks and ancillary equipment, and contaminated soils remediated in place and/or removed from the tank system to be treated and disposed of in accordance with RCRA requirements. As operations are completed, all SST system storage, treatment, and disposal facilities at the Hanford Site would be closed. ***Waste storage and disposal facilities would be closed in a manner that supported future use on an unrestricted basis and that did not require post-closure care***.[4]

Recommendations: The DOE should discard the assumption of institutional controls significantly beyond the cleanup period for its analysis of the alternatives, and for its choice of the preferred alternatives. A reasonable plan would be to assume institutional control for the duration of cleanup required by the alternative under consideration, with a free release after that. Such an approach would be consonant with the advice of the National Research Council, with historical and technical realities. With the proviso of thorough cleanup (see below), it is also the only assumption that is consonant with the unrestricted exercise of treaty rights by the Yakama Nation.

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B. Range of alternatives considered

The TC&WM EIS does not present overall alternatives whose environmental and health impacts could be compared in a straightforward way. Instead, the DOE has used a confusing approach in which a number of alternatives, with impacts that could differ widely, are grouped together as "preferred." The DOE has summarized its preferences as follows:

> Eleven alternatives for potential tank closure actions are evaluated in this draft EIS. These alternatives cover tank waste retrieval and treatment, as well as closure of the SSTs. DOE does not have specific preferred alternatives for retrieval or treatment of the tank waste, but has identified a range of preferred retrieval and treatment options. For retrieval, DOE prefers Tank Closure alternatives that would retrieve at least 99 percent of the tank waste. All Tank Closure alternatives would do this, with the exception of Alternative 1 (No Action) and Alternative 5. For treatment, DOE prefers Tank Closure Alternatives 2A, 2B, 3A, 3B, 3C, 4, and 5 because they would allow separation and segregation of the tank waste for management and disposition as LLW and HLW, according to the risks posed. In contrast, DOE does not prefer Tank Closure Alternatives 6A, 6B, or 6C because they would treat all tank waste as HLW. For closure of the SSTs, DOE prefers landfill closure, as provided under Tank Closure Alternatives 2B, 3A, 3B, 3C, 5, and 6C, for the reasons described in Section S.5.4.1. The Tank Closure alternatives that capture each of DOE's preferred retrieval, treatment, and closure options

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[4] TC&WM EIS 2009, Vol. 2, p. A-18, which is part of the 2003 "Notice of Intent to Prepare and Environmental Impact Statement for Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site, Richland, WA." The NOI starts on p. A-14. Emphasis added.

231-125 The calculation of potential doses to noninvolved workers has been revised to reflect a 2,080-hour worker year.

231-126 Please see response to comment 231-48.

231-127 For the analysis of radiological impacts, the impacted population is defined as the population within 50 miles of the release location. Therefore, a more dispersed plume would not impact a larger population, but it would change the distribution of dose in the population. Whereas the height of release may result in a difference in population dose, it would change the relative impacts among the alternatives being considered.

231-128 DOE revised Appendix K to delete the statement about FFTF Decommissioning Alternative 1 impacts only being accounted for as part of the baseline. Appendix K, Section K.2.2.1.4, was revised to include an estimate of the dose for FFTF Decommissioning Alternative 1 based on recent operational emissions data. The results of this analysis, showing very low doses to the public, were also incorporated into Chapter 4, Section 4.2.10.1.1, of this EIS.

231-129 DOE acknowledges that there are chemicals in the WTP process streams and process byproducts that may be toxic. However, because the process streams and byproducts would be extremely radioactive, the radiological effects of potential accidents involving them would outweigh the chemical effects. Analyses of the radiological effects of representative accidents can be found in Appendix K, Section K.3.7. Potential accidents involving the process chemicals were analyzed because these chemicals present an additional risk that would not be accounted for by evaluating accidents involving only the radioactive waste.

231-130 The criteria used to reduce the original list of 400 chemicals to the 24 listed in Appendix K in Table K–108 were as follows:

- Estimates of the likelihood or prevalence of a specific component in the waste based on interviews with past and present personnel at the generating facility
- The hazard posed by the substance to the health and safety of onsite or offsite individuals
- The likelihood that the hazardous material remains in a dangerous form

As indicated below the table, the information in Table K–108 is taken from the current safety analysis document for Hanford solid-waste operations, which cites the *Solid Waste Stream Hazardous and Dangerous Components Study* (WHC-SD-WM-RPT-056) as the original source. The use of the criteria to perform the screening evaluations is described in the study. The section has

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are Alternatives 2B, 3A, 3B, and 3C. For storage, DOE prefers Alternatives 2A, 2B, 3A, 3B, 3C, 4, and 5. These alternatives assume shipment of IHLW [Immobilized High-Level Waste] canisters for disposal off site.[5]

However, it is not technically appropriate, for instance, to lump Alternatives 2B and 3B together for treatment, even though they are similar in many respects. This is because Alternative 2B would vitrify all low-activity waste, which allows for the possibility of offsite disposal, while Alternative 3B has a stone-casting of some radioactive waste as part of its treatment process. Further, even the onsite disposal impacts of the stone casting and vitrified low-activity waste would be different, so that they are not equivalent from a health and environmental point of view. Indeed, Alternative 2B, which the DOE "prefers," is closest with respect to waste management and environmental impacts to Alternative 6B, which the DOE explicitly rejects. The DOE's rejection of Alternative 6B (as well as Alternatives 6A and 6C) in the passage quoted above is not based on process or environmental or health considerations. Rather, it appears to be based on a policy aversion to treating all tank waste as high-level waste, even though it is currently defined as such under the Nuclear Waste Policy Act of 1982. ***231-203 cont'd***

Further, none of the alternatives come close to meeting drinking water standards for groundwater, even for single radionuclides, even when institutional control is assumed to be in effect inside the core zone. The overall problem, when all radionuclides are taken into account, as they are required to be under the EPA regulations, is even worse. For instance, groundwater concentrations of either technetium-99 or iodine-129 or both exceed the drinking water limits individually at the core zone boundary in all cases. When the restriction that the sum of the ratios of estimated concentrations to maximum contaminant levels (MCLs) is applied, the problem is even worse. These are very severe in many cases, as is evident from the estimates of future contamination in Appendix U. ***231-204***

Further, even though this is a tank closure EIS, the closure of the double shell tanks (DSTs) is not even considered. Only Single Shell Tank (SST) closure alternatives are presented. It is reasonable to assume, as the DOE has done, that the DSTs will be closed after the SSTs, since the former are needed for retrieval of SST waste and transfer operations to the Waste Treatment Plant (WTP). However, this does not provide a sufficient rationale to defer the problem of considering DST closure to a later date. This balkanized approach prevents an integrated assessment of health and environmental impacts related to decommissioning of the high-level waste tank farms, which should be the central objective of this EIS. ***231-205***

The DOE should present each alternative as a comprehensive and comprehensible set of actions from tank waste management for tank waste storage, retrieval, treatment, and closure, plus the associated impacts of low-level waste and mixed waste streams generated in the process. In this context, it is important to note that the peak year concentrations, doses, and risks presented in Appendix U for the three alternatives combined with non-tank-farm 200 Areas source terms are essentially useless for the purpose of estimating the overall impact of cleanup or even to allow a determination of what actions the DOE might be planning for the non-tank-farm 200 Areas vadose zone clean up. This is because most of the peak year radiological impacts are in the past – even though there were no resident farmers drinking groundwater and using it for irrigation on ***231-206***

[5] TC&WM EIS 2009, p. S-118.

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been revised to include a citation to this document, and a reference has been added to the reference list.

231-131 The industrial safety impact rates between 2001 and 2006 represent the general level and type of work to be performed under the alternatives identified in this EIS. Also considered were the safety programs, practices, and procedures developed and implemented up to and during the sample period. Additionally, it was assumed that these safety programs, practices, and procedures would continue in force into the future. They include the use of safety surveillance and lessons-learned programs, as well as oversight conducted by DOE. The calculations represent the annual risks to workers; the values identify possible occurrences of injury, illness, and death each year the work activities are conducted. Finally, the estimations of injury, illness, and death are for the discrete elements of the work performed in the four phases of construction, operations, deactivation, and closure and do not include other impacts outside of those activities.

231-132 DOE believes that it has used consistent geologic terminology as appropriate to the level of analysis performed. The purpose of Chapter 3, Section 3.2, of this *TC & WM EIS* is to provide a succinct discussion of the Hanford affected environment, both as a whole and as it is relevant to the entire scope of proposed actions and alternatives considered in this EIS. Such is the case with the level of detail presented in Chapter 3, Section 3.2.5, Geology and Soils.

In Chapter 9, "Glossary," of the draft EIS, the technical terms "silt" and "clay" are defined (but not "mud"), as they are widely used throughout this *TC & WM EIS*. The term "mud" is a general field term for sedimentary strata or rock composed predominantly of clay-sized particles. Specific lithofacies (rock or sediment characteristics) of geologic members within the Ringold Formation at Hanford have been named "mud" units by members of the geologic community and are formally recognized as such. Therefore, the use of the term "mud" has appropriately been adopted for use in this EIS. A definition for this term has been added to Chapter 9 of this *Final TC & WM EIS*. Specific to the needs of developing the *TC & WM EIS* groundwater flow model, detailed hydrogeologic data were compiled in part from a review of approximately 5,000 Hanford boring logs, as described in Appendix L, Section L.4, of this EIS. This review was conducted to discern textural differences between layers of mud (clay), silt, sand, and gravel, and associated differences in hydraulic characteristics, for development of the geologic layers for the groundwater model flow field. Within this scheme, grain size and other information pertinent to the development of the

the site in the years of estimated peak impact (for the most part during the 1950s to the 1990s). Even so, the portion of Appendix U that shows the non-tank-farm impacts and other parts of the TC&WM EIS where various tank farm impacts are estimated make it clear that even after DOE has completed what it calls "reasonably foreseeable" actions, Hanford will remain contaminated far beyond drinking water standards outside of the core zone for thousands of years.

There should be at least one alternative in the Final EIS in which all applicable drinking water standards are met for groundwater within the core zone without institutional controls at the completion of foreseeable cleanup actions. Since the DOE does not appear to include a set of actions that would lead to such a result, it seems clear that the list of actions would need to be expanded, especially to clean up the contamination from past practices in the non-tank-farm 200 Areas, or contracted, as for instance, in the case of the plan to import waste.

Further, for all alternatives, future post-remediation impacts should be clearly presented in tables and graphs showing the future variation over time concentrations of all major contaminants, as well as the individual future peak for each contaminant beyond the completion of cleanup activities at the site. This is important, since a part of what makes the TC&WM EIS difficult or impossible to interpret in terms of Applicable or Relevant and Appropriate Requirements (ARARs) is that peak concentrations are shown in the past or within the cleanup period, when the scenarios such as the one for a resident farmer (whether native American or not) are not meaningful.[6]

Recommendations: The DOE should present each alternative as a comprehensible set of actions from tank waste management for tank waste storage, retrieval, treatment, and closure, plus the associated impacts of low-level waste and mixed waste streams generated in the process. There should be at least one alternative in the Final EIS in which all applicable drinking water standards are met for groundwater within the core zone without institutional controls at the completion of cleanup actions both for tank farm and non-tank farm 200 Areas. For all alternatives, future post-remediation impacts should be clearly presented in tables and graphs showing the future variation over time concentrations of all major contaminants and the evolution of compliance with ARARs.

231-206 cont'd

C. Radiation Protection Standards and ARARs

The DOE has used a reference value of 100 millirem (mrem) per year whole body total effective dose equivalent (TEDE) as the reference value to its health protection dose calculations. For population dose the DOE uses a so-called "background" exposure value:

> The significance of dose impacts is evaluated by comparison against the 100-millirem-per-year all-exposure-modes standard specified for protection of the public and the environment in DOE Order 5400.5. Population doses are compared with total effective dose equivalents from background sources of 365 millirem per year for a member of the population of the United States (NCRP 1987).[7]

231-207

[6] TC&WM EIS 2009, Vol. 2, Appendix U. See for instance, Table U-2 and Figures U-1 to U-48.
[7] TC&WM EIS 2009, Vol. 2, p. Q-238.

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model are presented. The commentor is referred to Appendix L, Table L–15, of the draft EIS.

231-133 In response to this and similar comments, references to compilations of data and original data sources have been added to Appendix L of this *Final TC & WM EIS*. The sensitivity of the model to basalt elevation and the propagation of this uncertainty into the base and alternate flow fields are fully discussed in Sections L.4.3.2.1, L.10.1, and L.10.2 of the *Draft TC & WM EIS*.

231-134 A simplifying assumption was made in the *Draft TC & WM EIS* that there is no ongoing Hanford pumping, although it is known that pump-and-treat activities are occurring. This assumption is believed not to bias the alternatives impacts analysis within the context of the cumulative impacts analysis. This assumption was reevaluated and is further discussed in this *Final TC & WM EIS*.

231-135 Appendix L, Figure L–18, provides a cross-section view of the MODFLOW vertical grid. Top and bottom elevations for each of the 31 model layers are shown in this figure. As described in Section L.4.1.2, each model layer is a uniform (constant) thickness across the entire model domain in the horizontal directions.

231-136 Appendix L of this *Final TC & WM EIS* was revised to expand the groundwater flow model gridding discussion to include factors that were considered in selecting model cell size.

231-137 A simplifying assumption was made that there is no hydraulic connectivity between the unconfined aquifer and any existing confined aquifers. It is likely that some interaction between unconfined and confined aquifers exists. However, the availability of data that describe the locations, sizes, and water flux amounts between the aquifers is not sufficient to encode these features into the model. This simplifying assumption should not bias the EIS analysis and is, therefore, believed to be reasonable in light of the uncertainty related to this feature.

231-138 The adjustable parameters on the river boundary condition cells are hydraulic head and river bed conductance. Hydraulic head is encoded as reaches along the river trace based on data provided in the *Groundwater Data Package for Hanford Assessments*, Rev. 1 (Thorne et al. 2006), and data collected for this *TC & WM EIS* using a global positioning system (GPS). River conductance values were set in the range of 1×10^7, essentially making the river boundary condition a specified, or prescribed, head boundary. Setting the river conductance values in this range stabilized the model's convergence behavior. In general, lower river conductance values resulted in greater model instability. In addition, the model's head

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This approach is problematic for a number of reasons. To take the issue of "background sources" first. The amount includes about 200 millirem per year of radon dose, almost all of which is due to indoor radon. While radon occurs naturally, its outdoor concentrations are, on average, considerably lower than indoor ones. This is because indoor radon concentrations are mainly an artifact of building construction. Radon concentrations indoors can be lowered to close to outdoor levels with appropriate construction and control technology. Indoor radon should not be considered a part of natural background radiation. This position has ample scientific justification, as is evident in the positions of various scientific advisory bodies. An extensive discussion with references is provided in a 2005 IEER publication, a part of which is quoted below:

> As noted by the National Research Council in 1999
>
> > Many human activities – such as mining and milling of ores, extraction of petroleum products, use of groundwater for domestic purposes, and **living in houses** – alter the natural background of radiation either by moving naturally occurring radionuclides from inaccessible locations to locations where humans are present or by concentrating the radionuclides in the exposure environment.
>
> The National Research Council considered indoor radon to be a "technologically enhanced naturally occurring radionuclide [TENORM]." The treatment of other TENORM from a radiation protection standpoint is thus illustrative in the present context. For example, playground equipment and fences contaminated with TENORM waste from the oil industry containing radium has been found at a number of locations in Mississippi and Louisiana.[8]

A background level at sea level of 100 mrem per year is a reasonable reference value to use for background, when such a reference is appropriate, as for instance when comparing radiation to other natural hazards. Such a comparison is neither relevant nor appropriate in the present case, even though 100 millirem per year is the same as the annual exposure limit for the public in DOE Order 5400.5.

231-207 cont'd

Clean up of a site is subject not only to DOE Order 5400.5 but to a complex set of standards, especially when both radionuclides and hazardous chemicals are present and the site has been put on the National Priorities List (a "CERCLA site") by the EPA, as is the case with Hanford. It is simply inappropriate for the DOE to take a posture that CERCLA strictures, which include compliance with ARARs, such as drinking water limits, are not relevant to overall health impact assessment. One of the most important relevant requirements is the set of maximum contaminant levels in EPA's drinking water standards for radionuclides and chemicals. Technetium-99 and iodine-129 are fission products that are important long-lived radionuclides with half-lives of 213,000 years and 15.7 million years, respectively. A drinking-water dose

231-208

[8] Arjun Makhijani and Brice Smith, *Comments on the U.S. Environmental Protection Agency's Proposed Rule for the Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada*, Institute for Energy and Environmental Research, Takoma Park, Maryland, November 21, 2005, Section Two. On the web at http://www.ieer.org/comments/waste/yuccaepa.pdf. References may be found in this publication. The emphasis in the National Research Council quote was added by the authors of the IEER paper.

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calibration was not highly sensitive to changes in river conductance. Therefore, the river conductance values were set in the 1×10^7 range to aid the model's convergence behavior.

231-139 The source of the mountain-front recharge is the result of surface runoff from mountains along the western and southwestern boundaries of the flow model. The GHB boundary condition cells, which represent the mountain-front recharge, are encoded into the *TC & WM EIS* MODFLOW model below the water table and, therefore, below the ground surface. Appendix L, Section L.4.2.3, in this *Final TC & WM EIS*, has been updated to include additional information regarding the locations (X, Y, and Z) of the mountain-front recharge boundary condition cells encoded in the MODFLOW model. This also includes graphics correlating the ground surface topography with the X and Y locations of the model-encoded GHB boundary condition cells.

231-140 The process and criteria used to interpret the borehole logs are included in a calculation and analysis package. Due to the difficulties associated with independently verifying the past work of others, coupled with the possibility that independent identification and interpretation of the data may still be required, it was decided to focus efforts on building the lithology data from source well borings instead of attempting to confirm earlier interpretation efforts.

231-141 The groundwater team used the results of preceding analyses only in the cases where these results could be independently verified. The top-of-basalt surface was completed according to this requirement. The traceability of the top-of-basalt surface used in the MODFLOW model back to original records is contained in the project files (calculation and analysis packages) and has been examined in a variety of independent quality assurance audits.

231-142 DOE believes that the methods and procedures used to model the suprabasalt sedimentary layers are reasonable and consistent with other methods that could have been used. The *Draft TC & WM EIS* method, like other reasonable methods, included examining the available data; interpreting the data to assign geologic formations and textural types; interpreting the point data, where available, to create two-dimensional cross sections across the model domain; and knitting together the two-dimensional cross sections to create the fully three-dimensional subsurface model. Other methods of creating the fully three-dimensional subsurface model could also be used. The approach used in this *Final TC & WM EIS* is fully discussed in Appendix O, together with an estimate of the uncertainty in the surface, and the potential effects of that uncertainty on the estimate of the long-term groundwater impacts of the alternatives.

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limit of 4 millirem per year Total Effective Dose Equivalent (TEDE) or to any internal organ applies to these two radionuclides and all other beta-particle emitting man-made radionuclides, except strontium-90 and tritium, for which MCLs are specified. If more than one such radionuclide is present the sum of the doses must not exceed 4 millirem.[9] Yet, though the appropriate dose limit corresponding to drinking water standards is 4 millirem per year (TEDE or internal organ dose), DOE uses 100 mrem per year TEDE in Appendix Q to measure impacts from these two radionuclides. In fact, the TC&WM EIS only calculates TEDE[10] and does not calculate organ doses as required by drinking water regulations. In this context it is important to note that the iodine-129 dose to the thyroid, which is not calculated in the TC&WM EIS, is about 20 times larger than the internal committed effective dose equivalent.

Even more important, the 100 millirem per year TEDE in DOE Order 5400.5 is entirely inappropriate in a CERCLA context. CERCLA cleanup requires that the lifetime cancer incidence risk from residual radioactive and chemical contaminants be in the range 10^{-4} to 10^{-6}. The CERCLA regulation states:

> (*2*) For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess **upper bound lifetime cancer risk** to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response. **The 10^{-6} risk level shall be used as the point of departure** for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure…[11]

Using the DOE's selected value of fatal cancer risk of 6 deaths per 10,000 person rem,[12] a 100 millirem per year dose over 70 years creates a lifetime risk of dying from cancer of 1 in 238. This is 42 times higher than the highest allowable risk under CERCLA and 4,200 times higher than the lowest CERCLA risk level of 10^{-6}. If one uses cancer incidence risk (rather than fatal cancer risk) the disparities are even greater.

Hanford has vast quantities of radionuclides and hazardous chemicals whose interactions are not well understood; their combined effect on the human body and ecosystems is largely unknown. Indeed, the importance of such interactions is only now beginning to be appreciated. And until recently, it was normal to assume that a radiation protection framework that limited cancer among human beings would also be satisfactory for protection of other species, and by extension, of ecosystems. Given these realities, if there is any site to which the 10^{-6} risk level "shall be used

231-208 cont'd

[9] Drinking water standards for photon and beta-emitters, except strontium-90 and tritium, are not specified as MCLs but as a dose limit of 4 millirem per year TEDE or 4 millirem to the most exposed organ. See 40 CFR 141.66(d)(1).
[10] Appendix H states: "***All*** radiological impacts are calculated in terms of the committed dose received by the exposed populations and its associated health effects. The calculated radiation dose is the total effective dose equivalent (10 CFR 20), the sum of the effective dose equivalent from external radiation exposure and the 50-year committed effective dose equivalent from internal radiation exposure." (TC&WM EIS 2009, Vol. 2, p. H-2) Emphasis added. The ratio of iodine-129 doses is for adults. It was calculated from EPA's Federal Guidance Report 13, CD, published in 2002.
[11] 40 CFR 300.430(e)(2)(i)(A)(*2*), which is a part of the Remedial Investigation and Feasibility Study portion of the National Oil and Hazardous Substances Pollution Contingency Plan, specified at 40 CFR 300. Emphasis added.
[12] TC&WM EIS 2009, Vol. 2, p. K-7.

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231-143 DOE believes that the methods and procedures used to model the suprabasalt sedimentary layers are reasonable and consistent with other methods that could have been used. The *Draft TC & WM EIS* method, like other reasonable methods, included examining the available data; interpreting the data to assign geologic formations and textural types; interpreting the point data, where available, to create two-dimensional cross sections across the model domain; and knitting together the two-dimensional cross sections to create the fully three-dimensional subsurface model. Due to the physical size of this *TC & WM EIS*, many of the details associated with the analysis could not be included in the published document. Additional process details like those requested here are included in calculation and analysis packages.

231-144 Appendix L, Section L.5.2, of this *Final TC & WM EIS*, has been updated with a footnote that defines a stress period as a period of time within the model simulation when all boundary conditions are static or unchanging. By design, the *TC & WM EIS* MODFLOW model stress periods are no less than 1 year in duration and cannot include partial years. Stress periods may be greater than 1 year in duration if boundary conditions are static for longer than 1 year.

231-145 The MODFLOW 2000 numerical solution settings are included in Appendix L, Table L–8, of this EIS. This table includes the convergence requirements for the head change criterion, residual criterion, and damping factor. A description of how these settings are used by the solver to determine when convergence has been achieved is included in Section L.5.3 and re-stated as follows: "Both the head change and residual criteria determine convergence of the solver. The head change criterion is used to judge the overall solver convergence; the residual criterion is used to judge the convergence of the inner iteration of the solver. The damping factor allows the user to reduce the head change calculated during each successive outer iteration."

231-146 In the process of producing the groundwater flow model for this *Final TC & WM EIS*, changes were made to the boundary conditions, hydraulic conductivity zonation, and the head observation data. As a result, the modeling team recalibrated the flow model. This process is presented in the revised Appendix L and includes all material types used in the calibration, per the commentor's suggestion.

231-147 All section and table references in this response are to the *Draft TC & WM EIS*. The hydraulic conductivity values described in Appendix L, Section L.7.2.4 and Table L–14, were derived from preliminary model calibration. For comparison

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as the point of departure," it should be Hanford. A 10^{-6} lifetime fatal cancer risk would mean an average exposure of about 0.024 millirem per year – about 4,200 times lower than the DOE's reference value of 100 millirem per year. For a lifetime cancer incidence risk for women, this value would be reduced to about 0.014 millirem per year.

DOE's analysis in Appendix Q is geared to the inappropriate reference value of 100 millirem per year that is two to four orders of magnitude than the CERCLA risk range of 10^{-4} to 10^{-6}. DOE Order 5400.5 has very little real relevance for a CERCLA site. A Record of Decision that is based on this limit would allow serious violations of the CERCLA risk limits as well as drinking water ARARs for radionuclides and chemicals. The CERCLA risk range and the drinking water standards should be central considerations.

DOE has stated in the Draft EIS that the remediation of the "non-tank-farm 200 Areas is being addressed under CERCLA, which will also satisfy substantive RCRA and Hazardous Waste Management Act corrective action requirements."[13] But the document provides no clue as to how an EIS Record of Decision that is based on risk levels that are at least two orders of magnitude higher for radionuclides alone would be made compatible with a CERCLA cleanup for the non-tank-farm 200 Areas. It would be completely unacceptable if an ROD under the EIS that had lax cleanup criteria, resulting in part from an inappropriate radiation dose limit, were to be used later as a rationale for failing to make a major effort to remediate the non-tank-farm part of the 200 Areas vadose zone. DOE's use of 100 millirem per year as the reference value for assessing the health impacts of alternatives also appears to be at odds with the requirements of DOE Order 5400.1, which is its order for general environmental protection at its facilities, which states in part:

> SPECIAL PROGRAM PLANNING REQUIREMENTS. In addition to other program requirements and documentation required in this Order, each Head of Field Organization shall prepare a separate plan of sufficient scope and detail to reflect program significance, as appropriate, for each of the following activities.
>
> a. A Groundwater Protection Management Program that includes for each site, the following: (1) documentation of the groundwater regime with respect to quantity and quality; (2) design and implementation of a groundwater monitoring program to support resource management and comply with applicable environmental laws and regulations; (3) **a management program for groundwater protection and remediation, including specific Safe Drinking Water Act (SDWA), Resource Conservation and Recovery Act (RCRA) and CERCLA actions**; (4) a summary and identification of areas that may be contaminated with hazardous substances; (5) strategies for controlling sources of these contaminants; (6) a remedial action program that is part of the site CERCLA program required by DOE 5400.4; (7) decontamination and decommissioning and other remedial programs contained in DOE directives. Plans, permits, and other technical documents such as those associated with compliance with the SDWA, RCRA, and CERCLA may be used in whole or in part to satisfy this requirement. This plan shall be completed no later

231-208 cont'd

[13] TC&WM EIS 2009, Vol. 1, pp. 1-13 and 1-14.

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purposes, Table L–15 includes field and laboratory hydraulic conductivity ranges from a limited data survey completed by the *TC & WM EIS* modeling team. As noted in this comment and as shown in Table L–15, no hydraulic conductivity data sources are available for some material types. Additionally, when data sources are available for a material type, hydraulic conductivity values from those sources can vary over a range of several orders of magnitude. The hydraulic conductivity values shown in Tables L–14 and L–15 were used only as starting points for the gradient-based calibration described in Section L.8 and the Monte Carlo optimization and uncertainty analysis described in Section L.9. The set of hydraulic conductivity values selected and used in the Base Case groundwater flow model are listed in Table L–20 and were derived during model calibration, as opposed to being from a particular data source.

231-148 The figure captions referred to by the commentor were in error in the *Draft TC & WM EIS*. The time for which these graphs were prepared was calendar year 2005, not calendar year 2015. This *Final TC & WM EIS* was revised accordingly.

231-149 Although not mentioned in the comment, it is assumed that comment refers to pathlines and contours shown in Appendix L, Figures L–93, L–94, L–95, and L–96 of the *Draft TC & WM EIS*. Based on a review of these figures, the particle pathlines are indeed perpendicular to the groundwater equipotential lines, as required by theory. Therefore, no error exists that requires reconciliation. As stated in Sections L.10.2.3.1 and L.10.2.3.2 of the draft EIS, the pathlines analysis was run using MODPATH (MODFLOW particle-tracking postprocessing package). This *Final TC & WM EIS* was updated with additional text in Section L.8.1.4 to describe MODPATH as a computer program developed by USGS to calculate three-dimensional particle tracking pathlines from steady-state and transient flow simulation output obtained using MODFLOW.

231-150 Due to the size limitations of the *TC & WM EIS* document, many of the details and parameters associated with the release models could not be included. Additional process details like those requested here are included in calculation and analysis packages. However, DOE believes that the relevant information on the release models is provided in Appendix M. In addition, Appendix M has been revised in this final EIS to provide more detail than was previously provided in the draft EIS.

231-151 DOE has included in this *Final TC & WM EIS* additional sensitivity analyses that address varying distribution coefficients for waste-form performance. The commentor is referred to Chapter 7, Section 7.5, for more information.

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than 18 months after the effective date of this Order. The plan shall be reviewed annually and updated every 3 years.[14]

The matter is further complicated by the well-known presence at Hanford of vast amounts of hazardous chemicals, ranging from heavy metals, such as chromium, to organic pollutants, such as carbon tetrachloride and TCE. These substances are covered by the RCRA as well as the counterpart Washington State law known as the Model Toxics Control Act (MTCA). The latter specifies lifetime cancer risk limits of 10^{-6} for individual carcinogens and 10^{-5} for all hazardous substances combined. MTCA includes radionuclides in its definition of hazardous materials.[15]

In view of the fact that Hanford has a large number of chemical and radioactive contaminants the CERCLA framework quoted above indicates that the DOE should use a 10^{-6} lifetime cancer incidence risk for individual chemicals and radionuclides as required by law. This will mean the maximum contaminant levels for evaluating TC&WM EIS alternatives for groundwater and surface water that are much more stringent than drinking water standards. Under this approach the limits for some of the prominent radionuclides are shown in Table 1.

Table 1: Drinking Water Limits Corresponding to a 10^{-6} Lifetime Cancer Incidence Risk Level for Some Man-Made Radionuclides

Radionuclide	picocuries per/liter
Americium-241	0.19
Cesium-137	0.64
Iodine-129	0.13
Plutonium239/240	0.15
Strontium-90	0.35
Technetium-99	7.1
Tritium	400

Notes: 1. Values have been calculated using the lifetime morbidity risk coefficients in Federal Guidance Report 13, published by the Environmental Protection Agency in 1999; the CD containing the risk and dose coefficients was published in 2002.
2. All values are rounded as indicated.

Similarly, carcinogenic chemicals may be assessed by MCLs that use a 10^{-6} risk factor for individual contaminants.

Overall, the above restrictions mean that individual radionuclide and chemical concentrations should be such that they not exceed 10^{-6} lifetime risk levels after clean up is completed.

There is also the question of restrictions relating to multiple contaminants. In this case, the sum of ratios of the concentrations of all radionuclides and carcinogenic chemicals present to their

[14] DOE Order 5400.1, *General Environmental Protection Program*, p. III-2, changed on 6-29-1990, on the web at https://www.directives.doe.gov/directives/archive-directives/5400.01-BOrder-c1, viewed on February 14, 2010, emphasis added.

[15] . The risk level for individual carcinogens could be increased to 10^{-5} under Modified Method C for cleanup, but the overall risk level in case of multiple carcinogens also has to be maintained at 10^{-5}. *Washington Administrative Code*, "Model Toxics Control Act--Cleanup," Chapter 173-340 WAC, Update of 10/12/07, on the web at http://www.ecy.wa.gov/pubs/wac173340.pdf, p. 18 and pp. 94-96

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231-208 cont'd

231-152 DOE disagrees that there was no concerted or documented effort to address the propagation of uncertainties along the modeling chain in the *Draft TC & WM EIS*. As described in Appendices L, M, N, and O, an integrated test of the entire groundwater modeling system was performed on the complex series of sources that produced extensive, regional-scale groundwater plumes. In this analysis, uncertainties regarding inventory, vadose zone flow and transport, and groundwater flow and transport were described, and the effect of those uncertainties on specific metrics was discussed.

231-153 As noted by the commentor, application of the constituent solubility limited-release model is not described in this *TC & WM EIS*. Therefore, as suggested by the commentor, the discussion of this model has been removed from Appendix M for this *Final TC & WM EIS*.

231-154 To avoid confusion and in response to other comments to the effect that the constituent solubility limited-release model was not used for this *TC & WM EIS*, the discussion on the constituent solubility limited-release model in Appendix M has been removed from this final EIS.

231-155 The primary justification for this assumption is the *Technical Guidance Document* (DOE 2005). This document codifies modeling assumptions and agreements between ORP, DOE-RL, DOE Headquarters, and Ecology. The value of 3.5 millimeters per year was agreed upon after extensive discussions and technical input from the Local Users' Group. Additionally, the Black Rock Reservoir sensitivity analysis documented in the *Draft TC & WM EIS*, Appendix V, considers increased water flux into the model due to the construction of a reservoir just west of Hanford. This analysis serves as a model for increases in water flux that could occur over the period of analysis, including those attributable to global warming or climate changes.

231-156 The label for the vertical axis for this figure has been corrected to identify it as the cumulative release of technetium-99 (curies).

231-157 Due to the range of the scale for the COPCs, logarithmic scales are necessary. However, to provide clarity, tables were added to Appendix M, Section M.4, and Appendix N, Section N.4, to provide numeric values for the height of each bar.

231-158 Focused sensitivity analyses for key IDF radionuclides have been included in this *Final TC & WM EIS*. One component of these analyses was an examination of variations in grout waste-form performance. Calculations performed as part of those analyses revealed that changes in grout performance were brought

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MCLs derived from a 10^{-5} cancer incidence risk level should be less than one. This would make the result compliant with MTCA and the combined chemical risk would be in the middle of the CERCLA risk range.

This risk value should be evaluated over time, since the peaks of individual chemical and radionuclide concentrations can be expected to differ due to a variety of factors such as varying K_d's and different half-lives.[16] The peak value of the risk should be less than 10^{-5} for unrestricted use of the site after cleanup is completed. *231-208 cont'd*

Recommendations: In view of the fact that Hanford has a large number of chemical and radioactive contaminants the CERCLA framework quoted above indicates that the DOE should use a 10^{-6} lifetime cancer incidence risk for individual chemicals and radionuclides as required by law. For all carcinogens, the cancer incidence risk level should not exceed 10^{-5}, an upper bound value required by MTCA when there is more than one carcinogen.

D. Tank Storage and Waste Retrieval Alternatives

The alternatives that require building new double shell tanks are unrealistic and could cause a variety of problems and delays. They should be ruled out. DOE's Alternative 2B for waste storage appears to be the best one available. No new DSTs would be built, but four new below-grade storage and waste conditioning facilities, called Waste Receiver Facilities, would be built. *231-209*

The technologies for retrieval of waste from the tanks in order to deliver it to the Waste Treatment Plant are complex and pose a variety of technological risks. For instance, sluicing of waste requires the addition of vast amounts of water under pressure – it is projected to increase the volume of the retrieved solid waste by a factor of four.[17] Sluicing and use of chemicals could also cause corrosion and cracking. This is noted in the TC&WM EIS: *231-210*

> Stress-corrosion cracking and pitting/crevice corrosion are the failure mechanisms most applicable to the SSTs that have leaked in the past. The rate at which these modes of corrosion may have progressed in nonleaking SSTs is unknown. However, the general condition and age of the SSTs suggest that new SST leaks could occur during retrieval actions that involve additions of liquid to the tanks (DOE 2003c).[18]

As another example, chemical removal to achieve a 99.9 percent volume removal level could create more hazardous wastes and potentially aggravate residual contamination on the site. Corrosive chemicals could also increase the risk of new tank leaks. The TC&WM EIS identifies this as the only approach to achieving a retrieval of 99.9 percent of the waste volume. *231-211*

In view of the risks of adding chemicals and of sluicing in the SSTs, it appears to us that the use of vacuum-based retrieval, complemented by the in-tank vehicle, which is a mobile retrieval *231-212*

[16] K_d is the ratio of the concentration of a contaminant in the soil to that in the water. A low K_d means a higher water contamination for a given soil concentration and vice versa.
[17] TC&WM EIS 2009, Vol. 2, p. D-28, where the DOE states: "Current analysis projects that three volumes of sluicing liquid would remove one volume of SST solids".
[18] TC&WM EIS 2009, Vol. 2, p. E-28.

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about by modifying contaminant diffusivities in the waste form, and that this is accomplished by adjusting the distribution coefficients of the radionuclides. DOE notes that, where available, the parameter values (including those for distribution coefficients) used in the analyses are representative of site conditions. Sources include both site literature and, in some key instances, values from the *Technical Guidance Document* (DOE 2005), which was signed by DOE and Ecology. In those cases where site-specific information was not available, estimates were taken from the literature.

231-159 Please see response to comment 231-152 regarding the integrated test to address uncertainties throughout the groundwater modeling system.

231-160 The difference between the number of chemical constituents addressed in the source release model results (Appendix M, Section M.4) and the number addressed in the vadose zone transport model results (Appendix N, Section N.4) has been clarified in this *Final TC & WM EIS* to ensure consistency in the constituents addressed in the two appendices.

231-161 In response to this comment and others, further explanation and description have been provided in Appendix N of this *Final TC & WM EIS*.

231-162 The primary justification for this assumption is the *Technical Guidance Document* (DOE 2005). This document codifies modeling assumptions and agreements between ORP, DOE-RL, DOE Headquarters, and Ecology. The value of 3.5 millimeters per year was agreed upon after extensive discussions and technical input from the Local Users' Group. Additionally, the Black Rock Reservoir sensitivity analysis documented in the *Draft TC & WM EIS*, Appendix V, considers increased water flux into the model due to the construction of a reservoir just west of Hanford. This analysis serves as a paradigm for increases in water flux that could occur over the period of analysis, including those attributable to increased precipitation.

231-163 The figure shows all sources of technetium-99 in calendar year 2005. The label indicates the location of the plume that originated from BY Cribs. The figures and text in Appendix N have been revised for clarification.

231-164 Additional discussion on the determination of the Van Genuchten parameters has been added to this *Final TC & WM EIS*.

231-165 This figure was taken from the 2007 Hanford sitewide monitoring report. The interpretation of this plume is that the BY Cribs are the primary source of the technetium-99. It should be noted that the BY Cribs delivered a nonuniform flux

system, should be the preferred options to retrieve 99 percent of the waste in the tanks. These methods should especially be preferred in tanks that have leaked or are suspected of having leaked. Further development of these methods to achieve greater than 99 percent retrieval is desirable. Sluicing (or modified sluicing) can be used to increase the proportion of recovered waste beyond 99 percent or as necessary to achieve the 99 percent target if it cannot be achieved with a combination of vacuum-based and in-tank vehicle mobile system retrieval.

231-212 cont'd

We are in agreement with the TC&WM EIS approach that the SST waste transfer infrastructure not be used for tank waste transfer. Rather, as noted below, this SST infrastructure, which contains residual high-level waste, should be removed and stored as HLW (see below).

The goal should be to retrieve at least 99 percent of the waste volume and as much beyond that as possible without further compromising the integrity of the SSTs or inducing leaks in the inner shell of the DSTs. This is because the remaining one percent of the waste volume would still likely contain a huge amount of residual radioactivity.

231-213

The characterization of residual radioactivity in the TC&WM EIS ignores the technical history of the tanks and the non-uniform nature of distribution of radionuclides in the waste. While a highly accurate estimate of residual radioactivity by radionuclide would not be possible at the present time and will depend to some extent on retrieval technology, a much better set of estimates based on the history of the tank farm should be possible.

Appendix D shows DOE assumptions regarding residuals in the tanks. The simple, but highly unrealistic, assumption used is that the proportion of radioactivity of each radionuclide removed will be the same as the proportion of the volume removed. The assumption is applied to every volume removal option considered – 90 percent, 99 percent, and 99.9 percent. So for instance, residual strontium-90 at 99 percent retrieval is assumed to be 505,000 curies, since the source term in the tanks is estimated at 50.5 million curies.[19] Similarly, the cesium source term in the tanks is estimated at 45.9 million curies; the residual source term after 99 percent removal is estimated at 459,000 curies – and so on for all radionuclides listed in the tables.

231-214

This is not a reasonable way to estimate residual radioactivity or the impacts of various options of tank closure. For instance, we know that the acidic wastes from the reprocessing canyons were neutralized prior to storage in the SSTs and DSTs. This process tends to separate out various radionuclides into different parts of the waste. Specifically, the actinides, including plutonium and uranium, would tend to go to the bottom sludge layer, while strontium-90 also tends to go to the sludge layer with the actinides. In contrast, the cesium remains preferentially in solution after neutralization. Evaporation of the solution and the crystallization process subsequent to evaporation would tend to concentrate cesium-137 in the salts.

Other chemical processes at Hanford, such as addition of ferrocyanides, addition of solvents and organic complexants, inter-tank waste transfers, and processing of some wastes in the 1950s to extract uranium, have further complicated the picture. While this makes it difficult to estimate

[19] SST and DST residuals are separately estimated. They have been added here. The data cited here are from Tables D-4 and D-5 for the SST and DST source terms and Tables D-16 and D-17 for the residuals. See TC&WM EIS 2009, Vol. 2, Appendix D.

to the vadose zone, and that the site in question is near the groundwater divide across the Central Plateau of Hanford, where groundwater flow directions vary widely over time. Under these conditions, multilobed plumes can be expected to develop.

231-166 The label of Figure N–80 in the *Draft TC & WM EIS* has been revised to reflect kilograms released to the aquifer in Figure N–97 in this *Final TC & WM EIS*.

231-167 Appendix D, Section D.1.4, Historical Leaks and Other Releases, provides a discussion on the use of the Hanlon (2003) document and explains the uncertainties of this information on past leaks.

231-168 The dispersivity threshold was determined through a series of calibration tests. In these tests, the dispersivity parameters were varied and the resulting spatial distributions of the tritium plumes from the PUREX and REDOX waste sites were qualitatively compared with associated plume maps provided in the *Hanford Site Groundwater Monitoring for Fiscal Year 2003* (Hartman, Morasch, and Webber 2004). A more detailed discussion of these calibration tests is provided in Appendix O, Section O.2.6 and Tables O–3 and O–4, of this *TC & WM EIS*.

231-169 DOE agrees that the modeling results for past conditions are different under Tank Closure Alternative 1 (see Appendix O, Table O–10) and Tank Closure Alternative 2A (Table O–16). For example, the predicted peak concentration of tritium in Table O–10 occurs during 1956 at 2,855,631 picocuries per liter, while the corresponding entry for Table O–16 occurs during 1956 at 2,955,633 picocuries per liter. These numbers are different by about 1 part in 30, roughly 3 percent. DOE disagrees with the commentor's suggestion that this difference is an indication of model instability. As stated in this *TC & WM EIS*, the results under each individual alternative for each constituent are obtained by aggregating all of the individual runs for the sources composing that alternative (typically on the order of 30 to 40 individual runs). Also, as stated in this *TC & WM EIS*, each transport run contains a stochastic component (to model hydrodynamic dispersion). The result of adding 30 to 40 runs, each of which contains small random perturbations, and selecting the maximum year and concentration from the resulting sum is not expected to yield identical results under every alternative. In fact, differences of several percent in the peak concentrations are exactly what are expected and are an indication of stability in the model, rather than instability. Finally, Appendix O discusses the precision, and Appendix U, the accuracy, of the groundwater modeling, and both strive to suggest that, for the purpose of comparing impacts among the alternatives,

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the effect of removal of a certain waste volume on residual radioactivity, a best estimate would start with the well known effects of waste neutralization, which has occurred in all cases. The sludge layer that forms at the bottom of the tanks after waste neutralization is a small proportion of the volume and contains almost all the actinides as well as strontium-90. It is also reasonable to assume that sluicing and vacuum removal technologies would tend to mobilize the more easily removed liquids and salts, while the encrusted portions of the sludges would be preferentially retained in the tanks as residuals.

These considerations indicate that the residual plutonium, uranium, neptunium, and strontium-90 in the tanks could well be an order of magnitude higher than estimated in Appendix D of the TC&WM EIS. At the same time, the residual cesium-137 and tritium would be far lower than estimated. This means that residual strontium-90 could be in the millions of curies even with 99 percent waste volume removal. As for plutonium, residuals could be well over 100 kilograms, while residual uranium could be well over 100 metric tons.[20]

These considerations point to the need for two items in a preferred option for tank closure:

a. Waste residues must be carefully characterized by radionuclide and hazardous chemical, especially in the final stages of tank waste removal. The use of the in-tank mobile unit could be particularly useful in this regard. Appropriate research and development to enhance the capabilities of this or some other in-tank mobile vehicle should be initiated so that residual tank wastes can be accurately characterized.
b. No actions should be planned or taken that would make waste retrieval beyond 99 percent impossible. This rules out alternatives for closing tanks in place that would make clean closure by tank removal (which is part of Alternative 6B, for instance) impossible.

Recommendations: At least 99 percent of the waste volume should be removed. Approaches that risk creating more hazardous wastes and increase the risk of new tank leaks and tank corrosion should be de-emphasized or not used. Residual radionuclide amounts should be carefully characterized. No actions should be planned or taken that would make waste retrieval beyond 99 percent impossible. This rules out alternatives, such as grouting, for closing tanks in place that would make clean closure by tank removal (which is part of Alternative 6B, for instance) impossible. No new DSTs should be built.

231-214 cont'd

E. Waste treatment

The success of the Waste Treatment Plant is the most critical element to the ability to remove waste from the SSTs and prepare it for long-term management. Certain core elements of the WTP – pretreatment of the waste, at least two high-level waste melters, at least two low activity waste melters, are common to all alternatives except the no-action alternative and Alternative 6A. The robust and reliable functioning of the WTP is central to the success of the purposes of

231-215

[20] Natural uranium isotopic composition has been assumed in this calculation, since natural uranium or uranium of very low enrichment were the main types of uranium fuel used at Hanford.

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differences of about an order of magnitude are probably significant. DOE agrees with similar comments that the number of significant figures presented in maximum concentration tables needs reexamination. The entries in these tables were generated directly from computer output and the formatting remained unchanged to facilitate traceability and quality assurance. DOE is of the view that these results are probably better represented with fewer significant figures, and the data presentation in this *Final TC & WM EIS* has been revised accordingly.

231-170 The difference referred to by the commentor is not a discrepancy. The Base Case and Alternate Case flow fields were independently calibrated to water table elevation. In general, calibration to water table elevation is a useful method and, in the absence of specific groundwater flux measurements, probably the best method to develop a reasonable flow field. However, calibration to head alone does not guarantee that transport predictions will agree with field observations. This is the reason that the transport predictions were checked against field observations. It was determined that two independent models calibrated to head data yield qualitatively different results for transport, and that the Base Case calibrated model is in better agreement than the Alternate Case calibrated model with field data.

231-171 The text in this *Final TC & WM EIS* has been revised to say "particle density," instead of "bulk density."

231-172 The purpose of the analysis presented in Appendix O, Section O.6.4, was to clarify whether peak concentrations for uranium-238 were captured during the 10,000-year period of analysis. The results in Section O.6.4 suggest that the peak concentrations for uranium-238 definitely do occur after the 10,000-year period of analysis, probably in the 20,000- to 30,000-year timeframe. This *Final TC & WM EIS* was revised to explicitly state this finding.

231-173 The results presented in Appendix O, Section O.6.4, are for the Base Case flow scenario. This *Final TC & WM EIS* was revised accordingly.

231-174 Material on how concepts such as dose, risk, and Hazard Index are applied in environmental actions is provided in Appendix Q, Section Q.2, of this final EIS. In addition, Chapter 3, Section 3.2.10.1, and Appendix K have discussions of dose and risk concepts, including established standards and guidelines.

231-175 Graph formats for each alternative were chosen to display the data for maximum readability. Presentation of the results was revisited as a matter of course in the preparation of this final EIS.

the TC&WM EIS. The WTP is under construction and, according to the TC&WM EIS, is 40 percent complete.[21]

Alternative 6A would treat all tank waste as high-level waste and require five high-level waste melters. It is also unclear whether the very diverse waste types that would constitute the melter feed could be successfully processed as borosilicate glass. Further, under this alternative, high-level waste processing would continue for 145 years. The WTP would have to be replaced. New DSTs would have to be built. The technical uncertainties would be compounded by the logistical and budgetary uncertainties. Risks of SST leaks and tank failures over such a long period would increase. For these reasons, we support pretreatment of the waste and completion of treatment expeditiously.

231-215 cont'd

1. Safety

However, the course towards successful pretreatment is unclear at present. In a November report (issued just a few weeks after the TC&WM EIS), the Defense Nuclear Facilities Safety Board raised serious performance and safety concerns about the pulse jet mixers that are a critical part of the pretreatment process in the WTP.[22]

The three safety issues identified were:

a. Inadvertent criticality due to preferential separation and settling of particles with "high concentrations of fissile materials (e.g. uranium or plutonium)" creating a sediment layer at the bottom of the pretreatment vessel due in part to "underpowered pulse jet mixers";
b. Release of flammable gas generated in bottom sediments by radiolysis under certain conditions;
c. Lack of demonstration of a sufficient level of reliability of the pulse jet mixer for the one million to ten million cycles and the problem that "insufficient reliability can ultimately lead to failure of structural components in process vessels…."[23]

231-216

The report noted that the DOE contactor, Bechtel National, Incorporated (BNI) "has not conducted nor does it plan to conduct any long-term test to demonstrate the reliability of a fully prototypic mixing system…."[24]

The problem is further complicated by the reality that the solution to the problems identified by the DOE would, according to the Vice-Chairman of the DNFSB, require the "deployment of new mixing, sampling, and separation systems. The result would be new design basis requirements

[21] TC&WM EIS 2009, Summary, p. S-36.
[22] Memorandum from A. Poloski to T.J. Dwyer, *Subject: Inadequate Mixing, Waste Treatment and Immobilization Plant*, Defense Nuclear Facilities Safety Board Staff Issue Report, November 11, 2009, with a cover letter dated January 10, 2010 from Vice-Chairman of the DNFSB, John E. Mansfield, to Inés Triay, Assistant Secretary of Environmental Management, Department of Energy. On the Web at http://www.dnfsb.gov/pub_docs/staff_issue_reports/hanford/sir_20100106_hd.pdf. Memorandum cited hereafter as DNFSB 2009; cover letter cited hereafter as DNFSB 2010.
[23] DNFSB 2009, p. 2.
[24] DNFSB 2009, p. 2.

231-176 The list of constituents included in the detailed analysis for the *Draft TC & WM EIS* was developed using a screening analysis based on constituents and inventories present in the BBI for the HLW tanks. The screening analysis considered decay and ingrowth both at the source and during transport. In particular, for plutonium-241, complete conversion of the BBI plutonium-241 inventory to americium-241 would increase the BBI americium-241 inventory by approximately 3 percent and would contribute less than 1 percent of dose impact for the intrusion screening scenarios.

231-177 DOE believes that a representative set of scenarios was selected for analysis in this EIS in accordance with standard practice. The primary use of that set was to produce estimates of the human health impacts, thus informing the comparison of alternatives. The scenarios were chosen both to accommodate lifestyles representative of the region and to include—in addition to direct groundwater consumption—indirect exposure by way of other environmental media. Because the scenarios analyzed were constructed assuming significant exposures to contaminated materials via multiple media and exposure pathways, DOE believes that additional variations would not lead to outcomes qualitatively different from those already presented in the *Draft TC & WM EIS*.

231-178 Appendix Q includes long-term radiological and chemical human health impacts. Please see Appendix K for short-term radiological and chemical human health impacts.

231-179 The discussion in Appendix Q on page Q–22 of the *Draft TC & WM EIS* states that doses due to the ingestion of drinking water are reported in the long-term impacts analysis. This analysis includes those long-lived radionuclides of concern.

231-180 Regarding the exposure parameters used in the American Indian scenarios, the intent of those scenarios was to collectively reflect American Indian lifestyles for the purpose of comparison. Both the activities and parameters used in those scenarios are based on existing reports and compilations. It was never the intent to analyze all possible American Indian scenarios. However, in Appendix W, Section W.3, data provided by the tribes are now used to estimate peak impacts on Yakama and CTUIR hunter-gatherers for a representative alternative, Alternative Combination 2, without non–*TC & WM EIS* sources.

231-181 In response to this comment, DOE has reviewed regulatory guidance and tribal recommendations regarding this scenario and has increased the fish intake and sweat lodge use for the American Indian hunter-gatherer. Also in Appendix W,

Commentor No. 231 (cont'd): Harry Smiskin, Chairman, Yakama Tribal Council, Confederated Tribes and Bands of the Yakama Nation

for particle size and density for WTP that must be consistent with the actual performance of the newly deployed systems."[25]

This is a rather alarming state of affairs when so much construction of the WTP has already been completed. Addressing the problems identified by the DNFSB, redesign as necessary, and full testing are essential, since pretreatment is central to the separation of high-level tank waste into high activity and low activity waste streams that would then be vitrified in separate melters into Immobilized High-Level Waste (IHLW) and Immobilized Low Activity Waste (ILAW). The present course – no long-term reliability test – is very risky, especially as the DOE does not appear to have a viable back up plan.

231-216 cont'd

The Final EIS should include provisions for the full implementation of the DNFSB's recommendations. It should also include urgent development of backup technologies for pretreatment that are compatible with vitrification either as IHLW and ILAW of the all the waste in the waste steams created from such pretreatment. As noted below, we are opposed to onsite disposal of ILAW and to any treatment option, such as bulk vitrification or stone casting, that would result in any tank waste being disposed of onsite. A back up approach could be explored would be to expand Alternative 6A to include more high-level waste melters, some possibly with phosphate glass, so that additional DSTs and replacement of the WTP would not be required and processing would be completed within about 25 years of the start of the WTP, as now envisioned for Alternatives 2B, 6B, and others. Any option that extends the emptying of the tanks and vitrifying those wastes beyond 2043 would be unacceptable. There have already been far too many delays.

2. Technetium-99 removal

231-217

As presently designed, the WTP does not include removal of technetium-99 so that it can be vitrified in the HLW waste stream. The TC&WM EIS makes contradictory statements about Tc-99 removal and its environmental impacts. In the summary it states:

> Tank Closure Alternative 2B includes technetium-99 removal in the WTP, a pretreatment activity that separates technetium-99 and sends it for immobilization into IHLW glass. By contrast, Tank Closure Alterative 2A assumes no technetium-99 removal in the WTP; therefore, most of the technetium-99 is immobilized in ILAW glass and disposed of onsite in an IDF. **The analysis indicates that ILAW glass with or without technetium-99 has similar potential short-term and long-term impacts. The analysis further indicates that removal of technetium-99 and disposal of it offsite as IHLW glass provides little reduction in the concentrations of technetium-99 at either the Core Zone Boundary or the Columbia River nearshore.** This is because the rate of release of technetium-99 from ILAW glass is small when compared to the rate of release of technetium-99 from other sources such as ETF [Effluent Treatment Facility]-generated secondary wastes and tank closure secondary wastes.[26]

However, Volume 1 of the TC&WM EIS states:

[25] DNFSB 2010.
[26] TC&WM EIS 2009, Summary, p. S-91. Emphasis added.

Section W.3, data provided by the tribes are used to estimate peak impacts for both a Yakama and a CTUIR hunter-gatherer for a representative alternative, Alternative Combination 2, without non–*TC & WM EIS* sources.

231-182 The peak total risk during the year of peak total risk is calculated by summing the total risk for all constituents for each year and then determining the maximum risk and year over the time period. The peak total dose during the year of peak total dose is calculated in the same manner. When dealing with a mixture of radionuclides, it is possible for the peak total risk and peak total dose to occur in different years.

231-183 One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. To this end, this *TC & WM EIS* evaluates the long-term impacts of different potential approaches to closing the SST farms ranging from no closure to complete clean closure. As discussed in this *TC & WM EIS*, the modeled responses of the groundwater system (as indicated by concentration of contaminants as a function of time at the Core Zone Boundary) support the finding that past leaks from SSTs are an important factor in determining future outcomes.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

231-184 There are two aspects that have bearing on predicted risk in the *Draft TC & WM EIS*. First, there is some conservatism in the predicted concentrations presented in the draft EIS, which resulted in predicted modeled exceedances of benchmark standards. This is why the second aspect—the regulatory context—remains important. This EIS addresses those laws and requirements that would apply to the proposed actions, depending on the alternative. Issues concerning the ability to meet legal standards or requirements are also discussed, along with the potential mitigation measures that may be needed and that are feasible for DOE

> Another assumption detailed in Appendix D of this *TC & WM EIS* is partitioning of technetium-99 in IHLW, ILAW, and supplemental treatment primary waste forms. Without technetium-99 removal as a pretreatment step in WTP, the analysis assumes that roughly 97 to 98 percent of the technetium-99 from treated tank waste would be captured in ILAW or supplemental treatment waste products, 1 to 2 percent would be captured in secondary waste forms, and less than 1 percent would be captured in IHLW.… However, under Tank Closure Alternative 2B, where technetium-99 removal would be incorporated as a pretreatment step in WTP, 97.5 percent of technetium-99 is expected to be captured in IHLW and only 1 percent in ILAW.… Similar to iodine-129 above, **technetium-99 is a conservative tracer with a long half-life (211,000 years) and is projected to exceed benchmark concentrations. Potential mitigation measures that could be considered include technetium-99 removal as a pretreatment option in the WTP.** Also, the development of more robust, longer-performing waste forms, particularly for supplemental treatment technologies and grouted secondary waste, could be pursued.[27]

231-217 cont'd

The analysis in the TC&WM EIS indicates that while other sources of Tc-99 contribute most of the contamination, Tc-99 from the tanks themselves would constitute a sufficient source term to cause an exceedance of the reference drinking water limit of 900 picocuries per liter that DOE has used. Specifically, the difference in peak groundwater concentration of Tc-99 at the boundary of the core zone between Alternative 2A, which does not include Tc-99 removal, and in Alternative 2B, which does, is 1,900 picocuries per liter.[28] Hence, while the total concentrations in both cases are over 25,000 picocuries per liter, the situation calls for reducing other sources rather than adding a source that by itself would cause a violation of the drinking water limit. As we shall see the main other source of Tc-99 within the actions specified in the TC&WM EIS is offsite waste, which is easily controlled by not bringing it to Hanford.

Tc-99 removal technology exists. Some alternatives included in the TC&WM EIS include its incorporation. It should be incorporated into the WTP design and construction as specified in Alternative 2B.

3. Iodine-129 capture

231-218

The TC&WM EIS does not include any alternative for incorporating iodine-129 in the HLW waste stream. Iodine is volatile and would have to be captured by secondary recovery. According to the TC&WM EIS:

> One of the assumptions of the *TC & WM EIS* analysis is that approximately 20 percent of iodine-129 would be captured in primary waste forms (e.g., ILAW, bulk vitrification, or steam reforming waste forms), with the balance due to volatization recovered in secondary waste forms. The only exception would be under Tank Closure Alternatives 3B, 4, and 5, where cast stone would capture a higher percentage of iodine-129 due to the nonthermal nature of this treatment technology**. Iodine-129,** as mentioned above, is one of the conservative tracers with a half-life of approximately 17 million years and **is**

[27] TC&WM EIS 2009, Vol. 1, p. 7-16. Emphasis added. Grouting or any onsite disposal of Tc-99 from the tanks is inappropriate, since the half-life of Tc-99 is much longer than the timeframe of major geologic disruption in the region, making shallow land burial of such radionuclides inappropriate (see below).
[28] This difference is calculated from Tables Q-59 and Q-80.

to implement. In particular, additional mitigation measures could be required in future permits issued by the State of Washington or addressed under the scope of the TPA as part of future remedial actions that are subject to CERCLA. In the ROD, DOE will identify and discuss the factors considered in reaching its decisions, such as economic, technical, and national policy considerations, along with mitigation and monitoring measures that will be implemented. In all cases, DOE will select activities designed to protect public health and safety.

231-185 Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*. In all cases, DOE will select an approach to cleanup of the site that reflects a commitment to protection of public health and safety.

231-186 Appendix Q, Section Q.2.1, describes the hypothetical receptors analyzed in the human health dose and risk analysis. The receptors include an American Indian resident farmer and an American Indian hunter-gatherer. As described in Section Q.2.2.2, the American Indian resident farmer scenario involves radionuclide and chemical exposures from the drinking of contaminated groundwater, consumption of contaminated plants from a domestic garden, consumption of contaminated domestic livestock, inadvertent ingestion of soil, consumption of contaminated fish, inhalation of contaminated dust, and participation in ceremonial sweat lodge/sauna ceremonies. The American Indian hunter-gatherer scenario is similar except that the exposed adult American Indian is assumed to live a more traditional American Indian lifestyle. For the hunter-gatherer scenario, the domestic garden exposure pathway is replaced by consumption of wild plants, and consumption of domestic livestock, by consumption of game animals, specifically deer. An important difference between the hunter-gatherer and resident farmer scenarios is that the hunter-gatherer is exposed to contamination from both surface water and groundwater. These scenarios, presented in Appendix Q, were developed in consultation with American Indian representatives, and DOE believes they adequately represent the range of exposure scenarios for American Indian peoples. Sensitivity analyses using the specific American Indian parameters provided by the Yakama Nation and the Umatilla Tribes were completed for Alternative Combination 2; the results are included in Appendix W, Section W.3, of this *TC & WM EIS*.

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projected to exceed benchmark concentrations. As such, reasonable mitigation measures could be considered that would recycle secondary waste streams into the primary waste stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, which are considered more stable waste forms than those associated with secondary waste. The current WTP design supports the ability to recycle. For example, one method would involve the recycling of iodine within the WTP by capturing it in the submerged bed scrubber and returning it to pretreatment. This recycling could theoretically concentrate the iodine in the feed stream, which, in turn, could put more iodine in a specific volume of glass product. Also, the development of more robust, longer-performing waste forms, particularly with regard to cast stone, steam reforming, and grouted secondary waste, could be pursued.[29]

231-218 cont'd

The current plan to dispose of iodine-129 in a secondary waste stream in the Effluent Treatment Facility (ETF) is clearly unsatisfactory. The TC&WM EIS analysis shows that the annual flux of iodine-129 at the water table is orders of magnitude greater in case of ETF disposal compared to incorporation in ILAW glass that is disposed of on site. The figure below, reproduced from Appendix N of the EIS, shows that iodine-129 contamination of the groundwater would exceed that from ILAW by two orders of magnitude even when the majority of the iodine-129 (70 percent) is incorporated in the ILAW.

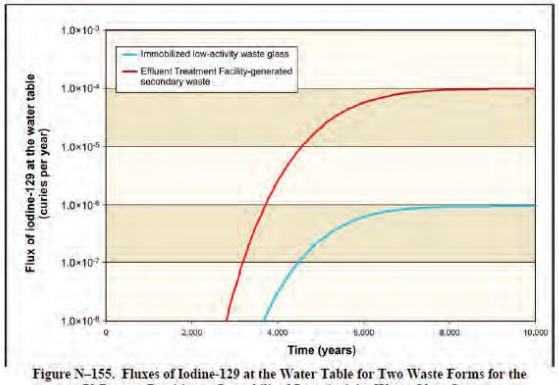

Figure N–155. Fluxes of Iodine-129 at the Water Table for Two Waste Forms for the 70 Percent Partition to Immobilized Low-Activity Waste Glass Case

Source: TC&WM EIS, Vol. 2, p. N-108.

[29] TC&WM EIS 2009, Vol. 1, p. 7-16. Emphasis added.

231-187 Appendix U, Figure U–1, discusses future tritium concentrations. These increases result from multiple sources contributing to the plume. The strength of contribution from each source varies with time. Appendix U of this *Final TC & WM EIS* has been revised to include an explanation of this behavior.

231-188 Appendix U, Figure U–3, discusses future strontium-90 concentrations. These increases result from multiple overlapping sources, each with a different flux to the aquifer as a function of time. Appendix U of this *Final TC & WM EIS* has been revised to include an explanation of this behavior.

231-189 As described in Appendix R, and summarized in Chapter 6, Section 6.1, cumulative impacts were estimated by the addition of impact values for the alternative combinations (Chapters 4 and 5); the baseline (Chapter 3); and past, present, and reasonably foreseeable future actions (Appendices R, T, and U). Because the cumulative impacts analysis involves the consideration of past, present, and reasonably foreseeable future contamination, it includes much of the same information as a baseline risk assessment. As described in Section S.3.5 of Appendix S, 403 waste sites are included as part of the other past, present, and reasonably foreseeable future actions considered in the cumulative impacts analysis for groundwater.

231-190 As described in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, Decisions Not to Be Made, there are six sets of cribs and trenches (ditches) that are contiguous to the SSTs and would fall under the barriers placed over the SSTs during closure. These cribs and trenches (ditches) are CERCLA past-practice units and are evaluated in this EIS as part of a connected action because they would be influenced by barrier placement. These six sets of cribs and trenches (ditches) are noted in Chapter 2, Sections 2.5.2 and 2.9.1, and are described in detail in Appendix D, Section D.1.5.

231-191 The scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and closure of the SST system, including the tank system and the vadose zone impacted by the tank farms (i.e., past leaks). The *TC & WM EIS* closure alternatives considered for the tank farms include no action, landfill closure, selective clean closure, and clean closure (which would involve actions to remove the source of contamination). The State of Washington has agreed that the alternative descriptions identify the information needs necessary to meet SEPA requirements. Ecology expects that the analysis provided in this *Final TC & WM EIS* will provide enough information to adequately inform its permitting requirements. When Ecology provides approval

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Appendix E notes that submerged bed scrubbers will be part of the offgas treatment of both the HLW and LAW melters. It is unclear why the iodine-129 rich scrubber solution cannot be recycled to the HLW waste stream for incorporation into IHLW rather than into ILAW. This is important since under most options, the DOE plans to dispose of ILAW on site. Under Option 6B, the DOE states that ILAW would be managed as HLW and stored on site, but no disposal path is specified. This option should logically include disposal of ILAW glass in a deep geologic repository since it treats ILAW as high-level waste for storage purposes.

The bottom line is that iodine-129 should be recovered an incorporated into glass that will be disposed of in a deep geologic repository. It would be preferable to incorporate this into IHLW and the Final EIS should contain at least one such alternative.

231-218 cont'd

4. Internal inconsistencies in I-129 and Tc-99 contamination estimates

Appendix Q provides details of the results of DOE's calculations regarding the impacts of various alternative actions taken under the TC&WM EIS at various points in the Hanford Site. It also provides the year of peak impact. Appendix U does the same for the combined impacts of actions taken under the TC&WM EIS and other sources of contamination not covered under the TC&WM EIS. Specifically, Appendix U includes the contamination due to the non-tank-farm 200 Areas contamination.

The results in Appendix Q and Appendix U are inconsistent and the inconsistency indicates that at least one set of calculations is incorrect; it may be that both are incorrect.

Specifically, the concentration from TC&WM EIS and non-TC&WM EIS actions should be equal to or greater than that attributable to TC&WM EIS actions alone. This is not the case. For instance, Appendix Q, Table Q-80 states that the technetium-99 contamination at the core zone boundary in the year of peak dose under Alternative 2B (and other comparable alternatives) would be 25,900 picocuries per liter in the year 2050. Appendix U states that under Alternative Combination 2 (of which Alternative 2B is a part) the Tc-99 concentration at the core zone boundary at the time of peak dose would be 1,780 picocuries per liter, or more than an order of magnitude lower. Further, it states that the year of peak impact was in the past – 1997.[30]

How can the impact from all sources be less than the impact from some sources? How can there be a greater concentration on Tc-99 from some activities in the future when Appendix U states that a smaller concentration from all activities has already occurred in the past?

231-219

[30] The Tc-99 concentrations are from Table Q-80 and Table U-9. The values in these tables are given in curies per cubic meter. These have been converted here to picocuries per liter (by multiplying curies per cubic meter by a factor of 10^9) for consistency and comparability with the usual method of stating drinking water MCLs. See TC&WM EIS 2009, Vol. 2, p. Q-98 and p. U-62.

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of DOE's proposed actions by issuing a permit, the applicable WAC regulations will be applied and enforced. The state closure standards for the owners and operators of all dangerous waste facilities are defined (WAC 173-303-610(2)); references to the tank systems (WAC 173-303-640) and corrective action requirements (WAC 173-303-645) are included. The regulations describe specific requirements for closure of the tank system (WAC 173-303-640(8)(a) and (b)), including a requirement for DOE to "remove or decontaminate all wastes residues, contaminated soils, and structures and equipment contaminated with waste" from the tank system. If DOE "demonstrates that no contaminated soils can be practically removed or decontaminated," then the corrective action regulations (WAC 173-303-645) will apply.

231-192 The conveyance of WTP-generated wastewater effluent to, and its treatment in, the ETF and other facilities are discussed in the surface water sections of Chapter 4, Section 4.1.6, of this EIS. Baseline operational characteristics of the ETF and related facilities in the ETF system, including the Liquid Effluent Retention Facility impoundments and State-Approved Land Disposal Site, are discussed in Chapter 3, Sections 3.2.6.3.1 and 3.2.12.1.5. Appendix E, Section E.1.2.3.3.3, presents DOE's enabling assumptions and associated uncertainties regarding future ETF operations and those of the related Hanford facilities in support of Hanford WTP activities. Specifically, DOE assumed that the ETF main building (2025) and the ETF support building (2025-EA) would require replacement, while associated facilities in the ETF system, including the Liquid Effluent Retention Facility impoundments and State-Approved Land Disposal Site, would be suitable for life extensions. DOE also assumed that the current design capacity of the ETF would be sufficient to support all current Hanford activities, as well as the tank closure activities analyzed in this EIS. While DOE has not further quantified or characterized potential influent streams to the ETF system, DOE has accounted for the impacts of constructing, operating, and deactivating facility replacements for the ETF and other facilities throughout this *TC & WM EIS* to provide a conservative analysis of future waste treatment infrastructure needs based on the enabling assumptions and given uncertainties.

231-193 DOE is committed to meeting its obligations to manage and ultimately dispose of Hanford waste, including the HLW, HLW melters taken out of service, and selected tank closure waste (highly contaminated tank debris, equipment, soils, and rubble), all of which are analyzed in this *TC & WM EIS*. Appendix E, Section E.1.2.4.4, of this *TC & WM EIS* describes the WTP melters and the assumptions and uncertainties regarding disposition of the melters after use. It is

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The same problem is found in these two tables in regard to iodine-129. The respective concentrations at the core zone boundary are 30 picocuries per liter in Table Q-80 (in 2050) and only 8.79 picocuries per liter in Table U-9 (in 1997).

A careful consistency check as well a check on the validity of the source terms and models that underlie these calculations is needed, quite apart from issues associated with the validity and accuracy of the models.

Recommendations: The Final EIS should include provisions for the full implementation of the DNFSB's recommendations. There should be no onsite disposal of ILAW and or resort to any treatment option such as bulk vitrification or stone casting that would result in any tank waste being disposed of onsite. All tank waste should be immobilized either as ILHLW or ILAW. The approach in Option 2B for two HLW and six ILAW melters would meet this goal. Treatment should include alternatives for incorporating almost all Tc-99 (as in Alternative 2B) and iodine-129 (not presently in any alternative) in IHLW. The calculations for Tc-99 and I-129 need to be carefully checked for consistency, quite apart from issues associated with the validity and accuracy of the models.

231-219 cont'd

F. **Treatment of the Cesium and Strontium Capsules**

While the DOE is formally deferring the question of the final disposition of the cesium and strontium capsules, which constitute the most concentrated large source of radioactivity in the DOE complex, the TC&WM EIS discussed the treatment of these capsules. However, only one alternative to the no action alternative is presented. This is unacceptable for the two largest source terms and by far the most concentrated source terms of radioactivity on site.

The course of action that is common to all alternatives other than "no action" is that DOE would "[r]etrieve cesium and strontium capsules from the WESF [Waste Encapsulation and Storage Facility] for de-encapsulation at the Cesium and Strontium Capsule Processing Facility and treatment in the WTP."[31]

It would be safer to remove the cesium and strontium capsules into dry storage and consider a wider range of alternatives to treatment in the WTP. Mixing tens of millions of curies of strontium-90 and cesium-137 into IHLW would greatly increase the heat load and external radiation associated with IHLW. This may be problematic for repository disposal, since heat loading is a primary determinant of space requirements. The number of containers of IHLW will be very large. Increasing the heat loading in these containers could increase the costs of disposal considerably. It would be prudent, especially in a context when no repository site has yet been selected and Yucca Mountain is off the table, to consider a variety of immobilization options for the cesium and strontium now in the capsules. The immobilization of the cesium and strontium in the capsules presents an opportunity to develop more durable waste forms and this should be pursued in parallel to treatment of tank waste in the WTP.

231-220

[31] TC&WM EIS 2009, Summary, p. S-23.

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assumed for analysis purposes that the HLW melters would be placed in interim onsite storage until disposition decisions are made and implemented, and that the LAW melters would contain residual ILAW and would be disposed of as MLLW on site in an IDF. If DOE makes decisions regarding their disposition that are not within the bounds of this *TC & WM EIS*, additional analysis may be required.

231-194 The Summary is intended to provide a brief overview of the material contained in this *TC & WM EIS*. For a description of the general WTP configuration, the reader is directed to Chapter 2, Section 2.2.2.2.1, of this *TC & WM EIS*. Chapter 2, Section 2.5.2, provides a more detailed description of the various WTP configurations under the alternatives, along with graphics that depict the differences.

231-195 The purpose of Table S–1 in the *TC & WM EIS* Summary is to provide an overview of comparison of the Tank Closure alternatives. Whether or not a new or additional facility is included under any of the Tank Closure alternatives is indicated by the terms used in the first column. For example, the use of the terms "New WRFs" or "New DSTs" indicates that additional or new facilities would be constructed under that specific alternative. Another example is the use of the terms "Expanded LAW vitrification" or "Replacement of WTP," both of which mean additional or new facilities. DOE does not believe additional clarification is warranted.

231-196 For analysis purposes, the period of time assumed for postclosure care is 100 years. For disposal facilities licensed by NRC for the disposal of Class A and Class B low-level waste without special provisions for intrusion protection, institutional control of access to the site is required for up to 100 years. For hazardous waste management disposal units, RCRA and Ecology hazardous waste regulations require a 30-year postclosure care period; however, due to the types of waste planned for disposal, it was assumed that this period would be extended to 100 years.

231-197 As described in Appendix E, Section E.1.1.1, and, specifically, Section E.1.1.1.2.1, DOE has established and operated under stringent requirements and procedures that ensure the compatibility of waste streams prior to their transfer and mixing. Such requirements and procedures have been in place for many years at Hanford, and DOE is confident that safe waste operations involving compatible waste streams will continue within the tank farms.

231-198 The waste retrieval technologies analyzed in this EIS represent the best-available waste retrieval technologies at the time of this EIS's preparation and the analyses

Finally, a timeline is needed for completion of cesium and strontium immobilization. It should be completed no later than the immobilization of tank waste.

Recommendations: It would be safer to remove the cesium and strontium capsules into dry storage and consider a wider range of alternatives to treatment in the WTP.

G. Tank and Tank Farm Closure

As discussed above, tanks are likely to have very large residual source terms for radionuclides like strontium-90 and plutonium-239/240 even in the case of 99 percent volume retrieval. Grouting the tanks or simply abandoning the tanks after a certain period of surveillance (the year 2193 is suggested in Alternative 2A) would be inappropriate. Alternatives 6A and 6B propose clean closure, including removal of tanks, and removal of ancillary equipment and some contaminated soil as follows:

> **Alternatives 6A and 6B.** Clean-close all 200-East and 200-West Area SST farms following deactivation by removing all tanks, associated ancillary equipment, and contaminated soil to a depth of 3 meters (10 feet) directly beneath the tank base. Package these materials as HLW for storage on site. Excavate deep soils, where necessary, to remove contamination within the soil column, and treat these soils in the PPF [Preprocessing Facility] to make them acceptable for disposal on site. Process the resulting liquid waste stream in the PPF and dispose of it on site in an IDF [Integrated Disposal Facility]. Dispose of the washed soils in the RPPDF [River Protection Project Disposal Facility]. Cover the cribs and trenches (ditches) associated with the tank farms with a landfill barrier (Base Cases) or clean-close them (Option Cases).[32]

This is broadly acceptable with some provisos. Treating soil as high-level waste and storing it as such is technically and legally sound. But making soils "acceptable for disposal on site" after treatment needs to be defined. As noted above, this acceptability must be in the framework of an overall risk criterion from all residual radioactivity and carcinogenic chemicals not exceeding 10^{-5}. None of the existing plans for cleanup of the Hanford Site meet this criterion. A second proviso is that excavation of the soil may need to be carried out around the tanks and the depth of excavation below them beneath may need to be more or less than 3 meters, depending on the tank and the extent and type of leaks. Rather than a fixed depth, the excavation extent and depth should be determined by sampling and characterization as the tanks and ancillary pipes and other equipment are decommissioned and dismantled. Third, clean closure of the DSTs and associated ancillary equipment should be made part of the TC&WM EIS.

The "Option Case" for Alternative 6B includes clean closure of six cribs and trenches. While this would increase short-term impacts, such as demand for workforce and resources, it would greatly decrease long-term impacts, as noted in the TC&WM EIS:

> Cribs and trenches are major contributors to potential long-term groundwater impacts for all Tank Closure alternatives due to their early discharges in the 1950s and 1960s. As shown in Figure 2–127, for Tank Closure Alternative 1 (no landfill closure of the cribs and trenches), Tank Closure Alternatives 2B, 3A, 3B, 3C, and 6C (landfill closure of the

[32] TC&WM EIS 2009, Summary, p. S-26.

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231-220 cont'd

231-221

are likewise based on the best-available tank, tank waste, and waste retrieval information. However, as additional, relevant information becomes available that is not bounded by the analysis of the representative technologies in this EIS, DOE would re-evaluate this as appropriate.

231-199 "Combined impacts," as used in the referenced section, means the impacts of the tank closure, radioactive waste management, and FFTF decommissioning activities. Tank closure activities would occur in the 200-East and 200-West Areas, which are about 3.2 kilometers (2 miles) from each other, with most activities occurring near the WTP in the 200-East Area. Other tank closure activities would occur in the tank farms and the supplemental treatment technology sites that spread across the 200-East and 200-West Areas. The primary waste management activities would occur at the 200-West Area waste disposal facilities or IDF-East or -West. FFTF is about 16.1 kilometers (10 miles) from the 200 Areas. Because of the distances between the primary locations where activities would occur, there would not be any reasonable combined noise impacts, so no noise impact analyses were performed for these alternative combinations.

231-200 The preferred alternative discussion in Chapter 2, Section 2.12, of this EIS describes how landfill closure addresses past soil contamination. Chapter 7, Section 7.1, describes the closure process in more detail for a waste management area.

231-201 The *TC & WM EIS* analysis shows that receipt of offsite waste streams containing specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this final EIS.

231-202 This EIS assumes several different types of end-state management, as described in the Summary, Chapter 2, and Chapter 9 ("Glossary"), including administrative controls, active institutional controls, and postclosure care, as appropriate. Each of these end-state management options would take place at the completion of an action and is assumed to occur for 100 years following the end of the action (e.g., active institutional controls would be maintained for 100 years following final placement of waste in a storage facility). The 10,000-year time period described in this *TC & WM EIS* represents the period of analysis used for the long-term impact analyses for groundwater, human health, and ecological risk. It

Commentor No. 231 (cont'd): Harry Smiskin, Chairman, Yakama Tribal Council, Confederated Tribes and Bands of the Yakama Nation

cribs and trenches), and Tank Closure 6B, Option Case (clean closure of the cribs and trenches), estimates of human health impacts (radiological risk to the drinking-water well user) correlate with the closure options. For example, Tank Closure Alternative 1 and Tank Closure Alternatives 2B, 3A, 3B, 3C, and 6C have similar radiological risk to the drinking-water well user at the Core Zone Boundary throughout the period of analysis, because the contaminants have already reached the vadose zone or groundwater and, therefore, there is minimal benefit to the addition of a landfill closure barrier. By contrast, results for Tank Closure Alternative 6B, Option Case, indicate that clean closure of the cribs and trenches significantly reduces radiological risk to the drinking-water well user at the Core Zone Boundary after calendar year 7000. The variability in lifetime radiological risk represented in Figure 2–127 is attributable primarily to the release of multiple constituents at differing times and rates from 35 sources comprising these sets of cribs and trenches and secondarily from variability in prediction of concentration inherent in the method applied (i.e., particle tracking) for simulation of transport of contaminants in the unconfined aquifer.[33]

231-221 cont'd

For the issue of unrestricted access and of treaty rights, it is clear that clean closure of cribs and trenches would be preferable.

Recommendations: Alternative 6B is broadly acceptable for tank closure, including removal of soil and ancillary equipment, with some proviso, including ensuring that onsite secondary waste disposal meets the overall risk criterion of 10^{-5} as an upper limit in the context of all other wastes to be disposed of onsite. Clean closure of the DSTs and associated ancillary equipment should be made part of the TC&WM EIS. The "Option Case" for Alternative 6B includes clean closure of six cribs and trenches. This should be pursued. While this would increase short-term impacts, such as demand for workforce and resources, it would greatly decrease long-term impacts, as noted in the TC&WM EIS.

H. Waste Disposal

The TC&WM EIS is even more complex in its consideration of waste management approaches and has a bewildering array of possibilities (a fact that is recognized within the document). Apart from the various wastes generated as part of the tanks closure process, there are wastes from other areas of Hanford, offsite wastes, and a variety of waste disposal sites discussed in the TC&WM EIS. We will take up the question of IHLW, ILAW, and Greater than Class C waste first and then discuss low-level wastes and mixed low level waste issues.

1. Immobilized High-Level Waste and Immobilized Low-Activity Waste

231-222

In the absence of a high-level waste repository or even an active program to find and develop one, Hanford must make provision for storage of all the high-level waste. Further, ILAW waste should be managed as high-level waste when stored on site. This is provided for in Alternative 6B. The Final EIS should specify the options. One suitable option to examine would be to dispose of the vitrified ILAW as Greater than Class C waste along with any Greater than Class C waste generated during Hanford remediation. We are opposed to shallow land disposal of

[33] TC&WM EIS 2009, Vol. 1, p. 2-290.

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does not represent the assumed timeframe for period of institutional controls. For clarity, the definition of "10,000-year period of analysis" is included in this final EIS in the Summary, Chapter 2, and the Glossary, as appropriate.

231-203 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

The commentor's concerns regarding DOE's Preferred Alternatives are noted. Chapter 2, Section 2.12, of the *Draft TC & WM EIS* discusses DOE's Preferred Alternatives for FFTF decommissioning (Alternative 2) and waste management (Alternative 2). It further explains that, at the time the *Draft TC & WM EIS* was being prepared, DOE did not have a specific preferred alternative for tank closure, but could identify a range of preferred storage, retrieval, treatment, and closure options that met DOE's purpose and need. Consistent with the CEQ regulations (40 CFR 1502.14(e)), DOE has identified its Preferred Alternatives for tank closure, FFTF decommissioning, and waste management in this final EIS, except for a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW. When DOE is ready to identify a preferred alternative regarding supplemental treatment for LAW, this action will be subject to NEPA review as appropriate. See Chapter 2, Section 2.12, of this *Final TC & WM EIS*, for a comprehensive discussion of preferred alternatives. DOE's Preferred Alternatives in this *Final TC & WM EIS* may not necessarily represent the most environmentally preferred alternatives, but this is not required by NEPA or CEQ regulations.

GTCC waste at any site, including Hanford. Construction of a GTCC disposal site at Hanford is one of the alternatives being considered in the GTCC EIS being prepared by DOE.[34] Besides being inappropriate for GTCC, such a site would add to the burdens of contamination on the site instead of reducing it.

In view of the lack of an active program for a deep geologic repository, considerable storage will be needed for IHLW and also for ILAW (the latter under Alternative 6B). The TC&WM EIS anticipates this:

> The IHLW Shipping/Transfer Facility would be constructed concurrently to support IHLW glass canister shipments. Construction of additional storage modules is included under each of the *TC & WM EIS* alternatives to provide storage capacity for IHLW glass produced in the WTP. In the case of Tank Closure Alternatives 6A, 6B, and 6C, all of the waste would be managed as IHLW glass, and appropriate storage facilities are considered for IHLW glass, ILAW glass, and waste from closure of the tank farms.
>
> **E.1.2.1.3.1 Assumptions and Uncertainties**
>
> Due to uncertainties regarding the timing for shipment of IHLW glass canisters off site and the capacity for receiving all waste managed as HLW (Tank Closure Alternatives 6A, 6B, and 6C), it was assumed that onsite storage facilities would be required for all IHLW glass.[35]

This is a sound approach. Additional waste storage buildings should be part of the Final EIS preferred alternative consistent with 6B streams from IHLW and ILAW.

We are also in agreement that HLW melters taken out of service should be treated as high-level waste and that disposal onsite should be ruled out.[36]

231-222 cont'd

2. Low-Level Waste and Mixed Low-Level Waste

It is useful to enunciate a principle for onsite disposal of waste. In general radionuclides disposed of on site should be short-lived, defined as those with half-lives of less than ten years. We understand that sharp segregation of waste into short and long-lived components is often impossible. Given this problem, the general principle should be that the total source terms for residual long-lived radionuclides should be such that the restrictions discussed in Section C (above) are maintained in the post-remediation phase.

We have already discussed the need for immobilizing technetium-99 and iodine-129 retrieved from the tanks into wastes that will not be disposed of at Hanford, though small fractions may wind up mixed with rubble and very dilute low-level wastes. These should be minimized. Even one percent of the tank source term for Tc-99 would be about 300 curies. One percent of the iodine-129 source term would be about half a curie, which is a larger source term than the Tc-99

231-223

[34] TC&WM EIS 2009, Vol. 2, p. S-15.
[35] TC&WM EIS 2009, Vol. 2, p. E-14.
[36] TC&WM EIS 2009, Vol. 2, p. E-172.

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See response to comment 231-185 regarding future DOE decisions.

231-204 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding the cleanup of past leaks.

231-205 Because DSTs may be located in an area of the SST system being closed under these Tank Closure alternatives, the impacts associated with closure of all of the DSTs (such as the impacts of filling the tanks and covering the tanks with a closure barrier) were evaluated. Chapter 1, Section 1.4.2, addresses decisions not to be made in this *TC & WM EIS* and states a decision that closure of DSTs is not within the scope of the proposed actions because the DSTs are active components needed to complete waste treatment. Closure of the DSTs would be addressed at a later date, subject to appropriate NEPA review.

231-206 As described in Chapter 5, Section 5.4, several hundred impact scenarios could result from the potential combinations of the 11 Tank Closure, 3 FFTF Decommissioning, and 3 Waste Management alternatives when factored with their associated option cases and waste disposal groups. For analysis purposes, three combinations of alternatives were chosen to represent key points within the range of actions and associated overall impacts that could result from full implementation of the three sets of proposed actions. DOE believes that these three combinations adequately represent the range of impacts presented by the possible impacts scenarios.

This EIS is not being prepared under CERCLA; therefore, the ARARs process does not apply. The scope of the proposed actions evaluated in this *TC & WM EIS* does not include CERCLA remedial actions. Chapter 6 addresses cumulative impacts, including reasonably foreseeable CERCLA activities. All environmental restoration actions conducted at Hanford under CERCLA must evaluate the "legally applicable, relevant and appropriate requirements of Federal and State laws and regulations" to establish the appropriate cleanup level that must be achieved at an individual cleanup site.

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one given that the drinking water MCL for iodine-129 is almost three orders of magnitude lower than that of Tc-99.

Remediation of other parts of the Hanford Site, such as the 100 and 300 Areas, which are along the Columbia River, is proceeding with the wastes being disposed of in the Environmental Restoration Disposal Facility (ERDF). ERDF is a lined disposal facility with provision for leachate collection. We recognize that waste disposal in ERDF is a concomitant of the way cleanup of the 100 and 300 Areas has been organized. But we also note that the DOE itself has projected a very substantial exceedance of the drinking water limits under EDRF, and by extension at the core zone boundary, since ERDF abuts the southern end of the core zone. Table 2 below is taken from a DOE publication related to ERDF.

Table 2. Potential Groundwater Contaminants at the ERDF

Constituents	Maximum detected soil concentration	Predicted groundwater concentration	Travel time to ERDF boundary
Radionuclides	**picocuries per gram**	**picocuries per liter**	**Years**
Carbon-14	640	1.3×10^6	520
Technetium-99	1.1	2.3×10^3	520
Total uranium	20034	1.1×10^3	520
Uranium-233/234	2100	5.3×10^2	520
Uranium-235	638.4	2.3×10^1	520
Uranium-238	9143	4.9×10^2	520

Source: United States Department of Energy. *Remedial Investigation and Feasibility Study Report for the Environmental Restoration Disposal Facility*. DOE/RL 93-99 rev.1. Richland, WA: DOE Richland Operations Office, October 1994. On the Web at http://www5.hanford.gov/pdw/fsd/AR/FSD0001/FSD0047/D196061256/D196061256_58632036_76907_802.pdf. Table 4-10 (pp. 4T-10c to 4T-10d)

The estimated future peak concentration of carbon-14 is more than two orders of magnitude greater than the drinking water MCL (calculated from the 4 millirem per year dose limit). The technetium-99 concentration would be more than a factor of two greater than the MCL. Total uranium would be about 50 times more than the drinking water limit.

We are not commenting here on the use of ERDF for ongoing remediation efforts, notably in the River Corridor. However, we note that it will be impossible to meet cleanup criteria if EDRF is just capped. It will be essential to clean close ERDF as part of the series of steps to fully remediate Hanford. Plans for doing so should be part of the CERCLA process for the Central Plateau.

The low-level wastes that will be generated as part of the tank waste remediation process are proposed to be disposed on in various ways on site. Aside from the no action alternative, the TC&WM EIS proposes the use of one or two integrated disposal facilities (IDF East and IDF West). IDF West would have a small capacity relative to IDF East and there appears to be no real purpose to building both of them. The DOE has noted this. IDF West should be eliminated from the set of alternatives, since it needlessly complicates an already complex picture in terms

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231-223 cont'd

Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives and identify where standards may be exceeded. This is not the same as an "ARARs analysis" under CERCLA, and it serves a different purpose. The identification of legal requirements in a NEPA document assists an agency in its planning, funding, and decisionmaking process. It also provides full disclosure to members of the public, stakeholders, and other agencies regarding the potential scope of an agency's effort to implement a proposed action (or an alternative) in terms of the subsequent permitting, other approvals, consultations, and coordination requirements.

231-207 As noted in the comment, background exposure comprises contributions from different sources whose magnitudes vary with location and behavior of the receptor. This *TC & WM EIS* recognizes this fact but will continue to follow the approach of the International Commission on Radiological Protection and the National Council on Radiation Protection and Measurement in including estimates of exposure to radon in estimates of background radiation. Please see Chapter 3, Section 3.2.10.1, for a detailed discussion on radiation exposure and risk.

231-208 See response to comment 231-206 for a discussion of ARARs and CERCLA with regard to this EIS.

As stated in Chapter 1, Section 1.4.2, of this *TC & WM EIS*, groundwater contamination in the non-tank-farm areas of the 200 Areas (which include cribs, trenches [ditches], and tile fields) is being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements. Contamination in the vadose zone resulting from tank farm past leaks will be addressed during the SST closure process. The cumulative impacts analysis for this *TC & WM EIS* (see Appendix U and Chapter 6) includes the vadose zone of the 200 Areas in addition to other areas of Hanford.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

of potential alternatives. Besides, the analysis in the TC&WM EIS indicates that groundwater pollution would be greater under IDF West compared to IDF East for the same source term.[37] *231-223 cont'd*

However, the main source term at the IDF is not Hanford origin waste, but offsite waste:

> For iodine-129 and technetium-99, release to the vadose zone is dominated by waste management sources, in particular by offsite waste disposed of in IDF-East. Offsite waste accounts for over 93 percent of the total release to the vadose zone for iodine-129 and over 83 percent of the total release to the vadose zone for technetium-99.[38]

It defeats the purpose of remediation if offsite wastes contribute to the majority of the contamination for thousands of years and drinking water standards are violated for thousands of years as a result of offsite wastes. Import of wastes into Hanford can be controlled by the DOE in that it can manage the wastes otherwise. We recommend that the Final EIS have an alternative that does not include offsite wastes containing long-lived radionuclides. This alternative should also limit the Hanford long-lived radionuclide source term so that it complies with the restrictions in Section C above.

The DOE has estimated impacts of offsite wastes based only on the source terms that DOE could somehow calculate. However, these estimates contain large and unquantified uncertainties. The TC&WM EIS notes:

> Estimates of potential, future offsite generated LLW and MLLW volumes requiring disposal in DOE regional disposal facilities are comprised primarily of waste generated in **cleanup and decommissioning projects, rather than legacy waste. Much of this work is yet to be planned. Therefore, there are significant uncertainties in waste volume projections because waste is yet to be generated, and little characteristic information is available as previously discussed. This is a change from the situation during the early years of the EM program when most MLLW was in storage awaiting treatment and disposition.** *231-224*
>
> **In addition to uncertainties in waste volume, the newly collected LLW and MLLW waste data did not include radionuclide or hazardous chemical data needed for EIS modeling. EM has not collected radionuclide and hazardous constituent information since the 1990's, when data was collected to support the Federal Facilities Task Force and the WMPEIS development.** Documented information on radionuclides is found in the *Low-Level Waste Capacity Report*, Revision 2, produced in 2000. This document continues to serve as a source for waste characteristics.
>
> It is difficult to predict the radionuclide and hazardous chemical composition of waste projected in the future, particularly from cleanup programs, because the waste does not exist until the cleanup work progresses. Forecasts are based on best available characterization of the site or facility, the technology selected for cleanup, and the work plans. For this reason, the forecast waste characteristics data in most instances relies on representative information from similar waste streams recently sent to disposal. Actual LLW and MLLW disposal profiles were requested from waste managers and several

[37] TC&WM EIS 2009, Summary. See Tables S-8 and S-9 on pages 100 and 101, respectively.
[38] TC&WM EIS 2009, Vol. 1, p. 5-1197.

231-209 DOE disagrees that building new DSTs is unrealistic or that they would necessarily lead to a variety of problems and delays. It should be noted that Tank Closure Alternatives 3A, 3B, 3C, 4, 6B, and 6C also do not involve DSTs, but do discuss the construction of waste receiver facilities (WRFs).

See response to comment 231-185 regarding future DOE decisions.

231-210 As discussed in Appendix E, Section E.1.2.2.1, modified sluicing could potentially be used to retrieve 99 percent of the waste from the DSTs and nonleaking 100-series SSTs. DOE has developed and implemented a very advanced system for detecting and monitoring leaks and spills from the waste tanks. As discussed in Appendix D, Section D.1.6, Tank Waste Retrieval Leaks, this EIS conservatively assumed 4,000 gallons of tank waste, on average, would leak from each of the SSTs. This volume is considered conservative because of the advanced leak detection and monitoring systems DOE has in place now at the tank farms.

231-211 As discussed in Appendix E, Section E.1.2.2.4, this *TC & WM EIS* assumes a chemical wash system would be required to supplement the MRS and vacuum-based retrieval (VBR) retrieval systems to achieve 99.9 percent retrieval. In addition, as stated in Section E.1.2.2.4.4, this EIS assumes that the chosen chemicals would be compatible with safety requirements (e.g., worker health and safety and nuclear safety requirements), as well as the construction materials, wastes to be treated, and waste-feed-composition requirements for the WTP or supplemental treatment technologies. However, as further discussed in Section E.1.2.2.4.4, although the chemical-wash-system process has been demonstrated at Hanford, there are uncertainties; thus, the acid wash analyzed (oxalic acid) is considered representative of the wash fluids that could be used. As noted in Section E.1.2.2.4.2, chemical washing is identified for use in conjunction with MRS and VBR system retrieval of 99.9 percent of the waste, and the specific chemicals to be used for this process would be selected to minimize potential environmental, health, and safety impacts, while maximizing the effectiveness of residual waste retrieval.

231-212 As discussed in Chapter 2, Section 2.2.2.1.1.5, DOE's strategy includes the use of the MRS to retrieve waste from 100-series SSTs that are classified as known or suspected leakers, and use of a VBR system to retrieve waste from the smaller 200-series tanks, miscellaneous underground storage tanks, and WRFs. Both the VBR and MRS technologies are expected to be capable of retrieving up to 99 percent of the waste in the tanks. To achieve 99.9 percent retrieval, DOE

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were judged to have the necessary data for modeling and be suitable for projected waste streams.[39]

Many of the source terms are inappropriately estimated. Some do not appear to be "similar waste streams" as claimed. For instance, the Rocky Flats waste composition has been used for estimation at Savannah River Site and West Valley source terms. However, the latter sites have reprocessing plants; SRS also has reactors. Rocky Flats was a facility whose main purpose was to produce plutonium pits and it did not have reprocessing facilities with large amounts of fission products and did not have reactors. As another example, in several cases – Oak Ridge, Savannah River Site, and Idaho National Laboratory– exactly the same volume of mixed low-level waste was estimated. This is completely unrealistic. If the DOE does not have even moderately reliable information, the resultant environmental impact analysis will be meaningless. *231-224 cont'd*

One conclusion from the above is that the offsite source term radiological impacts could be much larger than estimated in the TC&WM EIS. The DOE has made no effort to bound these impacts.

The problem with chemicals is even worse, since the large majority of source terms is not reported. And the unreported source terms are ignored in the impact analysis.[40]

One must conclude that the offsite impacts may be seriously underestimated both in regard to chemicals and radionuclides, including long-lived radionuclides. This reinforces our conclusion that offsite wastes should continue to be banned from the Hanford Site.

3. Other issues relating to waste

The TC&WM EIS discusses the possibility of using phosphate glass as follows:

> It has been proposed that the use of a phosphate glass formula for Hanford waste vitrification would have some advantages over the current baseline borosilicate glass. Hanford tank waste has some chemical constituents that are troublesome to incorporate into the base program ILAW and IHLW borosilicate glasses. The low solubility of sulfate in silicate glasses limits the concentration of sodium oxide in the ILAW glass. Without the sulfate problem, an increase in waste loading would be possible for ILAW glass. **Sulfate incorporation and chemical durability have been demonstrated in the laboratory for phosphate glasses formulated for Hanford ILAW. Similarly, for IHLW glass, the chromium solubility limits the waste loading in the baseline borosilicate glass. High chromium content may be incorporated by adding phosphate to the waste feed and operating at 1,200 to 1,250 °C (2,190 to 2,280 °F).** Increased waste loading can be accommodated, and the lower viscosity of the resulting melt allows a shorter residence time in the melter. These factors offer the potential for improved IHLW glass throughput at the WTP. This option was not considered for evaluation in this *TC & WM EIS* because the phosphate glass formula has not been proven to be compatible with production-scale melters, and the resulting product glass *231-225*

[39] TC&WM EIS 2009, Vol. 2, pp. D-127 and D-128.
[40] TC&WM EIS 2009, Vol. 2, table D-82.

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would couple the MRS and VBR system, as appropriate, with a chemical wash process.

DOE would not use the existing SST transfer system due to its age, design limitations, and structural integrity. Rather, the VBR and MRS would make extensive use of hose-in-hose transfer lines, and where necessary, new underground transfer lines, as discussed in Appendix E, Section E.1.2.2.7. The existing SST infrastructure would be removed or remediated in place, depending on the closure approach selected.

See response to comment 231-185 regarding future DOE decisions.

231-213 As explained in Chapter 2, Section 2.12, DOE's Preferred Alternative with respect to waste retrieval is the removal of at least 99 percent of tank waste. This would occur under all Tank Closure alternatives, with the exception of Alternative 1 (No Action) and Alternative 5; under Alternatives 4, 6A, and 6B, 99.9 percent of the waste would be retrieved (see Chapter 2, Table 2–2). As discussed in Chapter 2, Section 2.2.2.1.1.5, DOE has developed a tiered strategy for maximizing tank waste retrieval while minimizing the potential for causing leakage. Appendix D of this EIS discusses uncertainties regarding the residual waste inventories. DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed on only a small number of SSTs and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks and residual waste, requires the preparation of a performance assessment and a closure plan. These documents would provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

231-214 As noted by the commentor and discussed in Appendix D of this EIS, there are uncertainties regarding the residual waste inventories. See response to comment 231-213 regarding tank waste composition and the tank closure process.

231-215 Comment noted.

231-216 See response to comment 231-23 for a discussion of DNFSB recommendations.

As stated in this EIS, these are two representative supplemental treatment technologies that are analyzed in this EIS and are being considered by DOE. Regarding the use of phosphate glass melters, Appendix E, Section E.1.3.3.3.3,

has not been shown to meet the waste acceptance technical requirements for DOE's Civilian Radioactive Waste Management System (DOE 2007).[41]

231-225 cont'd

Given that Yucca Mountain is no longer being considered as a repository, the phosphate glass melter approach should be seriously reevaluated as a complement to the borosilicate glass.

231-224 cont'd

Recommendations: There should be no import of offsite wastes into Hanford. It will eventually be essential to clean close ERDF as part of the series of steps to fully remediate Hanford. Plans for doing so should be part of the CERCLA process for the Central Plateau.

I. Central Plateau Cleanup

231-226

The data and analyses in Appendix U of the TC&WM EIS show that an intensive cleanup of the non-tank-farm 200 Areas will be needed if the Central Plateau, and hence the Hanford Site, are to be restored to anywhere near environmentally acceptable conditions. For instance, the TC&WM EIS estimates that the Columbia River nearshore concentration of plutonium-239/240 will be 4250 picocuries per liter – 283 times the drinking water limit were only plutonium present – in the year 2953, more than 800 years from the present. The charts and maps in Section U-1 of Appendix U show several radioactive and hazardous chemical pollutants that are estimated to exceed ARARs for hundreds or even thousands of years.

A plan that addresses the removal of the contamination in the non-tank 200 Areas is an essential complement to a preferred alternative for the TC&WM EIS that will allow the use of the Hanford Site without institutional controls after remediation is complete. At present none of the tank farm closure options meet CERCLA and MTCA requirements. The final TC&WM EIS should contain an option in which the tank farm cleanup activities are set in an overall context of meeting CERCLA requirements for all parts of the Central Plateau and the rest of the Hanford Site.

Recommendations: A plan that addresses the removal of the contamination in the non-tank 200 Areas is an essential complement to a preferred alternative for the TC&WM EIS that will meet all ARARs, including drinking water standards for groundwater and allow the use of the Hanford Site without institutional controls after remediation is complete is essential. The final TC&WM EIS should contain an option in which the tank farm cleanup activities are set in an overall context of meeting CERCLA requirements, including drinking water MCLs, for all parts of the Central Plateau and the rest of the Hanford Site.

[41] TC&WM EIS 2009, Vol. 2, p. E-171.

describes DOE's current position. In summary, use of a phosphate glass formula for waste vitrification would have some advantages over the current baseline borosilicate glass. However, this option was not considered for evaluation in this *TC & WM EIS* because the phosphate glass formula has not been proven to be compatible with production-scale melters, and the resulting product glass has not been shown to meet the waste acceptance technical requirements for DOE's Civilian Radioactive Waste Management System. Additionally, DOE reviewed the available technical data since publication of the *Draft TC & WM EIS* and concluded there are no referenceable data that address the issues that need to be addressed, such as the impacts on the current WTP flowsheet, waste throughput, offgas system requirements, and physical space requirements for phosphate melters.

231-217 As recognized by the commentor, there are tradeoffs with regard to technetium-99 removal in the WTP. These tradeoffs are discussed in the Summary, Section S.5.5, and Chapter 2, Section 2.10, Key Environmental Findings.

231-218 As stated in Appendix E, Section E.1.2.3.1.7, the behavior of iodine-129 in thermal processes and the fraction that would be captured in the final waste form are difficult to predict. Therefore, for analysis purposes in this EIS, it was conservatively assumed that there would be no retention of iodine-129 in the IHLW glass and 20 percent retention in the ILAW glass. Further demonstration and testing of the iodine recovery technology should provide the necessary performance data to confirm these assumptions and possibly support some fraction of iodine-129 retention in the IHLW. However, such retention information was not available at the time of this EIS's preparation. As discussed in Chapter 7, Section 7.1.6, this is a particular area of focus for DOE, especially with regard to partitioning and capture of iodine-129, a conservative tracer, in secondary-waste forms. Additional sensitivity analyses have been added to this final EIS that evaluate the changes in potential impacts that might result if partitioning or recycling of some contaminants, e.g., iodine-129, could be increased into primary-waste forms and/or if secondary-waste-form performance could be improved. The discussion found in Chapter 7, Section 7.5, was added to summarize these results. The results of these analyses will aid DOE in formulating appropriate performance targets for secondary-waste forms.

Regarding Tank Closure Alternative 6B, this EIS assumes that ILAW would be managed as IHLW and, therefore, would be disposed of as IHLW. The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward

Commentor No. 231 (cont'd): Harry Smiskin, Chairman, Yakama Tribal Council, Confederated Tribes and Bands of the Yakama Nation

for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

231-219 In Appendix Q, human health impacts are presented in three tables for each Tank Closure alternative. There is a table presenting human health impacts related to cribs and trenches (ditches) after year 1940, another table related to past leaks after year 1940, and a third table related to the combination of cribs and trenches (ditches), past leaks, and other sources (i.e., tank farms) after the year 2050. Table Q–80 presents human health impacts related to the combination of cribs and trenches (ditches), past leaks, and other sources after year 2050.

In Appendix U, the alternative combination tables present human health impacts with and without the past, present, and reasonably foreseeable future (non–*TC & WM EIS*) actions after year 1940. The peak dose during the year of peak dose is calculated by summing the total dose for each year and then determining the maximum dose and year over the time period. The peak dose and year are driven by the impacts associated with the alternatives; therefore, the concentrations of individual constituents and the year of peak dose can be different (lower or higher) when comparing between tables. In Appendix U, the alternative combination tables that include non–*TC & WM EIS* sources are dominated by the impacts of these sources. Under Alternative Combination 2, the past impacts dominate the dose at year 1997. Table Q–80 does not analyze impacts before year 2050 and cannot be used to compare impacts.

231-220 The *Draft TC & WM EIS* included disposition of the capsules: preparation of the capsules for treatment in the WTP and disposal of the inventory as IHLW. Based on production rates, it was calculated that the WTP would need to operate for an additional year to treat the capsule inventory in a separate campaign and would produce approximately 340 IHLW canisters. In response to comments received on the *Draft TC & WM EIS*, DOE evaluated dry storage of the capsules at a new facility in the 200-East Area; this final EIS compares potential impacts of this option with those associated with vitrifying and disposing of the capsules as IHLW. The short- and long-term environmental impacts of storing the capsules were analyzed and are summarized in Appendix E, Section E.1.2.3.4.5, of this final EIS. As stated in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *Final TC & WM EIS*, DOE is not making a final decision regarding disposition of the capsules at this time; their ultimate disposition will be determined at a later date and will be subject to appropriate NEPA review.

231-221 Soil washing is discussed in Appendix E, Section E.1.2.5.3.2, Preprocessing/Packaging Contaminated Soil and Debris. As noted in this section, the soil-washing process within the Preprocessing Facility is based on an immature design, and very little data are available to further define the allowable contaminant levels to support a determination that the processed, but still contaminated, soil would be "acceptable for disposal on site." The proposed process is comparable to similar processes used in the hydrometallurgy industry, but would use a weaker solution of nitric acid. As the design matures and samples of the contaminated soil become available, risk analyses would be prepared to support a comparison with the established risk criterion for radioactive and chemical contaminants. Likewise, the disposal of secondary waste on site would depend on the final risk analyses and a comparison with the established risk criterion.

Closure of the disposal facilities would require detailed examinations of the disposed waste to support preparation of site-specific radiological performance assessments and closure plans. These examinations would require detailed waste sampling and sample analyses, assessments of the structural stability of the tanks, and assessments of the risks to human health and the environment. These documents would provide the information and analysis necessary for DOE and regulators to make decisions on what levels of waste are acceptable in terms of short- and long-term risks.

See response to comment 231-185 regarding future DOE decisions.

Regarding the depth of contaminated soil excavation below the tanks that would be required for disposal of the soil as HLW, DOE estimated a depth of 3 meters (10 feet), but agrees with the commentor that soil sampling and characterization would determine this final depth. Regarding closure of the DSTs and disposal of the ancillary equipment that supports the DST waste system, Section S.1.3.2 of the Summary and Chapter 1, Section 1.4.2, of this *TC & WM EIS* define the facilities and operations at Hanford that are not within the scope of this EIS, including closure of the DSTs and the WTP. Decisions regarding closure of these facilities therefore will not be issued in the ROD for this EIS, but will be made at a later date, after appropriate NEPA review.

231-222 This *TC & WM EIS* assumed that the IHLW canisters would not be shipped immediately after generation. Storage capacity for all the IHLW canisters was analyzed under the short-term impacts analysis for onsite IHLW interim storage. Also, as mentioned in the comment, the management of all the tank waste as HLW

Commentor No. 231 (cont'd): Harry Smiskin, Chairman, Yakama Tribal Council, Confederated Tribes and Bands of the Yakama Nation

is analyzed under Tank Closure Alternatives 6A, 6B, and 6C, which assumed the DOE Manual 435.1–1 waste incidental to reprocessing evaluation determination process could not be implemented, which supports the separation of the tank waste into two fractions, HLW and LLW. Separation and treatment of tank waste is one of the decisions to be made by DOE.

Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

231-223 Decisions to be made concerning operation and closure of the ERDF are not within the scope of this EIS under NEPA. However, impacts on groundwater resulting from ERDF activities are analyzed in this EIS as part of the cumulative impacts analysis. In addition, DOE has reviewed the estimated inventory for the ERDF presented in the draft EIS and revised it in this final EIS. This revised estimate is based on the inventory disposed of at the ERDF through March 2010, as reported in Hanford's Waste Management Information System. This estimate does not take into account inventory that may be disposed of in ERDF from future cleanup in sites at Hanford, but this EIS does evaluate waste remaining in place.

231-224 DOE disagrees that the main source term at the IDF is offsite waste and not Hanford waste if the source term is identified as radioactive and chemical inventory. Performance at the IDF depends on both inventory and waste form. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Ecology's foreword to the draft EIS included its views and positions concerning DOE's analysis in the document and has been updated in this final EIS.

With regard to the offsite waste inventory estimates, DOE believes that they represent the best-available data to support this EIS. As noted in Appendix D, for analysis purposes, DOE used assumptions in developing the offsite waste inventories that tend to overestimate the potential impacts, because of the uncertainties in the characteristics of the waste types. Concerning the contention

that the offsite waste may cause violations of drinking water standards for thousands of years, this *TC & WM EIS* provides information on the results of DOE's analysis and compares those results to existing standards. For example, regarding the long-term impacts analysis for groundwater, the risk driver's contaminant concentration results from the groundwater modeling run are compared with the benchmark value, which in most cases is the MCL (the standard for drinking water). Much of the groundwater at Hanford is not currently used for drinking water. However, under the TPA, DOE is taking actions to protect groundwater and prevent or minimize impacts on the Columbia River.

231-225 Appendix E, Section E.1.3.3.3.3, as recognized in the comment, discusses the use of a phosphate glass formula for Hanford waste. Since the issuance of the draft EIS, DOE reviewed the most recent technical data in 2010 and concluded that there are no referenceable data that address issues that need to be addressed, such as the potential impacts on the current WTP flowsheet, waste throughput, offgas system requirements, and physical space requirements for phosphate melters. This discussion and a reference for the review is included in Section E.1.3.3.3.3.

231-226 Appendix U has been updated to provide more-detailed information related to cleanup plans for CERCLA sites at Hanford, including the existing contamination, decisions, and existing milestones and discussion of response actions that have been taken or are being planned.

See response to comment 231-206 for a discussion of ARARs and CERCLA with regard to this EIS.

Commentor No. 232: Susan Burke, INL Coordinator, Idaho Department of Environmental Quality

From: Susan.Burke@deq.idaho.gov
Sent: Friday, March 19, 2010 2:47 PM
To: tc&wmeis@saic.com
Cc: Toni.Hardesty@deq.idaho.gov; Curt.Fransen@deq.idaho.gov; provenrb@id.doe.gov
Subject: TC & WM EIS comments
Attachments: hanford eis comments 3-19-10.pdf

Please find attached the Idaho Department of Environmental Quality's comments on the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington.

Susan Burke
INL Coordinator
Idaho DEQ
susan.burke@deq.idaho.gov
xxx/xxx-xxxx

Response side of this page intentionally left blank.

Commentor No. 232 (cont'd): Susan Burke, INL Coordinator, Idaho Department of Environmental Quality

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 North Hilton • Boise, Idaho 83706 • (208) 373-0502

C.L. "Butch" Otter, Governor
Toni Hardesty, Director

March 19, 2010

Mary Beth Burandt
EIS Document Manager
DOE Office of River Protection
P.O. Box 1178
Richland, WA 99353

Re: Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington

Dear Ms. Burandt:

The Idaho Department of Environmental Quality (DEQ) has reviewed the above titled document (draft EIS) and has the following comments:

1. The Department of Energy's (DOE) preferred alternative to treat remote-handled special components (RH-SCs) from the Hanford Fast Flux Test Facility at the INL should meet the following conditions:

- No RH-SCs should be transported to the INL until a DOT approved transport cask exists and the actual dose of radiation to the public is calculated from such a cask. Section 4.2.12 of the draft EIS calculates a specific dose to a person stuck in traffic next to a shipment of RH-SCs but as noted elsewhere in the document, there are currently no DOT approved transports casks large enough to hold the components. Once a specific cask is identified for use, the transportation radiological exposure assessment should be recalculated. *232-1*
- No RH-SCs should be brought into Idaho until the DOE completes the Remote-Handled Waste Disposition Project DOE/EA-01386 (that was formerly, and still is in this EIS, referred to as the Remote Treatment Project) at the INL and it has a proven record of successfully treating remote-handled sodium contaminated components. *232-2*
- Any RH-SCs brought to the INL for treatment must comply with the INL Site Treatment Plan. The DOE must receive prior approval to bring the waste into Idaho and the waste must leave Idaho within one year. In addition, the RH-SCs must have a clear disposal path before they come to the INL. *232-3*
- The DOE must provide adequate funding for treatment of any RH-SCs before they are brought to the INL. *232-4*
- No RH-SCs may be brought to the INL that would adversely affect the DOE's schedule to remove waste from Idaho. *232-5*

232-1 For analysis purposes in this *TC & WM EIS*, DOE uses a dose rate of 10 millirem per hour at 2 meters (6.6 feet) from the casks. This dose rate is the maximum value allowed for any certified cask containing radioactive materials (10 CFR 71.47 and 49 CFR 173.411). The impacts associated with transporting these RH-SCs are summarized in the Summary of this EIS, Section S.5.3, and Chapter 4, Section 4.2.12.

232-2 In its *Finding of No Significant Impact for the "Environmental Assessment for the Proposed Remote-Handled Waste Disposition Project,"* issued February 18, 2009 (DOE 2009), DOE selected the Preferred Alternative of using INL's existing Idaho Nuclear Technology and Engineering Center (INTEC) facilities, with modification, for waste-processing activities. This *Final TC & WM EIS* was revised to include the analyses from this environmental assessment by reference. As described in Chapter 2, Section 2.5.3, of this *Final TC & WM EIS*, the Hanford RH-SCs would be stored in the Hanford 400 Area pending shipment to INL for processing.

232-3 In Chapter 8, Section 8.1.4, of this *TC & WM EIS*, there is a discussion regarding the potential applicability of the Spent Fuel Settlement Agreement (also known as the Governor's Agreement), dated October 16, 1995, and the stipulations in the agreement concerning receipt of waste for treatment at INL.

232-4 DOE will seek funding to carry out any actions that are part of the decisions made in the ROD for this *TC & WM EIS*, including treatment of the RH-SCs.

232-5 As described on page 2–110 of the *Draft TC & WM EIS*, the RH-SCs would be stored in the Hanford 400 Area pending shipment to INL for treatment, in coordination with INL's waste treatment schedule.

Commentor No. 232 (cont'd): Susan Burke, INL Coordinator, Idaho Department of Environmental Quality

Mary Beth Burandt
March 19, 2010
Page 2

2. The draft EIS is premised on the Remote Treatment Project (RTP) being built at the INL's Materials and Fuels Complex (MFC). The Remote-Handled Waste Disposition Project has already been built and recently started operation at the Idaho Nuclear Technology and Engineering Center at the INL. The final EIS should address this change. In particular, the draft EIS states that the RTP would be located adjacent to the Hot Fuel Examination Facility (HFEF) at the MFC which "would result in significant cost savings from the sharing of important, high cost equipment and systems. Annexing the facility to the HFEF also allows sharing of the HFEF's synergistic workforce." As the RTP will not be at the MFC, these statements need to be reconsidered in the final EIS. *232-6*

3. The Idaho DEQ agrees with the DOE's preferred alternative to treat bulk sodium at Hanford rather than at the INL. Treatment of the waste at Hanford eliminates transportation risks associated with moving the bulk sodium between Washington and Idaho. *232-7*

Thank you for the opportunity to comment on the draft EIS.

Sincerely,

Susan Burke
INL Coordinator

cc: Toni Hardesty, Director, Idaho DEQ
Richard Provencher, Deputy Manager, DOE-ID

232-6 The *Finding of No Significant Impact for the* "*Environmental Assessment for the Proposed Remote-Handled Waste Disposition Project*," issued February 18, 2009 (DOE 2009), was acknowledged in the *Draft TC & WM EIS* in Chapter 1, Section 1.8; however, the analysis presented in the draft EIS was not consistent with the information in the EA. DOE acknowledges that the treatment facility for FFTF's RH-SCs, if taken to Idaho, would likely be conducted at INTEC, consistent with the final environmental assessment and subsequent decision. This final EIS was corrected by deleting reference to a proposed Idaho Remote Treatment Project adjacent to the Hot Fuel Examination Facility within the Materials and Fuels Complex. In addition, the analysis in this *Final TC & WM EIS* has been updated to reflect this change through the addition of INTEC into the affected environment discussion in Chapter 3, Section 3.3, and the incorporation of construction data from INTEC into Chapter 4, Section 4.2, of this *TC & WM EIS*. Operations data would remain similar to those used for treating the RH-SCs at the Materials and Fuels Complex.

232-7 Comment noted.

Commentor No. 233: Forest Shomer

From: Forest Shomer [ziraat@olympus.net]
Sent: Friday, March 19, 2010 4:29 PM
To: tc&wmeis@saic.com
Subject: comments

I live 200 miles 'upwind' of Hanford, but downstream as well.

Leaked radioactive fluids that make their way to the Columbia River will eventually reach the mouth of the river, be carried northward on the Kuroshio Current that sweeps our coast, and that radioactivity that should have been contained will spread to every mile of shoreline of my home, the Olympic Peninsula.

That's completely wrong! It bequeaths vast potential for mutagenic pollution to all future generations, the entire food chain from tiny marine organisms to fish, shellfish, marine mammals and ultimately, the human dinner table. How totally irresponsible. *233-1*

Don't let this happen. Get the cleanup process accelerated and don't bring more waste to Washington. The public voted on this and 70% had no difficulty discerning the miscarriage of environmental responsibility that is afoot.

There is only one chance to prevent this utter catastrophe to the local biosphere--and that is to act now to stop the ruination of the Pacific Northwest originating at Hanford. *233-2*

Forest Shomer
PO Box 639
Port Townsend WA 98368
--

Forest Shomer
Port Townsend, WA, USA
inspass@whidbey.net

233-1 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

233-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 234: John Felton

From: John Felton [jsf@pacifier.com]
Sent: Friday, March 19, 2010 4:18 PM
To: tc&wmeis@saic.com
Subject: Hanford EIS public comment on storage tanks

I am writing to comment on the storage tanks at Hanford.

Overall, the existing tanks must be remediated right away. The longer it takes, the greater the risk to the water table and to the Columbia River. The tanks are failing, and the longer this draws out, the more it will continue to cost and the more the region will be ruined for years to come. *234-1*

Hanford is a critically ill patient, and all the agencies involved (from local to state to federal) are the medical staff trying to decide what to do and how best to do it. The longer everyone tries to debate and negotiate their position, the less chance the patient has to live. How would you react if a loved one of yours was lying in a hospital bed urgently needing care and the entire staff was debating how to take care of him/her? The longer the delay in treating the patient, the lesser the chance he/she has to live. Would you simply sit in the waiting room for the staff to debate what to do? Or, would you get up in their face and demand immediate action? Do you want your loved one to die? This is exactly what is happening with Hanford. Do you want it to die? The leaking tanks are slowly seeping their contents toward the ground water. When it gets there, it will never be drinkable or usable again. It is important to act now to prevent further damage from occurring. *234-2*

As far as the suggestions on Ecology's web site, here are a few of my comments:

Single Shell Tank Retrieval Options - Clean up and remove 100% of the waste, not 99% of the waste. The State needs to comply and get this done. Good enough never is. *234-3*

Supplemental Treatment of Low level Waste – Additional plants should be built to ensure all waste is properly treated. On this there should be no compromise. Vitrification turns unstable, liquid materials into more stable solid waste. Build as many vitrification plants as are needed, and treat the waste! *234-4*

Transuranic Waste – Do not move any of it until a finalized plan is in place. We want it out of Washington, but not at the risk of having it come back if an agreement has not been made. Under no circumstances should any permits be modified unless all are in agreement on what the plan for transport and disposal is. *234-5*

Iodine 129 Issue - Make DOE prove that all the Iodine 129 will be captured if the waste is vitrified. If this cannot be proven, then do what is necessary to remove it properly and thoroughly. *234-6*

234-1 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities in the region. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

234-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

234-3 A goal of 100 percent retrieval of the waste removed from the tanks is not practical. Some residual waste would be left in the tanks. This can be likened to drinking a milkshake through a straw—even though almost all of the milkshake is removed through the straw, some small amount, residual, would be left on the inside of the straw. On a much bigger scale, pumps are used to remove the waste from the tanks, but some residual would be left behind. DOE's preference relative to waste removal includes those alternatives that remove at least 99 percent of the waste from the tanks (see Chapter 2, Section 2.12). Among these are Tank Closure Alternatives 4, 6A, and 6B, which call for the removal of 99.9 percent of the waste. As a point of clarification, it is DOE's responsibility, not the State of Washington's, to take the actions proposed in this *TC & WM EIS*.

234-4 The analyses in this *TC & WM EIS*, along with all the public and stakeholder input DOE has received, will help inform DOE's decisions, including those related to supplemental treatment facilities and technologies.

234-5 As stated in the Alternatives in Chapter 2, Section 2.12, of this *Final TC & WM EIS,* DOE prefers to consider the option to retrieve, treat, and package waste that may be properly and legally designated as mixed TRU waste from specific tanks for disposal at WIPP, as analyzed in Tank Closure Alternatives 3, 4, and 5. DOE would not, however, generate a waste stream without a clear

Commentor No. 234 (cont'd): John Felton

Interim Storage Canisters/Facilities – Do it. All waste must be safely and securely contained until it can be shipped to its permanent storage location. Leave nothing to chance or uncertainty when dealing with any level of radioactive waste. *234-7*

Quick and effective action is what is needed at Hanford. Anything less and the patient will die. *234-1 cont'd*

John Felton

P.O. Box 406
Vancouver, Washington 98666

path to disposal. Initiating retrieval of tank waste identified as mixed TRU waste would be contingent on DOE's obtaining the applicable disposal and other necessary permits, and ensuring that the WIPP Waste Acceptance Criteria and all other applicable regulatory requirements have been met. Retrieval of tank waste identified as mixed TRU waste would commence only after DOE had issued a *Federal Register* notice of its preferred alternative and a ROD.

234-6 As discussed in Chapter 7, Section 7.1.6, secondary-waste-form performance is a particular area of focus for DOE, especially with regard to partitioning and capture of iodine-129, a conservative tracer, in secondary-waste forms. Additional sensitivity analyses have been added to this final EIS that evaluate the changes in potential impacts that might result if partitioning or recycling of some contaminants, e.g., iodine-129, could be increased into primary-waste forms and/or if secondary-waste-form performance could be improved. The discussion found in Chapter 7, Section 7.5, was added to summarize these results. The results of these analyses will aid DOE in formulating appropriate performance targets for secondary-waste forms. As referenced in the discussion in Section 7.5.2.8 and further discussed in Appendix E, Section E.1.2.4.5.6, DOE has drafted a roadmap that implements a strategy for development of better-performing secondary-waste forms, including iodine-bearing waste.

234-7 An element of all Tank Closure action alternatives is the storage of IHLW in the Canister Storage Building, as well as additional Interim Storage Modules, as required, until disposition decisions are made and implemented (see Chapter 2, Section 2.5.2).

Commentor No. 235: Dennis O. Donnelly

From: Dennis Donnelly [dennidonn@ida.net]
Sent: Friday, March 19, 2010 5:53 PM
To: tc&wmeis@saic.com
Subject: TC & WM EIS comment letter

Dennis O. Donnelly
56 Tulane Ave.
Pocatello ID 83201

March 19, 2010

Gentlemen,

Please accept this letter as my commentary on the currently proposed Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington.

Section 5.3.2 of this TC & WM EIS, on page 5-1078, discusses human health impacts in terms of predicted cancer incidence and toxic effects from the modeled future transport of radionuclides and toxic chemicals in the environment resulting from this action.

I question the legitimacy of this study based on its inadequate modeling and assessment of health effects, for the following reasons. *235-1*

1. Discussion of health effects omits teratogenic effects of radioactive effluent, which I understand are far more limiting than cancer incidence for population exposure, and should therefore be considered.
2. The modeled transport maps all show as smooth plumes in the groundwater, that all end at the edge of the Columbia river. This document ignores piping and channeling of groundwater flow in the lava rock subsurface which can result in much faster flow than smooth 'best-case' plumes used in the modeling. The piping and channeling may also convey the groundwater under the river itself to feed the center-pivot agricultural watering systems to the east of the river that show clearly in the dispersion maps. And the Columbia river is a high speed pathway to fisheries and irrigation downstream. All these pathways need to be analyzed, not just for human impact but for environmental impact, by the NEPA law. *235-2*
3. No model maps consider future agricultural or domestic activity on the Hanford reach itself, which will certainly be redeveloped as future needs dictate. *235-3*
4. Modeling time-span is arbitrarily limited such that uranium-238 and total uranium are just beginning to appear in the offsite environment at the end of the modeling time-span. I didn't even see modeling of transuranic elements, which are all of major environmental (and carcinogenic) concern. *235-4*

235-1 Current standard practices by U.S. agencies were followed to calculate human health impacts. Teratogenic effects are recognized as effects of radionuclides, but these effects are not part of the analysis. The purpose of evaluating human health impacts was to inform a relevant comparison of alternatives; the set of representative scenarios selected was deemed adequate in that context.

235-2 DOE disagrees with the commentor's assertion that this *TC & WM EIS* ignores preferential underground pathways, or that the modeling used a smooth "best-case" approach. The discussions in Appendix L, Section L.4.3.2.3, regarding the zonation and parameterization of the flow model explicitly mention that a high-conductivity channel in the unconfined aquifer is necessary to achieve a good calibration and is a necessary feature of the model framework.

DOE also disagrees with the assertion that the unconfined aquifer can feed center-pivot agricultural watering systems to the east of the Columbia River. The supporting characterization data are in conflict with this supposition.

DOE agrees with the commentor's general observation that heterogeneities in the hydraulic conductivity zonation can influence projections of risk through the groundwater pathway.

235-3 DOE used the NEPA process as documented in the *Final Hanford Comprehensive Land-Use Plan EIS* (DOE 1999) to examine reasonable future land use alternatives at Hanford and conducted this process with nine cooperating agencies and consulting tribal governments. Based on this analysis, DOE adopted the Final Hanford Comprehensive Land-Use Plan designations, policies and implementing procedures in a ROD (64 FR 61615). The *Final Hanford Comprehensive Land-Use Plan EIS* must be reviewed periodically to ensure it remains current; the first such review was documented in the *Supplement Analysis, Hanford Comprehensive Land-Use Plan EIS* (DOE 2008c). An amended ROD was issued in 2008 to confirm the continued viability and use of the Hanford Comprehensive Land-Use Plan (73 FR 55824, September 26, 2008).

In June 2000, a Presidential Proclamation was issued that permanently withdrew from the public domain most of the Hanford lands designated as "Preservation" by the Hanford Comprehensive Land-Use Plan and established the Hanford Reach National Monument (65 FR 37253, Proclamation 7319 of June 9, 2000). The monument is superimposed over approximately 195,000 acres (304 square miles) of the 586-square-mile Hanford Site. The majority of monument land is managed by the U.S. Fish and Wildlife Service (USFWS) through a permit and MOU granted by DOE (DOE 2001); DOE manages some monument lands

Commentor No. 235 (cont'd): Dennis O. Donnelly

Because this study appears to be a self-serving study by the United States Department of Energy and the atomic industry generally, I call for much-needed formal review of this material by disinterested agencies such as the US Environmental Protection Agency, the United States Geologic Service, the United States Fish and Wildlife Service, and the International Atomic Energy Agency. *235-5*

Dennis O. Donnelly

that are undergoing or supporting environmental cleanup. However, monument lands continue to be under the custody and accountability of DOE for the Federal Government.

While cleanup and remediation work is ongoing, an agricultural or domestic land use is not considered. However, Appendix Q, Section Q.2.2, of this *TC & WM EIS* does describe a suite of scenarios, including agricultural and domestic use, that could occur after the site is cleaned up, under the assumption that there is a loss of administrative control. In addition, the sensitivity analysis discussed in Appendix V provides information on the potential impacts of a rising water table resulting from additional recharge to the unconfined aquifer.

235-4 The modeling time span of 10,000 years was based on precedent and NEPA requirements that the flow field must provide a basis for an unbiased evaluation of the *TC & WM EIS* alternatives for the 10,000-year period of analysis. Many of the results from the groundwater transport runs showed increases in uranium-238 concentrations at the end of 10,000 years. Therefore, uranium-238 from the SX tank farm was analyzed as a test case for 30,000 years to determine if peak concentrations occurred beyond the standard analysis period. The results of this long-term analysis are discussed in detail in Appendix O, Section O.6.4, of this EIS. The contaminants selected for the groundwater transport analysis are listed in Table O–2, which includes TRU elements. The contaminant transport results indicate that these elements are not the most important indicators of long-term groundwater impacts, due to their limited mobility.

235-5 Hanford operations are affected and, in many cases, regulated by numerous Federal legal requirements addressing environmental compliance, remediation, planning, preservation, and waste management. Major Federal laws, regulations, and Executive orders that may apply to the alternatives analyzed in this *TC & WM EIS* are presented in Chapter 8. Certain laws, such as the Endangered Species Act, U.S. Fish and Wildlife Coordination Act, and National Historic Preservation Act, require DOE to consult and coordinate with other Federal agencies, state and local agencies, and federally recognized American Indian tribal governments. Chapter 8 and Appendix C of this *TC & WM EIS* identify the process for such interaction, as well as the primary occasions for DOE interaction with these governmental entities regarding the *TC & WM EIS* preparation process.

Commentor No. 236: Keats Landis

From: EdwardPaulLandis@aol.com
Sent: Friday, March 19, 2010 6:20 PM
To: tc&wmeis@saic.com
Subject: public comment on this EIS report

Please continue clean up all around the tanks and deep under the ground of these tanks. Please make certain the clean up extends all the way to the Columbia River. Clean out the tanks thoroughly as opposed to leaving the highly contaminated materials inside the tank capped. No cap can protect the grounds and surrounding areas due to the make up of our geological area. *236-1*

Do not accept other nuclear or radioactive waste from other areas in the states. We are still intensely trying to figure out our present cleanup and contamination sites. The transportation alone to Hanford would be fraught with time consuming research and needless economic spending when the constant real problem should be working on the intense clean up of each site. *236-2*

The FFTF reactor should be totally dissembled and disposed in a researched area where the geological layers would be inherently safe in order to disallow any leakage to other areas. *236-3*

It is my strong belief that the employees and management working on these Hanford sites should become a part of a new team to inform any new building of reactors for any new energy technologies in any part of the country. We cannot build new reactors without understanding the how and why of nuclear waste. Why use nuclear reactors as new energy sources if the contamination of the waste in the end presents it own sets of problems? *236-4*

Keats Landis - 3/19/2010
Yarrow Point, WA 98004

236-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

236-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

236-3 Regarding the complete dismantlement of FFTF (essentially FFTF Decommissioning Alternative 3), although nearly all elements of FFTF and the two adjacent support facilities would be removed under this alternative, the lower portion of the RCB concrete shell would remain. This would be backfilled with either soil or grout to minimize void space. The area would be regraded and revegetated, with no need for a barrier. DOE's preference is for FFTF Decommissioning Alternative 2, under which some below-grade structures

would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment.

236-4 Nuclear energy production and its resulting waste are not within the scope of this *TC & WM EIS*. Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 237: Richard Till, Land Use Law Clerk, Friends of the Columbia Gorge

From: Rick Till [Rick@gorgefriends.org]
Sent: Friday, March 19, 2010 6:47 PM
To: tc&wmeis@saic.com
Subject: Hanford Tank Closure and Waste Management DEIS
Attachments: Hanford Tank Closure and Waste Management DEIS.pdf

Ms. Burandt, please find the attached comment on the Hanford Tank Closure and Waste Management DEIS.

Thanks,

Richard Till, Land Use Law Cler
Friends of the Columbia Gorge
rick@gorgefriends.org
522 SW 5th Ave., Suite 720
Portland, Oregon 97204-2100
(xxx) xxx-xxxx x xxx
Fax: (xxx) xxx-xxxx

Response side of this page intentionally left blank.

Commentor No. 237 (cont'd): Richard Till, Land Use Law Clerk, Friends of the Columbia Gorge

FRIENDS OF THE COLUMBIA GORGE

SUBMITTED VIA E-MAIL

Mary Beth Burandt, Document Manager
U.S. Department of Energy
Office of River Protection
P.O. Box 1178
Richland, WA 99352
Email: TC&WMEIS@saic.com

Re: U.S. Department of Energy's Draft Tank Closure and Waste Management Environmental Impact Statement.

To Whom It May Concern:

Friends of the Columbia Gorge has reviewed and would like to comment on the above-referenced Draft Environmental Impact Statement (DEIS). Friends is a non-profit organization with approximately 5,000 members dedicated to protecting and enhancing the resources of the Columbia River Gorge. Our membership includes hundreds of citizens who reside within or near the Columbia River Gorge and use the Columbia River and the Columbia River Gorge for recreational activities.

The National Environmental Policy Act (NEPA), 42 USC § 4321 *et seq.*, requires that the Department of Energy take a hard look at the potential direct, indirect, and cumulative social, economic, physical, and biological effects of the proposed action and reasonable alternatives. The Department of Energy must reasonably and objectively define the purpose and need of the proposed action so it can "rigorously explore and objectively evaluate all reasonable alternatives," 40 C.F.R. § 1502.14(a).

1. USDOE should remove all radioactive tank wastes at Hanford and clean up 99.9% of existing soil and groundwater contamination at the site.

An unknown number of single-shell tanks at Hanford are currently leaking into the surrounding soil. As a result, contaminants are currently entering the Columbia River at levels greater than 1,500 times the drinking water standard. Unless the contamination is cleaned up promptly and thoroughly, the amount and toxicity of radioactive materials entering the Columbia River will continue to increase. *237-1*

[illegible]2 SW Fifth Avenue, Suite 720, Portland, OR 97204 • (503) 241-3762 • www.gorgefriends.org
Printed on recycled, secondarily chlorine-free paper

237-1 As discussed in Chapter 5 of this *TC & WM EIS*, DOE acknowledges that benchmark standards could be exceeded in groundwater at the Core Zone Boundary and/or at the Columbia River nearshore at various dates. The term "benchmark standards" as used in this *TC & WM EIS* represents dose or concentration levels that correspond to established human health effects. For groundwater, the benchmark is the MCL, provided that an MCL is available. Ecology may impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA.

In reference to the commentor's statement that "contaminants are currently entering the Columbia River at levels greater than 1,500 times the drinking water standard," the location along the Columbia River, the timing, and the constituent to which the commentor refers are not clear. Additional information has been added to this *Final TC & WM EIS* to further describe the groundwater conditions at Hanford. Specifically, the commentor is referred to figures in Appendix U depicting maximum concentrations of several contaminants at various Columbia River nearshore locations, as follows: Figures U–18 and U–19 show chromium concentrations of about 61 and 380 micrograms per liter, respectively (relative to the benchmark standard of 100 micrograms per liter), and most concentrations are below 20 micrograms per liter; Figure U–20 shows a chromium concentration of about 5 micrograms per liter; Figures U–21 through U–23 show similar nitrate concentrations; Figures U–25 and U–26 show strontium concentrations near 320 picocuries per liter (relative to the benchmark standard of 8 picocuries per liter); Figure U–28 shows tritium concentrations of about 14,000 picocuries per liter (relative to the benchmark standard of 20,000 picocuries per liter); and Figure U–34 shows uranium isotope concentrations near 145 picocuries per liter (relative to the benchmark standard of 15 picocuries per liter). DOE believes it is more accurate to say that there are several areas of nearshore groundwater contamination that exceed benchmark standards by one to two orders of magnitude (as opposed to more than three) but that these areas are narrowly confined; that groundwater contamination in the vicinity of operable units is more typically near or below the benchmark; and that groundwater contamination away from operable units (i.e., the bulk of the shoreline) is more than several orders of magnitude below benchmarks.

DOE agrees that retrieval of the waste from the tank farms has a positive effect of reducing potential human health impacts. As shown in Figure S–14 of the Summary and Chapter 2, Figure 2–125, for retrieval of 99.9 percent of the waste, the peak lifetime radiological risk for the drinking-water well user is about

Commentor No. 237 (cont'd): Richard Till, Land Use Law Clerk, Friends of the Columbia Gorge

Friends of the Columbia Gorge is very concerned about the dangers of continuing contamination of the Columbia River. Friends recommends that the USDOE remove *all* tanks at the Hanford site and remediate all soil and groundwater contamination at the site. Allowing even a small amount of contamination to remain would pose a significant risk of cancer, even from drinking well water miles away from the radioactive tanks. Although USDOE proposes to remove 99% of the waste, increasing that number to 99.9% would decrease the cancer risk at least fivefold. Friends recommends adopting a preferred alternative in the final EIS that removes 99.9% of the radioactive wastes. *237-1 cont'd*

2. USDOE has failed to review the cumulative impacts of shipping new radioactive wastes to Hanford.

Although the draft EIS proposes to ship three million cubic feet of new radioactive and "mixed" radioactive waste to Hanford from off-site locations around the country, the EIS fails to include a route-specific analysis of the cumulative environmental impacts of the proposal. This is unacceptable. Shipping new waste to Hanford poses a serious threat to human health and safety. The specific route(s) chosen for shipping directly influences the types and levels of potential impacts, and must be evaluated as a cumulative impact of the proposal to ship new wastes. The final EIS must include a route-specific analysis of the proposal to ship new radioactive wastes to Hanford. Deferring such an analysis to a later date, as USDOE proposes to do, would unlawfully piecemeal the required environmental analysis.

The required route-specific analysis must evaluate and compare the risks to human health and natural resources posed by the possible routes. In a previous, non-route-specific EIS, USDOE estimated that trucking radioactive wastes to Hanford could cause approximately 816 fatal cancers in adult humans. This statistic is incomplete and inadequate because it neglects to include children, who are three to ten times more likely to get cancer from exposure to radioactive waste than adults. The final EIS must evaluate the cancer risks to all humans, and should compare such risks based on the possible routes. *237-2*

The required route-specific analysis should also evaluate the safety and human health risk posed by possible terrorist attack, accident, or other catastrophic event. It is not uncommon for trucks shipping materials through the Columbia River Gorge to overturn and leak hazardous materials into Gorge waterways. For instance, just two months ago the Oregon Department of Environmental Quality announced an $8,000 fine imposed against a company whose tanker truck overturned last summer, spilling asphalt oil into McCord Creek, a tributary of the Columbia River in the Columbia River Gorge. The asphalt oil coated the creek for approximately 100 feet; slicked its banks; and covered vegetation, soil, and rocks. *See* Justin Carinci, *$8K fine issued for asphalt oil spill*, Daily Journal of Commerce (January 11, 2010), http://djcoregon.com/news/2010/01/11/8k-fine-issued-for-asphalt-oil-spill-bldge/. While the adverse environmental effects of that asphalt oil spill were significant, a similar event involving radioactive wastes would be absolutely devastating to the resources of the Columbia River Gorge. This is one of the many reasons why Friends of the Columbia Gorge strongly opposes the shipping of radioactive materials through the Columbia River Gorge National Scenic Area.

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100-fold lower than no waste retrieval. It is also about 10 times lower than the 90 percent retrieval of tank waste and several-fold lower than the 99 percent retrieval of tank waste.

237-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

DOE uses DOE Order 151.1C, *Comprehensive Emergency Management System*, as a basis to establish a comprehensive emergency management program that provides detailed, hazard-specific planning and preparedness measures to minimize the health impacts of accidents involving loss of control over radioactive material or toxic chemicals, as discussed in Chapter 3, Sections 3.2.10.5 and 3.3.10.5, emergency preparedness at Hanford and INL, respectively. Hanford contractors are responsible for maintaining emergency plans and response procedures for all facilities, operations, and activities under their jurisdiction and for implementing those plans and procedures during emergencies. Plans and procedures are reviewed and approved by DOE in accordance with DOE Order 151.1C. The DOE, contractor, and state and local government plans are fully coordinated and integrated. The Transportation Emergency Preparedness Program was established by DOE to ensure its operating contractors and state, tribal, and local emergency responders are prepared to respond promptly, efficiently, and effectively to accidents involving DOE shipments of radioactive material. This program is a component of the overall emergency management system established by DOE Order 151.1C.

Commentor No. 237 (cont'd): Richard Till, Land Use Law Clerk, Friends of the Columbia Gorge

3. USDOE should formally reject the shipping of new radioactive wastes to Hanford.

The draft EIS proposes to ship three million cubic feet of new radioactive and "mixed" radioactive wastes to Hanford from off-site locations around the country. The hydrogeography at Hanford is not appropriate for the storage of radioactive materials, as evidenced by the fact that existing contamination at the Hanford site is already entering the Columbia River. In addition, the shipping itself would expose hundreds and potentially thousands of people to radioactive waste on our nation's highways and roads. The final EIS should amend the preferred alternative to formally reject the shipping of any new radioactive wastes to Hanford. *237-3*

4. USDOE must consult with NMFS and USFWS regarding impacts to threatened and endangered species.

Several endangered plant and animal species may inhabit areas that would be impacted by the proposed tank closure and waste management plan. This includes numerous anadromous fish species and all terrestrial wildlife that rely on the Columbia River for portions of their life cycle. Pursuant to Section 7 of the Endangered Species Act, the Forest Service must consult with the National Marine Fisheries Service ("NMFS") and the Fish and Wildlife Service ("USFWS") to ascertain whether the alternatives would impact any threatened or endangered species. *237-4*

5. Conclusion.

Thank you for the opportunity to comment, which preserves our standing.

Sincerely,

Richard F. Till
Land Use Law Clerk

237-3 DOE recognizes the potential negative impacts on Hanford groundwater that offsite waste poses and proposes that the receipt and disposal of offsite waste be delayed, at least until the WTP is operational (74 FR 67189), except for certain limited exemptions. These exemptions were specified in DOE's January 6, 2006, Settlement Agreement with the State of Washington (as amended on June 5, 2008) regarding *State of Washington v. Bodman* (Civil No. 2:03-cv-05018-AAM), signed by DOE, Ecology, the Washington State Attorney General's Office, and DOJ. In addition, for this *Final TC & WM EIS*, DOE is no longer proposing transportation of RH-LLW containing significant amounts of technetium-99 from INL to Hanford, which removes a possible long-term source of groundwater contamination. The transportation of radioactive materials and waste, both coming to and leaving Hanford, must comply with DOT and NRC regulations that promote the protection of human health and the environment. This includes requiring the use of certified packaging that minimizes the radiation dose rate outside the transportation package. As indicated in the *TC & WM EIS* Summary, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that transportation of radioactive waste would cause an additional fatality as a result of radiation from either incident-free transportation or postulated transportation accidents.

237-4 Communications have occurred with DOE and with USFWS, the National Marine Fisheries Service (NMFS), the Washington State Department of Fish and Wildlife, and the Washington Natural Heritage Program concerning listed species that are potentially present on Hanford (see Appendix C, Section C.2.1). Further, as reported in Chapter 3, Section 3.2.7.4, special studies were undertaken to identify the presence of special status species within areas potentially disturbed by the various Tank Closure, FFTF Decommissioning, and Waste Management alternatives. Potential impacts on special status species at Hanford are addressed in Chapter 4, Section 4.1, and there is no impact (that is, "no effect") on any federally or state-listed threatened or endangered species. If circumstances change, DOE will evaluate the need and undertake additional informal consultation with the appropriate agencies to ensure protection of listed species. Consultation with the U.S. Forest Service is beyond the scope of this EIS, since it is DOE and not the U.S. Forest Service that is undertaking the action.

Commentor No. 238: Melissa Laird

From: melissa laird [melissalaird7@gmail.com]
Sent: Friday, March 19, 2010 7:07 PM
To: tc&wmeis@saic.com
Subject: Comment on Waste Management EIS

Citizens of Washington State have already commented on bringing new nuclear waste to Hanford. Initiative 297 showed that the overwhelming majority of citizens oppose bringing new nuclear waste to Hanford which is already the most contaminated place in the Western Hemisphere. Having the DOE ignore this Initiative is hugely disenfranchising and one of the most demoralizing strikes against our democracy in a generation. *238-1*

Washington State is a place of amazing beauty and economic vitality, largely through its natural resources such as trees, soil for agriculture and fisheries. As the DOE continues to pollute soil and groundwater around Hanford, it will add more radioactivity to the already contaminated soil and threaten our amazing agricultural production and fisheries. Don't destroy our state's economy with your pollution! Hanford as a radioactive waste site is geologically inappropriate. Basalt is very porous adding to the threat of radionucleides flowing into groundwater and into the Columbia River. The University of Washington and Fred Hutchinson Cancer Research Center have demonstrated that cancer rates are on the rise at Hanford and will continue to rise with this pattern of radioactive toxins spreading. *238-2*

We need to back up and focus on clean-up using the strictest possible approach by removing tanks and contaminated soil -- not just capping over old tank farms. *238-3* The Department of Energy needs to find a site such as Nevada or Utah which has salty soils with groundwater much deeper than Hanford to serve as a permanent storage of nuclear waste. Using Hanford by default is unfair and unsafe. Let us protect the natural resources of the Northwest: healthy fish and farms, clean water, sagebrush and beautiful forests. *238-4*

238-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

238-2 See response to comment 238-1 for a discussion on the transport and disposal of offsite waste.

The analysis of long-term impacts on groundwater beneath all of the potential waste disposal sites was explicitly predicated on the presence of porosity in the suprabasalt sediments and the basalt itself, as well as the partial or complete presence of water in the porous media. This is described in Appendix L, "Groundwater Flow Field Development," and Appendix N, "Vadose Zone Flow and Transport," of this *Final TC & WM EIS*.

238-3 Please note that all of the action alternatives would involve retrieval of at least 90 percent of tank waste before tank closure would take place. The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). DOE's preferred retrieval option (i.e., to retrieve at least 99 percent of the tank waste) is consistent with the TPA goal of residual waste not exceeding 10.2 cubic meters (360 cubic feet) for 100-series tanks or 0.85 cubic meters (30 cubic feet) for the smaller 200-series tanks, corresponding to 99 percent retrieval.

Decisions made by DOE on the proposed retrieval actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

238-4 DOE explained in the *WM PEIS* (DOE 1997) that additional analyses would be prepared to implement DOE's programmatic decisions. This *TC & WM EIS* analyzes the potential environmental impacts associated with a number of

Commentor No. 238 (cont'd): Melissa Laird

proposed actions, including disposal of LLW and MLLW potentially shipped to Hanford from offsite DOE locations. Depending on the outcome of this *Final TC & WM EIS* and its ROD, DOE will evaluate whether additional NEPA reviews or updates to previous decisions are appropriate, as needed.

Commentor No. 239: Brian Kelly, Restoration Coordinator, Hells Canyon Preservation Council

From: Brian Kelly [brian@hellscanyon.org]
Sent: Friday, March 19, 2010 7:31 PM
To: tc&wmeis@saic.com
Subject: Hanford EIS Comments-please reply
Attachments: Hanford EIS Comments.docx

Please reply to acknowledge receipt of these comments.

Attached are comments about the TC&MW EIS for Hanford site.

Thank you.

Brian Kelly
Restoration Coordinator
Hells Canyon Preservation Council
Post Office Box 2768
La Grande, OR 97850
xxx-xxx-xxxx extension 24
www.hellscanyon.org

Response side of this page intentionally left blank.

Commentor No. 239 (cont'd): Brian Kelly, Restoration Coordinator, Hells Canyon Preservation Council

HELLS CANYON PRESERVATION COUNCIL

Hells Canyon Preservation Council, PO Box 2768, La Grande, OR 97850

To: Mary Beth Burandt, NEPA Document Manager, US Department of Energy, Office of River Protection, Attn:TC& WM EIS, P.O. Box 1178, Richland, WA 99352.

Sent by email to: TC&WMEIS@saic.com

March 19, 2010

Regarding: Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington

Dear Ms. Burandt,

Please accept these comments regarding the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington. I submit these comments on behalf of Hells Canyon Preservation Council, a non-profit organization of approximately one thousand members based in La Grande, Oregon. Our mission involves the protection and restoration of the Hells Canyon, Wallowa and Blue Mountain ecosystems.

The Columbia River flows along the Hanford Site for about fifty miles. The Snake River and Yakima River join the Columbia nearby. Salmon, steelhead and sturgeon depend on these important waterways for their survival.

Hanford is considered to be the most contaminated radioactive site in the hemisphere and it is the largest environmental clean-up project in the world.

Fifty-three million gallons of high-level radioactive waste have been stored in underground tanks at the Hanford Site and many of these tanks are leaking highly-toxic liquid into the soil. *239-1*

We are extremely concerned about the pollution of the Hanford site and we urge you to clean up the site to the absolute highest standard.

Post Office Box 2768 — La Grande, Oregon 97850 | Phone (541) 963-3950 — Fax (541) 963-0584
E-Mail: hcpc@hellscanyon.org — Web: www.hellscanyon.org

239-1 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 239 (cont'd): Brian Kelly, Restoration Coordinator, Hells Canyon Preservation Council

The Environmental Impact Statement

The Environmental Impact Statement (EIS) to address the Hanford clean-up includes:

* Treatment of the 53 million gallons of highly radioactive waste and closing the aging underground tanks.
* Disposing of solid waste with the possibility of receiving additional waste from other facilities.
* Decommissioning the Fast Flux Test Facility, a nuclear reactor from the 1980s.

Specific Comments

* *The DOE should clean-up all 53 million gallons of buried nuclear waste to a 99.9% rate of retrieval or higher.* ***239-2***
* *Drop the proposal to ship radioactive waste into Hanford from across the nation.* Shipments on Interstate 84 could travel through the Blue Mountains and the communities of Pendleton, La Grande, and Baker City.Cabbage Hill and Ladd Canyon are well-known as treacherous sections of the highway in the winter and numerous truck accidents occur there every winter.Hanford is already extremely contaminated.Do not import more contaminated waste! ***239-3***
* *Clean up the waste that has leaked into the ground and prevent it from reaching the Columbia River.* A complete clean-up is needed to protect salmon, steelhead, sturgeon and other aquatic life from contamination by radioactive waste.DOE's proposal is not thorough enough.All contaminated soil and groundwater must be treated! ***239-1 cont'd***

We appreciate the opportunity to comment on this project.

Sincerely,

Brian Kelly

Restoration Coordinator

Hells Canyon Preservation Council

239-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

239-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 240: Allyn Boldt

From: Allyn Boldt [a.boldt@verizon.net]
Sent: Friday, March 19, 2010 7:33 PM
To: tc&wmeis@saic.com
Subject: TC & WM EIS comments
Attachments: ALB Draft TC & WM EIS comments.doc

Attached as a MS word file.

Allyn Boldt
1019 S. Irby St.
Kennewick, WA

Response side of this page intentionally left blank.

Commentor No. 240 (cont'd): Allyn Boldt

Date: March 19, 2010

To: Mary Beth Burandt
EIS Document Manager
DOE Draft TC&WM EIS Comments
Office of River Protection
P.O. Box 1178
Richland, Washington 99352

Subject: Comments on the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington

References:
1) DOE/EIS-0391, 2009, *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*, U.S. Department of Energy, Washington, D.C.
2) EPA Manual 1640, 1987, *Policy and Procedures for the Review of Federal Actions Impacting the Environment*, U.S. Environmental Protection Agency, Washington, D.C.
3) DOE/EIS-0286F, 2004, *Final Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement*, Richland Operations Office, Richland, Washington.

The U.S. Department of Energy (DOE) has requested comments on the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site (reference 1), TC & WM EIS. This letter provides 4 comments on the draft TC & WM EIS.

1) The treatment and disposal of Effluent Treatment Facility Wastes and off-site wastes should be revised for the final TC & WM EIS or deleted from a final tank closure EIS and be the subject of a separate, later solid waste EIS.

The draft TC & WM EIS is unsatisfactory and inadequate concerning the treatment and disposal of Effluent Treatment Facility, ETF, wastes and off-site wastes. By the definitions of the Environmental Protection Agency, EPA, in reference 2, the treatment and disposal of both ETF wastes and off–site wastes are "EU - Environmentally Unsatisfactory" and "Category 3 – Inadequate".

> "Environmental Impact of the Action
> EU – Environmentally Unsatisfactory
> EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ)."

> "Adequacy of the Impact Statement
> Category 3 – Inadequate
> EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ."

240-1

240-1 In response to this and similar comments, an expanded discussion of the behavior of a variety of waste forms within the IDF(s) in the light of uncertainties including infiltration, waste-form performance, and decisions regarding the importation of offsite LLW and MLLW has been added to Chapter 7, Section 7.5, of this *Final TC & WM EIS*. As a point of clarification, DOE would like to point out that the rating the *Draft TC & WM EIS* received from EPA was an EO–2, which stands for Environmental Objections – Insufficient Information. This rating was provided by EPA Region 10 in its letter dated May 3, 2010, along with comments. DOE has met with both EPA Region 10 and EPA Headquarters to discuss their comments. These comments have been addressed in this CRD. Since that meeting, EPA has agreed to be a cooperating agency on this *Final TC & WM EIS*.

Commentor No. 240 (cont'd): Allyn Boldt

2

The magnitude of the environmental impact of all EIS alternatives disposing ETF wastes and off-site wastes can be derived by comparison of the peak number of square kilometers groundwater that exceeds the Maximum Contaminant Levels (MCL) for Iodine-129 and Technetium-99 at calendar year 8440. The peak groundwater value at year 8440 is derived from the Integrated Disposal Facility (IDF) leachates. The principal waste sources in the IDF leachates are the ETF wastes and the off-site wastes. The difference between year 8440 values on Figures 5-1232 and 5-1202 of the reference 1 document projects 33 square kilometers of groundwater will exceed the I-129 MCL. The difference between year 8440 values on Figures 5-1237 and 5-1206 of the reference 1 document projects 3.5 square kilometers will exceed the Tc-99 MCL.

Neither the TC & WM EIS nor the previous Hanford Solid Waste Environmental Impact Statement (HSW EIS) (reference 3) evaluated more than a single waste form for disposal in the IDF. Reasonably available alternatives outside the spectrum of alternatives analyzed in the draft TC & EM EIS include vitrified glasses. The draft TC & WM EIS is inadequate for the purposes of the National Environmental Policy Act and/or Section 309 review. As the planned research and selection of an ETF waste form is scheduled to be complete in 2015, the solid waste disposal of ETF wastes and off-site wastes should be removed from the tank closure EIS and be the subject of a separate stand alone solid waste EIS (a revised draft HSW EIS, reference 3). *240-1 cont'd*

2) The draft TC & WM EIS does not evaluate the cumulative effects of reasonably foreseeable future actions on other Hanford site vadose zone and groundwater contaminants when combined with the tank closure and solid waste management evaluations.

The council on Environmental Quality's (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) define cumulative effects as *240-2*

> The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions (40CFR1508.7).

Please evaluate the cumulative effects on the environment with reasonably foreseeable future removal or in-situ remediation actions on other Hanford site vadose zone and groundwater sources.

3) The presentation of data and results in the draft TC & WM EIS is difficult to comprehend and should be revised to clarify the presentation and comprehension of cleanup alternatives.

Clarify the presentation of source terms and impacts by presenting individual sources contributing to an alternative. The sources and impacts can be presented in a spreadsheet file included in the attached disc with the report. For example, the contributions from closed tanks cannot be separated from other deep(?) vadose zone sources under the tank farms. The contribution of tank closure secondary wastes and Effluent Treatment Wastes cannot be separated from the contributions of off-site wastes in the Integrated Disposal Facility. This methodology will allow the reader or reviewer to configure and evaluate a set of closure actions not included in the current draft TC & WM EIS. *240-3*

4) The TC & WM EIS should include an additional alternative that corresponds to the proposed "Tri-Party Agreement".

The TC & WM EIS is a complex document and difficult if not impossible for the public to comprehend the many alternatives of which none correspond to the proposed Tri-Party Agreement (TPA). It is not readily apparent that the reader has to extrapolate to the proposed TPA configuration. The TC & WM EIS should be revised to include the proposed TPA configuration and state that it is the preferred alternative for public understanding and acceptance. *240-4*

I thank you for the opportunity to comment on the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site.

Allyn Boldt

1019 S. Irby St.
Kennewick, WA 99338

240-2 Hanford remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. Cleanup decisions regarding the non-tank-farm contamination sites will be made in consultation with Federal and state agencies. Other Hanford remediation activities are considered in the cumulative impacts analysis, although this *TC & WM EIS* is conservative in that it does not fully reflect the effectiveness of remediation activities, and does not consider groundwater remediation.

As noted in Section S.3.5 of Appendix S, 403 waste sites are involved in the other past, present, and reasonably foreseeable future actions considered in the cumulative impacts analysis. Appendix S also describes the development of the waste site characteristics for the cumulative impacts analysis, including key characteristics such as the current or future end state. The current or future end state helps to determine how the waste sites were factored into the cumulative impacts analysis. For instance, for waste sites subject to landfill closure, the inventory of contaminants would be disposed of in place; for waste sites subject to "remove, treat, and dispose," the inventory would be removed to the extent possible, treated as necessary, and disposed of in the ERDF or an IDF. The groundwater modeling incorporates the disposition locations for the contaminant inventories from each waste site, and thus the long-term cumulative impact analyses reflect the current or future end states to the extent possible.

Despite its consideration of end states, however, this EIS is not able to fully reflect the effectiveness of all remediation activities. There are significant uncertainties in estimating the degree of cleanup to be achieved by the remediation activities. Among these uncertainties are (1) the inventories of contaminants released to the ground at many of the sites; (2) for liquid release sites, the portion of the originally disposed contaminants remaining in the vadose zone and the portion that has migrated into the groundwater; (3) the selection of specific cleanup/containment methods for some sites; and (4) the effectiveness of the cleanup/containment methods. Therefore, the cumulative impacts analysis for this *TC & WM EIS* is conservative in that it does not account for cleanup/containment of waste and contaminated soil at liquid release sites, or cleanup/containment of current or future groundwater contamination.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation

Commentor No. 240 (cont'd): Allyn Boldt

activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

240-3 In response to this and similar comments, the data presentation in Chapters 5 and 6 and Appendices N and O has been revised in this *Final TC & WM EIS* to provide additional clarification. In addition, an expanded discussion of the overall IDF performance in the context of uncertainties regarding infiltration, waste-form performance, and decisions regarding the importation of offsite LLW and MLLW has been added to Chapter 7, Section 7.5.

240-4 The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

The *TC & WM EIS* closure alternatives considered for the tank farms include no action, landfill closure, selective clean closure, and clean closure, which would include actions to remove the source of contamination. This EIS does not include proposed actions to address potential groundwater impacts resulting from the tank farms (i.e., past leaks), as this will be addressed along with the 200 Area non-tank-farm areas CERCLA process. All CERCLA remedial actions

Commentor No. 240 (cont'd): Allyn Boldt

include consideration of the applicable, relevant, and/or appropriate requirements under Federal and state laws and regulations that must be achieved as part of the remedies, or can be waived by EPA.

Commentor No. 241: Chuck and Lynetta Weswig

Comments regarding the Tank Closure and Waste Management Environmental Impact Statement

March 19, 2010

To: Mary Beth Burandt, Document Manager
TC & WM EIS
Office of River Protection
US DOE

Fax: 1-888-785-2865

We are opposed to the USDOE's "preferred" decisions in the Environmental Statement that was presented in Portland on Feb 10, 2010.

We cannot simply bury and cover up a problem that will exist for years and years in the future. It is inconceivable that the DOE would continue to consider and implement a plan that will lead to ongoing contamination of the Columbia River.

We were appalled that words such as "never been done before" & "would simply cost too much" were being used to justify a decision of this magnitude. That "cannot do" mentality would have prevented many of this countries past accomplishments.

We are in support of the Oregon DOE "Alternative 7 The Oregon Proposal" as outlined in their letter of January 4, 2010.

From

Chuck & Lynetta Weswig
1000 SW Hillcroft Ave
Portland, OR 97225

241-1 **241-1** Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Chapter 2, Section 2.6.4, of this *Final TC & WM EIS* has been revised to include a discussion of the Oregon Department of Energy's proposal and how DOE has addressed the range of reasonable alternatives for tank waste storage, retrieval, and treatment and remediation of the existing tank farms in its original Tank Closure alternatives. DOE has carefully considered the Oregon proposal and, as explained in Section 2.6.4, has determined that it is not reasonable.

Commentor No. 242: Mike Fox

From: Mike Fox [mike@foxreport.org]
Sent: Friday, March 19, 2010 7:40 PM
To: tc&wmeis@saic.com
Subject: Comments on the FFTF

Dear Sirs:

The FFTF should be preserved and renovated to lend support to the looming increase in nuclear energy in the United States and the world. At this time there are 56 new reactors under construction around the world and another 24 in advance stages of planning. Many more are in preliminary stages. The world will have a nuclear energy future but the United States has been pursuing a suicidal energy policy to excluded the US from that future in many other nations.

In addition to helping develop advanced nuclear fuel designs, advanced fuel cladding designs, and contributed to the first of a kind physics in the development of advanced reactor safety features, (such as turning off the coolant pumps at full-power), the FFTF reactor has the capability of producing dozens of special advanced medical isotopes diagnosing and treating cancer, arthritis, AIDS, and others.

All of this has been known for 2 decades, yet Washington bureaucrats continue to pursue a policy of destruction of the FFTF and to withhold from the public health benefit the demonstrable advances in the technology of cancer treatment, for lack of key isotopes. The FFTF is fully capable of making dozens of specialty isotopes which oncologists have been requesting. The FFTF is unique in the world for these missions, since it has high neutron spectra (<10E15 neutrons/sec), has a fast neutron spectrum (ie wide range of neutron energies), and impressively, a huge target volume for making these isotopes.

Finally, there seems to be a current fiction inside Washington that solving the critical Mo-99 supply problem will solve the entire medical isotope shortage problem. This is utterly untrue. Please preserve this national treasure for nuclear energy, nuclear safety. and nuclear medicine.

242-1

242-1 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. As discussed in Chapter 1, Section 1.4.2, Decisions Not to Be Made, DOE is not considering restarting FFTF, only decommissioning it.

Commentor No. 243: Marlene Oliver

From: Marlene Oliver [marleneo@curetc.com]
Sent: Friday, March 19, 2010 10:55 PM
To: tc&wmeis@saic.com
Subject: Draft Hanford Tank Closure and Waste Management EIS Statement
Attachments: SNM warns of severe shortage of medical isotopes Reuters March 18 2010.doc; Holdren Shanahan + Cosigners Feb 1st 2010l.doc

The EIS remains incomplete.

For example, the preferred alternatives for **FFTF** should include **RESTART/ removal from waste consideration at this time, and for the next several decades after restart,** and, at the very least, the NO ACTION alternative.

Nothing else is either acceptable or legal. *243-1*

The DOE has received overwhelming numbers of FFTF letters of support, in the past and present, from US allies as well as American taxpayer-citizens and hundreds of distinguished scientists - **please see the attached letter**.

All were ignored.

Hopefully, now will change how DOE does the taxpayer's business.

The Federal Data Quality Act **mandates** sound science be used in federal decision making.

The Atomic Energy Act of 1954 **mandates** peaceful uses of nuclear technology.

Please, **DOE, OBEY THE LAW.**

Secretary Chu and President Obama's stated policy supports the development of nuclear technology for energy and other related needs.

FFTF is uniquely qualified to bring American nuclear technology, now being surpassed by China, France, Korea, Russia, and others, into the 21st century. *243-1 cont'd*

I attended a conference in Moscow: "Research Reactors in the 21st Century." Three scientists from the United States attended amongst two hundred others. Let's get with the program.

Help us to REGAIN American supremacy in nuclear technology.

NOTE: **100% of targeted cancer cells and infectious disease cells die and 80% of arthritis patients can be helped with radionuclides that FFTF can produce to relieve worldwide shortages** in the required quantity and with the required quality that physicians require and AVOID UNNECESSARY DEATHS **(please see the attached, dated today)**.

243-1 DOE issued a ROD (66 FR 7877; January 26, 2001) for the *NI PEIS* (DOE 2000a) wherein DOE announced its decision that FFTF would be permanently deactivated. As discussed in Chapter 1, Section 1.4.2, Decisions Not to Be Made, DOE is not considering restarting FFTF, only decommissioning it. Thus, regardless of the alternative selected (including No Action), FFTF would not be available for future use.

Commentor No. 243 (cont'd): Marlene Oliver

We could reduce our healthcare bill by 50% once these technologies are adopted and embraced in the United States. Our country pays **TWICE AS MUCH FOR HEALTHCARE, per person**, as any other country in the world.

Also, I object to ALARA. ALARA costs US citizens billions of unneeded taxpayer dollars per year. Hundreds of times more radiation exists in a banana or a cup of milk as in a cup of Columbia River water sampled at the Richland pumphouse, just DOWNSTREAM of the Hanford site.

Again, SOUND SCIENCE should prevail.

Consult the UCLA independent hormesis study involving 10,000 subjects that shows that **nuclear workers live an average 8 years longer than members of the general public.**

Many thanks for this opportunity to comment on this EIS.

Marlene Oliver
94006 Northstar Lane PR NE
West Richland WA 99353
mobile xxx-xxx-xxxx
www.curetc.com
Innovative Cures Foundation, CEO 501(c)3
Curative Foundation, CEO 501(c)3
Fighting Children's Cancer Foundation, Director 501(c)3
(National Cancer Institute, CARRA)
(Centers for Disease Control - Washington Cares about Cancer Partnership)
Curative Technologies Corporation, CEO
IRIST.org, Director
EANM.org
SNM.org
World Association of Radiopharmaceutical and Molecular Therapy, founder
warmolth.org
Asia-Oceania Federation of Nuclear and Molecular Biology aofnmb.org
World Federation of Nuclear Medicine and Biology wfnmb.org
ANS-EWS
and PATIENT ADVOCATE

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Commentor No. 244: Kelly Skovlin

From: kskovlin@eoni.com
Sent: Saturday, March 20, 2010 2:03 AM
To: tc&wmeis@saic.com
Subject: Handford Waste Clean-up comment

U.S.Dept.ofEnergy,OfficeofRiverProtection
POBox450,MailStopH6-60
Richland,WA

DearMaryBethBurandt,

ThesearemycommentsregardingtheHandfordwasteclean-upeffort.

First,thetransportationofnuclearwastefromothersitesisnotacceptable.Wasteshould bedealtwithatthesiteonwhichitoccurstominimizetheexposureofpeopleandotherbeings totheradiationandotherhazardsthatareassociatedwiththewaste.Second,thetanks ofwasteshouldberetrievedattherateof99percent.Third,trenchesshouldnolongerbe usedtodisposewasteandtheyshouldbecoveredandsealedassecurelyaspossible. *244-1* *244-2*

IpreferTankClosureAlternative6C,FFTFDecommisioningAlternative3,andWaste ManagementAlternative3withoutshipmentsfromothernuclearwastesites.

ItwasnicetomeetyouinLaGrande.Thankyouforcomingtospeakwithusthereatthe University.

Sincerely,

KellySkovlin
802MillerDrive
LaGrande,OR97850

244-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

244-2 The removal of 99 percent of the tank waste is also DOE's preference as discussed in Chapter 2, Section 2.12.1. This level of waste removal would be achieved under all Tank Closure alternatives, with the exception of Alternative 1 (No Action) and Alternative 5. As noted in Chapter 2, Section 2.5.2, a barrier would be placed over the six sets of adjacent cribs and trenches (ditches) under all alternatives except Alternative 1 and the Option Case for Alternatives 6A and 6B. In the latter case, the trenches would be clean closed.

The commentor's preference for Tank Closure Alternative 6C and FFTF Decommissioning Alternative 3 is noted. While the commentor prefers Waste Management Alternative 3 without offsite waste shipments, this alternative calls for the shipment of LLW and MLLW to the site, as specified in the Settlement Agreement for waste disposal at Hanford (see Chapter 1, Section 1.9.3.3).

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 245: Karin Engstrom

From: Karin Engstrom [kengstrom@seanet.com]
Sent: Sunday, March 21, 2010 1:49 PM
To: tc&wmeis@saic.com
Cc: Joe McDermott; Eileen Cody; Sharon Nelson; lisa@hoanw.org
Subject: Comment on Hanford EIS: DOE/EIS-391-D
Attachments: TCWMEIS-Hanford.doc

March 19, 2010

To: Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
TC & WM EIS, P.O. Box 1178
Richland, WA 99352

From: Karin Engstrom
6911 – 34th Avenue SW
Seattle, WA 98126
kengstrom@seanet.com

Re: Comment on Draft EIS: Tank Closure & Waste Management - DOE/EIS-391-D

I attended the public hearing in Seattle on Monday, March 8th at the Seattle Center. I was struck that the presentation and discussion **did not address** several important issues concerning environmental impacts:

- Most of Hanford is a Superfund site.
- The real risk of earthquakes or Mt. Rainier eruption. What are the plans?
- The maps of contamination are individually presented. Wonder if we overlay these maps? What would it look like? They aren't separate – they are a mix in the soil and groundwater. What happens in that contaminant interaction?
- The risk of contaminants in the air flows over Hanford.
- The risk to people who work at Hanford.
- How does this "clean up" and proposed movement of nuclear waste affect global climate change? How do you measure that?
- Several participants mentioned other Environmental Impact Statement studies being conducted. Why are these studies separated? The words that come to mind are – shell game!

Please respond to where I can find these answers in your document.

245-1

245-1 DOE's intent was to focus only on the key parts of this EIS during the public hearings. DOE held a 1-hour open house prior to each public hearing on the draft EIS to allow the public to meet informally with members of the *TC & WM EIS* team, ask questions, and learn more about this EIS. Informative factsheets also were provided at these open houses. To help readers understand the information presented in this EIS, DOE took several approaches. For those who may not want to read through this entire EIS, DOE published a Summary. The Summary is intended to provide a brief overview of the material contained in the *Draft TC & WM EIS*. For those interested in reading this entire EIS, DOE also issued a Reader's Guide to assist the public in navigating through the information presented. This guide serves as an introduction and guide to the contents of this EIS, highlights the key features of the reasonable alternatives, and helps readers review the technical analyses presented. Recognizing that many people may not read beyond the EIS Summary, the information presented in both the Summary and the Reader's Guide attempts to strike a balance between those readers interested in the more technical details regarding DOE's proposed actions and alternatives and readers seeking a simpler overview. To find specific topics within this EIS, readers can use the Index, which identifies the page numbers where many topics are discussed. For example, in the *Draft TC & WM EIS*, the phrase "National Priorities List," which identifies Superfund sites, is listed in the Index, as are the terms "earthquake" and "global climate."

The groundwater analysis conducted for this EIS does account for the transfer of contaminants through the vadose zone into the groundwater; this topic is discussed in the front section of Chapter 5 (before Section 5.1). In addition, Chapter 6, Section 6.4.1, and Appendix U, Section U.1, of this EIS contain maps showing the alternative combinations and their cumulative impacts, including the potential groundwater impacts (which represent ranges) and the potential impacts represented by the cumulative impacts analysis. Risks to Hanford workers are discussed in Chapter 4 under the normal operations analysis. The other EIS studies mentioned by the commentor are discussed in Chapter 1, Section 1.10, Related NEPA Reviews. DOE does not believe it has purposefully hidden information from the public and has tried several mechanisms to assist readers in finding the information they feel is important.

Commentor No. 245 (cont'd): Karin Engstrom

I've looked through my previous letters on Hanford EIS drafts in 2002 and more recently. It just seems to go in circles. If I had the time – I would dig through my files in the 1990's when I first moved to the Northwest and am sure I wrote letters on EIS drafts as well. What I notice is that the names of responsible DOE officers change but the problems don't.

This EIS goes on the assumption that the public must accept that the plan is to "clean up" Hanford and then prepare it to be the future nuclear waste dumping ground. I do not find the "alternatives" responsible solutions.

This is NOT an EIS about clean up. The issue has moved on and is now about making Hanford the nuclear waste dumping ground.

Common sense would tell anyone that ANY plans to create a nuclear waste dump on top of what is already there, isn't feasible. In reality, the damage has already gone too far and clean up is theoretical. The word, remediation, is meaningless. You cannot remediate contamination that is already there.

There are no alternatives except to clean up with as little risk to the environment for all life.

If we are truly responsible, we will propose that all nuclear production – for any reason – be stopped. There is no place in the world to store the waste. It is contributing toward making human beings an endangered species.

I appreciate all your work within the confines of what you are told – but we need you to take a stand for the people and our future generations of the Northwest, the environment in general and the future of our earth.

Please make this comment a part of your record.

cc: President Barack Obama
Senator Patty Murray
Senator Maria Cantwell
Congressman Jim McDermott
Governor Christine Gregoire
State Senator Joe McDermott
State Representative Eileen Cody
State Representative Sharon Nelson
Lisa – Heart of American Northwest

245-2

245-3

245-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

245-3 Nuclear energy production and its resulting waste are not within the scope of this *TC & WM EIS*. Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 246: Tamara E. Shannon

From: Tamara Shannon [eaglet7@earthlink.net]
Sent: Sunday, March 21, 2010 3:17 PM
To: Hanford
Subject: Fw: Comments on Hanford waste removal
Attachments: HanfordLetter3-18-10.doc

Sorry this is late. I had a typo in the email address.

-----Forwarded Message-----
>From: Tamara Shannon <eaglet7@earthlink.net>
>Sent: Mar 19, 2010 1:57 PM
>To: TC&WMIES@saic.com
>Cc: Tamara Shannon <eaglet7@earthlink.net>
>Subject: Comments on Hanford waste removal
>

>Please include the attached comments for your review and decision making.

>Thank you. t.s.

>
>Tamara Shannon

Tamara Shannon

Response side of this page intentionally left blank.

Commentor No. 246 (cont'd): Tamara E. Shannon

3-18-2019

Mary Beth Burandt, Document Manger
TC & WM EIS
P.O. Box 1178
Richland, WA. 99352

Dear Mary Beth Burandt

I am for the 99.9% clean up of the existing Toxic material, from the tanks, troughs, unlined soil disposal ditches and tank leaks and all the places in between – CLEAN CLOSURE, nothing less. I saw the slide projecting the movement and dispersal of the various toxic wastes into the next millennium and was appalled that our government would leave anything uncleaned up within our technological abilities. I hope your scientists realize that whatever chemicals have "moved out" of the figures depicting the groundwater movement know that it isn't there because it has dissipated into the Columbia River, our life blood. It doesn't take rocket science to realize that if we pollute the places that we work, play, depend on for food, transportation, recreation and spiritual well-being, we won't "be" any more. ***246-1***

I am against any further storage of nuclear waste at Hanford, and am very upset that the concept of considering and documenting the effects of direct, indirect, cumulative and associated impacts was disregarded, concerning the transportation of nuclear waste to the Hanford site, should it become a National Radioactive Waste Dump. Again, it doesn't take rocket science to determine the adverse effects of transporting toxic wastes along *any* road way or water way, no matter how small or large the population is along the route. Any mishap along the way, whether it be from a natural disaster, terrorism, or human error is way beyond acceptable. Besides, humans aren't the only one that would be impacted by a mishap along the way, AND how can we even consider bringing more toxic wastes to Hanford when we don't have the track record for cleaning up what is already there? ***246-2*** ***246-3***

/s/ Tamara E. Shannon

3940 Blackberry Drive
Hood River, OR. 97031

246-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

246-2 DOE analyzed and documented the direct and cumulative transportation impacts for incident-free operations and accidents in this *TC & WM EIS* in Chapter 4, Section 4.3, Public and Occupational Health and Safety—Transportation. A more detailed description of the transportation analysis was provided in Appendix H of the *Draft TC & WM EIS*. The results of the transportation analysis are summarized in the Summary of this *TC & WM EIS*. As shown in the Summary, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs. The United Nations Scientific Committee on the Effects of Atomic Radiation, the International Atomic Energy Agency, and the International Commission on Radiological Protection all support the view that, "The standard of environmental control needed to protect man to the degree currently thought desirable will ensure that other species are not put at risk" (Linsley 1997). Therefore, the analysis of human health impacts is indicative of the potential impacts on plants and animals.

246-3 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 247: David E. Delk, President, and Gisela Ray, Secretary, Alliance for Democracy, Portland Chapter

ALLIANCE for DEMOCRACY
portland chapter

March 12, 2010

Mary Beth Burandt
DOE Draft TC&WM EIS Comments
Office of River Protection
PO Box 1178
Richland, WA 99685

Re: USDOE's preferred alternatives for the clean-up of the Hanford Nuclear Reservation.

Ms Mary Beth Burandt:

I am writing on behalf of the Alliance of Democracy, Portland OR chapter. As citizens, who are deeply concerned about the health of the people in this area, the health of the Columbia River and the environment in general, we strongly disagree with DOE's preferred alternatives for the Hanford clean-up. We would hope that an office, named "Office of River Protection", would share our outrage at the very real threat to the Columbia River. *247-1*

- Removing 99% of the 53 million gallons of high-level nuclear waste from the leaky tanks sounds good, but ignores the fact that the 1% left behind contains 25% of the radioactive contamination. That's unacceptable. We need to remove the tank waste to the 99.9% level! *247-2*
- A million plus gallons of high-level nuclear waste has already leaked into the soil. It is spreading into the ground water and toward the Columbia River. Now we learn that DOE not only wants to leave the leaky tanks in the ground but does not intend to clean up the spills. That's bad news for the cancer rates in that area. That's unacceptable. Even with a landscaped cap applied over the spill area, the contamination will continue to flow into the Columbia River. The contaminated soils must be cleaned up and the tanks removed! *247-3*
- Insane! That is the only description for the DOE preferred alternatives of bringing additional radioactive waste to the Superfund site Hanford. We cannot aggravate the very condition we are trying to improve. Using Hanford as a national radioactive waste dump is unacceptable. The principle must be "Clean it up first." *247-4*
- Bringing more waste to Hanford would require transporting almost 3 million cubic feet of radioactive and "mixed" radioactive materials over our roads. The expected exposure of the public to low level radiation and the possible contamination of the area in case of an accident is unacceptable. It is simple: no additional radioactive waste in Hanford! *247-5*

We demand that DOE reconsider its preferred alternatives and give Hanford the thorough clean-up the people of the area deserve. This EIS is defective. It does not include all of the factors regarding this site (evidenced by the fact that DOE will have additional EISs later this year to consider the rest), makes the assumption that additional waste will come here (EIS does not look at option of not bringing new waste to Hanford) and therefore, violates the law which established the EIS process.

This EIS must be abandoned and a new EIS issued which includes all of the options and all of the waste, both existing and future.

David e. Delk, President
Alliance for Democracy, Portland Chapter

Gisela Ray
Secretary, Alliance for Democracy

112 NE 45th Ave. Portland OR 97213 | 503.232.5495 | www.afd-pdx.org

247-1 Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

247-2 As noted in Appendix D, Section D.1.1.4, of this EIS, there are uncertainties regarding the residual waste inventories. DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste heels that would remain in the tanks after retrieval. Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks, residual waste, and surrounding waste in the soil, requires preparation of detailed performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

See response to comment 247-1 regarding future DOE decisions.

247-3 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the vadose zone.

247-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 247 (cont'd): David E. Delk, President, and Gisela Ray, Secretary, Alliance for Democracy, Portland Chapter

DOE is actively engaged in cleaning up Hanford under the TPA, a legal agreement between DOE, Ecology, and EPA that identifies cleanup actions and schedules, called milestones. Negotiations among the TPA agencies resulted in an agreement to make changes to the TPA that adjust cleanup schedules to focus currently anticipated funds on near-term, higher-priority milestones by delaying cleanup work identified by the agencies as lower priority at this time. A 45-day public comment period was held on this tentative agreement.

247-5 The purpose of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. Regarding the inclusion of all proposed actions concerning Hanford in one EIS, some proposed actions and alternatives concerning Hanford may be related, but involve different scheduling requirements that do not allow all of them to be analyzed in this *TC & WM EIS*. However, these separate but related actions are discussed in Chapter 1 and, if data were available, in the cumulative impacts analysis discussions in Chapter 6. For example, the transport and disposal of GTCC waste were not analyzed in the *Draft TC & WM EIS*. A separate EIS, the *Draft GTCC EIS*, was published in February 2011 and was not available when the *Draft TC & WM EIS* was issued in October 2009. However, information from the *Draft GTCC EIS* was incorporated into the *Final TC & WM EIS* cumulative impact analyses. Note that Hanford is one of a number of sites being considered for the disposal of GTCC waste. DOE has not yet made a decision on where GTCC waste will be disposed of.

Commentor Number 248 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 212.

Commentor No. 249: Sister Nancy A. Casale

He has made everthing beautiful in its time.
Ecclesiastes 3:11 (NIV)

March 7, 2010

To those involved in the ecological care of WA. State,

Washington is the "Evergreen State". I can't understand how anyone can consider, much less implement, making this State the dump for our nation's nuclear waste. The majestic Columbia River, that ribbons through Washington, signifies life, richness of life and abundant energy for life. The fertility of the land, the life-giving fresh water of the river both face death as innocent victims of human ignorance, lack of imagination and willfulness. The land and the river will no longer support life if the Hanford radioactive waste is not clean-up as it is now and a hundredfold more so if more is added. I protest the dumping of radioactive materials anywhere near such a major source of fresh water for so many people in the Pacific Northwest. What will happen to the vineyards, the orchards, the cattle, the children, the fish, the forests in generations to come? What happens in the event of natural disasters, ~~for~~ in events beyond our ability to foresee or prevent? – A major fresh water source is defiled, contaminated for millenia to come

249-1

249-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 249 (cont'd): Sister Nancy A. Casale

(2)

He has made everthing beautiful in its time.
Ecclesiastes 3:11 (NIV)

We have to care for the Columbia River's water and our fresh ground water. **249-1 cont'd**

I strongly oppose using Washington State as a nuclear waste dump for the U.S.A. I am a health care worker and cared for victims of nuclear contamination in the early 1990's, who had lived "downwind" from Hanford. They were still suffering the pain of exposure in their diseased bodies. **249-2**

1. Please remove as close to 100% of the tank wastes already present at Hanford. **249-3**
2. Remove the tanks and investigate and clean up the soil contamination in all the tankfarms.
3. Treat the waste at Hanford. Remove and treat the radioactive sodium and components on site. Keep radioactive waste materials off roads and highways, and out of towns and cities. **249-4**
4. Begin as soon as possible. **249-3 cont'd**
5. Please use land-fill areas somewhere other than next to or near major rivers or above drinkable groundwater — and don't import off-site waste to Hanford. **249-1 cont'd**

Thank you for considering my requests and concerns in the hope that you will act on them.

Sincerely
Sister Nancy A. Casale
2892 SR 211 #1
Newport, WA. 99156-8378

249-2 The potential doses to, and health impacts on, the public and workers from past Hanford operations have been the subject of a number of studies. Summaries of these studies are presented in Chapter 3, Section 3.2.10.3, of this EIS. As indicated in that section, the question of whether the population around Hanford has elevated cancer incidence or cancer mortality is unresolved. One past study showed no elevated levels of cancer around nuclear facilities, including Hanford; another study of 16 counties near Hanford determined that cancer incidence in white males and females was below the national average in most counties. The counties in which the incidences of cancer were higher than the national average were not those downwind of Hanford.

The Hanford Dose Reconstruction Project evaluated doses to, but not health effects on, members of the public from releases from 1944 through 1972. Airborne releases of iodine-131 from 1944 through 1957 were responsible for most of the dose from air emissions. The largest organ doses of 24 to 350 rad were to the thyroid. The maximum total effective dose equivalent to an adult from air emissions over the period from 1944 through 1972 was estimated to be 1 rem. The risk of a fatal cancer associated with a dose of 1 rem is about 1 in 1,600. The maximum dose through releases to the Columbia River (from eating nonmigratory fish) was estimated to be 1.4 rem.

249-3 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. DOE's preferred retrieval option (i.e., to retrieve at least 99 percent of the tank waste) is consistent with the TPA goal of residual waste not exceeding 10.2 cubic meters (360 cubic feet) for 100-series tanks or 0.85 cubic meters (30 cubic feet) for the smaller 200-series tanks, corresponding to 99 percent retrieval. DOE has already begun the process of retrieving waste from the tanks, such as tanks located in Waste Management Area C. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

249-4 As shown in the Summary, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, of this *TC & WM EIS*, it is unlikely that the estimated

Commentor No. 249 (cont'd): Sister Nancy A. Casale

total public radiation exposures from transporting radioactive waste associated with FFTF decommissioning, or transporting radioactive waste to Hanford for disposal, would result in any additional LCFs.

Commentor No. 250: Heart of America Northwest

Mary Beth Burandt
Document Manager
P.O. Box 1178
Richland, WA 99352

16 March 2010

Heart of America Northwest respectfully submits the following slideshow as formal comments on the draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site.

Heart of America Northwest
1314 NE 56th St, Suite 100
Seattle, WA 98105

Response side of this page intentionally left blank.

Commentor No. 250 (cont'd): Heart of America Northwest

3/16/2010

Hanford's Contamination Expected to Grow From Unacceptable Levels Today to Incredibly Unacceptable Levels in One Hundred Years and Thousands of Years… 10x Worse if USDOE uses Hanford as a National Radioactive Waste Dump

Source: USDOE's Own TCWMEIS
(Tank Closure Waste Management Draft EIS)
Presented by Heart of America Northwest 2010

TCWMEIS – Tank Closure Waste Management Environmental Impact Statement

- TCWMEIS was required due to legal and scientific errors in the 2004 Hanford Site Solid Waste EIS, which USDOE sought to rely on to use Hanford as national waste dump
- "Preferred alternative" proposes to use Hanford as national mixed radioactive hazardous and low level waste dump – once vitrification plant is "operational"
  - But, USDOE could start importing and disposing waste sooner, including extremely radioactive GTCC waste with Plutonium. Impact analysis missing from this EIS for adding GTCC wastes.
- "Closure" of Hanford's High-Level Waste Tank Farms – USDOE prefers leaving contamination in tank bottoms and in soil.

1

250-1

250-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

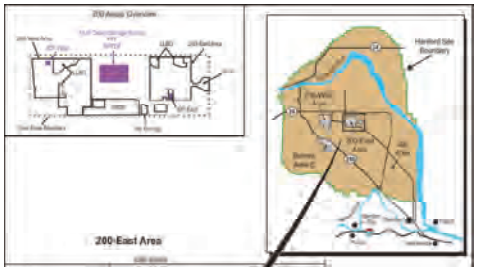
Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Section 2.12 of this CRD.

Commentor No. 250 (cont'd): Heart of America Northwest

3/16/2010

Columbia River at Risk

- Hanford Reach of the Columbia flows through Hanford for over 50 miles, past nine full scale nuclear reactors, hundreds of liquid waste and burial sites.
- Hanford Reach National Monument
- Contaminants already entering River along shore at levels >1,500 times Drinking Water Standard (Strontium-90)



2

250-2

250-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Commentor No. 250 (cont'd): Heart of America Northwest

3/16/2010

Hanford's Unknown Dangers

- 53 million gallons of waste in Hanford's High-Level Nuclear Waste Tanks; 35 million gallons remain in Single Shell Tanks.
- USDOE admits that over one million gallons of waste has leaked from tanks... How fast and where is it spreading? Will anything be done?
- Over 200 square miles of contaminated groundwater (80+ sq. miles above Drinking Water Standards)... Contamination already entering River at levels >1,500 times DWS for Strontium...

Combined Distribution of All Contaminants in Groundwater on the Hanford Site

250-2 cont'd

Use of Unlined Burial Grounds

Dumping of radioactive waste in unlined burial grounds took place at Hanford until public pressure caused it to stop in 2004. Now, USDOE is proposing to not clean up the burial grounds, cribs, trenches & tank leaks, meaning there will be persistent contamination of the soil & groundwater for thousands of years.

250-3

3

250-3 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that the removal of the contaminants from the vadose zone does not capture the contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

See response to comment 250-2 for information about the sensitivity analysis performed by DOE for this EIS.

Commentor No. 250 (cont'd): Heart of America Northwest

3/16/2010

WA Voters Said Do Not Add More Waste to Hanford's Contamination, but USDOE blocked in court

- Initiative 297 2004 "Clean up contamination before adding more"
- End Dumping in Unlined Trenches
- The TCWMEIS is a slap in the face to WA voters who resoundingly voted against adding more waste to Hanford in 2004.

250-4

Key Decisions USDOE Proposes to Issue Using TCWMEIS:

- Where to bury offsite waste at Hanford:
  - **Fails to include an alternative of not using Hanford as a national radioactive and mixed radioactive hazardous waste dump!**
  - Whether to use landfills in both 200 East and 200 West areas, or just 200 East
  - USDOE proposes to add **approximately 3 million cubic feet of waste to Hanford's** contamination and compliance problems… approximately 17,500 truckloads of waste
  - **USDOE improperly left out of EIS a disclosure that it is also considering sending highly radioactive GTCC waste to be buried in Hanford landfill(s).** Includes Plutonium.

250-5

250-6

4

250-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Since 2004, DOE has buried all LLW in lined trenches (see Appendix E, Section E.3.3, for a description of the evolution of past waste disposal practices). DOE continues to strictly limit the amount of waste Hanford can accept, and ensures that disposal activities are protective of the environment and meet regulatory requirements. Previous use of unlined trenches for disposal was a big concern to stakeholders and Washington and Oregon States; DOE heard and addressed those concerns and is using lined trenches.

250-5 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

250-6 Appendix S, Section S.3.6, describes Hanford's consideration as a candidate location for a new GTCC disposal facility. DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

Commentor No. 250 (cont'd): Heart of America Northwest

3/16/2010

Key Decisions USDOE Proposes to Issue Using TCWMEIS:

- How much Waste to retrieve from the leaky Single Shell High-Level Nuclear Waste Tanks (SSTs):
  - 90%
  - 99%: USDOE's choice
  - 99.9%
- Over a million gallons of waste has leaked from SSTs, and the contamination has moved deeper and into groundwater – heading towards the Columbia River - despite USDOE claiming it would not move for thousands of years.

250-7

Key Decisions USDOE Proposes to Issue Using TCWMEIS:

- Whether USDOE will Clean-Up the High-Level Nuclear Waste Tank Leaks and the Billions of Gallons of Tank Wastes Deliberately Discharged into Soil Ditches (Cribs, Trenches)?
- Whether to remove the tanks and piping or add cement and leave behind under a "cap"?
- "Tank Closure" decisions
- USDOE wants to use "landfill" closure: Not investigate contamination; add cement; Not cleanup leaks and discharges – put big soil caps over tank farms
- Hazardous waste law says use "clean closure": must take all practical steps to remove residues; and, investigate and cleanup contamination before capping.

250-8

5

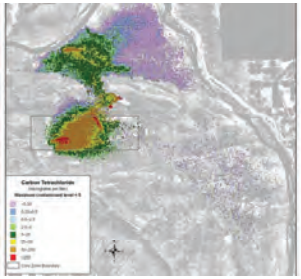
250-7 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

250-8 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

The *TC & WM EIS* closure alternatives for the tank farms include no action, landfill closure, selective clean closure, and clean closure (which would involve actions to remove the source of contamination). This EIS does not include proposed actions to address potential groundwater impacts resulting from the tank farms (i.e., past leaks), as such actions will be addressed as part of CERCLA remedial action for the non-tank-farm areas within the 200 Areas. All CERCLA remedial actions must meet the applicable, relevant, and/or appropriate requirements of Federal and state laws and regulations governing such actions or can be waived by EPA.

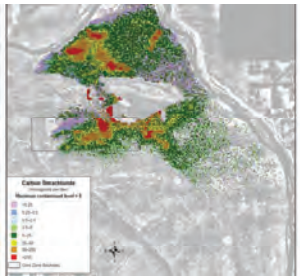
Commentor No. 250 (cont'd): Heart of America Northwest

3/16/2010



Carbon Tetrachloride level in groundwater now, darkest red area =>50x Drinking Water Standard. Carbon tetrachloride is a poison and carcinogen. River shown in blue runs through Hanford 50 miles.

Figure 6–99. Alternative Combination 3 Spatial Distribution of Cumulative Groundwater Concentration for Carbon Tetrachloride During Calendar Year 2005



Carbon Tet levels projected in year 2135. Carbon Tet is a poison and carcinogen. Dark red areas near Rivershore are >50x DWS. DWS set at level at which 1 adult male in 10,000 dies of cancer.

Figure 6–63. Alternative Combination 2 Spatial Distribution of Cumulative Groundwater Concentration for Carbon Tetrachloride During Calendar Year 2135 (USDOE's Preferred Alt)

250-9

6

250-9 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

The commentor also expresses concern regarding the inventories used for the cumulative impacts analysis. Appendix S of this *TC & WM EIS* explains the process used to develop the inventory data set for the cumulative impact analyses. All disposal sites for which an inventory was identified and considered a potential contributor to cumulative impacts on groundwater, including burial grounds, cribs and trenches (ditches), and ponds, are included in the inventory listing provided in Appendix S and, therefore, were modeled. The inventories listed in Appendix S represent the radionuclide inventories (measured in curies) and chemical inventories (measured in kilograms), including total uranium, that were identified for those sites and for those constituents that were screened (described in Section S.3.6 as COPCs, i.e., those constituents that control groundwater impacts). The source cited in this final EIS for the information listed in the Appendix S tables is SAIC 2011, which is a more extensive database of the inventory information used by DOE to accomplish the screening to identify the COPCs. These COPCs, as well as other constituents determined not to be COPCs, particularly other volatile organic chemicals, can be found in this source documentation for the sites noted.

DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication. None of the reviewed documents included a total uranium inventory estimate for these burial grounds and some liquid sites. However, DOE again reviewed the data and revised the burial ground inventories to include a calculated total uranium inventory. This inventory was included in this *Final TC & WM EIS* and analyzed appropriately. In addition, in response to a number of public comments, DOE undertook a detailed review of the tank past leaks inventory evaluated in the draft EIS and determined that the inventory for a number of unplanned releases needed to be revised. This inventory is relatively minor, but the inventory estimates and groundwater analyses were updated

Commentor No. 250 (cont'd): Heart of America Northwest

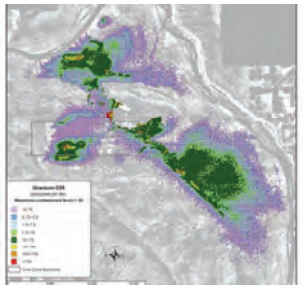
3/16/2010

Cumulative Impacts Without Adding More Waste or Considering Tank Wastes

Maximum Peak Year Concentrations of the COPCs from Non–*TC & WM EIS* Sources at the Core Zone Boundary and the Columbia River Nearshore

- Table U-2

Contaminant	Max concentration Central Plateau Inner (year)	Max concentration River shore (year)	DW Standard or benchmark
Pu (inc 239, 240)	2,660 (11,848)	4,250 (2983)	15 pCi/L
I-129	50.9 (4043)	9.1 (4540)	1. pCi/L
Chromium	2540 (2216)	16,100 (1978)	100



Uranium 238 in Groundwater in Year 2135
Dark red >50x Drinking Water Standard

Figure 6–65. Alternative Combination 2 Spatial Distribution of Cumulative Groundwater Concentration for Uranium-238 During Calendar Year 2135

7

250-9 cont'd

accordingly in this *Final TC & WM EIS*. For a more comprehensive discussion of the age and accuracy of data, see Section 2.2 of this CRD.

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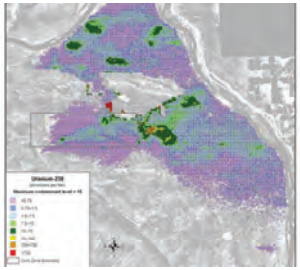

Uranium 238 in Year 3890 under Alt 2;
Uranium into River. New plumes from tank leaks, residues and discharges will grow for thousands of years under USDOE's plans to NOT cleanup tank leaks, waste discharge trenches and cribs, and to leave 1% in tanks.

Figure 6–66. Alternative Combination 2 Spatial Distribution of Cumulative Groundwater Concentration for Uranium-238 During Calendar Year 3890 . Discussion page 6-70.

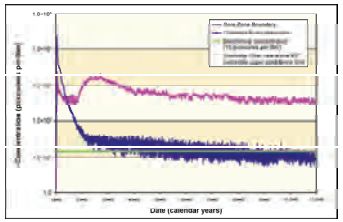

Figure 6–78. Alternative Combination 3 Cumulative Concentration Versus Time for Uranium-238

Uranium 238 over time in groundwater: increases on Central Plateau to 100 x DWS in 1,000 years. Sources include tank residues, leaks, and billions of gallons discharged to cribs.

Green: Drinking Water Standard
Pink: Central Plateau at edge of area expected for unrestricted public / Tribal use
Purple: Rivershore

250-9 cont'd

8

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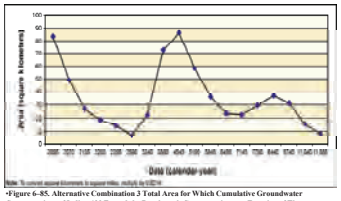

•Figure 6–85. Alternative Combination 3 Total Area for Which Cumulative Groundwater Concentrations of Iodine-129 Exceed the Benchmark Concentration as a Function of Time

Square kilometers of Hanford where Iodine 129 contamination will exceed Drinking Water Standard

85 square km today

In 600 years, begins climbing back to 85 sq Km under Alt 3, with landfill in 200 West and offsite waste - not including all other contaminated sites

250-9 cont'd

USDOE Grossly Underestimates Radioactive and Chemical Wastes

- The EIS shows huge contamination levels in **groundwater and flowing into the River in 125** years, a thousand years and for thousands of years;
- But, those estimates are greatly understated because **the TCWMEIS leaves out huge quantities of wastes:**
  - **In unlined landfills**
  - **In liquid discharge cribs, trenches, ponds**
  - **In High-Level Nuclear Waste tank overflows**

9

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Commentor No. 250 (cont'd): Heart of America Northwest

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Huge Amounts of Uranium Missing

- For the unlined commercial radioactive waste dump (run by the US Ecology company) in the center of Hanford, the EIS appears to have under reported the quantity of Uranium by tenfold:
- 10,800 curies reported in PNNL report 1998
- Only 1,820 Curies reported in the EIS
  - EIS App. Page S-91 table S-50b versus PNNL-11800 page 3.31
- ZERO Uranium reported in the EIS for US Ecology dump as a toxic chemical / heavy metal
  - page S-141, table S-76b

Huge Amounts of Uranium Missing

- Uranium impacts must be considered as a toxic heavy metal, not just as a radioactive carcinogen.
- All the burial grounds listed in Appendix S have a total of approx. 1,068 curies of uranium, but list only 83 total Kg under the chemical tables.
  - The 83 Kg is essentially from one burial ground (218-W-4C page S-125). Most other burial grounds with a curie inventory show no corresponding uranium chemical inventory.
- Nez Perce estimate that the TCWMFIS left out 96% of uranium on-site for toxicity and chemical impact analyses: 6.69 E+6 kilograms (6.69 million) in prior Hanford reports versus the EIS reporting total kg as 2.73 E+5 (273,000).

10

250-10

250-10 See response to comment 250-9 regarding the process used to develop the inventory data set for the cumulative impacts analysis in this *TC & WM EIS*.

For US Ecology specifically, the Washington State Department of Health's 2004 *Final Environmental Impact Statement, Commercial Low-Level Radioactive Waste Disposal Site, Richland, Washington* (Ecology and WSDOH 2004) was the source document. The PNNL-11800 document referred to by the commentor reports an inventory for US Ecology that was obtained from the Department of Health's 2000 *Draft Environmental Impact Statement; Commercial Low-Level Radioactive Waste Disposal Site, Richland, Washington*. DOE believes the inventory report in Appendix S of this *TC & WM EIS* is the most recent and has not revised it.

DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication. None of the reviewed documents included a total uranium inventory estimate for these burial grounds. However, DOE again reviewed the data and revised the burial ground inventories to include a calculated total uranium inventory. This inventory was included in this *Final TC & WM EIS* and analyzed appropriately. For a more comprehensive discussion of the age and accuracy of data, see Section 2.2 of this CRD.

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Huge Amounts of Toxic Chemicals Ignored in the EIS

- Volatile Organic Chemicals documented spreading out of unlined burial grounds, but NOT even reported as contaminants of concern in the EIS.
- Chemicals in the tanks and tank leaks ignored

250-11

Huge Amounts of Radionuclides as well as Chemicals Ignored

- High-Level Nuclear Waste Tank Overflows that were larger than the largest reported leak are missing from the TCWMEIS
- Waste in pipelines that go beyond tank farm boundaries are ignored
- **Enough Plutonium Missing to Build 8 Nuclear Weapons:**
  - several burial grounds are missing radioactive data for plutonium in Appendix S of the EIS. Based on data from a September 1996 Westinghouse Hanford Co. report (WHC-EP-0912) 218-W-2A has 6.38 Kg PU, 218-E-10 has 4.94 Kg Pu, and 218-W-4b has 66.47 Kg Pu, yet the EIS lists these burial grounds as having no curies associated with Plutonium. By comparison, 218-W-4a has 35 Kg of Pu with a corresponding 2,570 curies of Pu listed in Appendix S.

250-12

11

250-11 See response to comment 250-9 regarding the process used to develop the inventory data set (including volatile organic chemicals) for the cumulative impacts analysis in this *TC & WM EIS*.

As explained in Appendix S, the inventories for the sites were identified using the most recent information available. As stated in Table S–5, the liquid inventories were obtained from (1) SIM, Rev. 1 (Corbin et al. 2005); (2) *Radionuclide Inventories of Liquid Waste Disposal Sites on the Hanford Site* (Diediker 1999); (3) the *Hanford Site Waste Management Units Report* (DOE 1987); (4) technical baseline reports; (5) the latest version of WIDS; or (6) other sources. The solid-waste inventories were taken from (1) the *Summary of Radioactive Solid Waste Received in the 200 Areas During Calendar Year 1995* (Anderson and Hagel 1996) or other site-specific solid-waste references; (2) the *Hanford Site Waste Management Units Report* (DOE 1987); (3) technical baseline reports; (4) the latest version of WIDS (Shearer 2005); and (5) other sources.

250-12 DOE conducted an extensive review of existing inventory data for Hanford, and the resulting inventories are analyzed in this EIS. The list of radionuclides and chemicals was reduced by subjecting it to a "screening" process to select a set of COPCs. This screening process is described in Appendix Q, Section Q.2, Approach for Long-Term Performance Assessment. The results of this screening process provided the list of COPCs (radionuclides and chemicals) used in the analysis of the tank waste and cumulative impacts waste sites. As discussed in Appendix Q, only those radionuclides and chemicals that contributed to less than 1 percent of the impacts were eliminated.

With regard to waste pipeline inventories, Appendix D, Section D.1.2, Tank Ancillary Equipment Waste, provides a discussion of the inventories for the ancillary facilities, including the transfer piping associated with the SST and DST farms within the permit and waste management areas. Tables D–9 through D–12 provide the radioactive and nonradioactive inventories for the SST and DST ancillary equipment.

DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication. The primary source of referenceable inventory data for the burial grounds used in this EIS was the *Summary of Radioactive Solid Waste Received in the 200 Areas During Calendar Year 1995* (Anderson and Hagel 1996). As discussed in the introduction to this source document, the inventory data contained within included not only the inventory disposed of in 1995, but also the cumulative inventory through 1995. DOE's review of *The*

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Benefits of "Clean Closure" Underestimated; Harms from "Landfill Closure" Underestimated

- **The huge quantities of waste missing from the EIS lead to gross underestimation of the benefits from cleaning up tank leaks, removing tank pipelines, removing the contamination from unlined ditches, trenches and ponds (Clean Closure);**
- The projections of contamination levels and resultant cancer rates from exposure are low for the "landfill" closure alternatives
- **Clean-Up! Do not leave wastes under caps using "landfill" closure. Insist on Clean Closure.**

250-13

USDOE Only Considers Using Hanford landfill(s) as national radioactive waste dump - adding 3 million cubic feet of radioactive and radioactive toxic waste

Mostly from new nuclear weapons production

What's missing from this choice?

Alternative 2:	Alternative 3:
Landfills in 200 East and 200 West used as national waste dump	IDF landfill in 200 East used as national waste dump

250-14

12

History of the 200 Area Burial Ground Facilities (Anderson 1996) concluded that it may not be the best source for burial ground inventory data. The following statement is an excerpt from the preface to Anderson (1996): "Much of the information is not associated with referenceable documentation, and comes from the author's experiences and associations with others during the time spent in the burial grounds which covered a quarter of a century." However, to address the example provided by the commentor, the 4,930 curies of plutonium estimated in Anderson and Hagel (1996) converts to 67 kilograms of plutonium when the appropriate specific activity (curies/grams) factors are applied; this is approximately the same inventory estimate provided in *The History of the 200 Area Burial Ground Facilities* (Anderson 1996). Therefore, DOE sees no discrepancy in this case.

250-13 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). See response to comment 250-5 regarding factors influencing future DOE decisions.

250-14 See response to comment 250-4 for a discussion on the transport and disposal of offsite waste.

DOE recognizes the potential negative impacts on Hanford groundwater that shipment of offsite waste to the site could pose. The *TC & WM EIS* analysis shows that receipt of offsite waste streams containing specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. One means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this *Final TC & WM EIS*.

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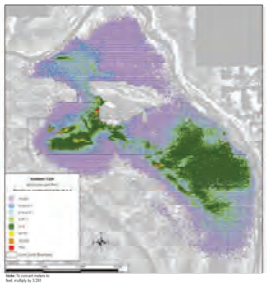
Using Hanford as a national radioactive waste dump for 3 million cubic feet of radioactive waste

- **Increases cancer risk to future generations using the groundwater, from the one landfill, tenfold to 100 times WA State's cancer risk standard**
  - Will include highly radioactive (Remote Handled) wastes and Transuranic wastes (e.g., Plutonium) in concentrations just below the legal limit requiring deep geologic disposal
  - TCWMEIS appears to have left these wastes out of modeling impacts
- USDOE illegally left out of the EIS its separate pending plan to import and bury highly radioactive "GTCC" wastes – as hot as High-Level Nuclear Waste.

250-15

Impacts of USDOE's Plans (Combo Alt 2) – Radioactive Iodine 129

- Iodine in Groundwater today
- Darkest red is >50x DWS
- Table 6-44



250-16

13

250-15 See response to comment 250-14 regarding offsite waste and mitigation measures.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Ecology's foreword to the draft EIS included its views and positions concerning DOE's analysis in the document and has been updated in this final EIS.

Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

250-16 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

The *TC & WM EIS* closure alternatives for the tank farms include no action, landfill closure, selective clean closure, and clean closure (which would involve actions to remove the source of contamination). This EIS does not include proposed actions to address potential groundwater impacts resulting from the tank farms (i.e., past leaks), as such actions will be addressed as part of CERCLA remedial action for the non-tank-farm areas of the 200 Areas. All

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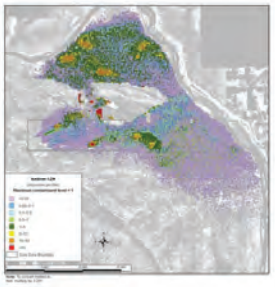
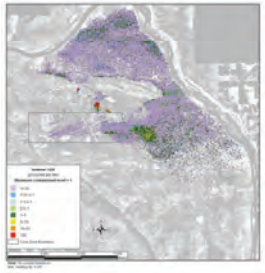
Impacts of USDOE's Plans (Combo Alt 2) – Radioactive Iodine 129

- Iodine in Groundwater in Year 3890
- **Tank residues and leaks are not cleaned up (landfill closure);** 200 East IDF landfill only
- Darkest red is >50x DWS
- Table 6-45



Impacts of USDOE's Plans (Combo Alt 2) – Radioactive Iodine 129

- Iodine in Groundwater in Year 7140
- Tank residues and leaks are **not cleaned up (landfill closure);** 200 East IDF landfill only
- Darkest red is >50x DWS
- Table 6-46



14

250-16 cont'd

CERCLA remedial actions must meet the applicable, relevant, and/or appropriate requirements of Federal and state laws and regulations governing such actions or can be waived by EPA.

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The Risk of >17,000 Trucks of Waste

Cancer Risk from Trucks Even Without an Accident or Terrorist Attack:

- USDOE estimated 816 fatal cancers in ADULTS along truck route due to routine exposure if Spent Fuel shipped to Hanford for storage and reprocessing under GNEP
  - USDOE ignored children and NAS data
  - This is separate example of the immense impacts of shipping radioactive waste through Northwest communities
- GTCC wastes as radioactive as Spent Fuel, but USDOE failed to disclose that it is considering shipping GTCC and highly radioactive Plutonium to Hanford in the TCWMEIS.
- For 3 million cubic feet of offsite LLW and MW, TCWMEIS fails to disclose sources from new production to be disposed at Hanford, claims treatment for offsite waste that is not planned.

250-17

250-18

15

250-17 The value of 816 LCFs is from the results provided in the *GNEP PEIS* (DOE 2008b). This value represents the maximum impacts associated with 50 years of transportation activities supporting the operations of all existing U.S. commercial light-water reactors if they all were replaced with high-temperature, gas-cooled reactors. The *GNEP PEIS* was canceled by DOE on June 29, 2009 (74 FR 31017). As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

There is no existing guidance that recommends dose coefficients for children's exposure to external radiation. DOE acknowledges that children have an elevated sensitivity to radiation exposure. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) is used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult, but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance that provides this information has yet to be developed.

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths for the sex and age distribution of the U.S. population in terms of the number of excess deaths per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing LCFs (DOE 2003a). The National Research Council report also shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose, compared with about 42 out of 100 individuals that are expected to develop solid cancer or leukemia from other causes, assuming a sex and age distribution similar to that of the entire U.S. population. The BEIR VII dose-to-risk conversion factor is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the *Draft* and this *Final*

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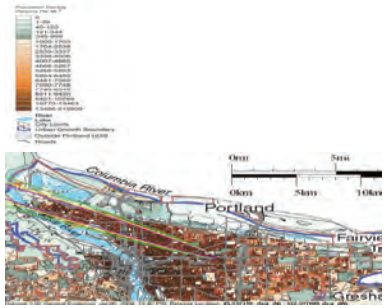
What if there is an accident or terrorist attack?

- HoA commissioned physicists to model impact of reasonably foreseeable accident with fire or terrorist attack on a truck at I-5 and I-205 in Portland, and on I-90 in Spokane
- Uses NRC model; was peer reviewed
- Over a thousand cancer deaths, hundreds of square miles contaminated and require evacuation. Decontamination on this scale never attempted.

250-19

Accident or Terrorist Figure 6. Approximately 350 Square Miles Could Be Exposed to Dangerous Radiation in The Event of an Attack



16

TC & WM EIS transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs.

250-18 In Appendix S, Section S.3.6, Waste Inventories for Cumulative Impact Analyses, DOE does discuss Hanford's consideration as a candidate location for a new GTCC waste disposal site, but this waste inventory was not included in the *TC & WM EIS* groundwater analysis because the *GTCC EIS* was still under development. Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

250-19 Appendix H, Section H.6, and its subsections summarize the methodology and assumptions used for the transportation accident analysis. As indicated in the *TC & WM EIS* Summary, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that transportation of radioactive waste would cause an additional fatality as a result of radiation from either incident-free transportation or postulated transportation accidents. DOE considers, evaluates, and plans for potential terrorist attacks during transportation and storage of radioactive materials. The details of DOE's plans for terrorist countermeasures and the security of its facilities and transports are classified. DOE addresses acts of sabotage or terrorism related to the transport of radioactive materials and waste in this *TC & WM EIS*, Appendix H, Section H.6.6. DOE considers the analyses of sabotage events described in the *Yucca Mountain EIS* (DOE 2002) and its SEIS (DOE 2008a) to be enveloping analyses for this *TC & WM EIS*. The consequences of such acts were calculated to result in a dose to the MEI of 40 to 110 rem (at 140 meters [460 feet]) for events involving a truck- or rail-sized cask, respectively. These events would lead to an increase in the LCF risk to an MEI of about 2 to 7 percent, or from 2 in 100 to 7 in 100 (DOE 2002). Note that the *Yucca Mountain EIS* assesses the potential impacts associated with transportation of SNF and HLW along national transportation routes, whereas the scope of this *TC & WM EIS* is focused on transportation of LLW, MLLW, and TRU wastes.

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Tank Closure Alternatives

-linked in USDOE's alternatives to treatment alternatives without reason, which makes the alternatives confusing for the public

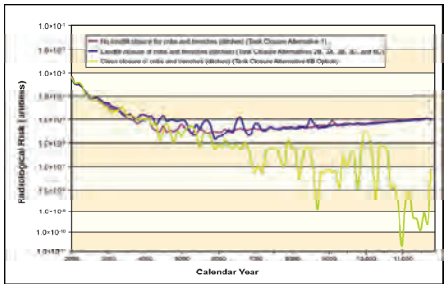
- "closure" is a legal term for what state tanks are left in and whether contamination and residues are cleaned up

Landfill closure:
Leave residues
Leave contamination in soil and cap tank farms

Clean Closure:
Remove residues
Remove tanks or pipes to extent practicable and based on risk
Clean up tank leaks and massive contamination from billions of gallons of deliberate tank waste discharges to cribs to extent practicable

250-20

Using Caps (landfill closure) instead of cleaning up just 2 sets of cribs and trenches causes magnitudes higher risk (S-16):



250-21

17

250-20 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites.

The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

See response to comment 250-5 regarding factors influencing future DOE decisions.

250-21 As discussed in Chapter 1 of this *TC & WM EIS*, Section 1.4.2, Decisions Not to Be Made, there are six sets of cribs and trenches (ditches) that are contiguous to the SSTs and would fall under the barriers placed over the SSTs during closure. These cribs and trenches (ditches) are CERCLA past-practice units and are evaluated in this EIS as part of a connected action because they would be influenced by barrier placement. However, closure of these CERCLA past-practice units is not part of the proposed actions evaluated in this EIS. Closure of these units will be addressed at a later date using the best-available information regarding those technologies that are both feasible and appropriate for these units. These six sets of cribs and trenches (ditches) are noted in Chapter 2 and are described in detail in Appendix D, Section D.1.5.

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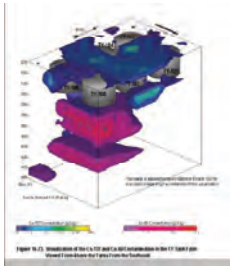
3/16/2010

Example of rapid contamination TY Tank Farm

- Fifty fold increase, from 1996 to 2002, in contamination found in one borehole tested between Tanks TY-103 and TY-105.
  - Rise in ^{137}Cs concentration
  - One of the tanks had a substantial release; no reporting, a significant violation.
  - Depth of contamination shows source is likely a pipe or tank leak, … not borehole contamination.
- USDOE also failed to report a release from TY-102.
- Claimed TY farm to be "Controlled, Clean and Stable".



250-22

6 sets of High-Level Nuclear Waste Treatment Alternatives Presented

- Vitrification Plant (WTP) is $8 billion over budget and delayed 8 years to start up in 2019. It is only designed with capacity to treat half of the volume of "Low Activity Waste" from the tanks.
- "Supplemental" treatment refers to how to treat the other half of the waste.
- Only one alternative proposes to treat all waste with current roadmap of separating High Activity Waste (10% volume with 90% of radioactivity) from Low Activity Waste (LAW) (90% volume with 10% radioactivity), followed by a second LAW vitrification plant

250-23

18

250-22 The *Draft TC & WM EIS* presented groundwater model predictions of current conditions for comparison with recent groundwater characterization data. This was intended to provide context for readers, stakeholders, and decisionmakers to help evaluate the accuracy and precision of the groundwater modeling system. In response to this comment and similar comments, an expanded discussion has been added to Appendix U of this *Final TC & WM EIS* comparing modeled current conditions against measured current conditions.

250-23 See response to comment 250-20 for information regarding the alternatives analyzed in this *TC & WM EIS*.

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3/16/2010

Key Decisions USDOE Proposes to Issue Using TCWMEIS:

- How to treat the 50% of tank waste volume that the Vitrification Plant is not designed with capacity to treat in 50 years?
  - Vitrification Plant (WTP) is $8 billion over budget and delayed opening from 2011 to 2019. The High Activity Waste vitrification portion is designed to glassify the 10% of volume with highest radioactivity, but the Low Activity Waste (LAW) portion is only designed to glassify half of the remaining 90%.
  - The LAW glass is planned to be buried at Hanford, only the HAW glass is stored for disposal in a geologic repository.
- Options:
  - Build second LAW plant (WA State preference)
  - Use less effective thermal treatments (steam reforming or bulk vitrification) or, grouting; or, delay making a decision until after the year 2015
    - WA State agreed to delaying choice in settlement proposal

Key Decisions USDOE Proposes to Issue Using TCWMEIS:

- How to Dismantle the FFTF Nuclear Reactor?
- Decision to shut it down permanently was made 2001 after long battle. Sodium drained.
  - Nuclear proponents want USDOE to reopen
- Choices are to entomb or to remove structure above grade
  - USDOE prefers entomb; state reactor siting law says remove (removal chosen for reactors along River)
- Whether to truck radioactive sodium and highly radioactive components to Idaho National Lab or to treat at Hanford?

19

250-24

250-24 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites.

See response to comment 250-5 regarding factors influencing future DOE decisions.

Commentor No. 250 (cont'd): Heart of America Northwest

3/16/2010

Comment & Organizing around the TCWMEIS

- The large turnout at the public hearings and strong comments will send a message to USDOE
- Without public outcry, Hanford will be a national radioactive waste dump and the contamination of the Columbia River will grow as you have seen
- It is UP TO YOU to protect our environment and future generations
- Come to at least one hearing, plan to speak up for 2-3 minutes, send in more detailed comments (addresses on handouts). Great if you can attend two.
- Phone bank to urge others to come to hearings around region. Start tomorrow! Email all your friends.
  - Ask your City officials, State reps and Members of Congress to have statements opposing Hanford as national waste dump and opposing abandonment of wastes at the hearings, and to send letter to Secretary of Energy.

Heart of America Northwest's Key Points on the TCWMEIS:

1. Drop All Consideration of Using Hanford as a national radioactive waste dump
2. Existing wastes will create so much contamination that adding more waste is unconscionable
   - We are not falling for USDOE's ploy of saying that it won't start importing waste until Vit plant operates – that doesn't protect the River from contamination
3. There has to be an alternative sending more of Hanford's wastes to repositories that won't contaminate groundwater or a River
4. Dismantle FFTF reactor entirely

250-25

250-26

20

250-25 See response to comment 250-4 for a discussion on the transport and disposal of offsite waste.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections describe the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

250-26 Regarding the commentor's concern about the disposition of HLW, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 250 (cont'd): Heart of America Northwest

3/16/2010

Heart of America Northwest's Key Points on the TCWMEIS:

5. USDOE must cleanup the contamination from High-Level Nuclear Waste tank leaks and billions of gallons of discharges
6. "Clean Closure" is what USDOE should be doing for every tank farm, not covering the tanks and contamination under caps – which will allow unconscionable levels of contamination to spread
7. Empty the tanks to remove 99.9% of waste or the limits of technology and then remove any tank and all pipes with significant waste remaining or which is above contamination.

21

250-27 **250-27** The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 6A and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all of the SST system.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

See response to comment 250-5 regarding factors influencing DOE decisions.

Commentor No. 251: Everett Jaros

3·2·10

I don't want any more nuclear waste brought through our communities in the NW, nor stored in Hanford.

In fact, the waste that is in Hanford should be cleaned up so that it doesn't delay long-term danger, but eliminates it.

Everett Jaros

251-1

251-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 252: Marion Flier

Further contamination of the Columbia River is unconscionable. Stop creating more nuclear waste and do not dump it here. "Roll on Columbia, Roll on" will be just a memory
Marion Flier

252-1

252-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor Number 253 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 513.

Commentor No. 254: Hoby Streich, Commission President, Port of Hood River

Port of
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March 17, 2010

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
PO Box 1178
Richland, WA 99352

Dear Ms. Burandt:

The Port of Hood River represents a large part of Hood River County and has significant recreational and industrial holdings along the Columbia River. All of our properties lie downstream from the Hanford Nuclear Reservation.

We write to express our concern that the recent Draft Tank Closure and Waste Management Environmental Impact Statement identifies the possibility of persistent environmental contamination of the Columbia River far into the future. This has far-reaching implications for the residents of our Port District.

We urge the Department of Energy to implement the highest level of cleanup possible at Hanford. We endorse the Oregon Department of Energy's proposed Alternative 7 making reasonable recommendations for tank waste storage, retrieval and treatment and remediation of the existing tank farms. We also ask you to rescind your February 2000 record of decision that opened up Hanford to offsite waste. We understand the desire to complete cleanup as quickly and cheaply as possible. However, there is no acceptable alternative to a thorough and complete removal and/or remediation of the existing contamination. *254-1*

The possibility of long-term contamination of the Columbia River as foreseen in this EIS is unacceptable. Please take the steps suggested in the Oregon Proposal to preserve the health and safety of the Columbia River downstream from Hanford.

Sincerely,

Hoby Streich
Commission President

Cc: Senator Ron Wyden, Senator Jeff Merkley, Congressman Greg Walden
Port of Hood River Commissioners, Hood River City Council, Hood River County Commission

254-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*. Chapter 2 of this EIS has been revised to include a discussion of the Oregon Department of Energy's proposal in Section 2.6.4 and how DOE has addressed the range of reasonable alternatives for tank waste storage, retrieval, and treatment and remediation of the existing tank farms in its original Tank Closure alternatives in Section 2.5.2. DOE has carefully considered the Oregon proposal and, as explained in Section 2.6.4, has determined that it is not reasonable.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 255: Patricia A. Milliren

Milliren①

1703 W. 8th St.
Port Angeles, WA 98363
March 17, 2010

U.S. Dept. of Energy
Tank Closure & Waste Management EIS
P.O. Box 1178
Richland, WA 99352

To the U.S. Department of Energy:

It is profoundly disturbing to me that my government continues to plan to use Hanford for our national nuclear waste dump in spite of the fact that it is located along the largest Pacific Northwest river, critical for drinking water, irrigation, food (fish), and navigation. What are you thinking? Is the Columbia River expendible to you? Is it OK with you to poison the water, the land, the food, the people of the Pacific NW just because it's too expensive to figure out some other place? Is it OK with you that we become the national sacrifice area — the incredibly beautiful, amazingly diverse and interdependent ecosystems — this place is just not important to you? It is more important to dump nuclear wastes quick and cheap and keep dumping than to preserve a huge river system? 255-1

IN THE LONG RUN WE NEED TO STOP CREATING THE WASTE BECAUSE NO ONE WANTS IT - NO RIVER, NO FISH, NO LAND, NO PEOPLE DESERVE THIS WASTE. IN THE SHORT RUN WE NEVER HEAR ANYTHING ABOUT YOUR VITRIFICATION PLANT AND WHEN YOU ARE GOING TO BE READY TO DEAL WITH ALL THE WASTE YOU'VE ALREADY DUMPED UNSAFELY IN OUR BACKYARD. YOU CAN'T EVEN DEAL WITH THAT : NO TO MORE WASTE. 255-2

255-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

255-2 Nuclear power and nuclear weapons production, as well as their resulting waste, are not within the scope of this EIS. The purpose of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. However, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 255 (cont'd): Patricia A. Milliren

milliren (2)

Some specifics:

① You need to remove (all) of the waste (high level, nuclear) from (all) the single shell tanks — Not just 90% or 99% or even 99.9%. Everyone knows the single shell tanks are a long lost cause. You are disrespecting WA state's cancer risk standards. The yuck in the bottom of the tanks is the most radioactive. It cannot stay. **255-3**

② You need to remove the Fast Flux Test Facility and restore the site - that is the WA state standard. Don't truck the wastes elsewhere for treatment; as bad as it sounds, it's better to treat at Hanford + keep the radioactivity off the road. **255-4**

③ Hanford's High-level Nuclear waste ALL needs to be treated with vitrification and certainly more quickly than 2095. This is scandalous. There should be no question about "supplementary treatments" other than LAW vitrification. Build more plants. Get LAW done quickly — "Just Do IT" for God's Sake. In fact, reconsider high and low radioactivity - Can you guarantee the LAW vitrification is adequate or do we need more High Activity waste treatment? **255-5**

④ All single shell tanks and LEAKS must be investigated and cleaned up. I cannot imagine leaving tanks and trenches NOT cleaned up. That would make the USDOE a traitor to WA state residents, water, all life. How could you leave such waste "unknown condition" & not cleaned up when we know leaks are already migrating toward the Columbia? And cleanup storage must not create future hazards - Period. **255-3 cont'd**

255-3 The decision to leave 0.1 percent, 1 percent, or more of the waste in the SSTs is one of the decisions supported by this *TC & WM EIS* (see Section S.1.3.1 of the Summary and Chapter 1, Section 1.4.1). With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed on only a small number of SSTs and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks and residual waste, will require preparation of a performance assessment and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks. For both Tank Closure Alternatives 6A and 6B, Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that the removal of the contaminants from the vadose zone does not capture the contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

255-4 Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives and identify where standards may be exceeded. Chapter 8 of this *TC & WM EIS* provides both a listing and short

Commentor No. 255 (cont'd): Patricia A. Milliren

Milliren
3

Future treated wastes must not endanger our rivers) or any others, must not endanger drinking water or the land through which water seeps + flows. **255-3 cont'd**

If we do not know how to store or treat these wastes, then it is high time we stop making them. Why is Hanford cleanup so far behind and over-budget? The priorities need to be cleanup/treatment and safe storage — not giving nuclear power plants and weapons to the world. This is insane — taking wastes from other nations. We are dealing with thousands of years, millions of lives. **255-2 cont'd**

Sincerely,
Patricia A. Milliren

description of the laws, regulations, and requirements that may apply to the proposed actions, including FFTF decommissioning.

Radioactive waste is transported in DOT-certified containers that meet strenuous technical standards established by NRC. Under DOE's Preferred Alternative for FFTF decommissioning (Alternative 2), some below-grade structures would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment.

255-5 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. In fact, several of the vitrification expansion alternatives analyze treating all of the tank waste inventory as HLW. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies. While DOE cannot guarantee the long-term performance of ILAW glass is "adequate" (nor can anyone else), both the Summary and Chapter 5 of this *TC & WM EIS* provide the long-term radiological risks estimated for ILAW glass.

Commentor No. 256: Karen Coulter, Director, Blue Mountains Biodiversity Project

From:
Karen Coulter, Director
Blue Mountains
Biodiversity Project
~~HCR 82~~ 27803 Williams Lane
Fossil, Oregon 97830
(541) 468 2028
(541) 385-9167 messages

March 17th, 2010

Comments on the Draft Tank Closure & Waste Management EIS
To: the U.S. Department of Energy
P.O. Box 1178
Richland, WA 99352

We are deeply concerned by the U.S. Department of Energy's preferred decisions in the Tank Closure & Waste Management EIS (aka EIS): to never clean up the millions of gallons of deadly, radioactive ~~wast~~ waste already leaked from the high level nuclear waste tanks - even though the contamination is rapidly moving toward the Columbia River -, to never clean up more than 40 miles of unlined soil trenches into which the U.S. DOE dumped huge amounts of chemical and highly radioactive wastes, including Plutonium - and to not dismantle the Fast Flux Test Facility, and accept adding even more nuclear waste from around the country to the already unsafe and contaminated Hanford reservation. These decisions can be expected to result in plutonium contamination reaching the Columbia River increasing to over 300 times the Drinking water standards over the next thousand years - even before new waste is added if Hanford becomes a national radioactive waste dump - and an increased cancer risk from the ground water ten to 100 times Washington State's cleanup cancer risk standard, based on your own analysis. These are unacceptable risks to Northwest water ways, fisheries, lands, wildlife, and human health. It is also insanity to approve thousands of truckloads to travel hundreds to thousands of miles to Hanford through relatively pristine areas and populated cities such as Portland and Spokane containing highly radioactive waste. Such long distance transport is sure to result in accidents, spreading radioactive contamination and risks.

256-1

256-2

256-3

Specifically, we ask that the following decisions be made:

* U.S. DOE should remove 99.9% of the tank wastes (high level nuclear waste) from the aging underground and single shell tanks or up to the limits of technical capability for removal.
* U.S. DOE should remove the tanks ("clean closure") and investigate and remediate the soil contamination from tank leaks. Washington state

256-4

256-5

256-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

256-2 See response to comment 256-1 regarding groundwater contamination and potential remediation.

One of the sources identified in the *Draft TC & WM EIS* as a large contributor to plutonium contamination in the groundwater is a reverse well that resulted in direct injection of waste streams into the aquifer. Information regarding this reverse well and the potential behaviors of the contaminants (i.e., plutonium) is discussed in Appendix U of this *Final TC & WM EIS*. In addition, as reported in the *Draft TC & WM EIS*, DOE reexamined other sources that appeared to contribute to the plutonium plume and identified an overestimation of a plutonium source in the 300 Area. This overestimation has been corrected in this *Final TC & WM EIS*.

256-3 As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs as a result of either incident-free operations or accidents.

256-4 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 256 (cont'd): Karen Coulter, Director, Blue Mountains Biodiversity Project

p.2 Blue Mountains Biodiversity Project Comments on U.S. DOE Hanford Tank Closure & Waste Management EIS 3/14/10

hazardous waste law specifies that landfill closure can only be used after practical efforts have been made to cleanup contamination. **256-5 cont'd**

* The Fast Flux Test Facility must be dismantled and removed with full site restoration as required by the Washington State standard for decommissioning nuclear reactors. There could be significant risks from trucking radioactive sodium and highly radioactive components back and forth to Idaho and there is no approved shipping cask for the highly radioactive components, so there should be no shipping or transport of these materials. Oregon fully decommissioned the Trojan nuclear reactor; the same should be done at Hanford, with all waste currently there treated there. **256-6**

* The 53 million gallons of high level nuclear waste at Hanford need to be turned into a stable glass form through vitrification. The other 99% of the waste volume ("low activity waste") still has a tremendous amount of radioactivity and chemical waste and should not just be buried to create more leakage contamination problems in the future. Vitrification of all the low and high level nuclear waste best protects groundwater. Early start-up of the low activity waste part of the vitrification plant could allow DOE to retrieve more of the waste from leaky single shell tanks prior to 2022 and should be implemented. The U.S. DOE should plan to start up the low activity waste part of the waste treatment plant prior to 2019 and start funding a second such facility in 2012, to have it ready by 2022. The "supplemental treatment" options should be rejected as they are less effective and less protective of ecosystems. The Hanford Advisory Board and the state of Washington also object to the "supplemental treatment" options for these reasons. **256-7**

* There should be no more waste added to the Hanford reservation area. It makes no sense and incurs great risks to ship radioactive waste to a national centralized waste dump. The EIS should have offered an alternative in which Hanford would not be used as a national radioactive waste dump. Wastes in Hanford landfills should be limited to amounts and types that won't cause future leakage and violate cancer risk and other standards. Landfills should not be next to major rivers (or any river or stream) or above drinkable groundwater and no off-site waste should be imported to Hanford. **256-8**

256-5 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B; selective clean closure is represented by Tank Closure Alternative 4. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives and the permits and approvals DOE would need to obtain from Federal, state, and local agencies.

256-6 Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives and identify where standards may be exceeded. Chapter 8 of this *TC & WM EIS* provides both a listing and short description of the laws, regulations, and requirements that may apply to the proposed actions, including FFTF decommissioning.

Radioactive waste is transported in DOT-certified containers that meet strenuous technical standards established by NRC.

256-7 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the

Commentor No. 256 (cont'd): Karen Coulter, Director, Blue Mountains Biodiversity Project

p.3 Blue Mountains Biodiversity Project Comments on Hanford Tank Closure & Waste Management EIS 3/16/10

* Plutonium and other "Transuranic" wastes from unlined soil disposal ditches and leaking tanks should be dug up, treated, and stored in deep geologic repositories. Other wastes from unlined soil ditches and tank leaks should also be dug up, treated, and stored in regulated commercial radioactive waste facilities not above drinkable ground water or near a river or stream. **256-9**

U.S. DOE is seriously underestimating the number of fatal cancers that could be expected by transporting radioactive waste to Hanford because U.S. DOE models do not separately calculate the higher risks for children exposed along the transportation routes. Children are three to ~~five~~ ten ~~more~~ times more susceptible to getting cancer from a given dose than an adult. U.S. DOE failed to apply the most recent dose-risk calculations from the National Academy of ~~Scientists~~ Science, which increase the risk from doses several times. **256-10**

U.S. DOE is also violating NEPA by piecemealing its disclosure and consideration of these risks by only disclosing risks from additional "Greater than Class C" wastes in a separate EIS not out until later this year. These wastes are just as radioactive as the high level nuclear waste considered for trucking to Hanford for reprocessing and should be analyzed in the same EIS. **256-11**

We are concerned that in the event of a fire or terrorist attack on a truckload of highly radioactive plutonium waste en route to Hanford on I-205 or I-5 or I-90, hundreds of square miles of either Portland or Spokane would be contaminated and over a thousand fatal cancers would result.

Personally, this could result for me in the pain, suffering, and untimely death of two close relatives and many of my friends and possibly myself as well as ecological destruction in beautiful and diverse ecosystems of the surrounding areas. It's time to recognize the political is personal, wake up, and reject such unnecessary risks. **256-12**

Please keep us informed of further public process and your decision.

Karen Coulter, Karen Coulter, Director, for Blue Mountains Biodiversity Project

WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies, including supplemental treatment waste-form performance (durability) for long-term groundwater protection.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, the BOF, as well as the Pretreatment Facility and the HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

256-8 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Chapter 8 of this EIS identifies both Federal and state regulatory requirements that may apply to DOE's proposed actions in this EIS.

256-9 TRU waste, including waste contaminated with plutonium, in unlined soil disposal trenches is not within the scope of this EIS. However, information on this waste is included in Appendix S, "Waste Inventories for Cumulative Impact Analyses." The scope of this *TC & WM EIS* includes decisions on storage,

Commentor No. 256 (cont'd): Karen Coulter, Director, Blue Mountains Biodiversity Project

retrieval, treatment, and disposal of tank waste and closure of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). Any LLW generated by the tank closure or FFTF decommissioning activities would be disposed of in the LLBGs, in one of the two active trenches (31 and 34); an IDF; and/or the RPPDF, all of which would have liners.

256-10 There is no existing guidance that recommends dose coefficients for children's exposure to external radiation. DOE acknowledges that children have an elevated sensitivity to radiation exposure. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) is used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993), which provides estimates for an adult, but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing the time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance providing this information has yet to be developed.

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths for the sex and age distribution of the U.S. population in terms of the number of excess deaths per million people per absorbed dose, which supports the dose-to-risk conversion factor estimate of 600 LCFs per million people per person-rem. The National Research Council report shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose, compared with about 42 out of 100 individuals that are expected to develop solid cancer or leukemia from other causes, assuming a sex and age distribution similar to that of the entire U.S. population. The BEIR VII dose-to-risk conversion factor is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs.

256-11 Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the

Commentor No. 256 (cont'd): Karen Coulter, Director, Blue Mountains Biodiversity Project

Final TC & WM EIS cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

256-12 Based on the analysis summarized in Chapter 4, Section 4.3.12, Public and Occupational Health and Safety—Transportation, and Appendix H of the *Draft TC & WM EIS*, it is unlikely that additional LCFs would occur in the general population from truck transport of offsite radioactive waste to Hanford during either incident-free operations or accidents. Note that waste shipments would not use the Interstate 5 or Interstate 205 corridors to travel through or around Portland, Oregon. DOE considers the threat of terrorist attack to be credible and makes all efforts to reduce any vulnerability to this threat. DOE considers, evaluates, and plans for potential terrorist attacks that could occur during transportation and storage of radioactive materials. The details of DOE's plans for terrorist countermeasures and the security of its facilities and transports are classified. DOE addresses acts of sabotage or terrorism related to the transport of radioactive materials and waste in this *TC & WM EIS*, Appendix H, Section H.6.6. DOE considers the analyses of sabotage events described in the *Yucca Mountain EIS* (DOE 2002) and its SEIS (DOE 2008a) to be enveloping analyses for this *TC & WM EIS*. The consequences of such acts were calculated to result in a dose to the MEI of 40 to 110 rem (at 140 meters [460 feet]) for events involving a truck- or rail-sized cask, respectively. These events would lead to an increased LCF risk to an MEI of about 2 to 7 percent, or from 2 in 100 to 7 in 100 (DOE 2002).

Commentor Number 257 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 213.

Commentor No. 258: Victoria Haven

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

Date/Fecha: March 17, 10

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS?)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS?)*

Please clean up all radioactive wastes at Hanford to the highest possible standard before importing any more waste.

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**** CONTINUE ON BACK FOR MORE SPACE ****
**** CONTINUAR AL DORSO PARA MÁS ESPACIO ****

Name/Nombre: Victoria Haven

Address/Dirección:

City, State, Zip Code/Ciudad, Estado, Zona Postal:

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

258-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 259: Sylvia Haven

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

Date/Fecha: 3/17/10

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS)*

It is a matter of security and safety of Northwest citizens that no additional waste be brought to Hanford until the present lethal danger is cleaned up. The USDOE should remove 99.9% of tank wastes or whatever is technologically possible. Then the treated waste needs to be placed in deep geological depositories. 259-1 259-2 259-3

It is a crime that radioactive wastes have been put in unlined ditches. It needs to be removed and treated. 259-4

We want "Roll on Columbia, Roll on" to be a blessing and not a radioactive threat.

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Sylvia Haven
Address/Dirección: 10418 12th Ave NE
City, State, Zip Code/Ciudad, Estado, Zona Postal: Seattle WA 98125

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@scjc.com

259-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

259-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

259-3 Regarding the commentor's concern about the disposition of HLW, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

259-4 Since 2004, DOE has buried all LLW in lined trenches (see Appendix E, Section E.3.3, for a description of the evolution of past waste-disposal practices). DOE continues to strictly limit the amount of waste Hanford can accept, and ensures that disposal activities are protective of the environment and meet regulatory requirements. Previous use of unlined trenches for disposal was a big concern to stakeholders and Washington and Oregon States; DOE heard and addressed those concerns and is using lined trenches.

Commentor No. 260: Daniel E. Peterson

Tank Closure and
Waste Management
Environmental Impact
Statement

March 15, 2010
3025 N.E. 137th St
Apt. 405
Seattle, Washington
98125

Dear Sirs

On behalf of our 22 year old son, who died in 1975, and his brothers and sister as well as his parents we urge an end to downwinders deaths. This means continued and expanded clean up of the Hanford site that will reduce contamination of the Columbia River and all of the downwind and downstream populations.

As one who has worked as a Columbia River historian for over 400 days (70 7 day trips) from Astoria to Hells Canyon and return between 2001 and 2008, I can testify to the major concern of those citizens downstream from the Hanford site.

Please expand the clean up effort and stop continually post-poning clean up goals.

Sincerely Dan Peterson
for Sir, Bret, Kevin
and Sharon Peterson

P.S. As a tax payer I am willing to pay for clean-up. I worked on the Grand Coulee Dam which provided the cheap block of power that made the Hanford project possible. That dam continues to pay for taxes so we are some on Hanford clean up.

260-1 **260-1** Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 261: Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

MICHAEL P. MCNAMARA
President

106 Newberry Street, SW
Aiken, South Carolina 29801
Phone: (803) 502-5729
mike.mcnamara@wsms.com

March 18, 2010

Mary Beth Burandt
EIS Document Manager
Department of Energy
Office of River Protection
PO Box 1178
Richland WA 99352

Subject: Draft Tank Closure and Waste Management (TC & WM) Environmental Impact Statement (EIS) for the Hanford Site, Richland, Washington, (DOE/EIS-0391)

Dear Ms. Burandt,

Please find enclosed comments submitted by THOR Treatment Technologies, LLC concerning the subject document. We appreciate the opportunity to participate in the development of environmental analyses affecting the future of cleanup at Hanford and look forward to consideration of our submittal.

Please do not hesitate to contact Mr. Phillip Staats at (509) 528-7542 or myself should you have questions or require further information.

Sincerely,

Michael P. McNamara
President
THOR Treatment Technologies, LLC

Enclosures

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

General Comments

The National Environmental Policy Act (NEPA) requires an Environmental Impact Statement (EIS) to evaluate alternatives for treating and disposing of Hanford waste and closing the tanks and associated facilities. In order to meet that requirement, the Department of Energy has prepared the *Draft Tank Closure and Waste Management (TC & WM) Environmental Impact Statement (EIS) for the Hanford Site*, Richland, Washington, (DOE/EIS-0391.

The EIS Tank Closure Activity comprises five components: Storage, Retrieval, Treatment, Disposal, and SST Closure. Although the EIS covers all wastes in both SST's and DST's, it just covers SST closure and defers DST closure to a future EIS. The draft EIS includes Performance Assessments (PA) for the Tank Closure Activity for each of 11 Alternatives and featured a set of 7 Preferred Alternatives. The Final TC & WM EIS will present a single preferred alternative that is likely to be among one of the 7 Preferred Alternatives of the Draft EIS. Clearly, it is in the best interest of the EIS to have accurate and well documented data to support their PA.

In particular, we believe that for the Tank Closure Treatment component of Alternative 3C the data supporting the impact evaluation of Fluidized Bed Steam Reformer should be improved. The EIS analysis of groundwater impacts from disposal of FBSR granules under Alternative 3C appears to be based on unnecessarily conservative assumptions about the solubility of FBSR Constituents of Potential Concern (COPC) in long-term porewater flow.

There are a series of reports cited by the EIS [Lorier, Pareizs, and Jantzen 2005; McGrail et al. 2003a, 2003b] that focused exclusively on FBSR durability under a standard battery of EPA, ANSI, and DOE waste form qualification standards such as TCLP, PCT, PUF, and SPFT. These durability tests showed superior FBSR performance that not only met the minimum goals for borosilicate glass, FBSR product met or exceeded the long-term performance of glass for the same tests. Unfortunately, these FBSR reports do not seem to have communicated the durability of FBSR encapsulated COPC's very well.

The EIS PA derived a set of parameters for their FBSR product that were not provided by these reports. For example, the EIS chose a granulated FBSR form and derived a nepheline solubility that seems to be four orders of magnitude greater than that reported in the literature. That nepheline solubility then implied an accelerated release of all COPC's to the porewater far in excess of what the durability testing showed.

There is much information about the durability of FBSR granules that shows excellent COPC retention. If the matrix solubility limited model is to be used, TTT requests that the EIS team updates the FBSR data given a more realistic and well documented nepheline solubility. Furthermore, TTT has now determined that a monolithic form of the FBSR granules better meets the projected IDF disposal requirements detailed below. Therefore, TTT asks that the EIS team consider incorporating the FBSR monolithic waste form instead of the granulated form that was originally slated for disposal.

261-1

The following comments are segregated into four areas: Administrative, technical, approach recommendations, and submittal of information previously provided along with updated test results in Appendices A and B respectively.

Administrative Comments

The Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR 1500) and CEQ Guidance (*Recommendations for the Preparation of Environmental*

261-2

1 of 5

261-1 Durability test results of fluidized-bed steam reforming (FBSR) product useful in developing estimates of long-term performance are limited to the identification of parameters in expressions for the undisturbed forward rate of reaction of that product. When applied to particles of the size of those produced in the bed and offgas of the FBSR, high rates of dissolution are predicted. Reported rates of the dissolution of crystalline (Tole et al. 1986, Table 2) and glassy nepheline (Hamilton et al. 2001, Table 2), when used with particles of the size of FBSR product, are comparable to those derived using the FBSR forward reaction expression. The current database does not identify alteration product or precipitates, or support the projection of decreases in the rate of reaction of such compounds. The analysis for this *TC & WM EIS* has been supplemented by development of estimates of a range of solubility of nepheline dependent on reaction conditions and the nature of the precipitation products assumed to appear. Specification of the physical form of the FBSR product is established by DOE; it currently remains that of the bed and offgas particulate.

261-2 DOE is familiar with all of the cited requirements and does not agree with the commentor's assertion that CEQ requirements and recommendations were not met and followed in the preparation and development of the *Draft TC & WM EIS*. In addition to the description contained in Chapter 2, Section 2.2.2.2, of the *Draft TC & WM EIS*, Appendix E, Section E.1.2.3.8, provides a detailed discussion of the steam reforming process, which is one of the supplemental treatment processes considered and evaluated in this EIS. This section includes a discussion and description of the technology description, technology process and facilities, waste form/disposal package, and assumptions and uncertainties related to this treatment process. NEPA requires information used in EIS analyses to be referenced and publicly available. Additional waste-form performance assessment analysis information has been included in Chapter 7, Section 7.5, and Appendix M, Section M.5, of this *Final TC & WM EIS*, including information regarding the performance of steam reforming.

Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

Assessments and Environmental Impact Statements, Second Edition, DOE 2004) provides guidance for the preparation and development of alternative analysis. Our examination of DOE/EIS-0391 indicates the following areas were not addressed with regard to the Fluidized Bed Steam Reformer, Alternative 3C.

Incomplete or Unavailable Information (40 CFR 1502.22) relevant to significant impacts essential to choice among alternatives:
•If the cost of obtaining the information is not exorbitant – include the information in the EIS
•If the cost of obtaining the information is exorbitant -- include in the EIS:
- o A statement that information is incomplete or unavailable
- o A statement of the relevance of the incomplete or unavailable information to evaluating adverse impacts
- o A summary of existing credible scientific evidence
- o The agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community.

Areas of scientific disagreement over methods or interpretation (*Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements*, DOE 2004) the Agency must:
•Identify responsible opposing views regarding how to conduct impacts analysis or interpret conclusions.
•Explain the basis for DOE's choice of methodology in a manner that demonstrates that the analysis is technically sound and provides a sufficient basis for decision making.
•Consider explaining how use of the different methodology would affect the conclusions.
•Consider presenting the results of using the alternative data, assumptions, or methodologies.

When **employing a methodology to analyze impacts** in the EIS the Agency must:
•Identify any methodologies used (40 CFR 1502.24)
•Make explicit reference to the scientific and other sources relied upon for conclusions (40 CFR 1502.24)
•Provide data and references to allow review of the validity of analytical methods and results. (DOE 2004)
•When using a bounding analysis identify the range of potential impacts (DOE 2004)

261-2 cont'd

It is also recommended 1) the final EIS include a detailed discussion of the technical maturation process that will be used to support the M-62-45 Supplemental Treatment Decision Milestone. This draft milestone requires a one-time supplemental treatment selection no later than April 30, 2015, and 2) defer the ROD selection of supplemental treatment technology until a determination can be made based on data and analysis provided to support the M-062-40 Supplemental Technology Report due October 31, 2014.

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261-3 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. Implementation of the selected actions following issuance of DOE's ROD would be subject to more-detailed evaluations and processes required under RCRA, the Washington State Hazardous Waste Management Act, CERCLA, and the TPA, as applicable, including obtaining appropriate treatment and closure permits from Ecology. Appendix E of this *TC & WM EIS* discusses the technologies and their assumptions and uncertainties. In addition, Appendix E, Section E.1.3.3.1, discusses the technology readiness assessment process.

Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

Technical Comments

1) DOE/EIS-0391, Vol .2, App. M, p. M-16, M.2.2.2 defines the release model used for the FBSR waste product as: *The primary application of the matrix solubility limited-release model is for releases from salt cake in high-level radioactive waste (HLW) tanks under Tank Closure Alternatives 1 and 2A and from steam reforming solids under Tank Closure Alternative 3C. Primary parameters of the model are rate of infiltration, mass of the waste matrix, solubility of the waste matrix, and concentration of hazardous constituents in the waste matrix.*

DOE/EIS-0391, Vol. 2, App. M, p. M-18 adopted very conservative values for nepheline solubility and a congruent Tc dissolution but does not specify the reaction and gives no reference for the solubility limit used.

Sections M.2 and M.3.1.2 cite numerous documents for characterization of release rate mechanisms, [Lorier, Pareizs, and Jantzen 2005; McGrail et al. 2003a, 2003b]. These models were not used and instead the matrix solubility limited release model in a porous media was used with ~50% porosity at 0.9 mm pore water flow rate. In addition, a very conservative "effective" nepheline solubility, 3.95e6 g/m3 in pore water flow, was used evidently based on two waters per nepheline instead of using a literature value for FBSR nepheline (NaAlSiO4) solubility.

It is recommended the solubility be revised to reflect the literature values reported by Hamilton et al. 2001 and Tole et al. 1986. The appropriate model input parameter for the equilibrium solubility of nepheline from FBSR should be revised to 104 g/m3 given Log (K_{eq}) = -9.39 at 17 C and pH = 10.9. This assumes that the dissolution reaction is

$$NaAlSiO_4 + 2\,H_2O \rightarrow Na^+ + Al(OH)_4^- + SiO_2$$

and that all species remain in solution with no secondary mineral formation.

The EIS nepheline solubility therefore seems to be about 40,000 times greater than the literature reports and as a result, the EIS FBSR fractional release per year was effectively 2.8e-3 g/g. The EIS Alternative 3C FBSR risk calculations are not consistent with previous calculations [Mann et al. 2003 and McGrail et al. 2003] for the performance characteristics of the THOR® alkali-aluminosilicate (mineral) matrix under long-term disposal conditions. These previous studies indicated the FBSR product durability to be equal to or greater than borosilicate glass, which is also consistent with past FBSR durabilities [Bryant 1987, WSRC-TR-2005-00124 2005], all based on a granular product.

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261-4

261-4 As reflected in the comment, the *Draft TC & WM EIS* analysis did assume consumption of two moles of water for the dissolution of one mole of nepheline. In the documents cited in the comment, the durability test results of FBSR product useful in developing estimates of long-term performance are limited to the identification of parameters in expressions for the undisturbed forward rate of reaction of that product. When applied to particles of the size of those produced in the bed and offgas of the FBSR, high rates of dissolution are predicted. Reported rates of dissolution of crystalline (Tole et al. 1986, Table 2) and glassy nepheline (Hamilton et al. 2001, Table 2), when used with particles of the size of FBSR product, are comparable to those derived using the FBSR forward reaction expression. These cited references do not contain estimates of the equilibrium solubility of nepheline. The current database does not identify alteration product or precipitates, and thus cannot support the projection of decreases in the rate of reaction of such compounds. The analysis for this *TC & WM EIS* has been supplemented by the development of estimates of a range of solubility of nepheline dependent on reaction conditions and the nature of precipitation products assumed to appear.

Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

2) DOE/EIS-0391, Vol. 2, App. E, p. E-90 states the FBSR waste disposal form as "free-form granulated material" packaged in steel containers. For Alternative 3C, TTT has concluded that a monolithic form of the FBSR granules is a better option and recommends that the EIS update Alternative 3C to reflect the monolithic waste form.

If the EIS chooses the monolithic waste form, the Diffusion Limited-Release Model described in M.2.2.4 should then be used for FBSR product. The diffusion-controlled release model applies to grout or cement waste forms, such as grouted HLW tanks or cast stone. As opposed to solubility, the primary parameters of this model are dimensions, porosity, and tortuosity of the waste form as well as the COPC diffusivities and Kd's, all at the disposal temperature.

261-5 RT-21-002, Rev.1, Section 10.2 states: *"The purpose of the final waste form (monolith) testing is to determine the suitability of a number of candidate binder materials for the production of monolithic solid waste forms from the NAS mineralized products generated by the treatment of Hanford LAW and WTP SW simulants. The Hanford IDF has requirements that apply to all waste forms to be disposed of at the facility. These requirements include minimum acceptable limits on leach resistance, compressive strength, free liquids, dispersible fines, and waste loading. Risk scenario pathways must also be considered. The NAS mineralized product will easily meet all of the known IDF disposal requirements except for compressive strength and dispersibility. Therefore, the binding of the NAS product solids into a final monolithic waste form will be required prior to disposal at the IDF to eliminate dispersibility and to provide a waste form that has compressive strength greater than 500 psi."*

Recommendations

The following recommendations are provided for consideration as a means to present current technical information and an approach consistent with recently negotiated Tri-party Agreement and Consent Order Milestones.

261-6

- If the Matrix Limited Solubility model remains favored for FBSR Alternative 3C, update the nepheline solubility to literature value.
- If the EIS chooses to adopt a FBSR monolith, the Diffusion Limited-Release Model would be more appropriate for FBSR monolith and a different set of parameters will be needed and nepheline solubility will not be among them.
- Include in the Final EIS a detailed discussion of the technical maturation process that will be used to support the M-62-45 Supplemental Treatment Decision Milestone
- Defer ROD selection of supplemental treatment technology until a determination can be made based on data and analysis provided to support the M-062-40 Supplemental Technology Report

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261-5 Specification of the physical form of the FBSR product as granular or monolithic is established by DOE; it currently remains that of the bed and offgas particulate.

261-6 In response to this and similar comments, this *Final TC & WM EIS* has been revised to include: (1) an analysis of the performance of steam reforming solids based on solid-phase solubility controls, (2) a discussion of the technical information regarding the characterization and performance of steam reforming solids that has been developed between 2006 (the *Draft TC & WM EIS* data cutoff date) and 2010, and (3) an analysis of the performance of steam reforming solids that would have to be achieved (in the context of Tank Closure Alternative 3C, with an IDF in the 200-East Area) to result in groundwater concentrations at the Core Zone Boundary below benchmark standards. This additional material can be found in Chapter 7, Section 7.5, and Appendix M, Section M.5, of this *Final TC & WM EIS*.

Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

References

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McGrail, B.P., H.T. Schaef, P.F. Martin, D.H. Bacon, E.A. Rodriguez, D.E. McCready, A.N. Primak, and R.D. Orr, 2003a, *Initial Suitability Evaluation of Steam-Reformed Low Activity Waste for Direct Land Disposal*, WTP-RPT-097, Rev. 0, Bechtel National, Inc., Richland, Washington, January 2003.

Olson, A, et. al., *Report for Treating Hanford LAW and WTP SW Simulants: Pilot Plant Mineralizing Flowsheet*, RT-21-002, Rev.1, THOR Treatment Technologies, LLC, Denver, Coloardo, April 2009.

M.P. Tole, A.C. Lasaga, C.G. Pantano, W.B. White, *The Kinetics of Dissolution of Nepheline (NaAlSiO4)*, Geochim. Cosmochim. Acta, 30, 379-92, 1986.

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

Appendix A
Previously Submitted Test Report Summaries

FBSR Update provided August 4, 2006

OBJECTIVE
This response provides information which may be used to update technical data presented in the Supplemental Treatment Data Package (DOE/ORP-2003-07) and evaluated in New or Changed Data Form 60 on the THOR® Fluidized Bed Steam Reforming (FBSR) process. Significant testing, including pilot scale operations, has been conducted, which provides an expanded database on waste form performance, air emissions, and accident analysis. In addition, reports currently being prepared will further document pilot scale results in areas of interest.

METHODOLOGY

The available documents applicable to THOR® steam reforming data that have been issued since those referenced in *Waste Treatment and Supplemental Technology Data Package* (DOE/ORP-2003-07) were reviewed for consistency with Data Set 60. The following documents provide additional information which may be used to update Data Set 60:

- ***Evaluation of Fluidized Bed Steam Reforming (FBSR) Technology for Sodium Bearing Wastes from Idaho and Hanford using the Bench Top Steam Reformer (BSR)*, (WSRC-TR-2004-00560)**. This document presents the results of testing performed on process effluents generated from the treatment of simulants representing INL sodium bearing waste and Hanford low activity wastes. A statistically designed test matrix was conducted to analyze the waste form and emissions, which confirmed data generated from pilot scale runs at the SAIC STAR and Hazen Research facilities.

- ***Fluidized Bed Steam Reforming of Hanford LAW Using THOR Mineralizing Technology*, (INEEL/EXT-04-2492)**. A pilot scale demonstration of the technology was completed in a 15-cm-diameter reactor vessel August 2–5, 2004, at the STAR facility in Idaho. The test was conducted using an HLAW Envelope A simulant and produced both waste form and air emissions data.

- ***Idaho High-Level Waste & Facilities Disposition, Final Environmental Impact Statement*, (DOE/EIS-0287)**. This document evaluated the impact of alternatives for the treatment of sodium bearing wastes at INL. Alternatives evaluated included technologies under consideration at Hanford.

- ***Record of Decision for the Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement*, (70FR75165, December 19, 2005)**. This document provided DOE's final decision to select steam reforming as the treatment process for sodium bearing waste at INL. The State of Idaho concurred with the DOE's decision to select steam reforming as the preferred treatment process.

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

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- ***Laboratory Testing of Bulk Vitrified and Steam, Reformed Low Activity Forms to Support a Preliminary Assessment for an Integrated Disposal Facility*, (PNNL-14414).** The purpose of this report was to document the laboratory testing that was conducted on bulk vitrification and steam reforming waste forms to supply the input parameters needed for reactive chemical transport calculations with the Subsurface Transport Over Reactive Multiphases (STORM) code. This same code was used to conduct the 2001 ILAW performance assessment.

- ***Risk Assessment Supporting the Decision on the Initial Selection of Supplemental ILAW Technologies*, (RPP-17675, Rev. 0).** This document evaluated the data developed in PNNL-14414 for potential impacts on groundwater from the radionuclides in the waste form. The FBSR waste form demonstrated the lowest environmental impacts when compared with other technology waste forms evaluated.

- ***Characterization and Performance of Fluidized Bed Steam Reforming (FBSR) Product as a Final Waste Form (U)*, (WSRC, MS, 2003, 00595, Revision 0).** This document reports the results of testing the FBSR waste form product generated from the treatment of a HLAW Envelope C simulant. The FBSR mineral waste form exhibited favorable, incongruent leaching characteristics during Product Consistency Testing (PCT or ASTM C1285). The radionuclides (Cs and Re as simulants for Cs137 and Tc99) are released in significantly lower concentrations than Na. In addition, the Na release is less than the 2 g/m^2 Hanford contract requirement for vitrified LAW. FBSR mineral waste forms are EPA regulatory compliant at the Universal Treatment Standard (UTS) making delisting an option for this waste form.

- ***Hazards Analysis for the Pilot Plant for Treating Sodium-Bearing Waste and Pyrolysis of Simulated TRU Waste in Drums using the THOR Steam Reforming Process*, (HAZ 1.1, Rev.1).** This document provides analysis of potential accidents and associated mitigation measures for the operation of the pilot scale unit during testing at the Hazen Research facility. This is a CWI/IWTU project document.

- ***Fluidized Bed Steam Reformer (FBSR) Product: Monolith Formation and Characterization*, (WSRC-STI-2006-00033 Revision 0).** The test report documents the results of FBSR mineralized product monoliths. The product used for the test was a mixture of available FBSR bed product made from mineralized SBW surrogate waste and mineralized Hanford Low Activity Waste (LAW) surrogate. The strength standard for this test was a compressive strength of >500 psi as compared to WTP glass requirements. In addition to the WTP glass compressive strength requirement, there is a waste loading minimum of 67 wt% solids and several chemical durability standards. All samples were tested using ASTM C 109-02 and the Ceramicrete cylinders were compression tested using ASTM C39-04A.

  Five concrete monoliths were formed with the FBSR product at a waste loading of 80-87 wt% dry solids. The concrete monoliths were fabricated from Type II Portland Cement. Four of the five cement monoliths tested had compressive strengths ~1397 psi after 7 days.

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One Ceramicrete® monolith with a waste loading of 35.7 wt% solids was tested. Ceramicrete® is a blend of MgO and monpotassium phosphate, which was mixed with a stoichiometric amount of water. The compressive strength achieved after 7 days was ~4300 psi.

Three sets of hydroceramic monoliths with waste loadings between 50-80 wt% were fabricated. The Pennsylvania State University hydroceramic monoliths are made by the solidification of NaOH or denitrated high sodium waste with NaOH and metakaolin clay. The monoliths are 50% FBSR product with 50% metakaolin and enough 4M NaOH to form a thick paste. The densest and highest waste loaded hydroceramic cured at 90°C for 1 week had a compressive strength of 1540 psi.

Three of the cement formulations and one hydroceramic formulations/curing temperatures met all of the monolith development criteria including waste loading for Hanford LAW. Ceramicrete® met strength and chemical durability standards. Waste loading will be maximized for all feasible formulations in follow-on testing.

The chemical durability of the steam reformer pilot scale products was determined using ASTM procedure C 1285-02 (PCT). The PCT leachate analyses for elements Al, Si, S, Cs, Na and Re indicates that all of the elements leach at <2 g/m^2 (2000 x 10-3 except for those of one formulation. Whereas the leaching trends of the alkali (Na and Cs) in the bed products was highly correlated with the Al release suggesting an aluminosilicate buffering mechanism was occurring, these trends were not observed when the same bed products were embedded in the monolithing binders tested in this study. In addition, before being monolithed the Re, S, and Si in the bed products were a strong function of solution pH and the leaching trends of Re with S appeared to track each other. These trends are not observed in the monolith leach results. This is likely due to interactions of the binder phases (calcium silicates in cement, magnesium phosphates in Ceramicrete, and zeolites in hydroceramics) with the leachate which complicates the interpretation of the leachate analyses. Of great importance is the durability of the monolithed FBSR in terms of the Hanford specification for Na release (<2 g/m^2) which ensures that the Tc99 release is <2 g/m^2 in a congruently dissolving glass. In the FBSR product Re was used as a simulant for Tc99 and results indicate that the Na and Re are not released congruently, e.g. Re is released at lower rates than Na except for Cement D. This type of incongruent leaching behavior has been widely observed for multiphase ceramic and mineral waste forms.

Other: Pilot scale testing of the FBSR was conducted November 2005 thru February 2006, and June 2006, at the Hazen Research facility using sodium bearing waste simulant. During production testing, which followed scoping tests, the system operated 289hrs with 249hrs of on-line feed time, resulting in an 86% TOE. During the production tests, 60,837 lbs of waste feed were treated to produce 10,965 lbs of waste product. Samples collected using EPA Methods during the demonstration included air emissions for MACT compliance, NO_x/SO_x, and waste product samples to verify chemical compatibility for WIPP disposal. A full report of the test is due by August 2006. Further pilot scale tests are scheduled for 2006, including a mineralized product run with a factory acceptance test of the full scale unit for INL deployment mid-2008.

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SUMMARY OF CHANGES TO STEAM REFORMING DATA

New data and information available can support a revision to the Supplemental Treatment Data Package and Data Set 60 regarding waste form performance. The following reports provide updated information:

Evaluation of Fluidized Bed Steam Reforming (FBSR) Technology for Sodium Bearing Wastes from Idaho and Hanford using the Bench Top Steam Reformer (BSR), (WSRC-TR-2004-00560) reports the results of producing a waste form using a Hanford AN-107 LAW simulant. Operating temperatures of 650-725^{0}C and additives of clay and BB carbon produced a waste form consistent with testing at the Hazen Research facility.

Fluidized Bed Steam Reforming of Hanford LAW Using THOR Mineralizing Technology, (INEEL/EXT-04-2492) document the results of testing at the STAR facility. Tables 4.4-2 and 4.4-3 provide mass balance data on the retention heavy metals and radioactive simulants in the waste product.

Idaho High-Level Waste & Facilities Disposition, Final Environmental Impact Statement, (DOE/EIS-0287) presents the evaluation of alternatives for processing Sodium Bearing Wastes at INL. Appendix C.10 reports the environmental consequences of implementing each alternative.

Laboratory Testing of Bulk Vitrified and Steam, Reformed Low Activity Forms to Support a Preliminary Assessment for an Integrated Disposal Facility, (PNNL-14414). The SR product SCT02-098 was subjected to detailed characterization of its physical, bulk chemical and mineralogical properties using a variety of methods. The results were used to determine the release rates of Al, Si, Na, S, and Re from the waste product. Section 3.1 of the report documents the rates which provided input to *Risk Assessment Supporting the Decision on the Initial Selection of Supplemental ILAW Technologies*, (RPP-17675, Rev. 0).

Risk Assessment Supporting the Decision on the Initial Selection of Supplemental ILAW Technologies, (RPP-17675, Rev. 0) provides potential Tc99 release data on supplemental technology waste forms over time. Table ES-1 reports the FBSR waste form exhibited a Tc99 release rate at 10,000 years of 7.05×10^{-10} compared with WTP glass Tc99 release rate of 2.81×10^{-8}.

Characterization and Performance of Fluidized Bed Steam Reforming (FBSR) Product as a Final Waste Form (U), (WSRC, MS, 2003, 00595, Revision 0) reports the results of leaching characteristics of FBSR waste forms made from Hanford AN-107 LAW simulant. The radionuclide Tc99 was simulated with Re while Cs137 was simulated with stable cesium (Cs133). The normalized Na release rate was 1.74 g/m^2. The release rate for Re was 0.29 g/m^2 with Cs133 at 0.16 g/m^2. In the FBSR final waste form the radionuclide release (Cs and Re) is retarded preferentially to the matrix element, Na, release (Table V) or conversely, Na is released from one of the phases preferentially compared to the nosean phase which retains the Re. This finding is noteworthy because the Hanford specification for Na release for vitrified waste forms is an indicator for the congruent release of Tc99 since Na and B and Tc99 are all released at similar stoichiometric rates (congruently) from vitrified waste forms [10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24]. Further, TCLP analyses conducted on the waste form indicate heavy metals (Table VI) were retained in the waste form at levels below UTS standards.

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The air emissions data presented in Table 2 of Data Set 60 can be revised with the emissions data provided in *Fluidized Bed Steam Reforming of Hanford LAW Using THOR Mineralizing Technology*, (INEEL/EXT-04-2492), *Evaluation of Fluidized Bed Steam Reforming (FBSR) Technology for Sodium Bearing Wastes from Idaho and Hanford using the Bench Top Steam Reformer (BSR)*, (WSRC-TR-2004-00560), *Idaho High-Level Waste & Facilities Disposition, Final Environmental Impact Statement (*DOE/EIS-0287), and the pilot scale test report due August 2006.

Table 2 of Data Set 60 presents emissions data in tons and refers to "WHC-SD-WM-EV-104" as the basis for the data. This document is not readily available; therefore, a direct update of Data Set 60 cannot be made. Included in the table below are available constituent concentrations.

	INEEL/EXT-04-2492[1]	WSRC-TR-2004-00560[2]	DOE/EIS-0287[3] (Studsvik 2002)
Particulates (PM_{10})	-	-	-
VOC	-	-	-
NO_X	80	>98% DRE	100-450 (max 1050)
SO_X	-0.5-	-	29-60 (max 100)
CO	-2.5	-	-
Hydrocarbons	-	-	-

1) Table 4-3-2. – Results are the average ppm concentration of 11 test runs.
2) Table 20. – Results were determined from 8 sample runs using color analysis (Beer's Law)
3) Appendix C.2, Table C.2-13, re: Studsvik 2002 as the basis document. Studsvik 2002 reports the results of testing conducted using a HLAW simulant. Results are ppm.

Data Set 60 may be revised to include accident analysis data using information contained in *Hazards Analysis for the Pilot Plant for Treating Sodium-Bearing Waste and Pyrolysis of Simulated TRU Waste in Drums using the THOR Steam Reforming Process,* (HAZ 1.1, Rev.1).

Fluidized Bed Steam Reformer (FBSR) Product: Monolith Formation and Characterization, (WSRC-STI-2006-00033 Revision 0) presents new information on waste form durability characteristics based on Hanford criteria.

REFERENCES

WSRC-TR-2004-00560 Rev. 0, 2005, *Evaluation of Fluidized Bed Steam Reforming (FBSR) Technology for Sodium Bearing Wastes from Idaho and Hanford using the Bench Top Steam Reformer (BSR) (U)*, Westinghouse Savannah River Company, Aiken, South Carolina.

INEEL/EXT-04-2492, 2004, *Fluidized Bed Steam Reforming of Hanford LAW Using THOR Mineralizing Technology*, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho

DOE/EIS-0287; 2002, *Idaho High-Level Waste & Facilities Disposition, Final Environmental Impact Statement*, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho

70FR75165, December 19, 2005, *Record of Decision for the Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement*, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

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PNNL, 14414, 2003, *Laboratory Testing of Bulk Vitrified and Steam, Reformed Low, Activity Forms to Support a Preliminary Assessment for an Integrated Disposal Facility*, Pacific Northwest National Laboratory

RPP-17675, Rev. 0, 2003, *Risk Assessment Supporting the Decision on the Initial Selection of Supplemental ILAW Technologies*, CH2MHILL Hanford Group, Inc.

WSRC, MS, 2003, 00595, Revision 0, 2003, *Characterization and Performance of Fluidized Bed Steam Reforming (FBSR) Product as a Final Waste Form (U)*, Savannah River National Laboratory

HAZ 1.1, Rev.1, 2005, *Hazards Analysis for the Pilot Plant for Treating Sodium-Bearing Waste and Pyrolysis of Simulated TRU Waste in Drums using the THOR Steam Reforming Process*, CWI, Inc.

WSRC-STI-2006-00033 Revision 0, July 2006, *Fluidized Bed Steam Reformer (FBSR) Product: Monolith Formation and Characterization*, Savannah River National Laboratory

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

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Summary - Draft Report for Treating Hanford LAW and LAW Recycle Simulants:
Pilot Plant Mineralizing Flowsheet, RT-21-001, Rev. 0, September 2008

This summary document provides information which may be used to update technical data presented in the Supplemental Treatment Data Package (DOE/ORP-2003-07) and evaluated in New or Changed Data Form 60 on the THOR® Fluidized Bed Steam Reforming (FBSR) Process. Significant testing, including pilot scale operation, has been conducted, which provides an expanded database on waste form performance and air emissions.

As part of the Advanced Remediation Technologies (ART) program, the Department of Energy has chosen to demonstrate the capabilities of the THOR® steam reforming process as a potential means to treat and prepare the Hanford LAW and LAWR wastes for disposal at the IDF. An Engineering Scale Technology Demonstration (ESTD) test of the mineralization process was recently completed at the Hazen Research facility in Golden, CO.

The testing program processed a Hanford LAW waste simulant and a LAW Recycle (LAWR) stream simulant through a dual fluidized bed steam reformer system to produce leach-resistant, solid products and environmentally compliant gaseous effluents. The solid products incorporated normally soluble ions into an alkali alumino-silicate (NAS) mineral matrix that inhibits the leaching of those ions into the environment.

The non-radioactive simulants consisted of alkaline aqueous solution whose principal constituents were sodium nitrate and sodium hydroxide. Minor constituent cations included aluminum, antimony, arsenic, barium, cadmium, calcium, cesium, chromium, lead, nickel, potassium, selenium, silver, and thallium. Rhenium was also added as a non-radioactive surrogate for technetium. Minor anionic constituents included acetate, oxalate, carbonate, chloride, fluoride, iodide, nitrite, phosphate, and sulfate ions. A Principal Organic Hazardous Constituent (POHC) in the form of benzene was added to the feed stream in order to determine the Destruction Removal Efficiency (DRE) for organics in the process. The mineralizing agent was a form of finely divided clay that has been demonstrated in past testing programs to immobilize the soluble components of the feed simulant into a leach-resistant matrix. The elemental constituents of the clay included mainly aluminum, silicon, and oxygen.

Testing was accomplished in two phases. The first phase consisted of parametric scoping tests in which optimum process temperatures and simulant-to-clay ratios were determined. The scoping tests were followed by two LAW and two LAWR production runs in which the process was operated for an extended period of time in order to demonstrate long-term system operability, process stability, and to generate an adequate inventory of product for subsequent monolith testing and laboratory analytical evaluation.

Following the production run tests, the mineralized products underwent bench-scale testing in which the NAS material was formed into monolith samples using various binders and waste loading levels. Monolith performance testing includes Toxicity Characteristic Leaching Procedure (TCLP), Product Consistency Testing (PCT), and compressibility testing. The monolith preparation and analytical work are being performed by the Savannah River National Laboratory (SRNL). This white paper provides a summary of information found in the test report, *Draft Report for Treating Hanford LAW and LAW Recycle Simulants: Pilot Plant Mineralizing Flowsheet*, RT-21-001, Rev. 0, September 2008. The final report is scheduled to be issued in late September 2008.

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Pilot scale demonstration testing of the FBSR process was conducted in April and May of 2008, at the Hazen Research facility. Aqueous solutions of various metal salts in combination with organic constituents were prepared for use in the pilot plant test program. Non-radioactive constituents were utilized as surrogates for radiological components for the purpose of this test. The composition of the simulant used for the ESTD LAW testing program was derived from a recommended Hanford LAW composition (S. D. Rassat, et al., "Cold Dissolved Saltcake Simulant Development, Preparation, and Analysis," PNNL-14194, Rev. 1, May 2003, Table 3.1). The determination of the appropriate metal concentrations was based on an evaluation of the anticipated feed composition and an evaluation of the Hanford Tank Waste Envelope A, B, and C (see 24590-WTP-PT-02-005: Flowsheet Bases, Assumptions, and Requirements).

The projected LAWR effluent stream composition was based on predictions of the composition of three streams from the WTP; the Submerged Bed Scrubber (SBS) condensate, the Wet Electrostatic Precipitator (WESP) drainage, and the Caustic Scrubber effluent. This combined LAWR effluent prediction was based on an Excel spreadsheet mass balance that calculated the performance of major operations of the LAW systems in the WTP. The target concentrations of the LAW and LAWR simulants are listed in Table 4-2 of the *Draft Report for Treating Hanford LAW and LAW Recycle Simulants: Pilot Plant Mineralizing Flowsheet*, RT-21-001, Rev. 0, September 2008. The analyzed concentration of each constituent in the simulants is found in Appendix C of the test report. A kaolin clay was added to this simulated waste prior to being fed to the THOR® process to create a NAS mineralized granular solid product. An organic POHC, benzene, was also added to the waste stream in order to determine the organic destruction removal efficiency of the system.

During the LAW simulant production tests (P-1A and P-1B), 1,193 gallons of LAW simulant were processed into ~7,395 pounds of granular solid product during 101.5 hours of "feed-on" operation which was achieved during a total of 102.25 hr of operation, for a feed on-line factor of 99.3%. During the LAWR simulant production tests (P-2A and P-2B), 1,223 gallons of LAWR simulant were processed into ~5,127 pounds of granular solid product during 102 hours of "feed-on" operation which was achieved during a total of 104.48 hr of operation, for a feed on-line factor of 97.6%. There was no liquid effluent generated as a result of the treatment. The key results from the production tests was that steady-state operation of the process and key components were demonstrated for each simulant. The test performance objectives including air emissions standards, waste form performance characteristics, process stability, and results achieved are included in Section 11 of the test report. The durability and leach performance of the FBSR granular product was superior to the Environmental Assessment (EA) and LAW glass standards for sodium and silicon. Normalized release rates for cesium and rhenium (used as a surrogate for technetium) were much less than that of sodium in the EA and LAW glass standards.

The nominal feedrate of the surrogate to the Demineralization and Mineralization Reformer (DMR) was 0.2 gpm for both LAW and LAWR treatment. The overall mass balances for both the LAW and LAWR tests met the performance objective of 10% specified in the Quality Assurance Project Plan with a difference of 5% and 6%, respectively, between input and output masses for major constituents. After adjustment of CRR ATG gas flows and OGC cooling flow to match high fidelity off-gas measurements, the overall balances for both tests were within 1% for both tests. Mass balance information for test phases is presented in Section 9.0 of the test report.

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The Carbon Reduction Reformer (CRR) was operated to oxidize the H_2, CO, and THC in the DMR process gas to CO_2 and H_2O and meet air emission regulations. The stack gas contained mainly H_2O vapor (averaging about 50% wet basis) and N_2, with smaller amounts of CO_2 and O_2, and trace amounts of other gas species, including smaller amounts of NO_x, CO, THC, and SO_2.

- Based on off-gas sampling results, cesium and rhenium were captured in the mineralized product with system removal efficiencies of 99.999% and 99.998%, respectively (no HEPA filtration was used for engineering scale testing). The overall system removal efficiency for iodine from the LAW simulant was 94.4%. Since the THOR® process does not use wet or dry scrubbers, the calculated system removal efficiencies reflect capture in the product because there are no secondary liquid or solid process waste streams that could contain Cs, I, and Re.
- The HCl/Cl_2 off-gas concentration for the production tests averaged 13.5 ppm, or 64% of the Hazardous Waste Combustor (HWC) MACT standard of 21ppmv. During the production runs, Cl from NaCl in the feed was captured in the solid products, with an average removal efficiency of over 92%. In addition, flouride was captured with 78% efficiency.
- The stack gas particulate matter (PM) concentrations during the production tests were much lower than during the scoping tests, and averaged only 18% of the MACT standard. A full-scale production facility will include a HEPA filter, resulting in significantly reduced PM releases.
- Hazardous metals were included in the simulant feed. System removal efficiencies were calculated using the stack gas emission rates for hazardous metals and input feed rates of those metals. Concentrations of semi-volatile metals (SVM) and low volatility metals (LVM) measured during the LAW production tests were within the HWC MACT standards. LVM emissions during the LAWR production test, ART-P2, exceeded the HWC MACT standard by 5%. The Hazen facility is not HEPA filtered, like a full-scale facility would be. With more effective filtration such as would be seen in a full-scale facility, typically two HEPA filters in series each with an efficiency of 99.97% at 0.3μm, it could reasonably be expected that LVMs resulting from the LAW recycle stream would be well below the MACT standard.
- The system NO_x destruction from test averages ranged from 91% to 97%. Test-average stack NO_x concentrations ranged from 572 to 726 ppmv (dry basis), well below the desired performance level of <1,500 ppmv (dry basis).
- Stack gas SO_2 levels ranged from 11 to 67 ppm (dry basis), well under the desired performance level of <100 ppm (dry basis).
- The CO levels measured during production testing were essentially non-detectable (dry basis), well below the HWC MACT value of <100 ppmv (dry basis).
- The THC levels measured during production testing ranged from 0.0 to 0.4ppmv (dry basis), well below the HWC MACT level of <10 ppmv (dry basis).

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- The Principal Organic Hazardous Constituent (POHC), benzene, was destroyed in the process at high efficiencies. The benzene destruction efficiency averaged 99.99989% for all tests. For production tests P-1A and P-1B the benzene destruction and removal efficiencies (DRE) were 99.99968% and 99.99986% respectively, averaging out to 99.99977% for both tests. These results are well below the HWC MACT requirement of 99.99% DRE.
- No dioxins or furans were detected in any samples above the reporting limit. All dioxin and furan values, and the concentrations as percentages of the HWC MACT standard, were less than the reportable values.

Samples of the products produced from the LAW and LAWR production runs were sent to SRNL for final waste form testing and analysis. The purpose of the final waste form (monolith) testing was to determine the suitability of a number of candidate binder materials for the production of monolithic solid waste forms from the NAS mineralized product generated by the treatment of Hanford LAW and LAWR simulants with the THOR® steam reforming process. The Hanford IDF has requirements that apply to all waste forms to be disposed of at the facility. These requirements include minimum acceptable limits on leach resistance, compressive strength, free liquids, dispersible fines, and waste loading. Risk scenario pathways must also be considered. The NAS mineralized product easily meets all of the known IDF disposal requirements except for compressive strength and dispersibility. Therefore, the binding of the NAS product solids into a final monolithic waste form will be required prior to disposal at the IDF to eliminate dispersibility and to provide a waste form that has compressive strength greater than 500 psi.

For burial at the Hanford Site in the State of Washington, the Hanford contract and the ILAW Product Compliance Plan specify the following:

- The mean compressive strength of the waste form shall be at least 3.45E6Pa when tested in accordance with ASTM C39/C39M-99 or an equivalent testing method.
- The normalized mass loss of elements of concern shall be less than 2.0 grams/m^2 when tested by ASTM C1285-98 or equivalent. This is the Product Consistency Test (PCT) A, which uses a glass-to-water ratio of 1 gram of -100 to +200 mesh glass to 10 milliliters of ASTM Type I water for 7 days at 90°C.

To that end, the objectives of the monolith testing phase of this program are:

- Determine optimal waste loadings of the NAS product in the monolith matrix.
- Determine the optimal binder materials.
- Analyze monolith properties to ensure adherence to regulatory requirements.

The table below presents the preliminary PCT results of the High Temperature Filter (HTF, fines) and Product Receiver (PR, bed material) samples. The durability and leach performance of the FBSR granular products was found to be superior to the EA and LAW glass standards for sodium and silicon by one to three orders of magnitude. Normalized release rates for cesium and rhenium (used as a surrogate for technetium) were two orders of magnitude less than that of sodium in the EA glass standards, and 44 and 37 times, respectively, less than sodium in the LAW glass standard. As can be observed in the table, all results are well below the release rate of 2.0 grams/m^2.

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Normalized constituent release data for LAW and LAWR FBSR products.

Sample	Date/Time	Normalized Release (g/m^2)							
		Al	B	Cs	K	Na	Re	S	Si
P-1A 5274 PR	4/28/2008 5:15	0.0020		0.0135	0.0003	0.0103	0.0083	0.125	0.00065
P-1A 5280 HTF	4/27/2008 21:42	0.0019		0.0054	0.0002	0.0145	0.0309	0.203	0.00047
P-1A 5297 HTF	4/28/2008 17:28	0.0024		0.0066	0.0001	0.0133	0.0239	0.185	0.00032
P-1A 5316 PR	4/29/2008 3:54	0.0017		0.0123	0.0002	0.0115	0.0091	0.101	0.0006
P-1B 5351 HTF	4/30/2008 12:00	0.0019		0.0098	0.0002	0.0142	0.0069	0.131	0.00063
P-1B 5357 HTF	4/30/2008 19:44	0.0021		0.008	0.0002	0.0162	0.0333	0.233	0.00056
P-1B 5359 PR	4/30/2008 22:55	0.0019		0.0178	0.0003	0.0145	0.0051	0.106	0.00063
P-1B 5372 PR	5/1/2008 7:00	0.0019		0.0106	0.0003	0.0143	0.0048	0.092	0.00066
P-2A 5471 HTF	5/5/2008 0:20	0.0029	0.083	0.0122	0.0001	0.0134	0.0153	0.146	0.00011
P-2A 5475 PR	5/5/2008 4:00	0.0034	0.150	0.0157	0.0001	0.0132	0.006	0.083	0.00014
P-2B 5520 HTF	5/6/2008 10:00	0.0032	0.091	0.0143	0.0001	0.0155	0.0221	0.152	0.00011
P-2B 5522 PR	5/6/2008 10:00	0.0040	0.183	0.0188	0.0001	0.0126	0.0082	0.068	0.00019
EA Reference						6.67			1.96
LAW Reference						0.54			0.16

Note: LAW = P1A and P1B. LAWR = P2A and P2B.

Other analyses such as TCLP and compressive strength on the product samples, or those same analyses including PCT analysis on the monolith samples produced from the products have not yet been completed. Once all analyses are complete and verified, this summary will be updated.

References:

RT-21-001, Draft Report for Treating Hanford LAW and LAW Recycle Simulants: Pilot Plant Mineralizing Flowsheet, RT-21-001, Rev. 0, September 2008

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

Appendix B
New Information – Test Report Summary

Summary - Report for Treating Hanford LAW and LAW Recycle Simulants:
Pilot Plant Mineralizing Flowsheet, RT-21-002, Rev. 1, April 2009

Background
Fluidized Bed Steam Reforming is a process that treats nitrate wastes containing organic carbon along with a mineral fraction in a two stage process. The FBSR process has been used for many commercial waste applications with high organic content like bio-mass gasification. Notably a plant in Erwin, TN, has processed high activity organic ion exchange resins for over ten years. The DOE is evaluating FBSR for treatment of low-activity waste (LAW) streams that are largely decontaminated caustic sodium nitrate and nitrite liquids. By adding carbon particles to the FBSR bed and a clay mineral fraction to a Hanford LAW simulant feed, previous tests have shown that a very stable mineralized solid results that appears to be suitable for direct encapsulation and disposal.

Treatment and disposal of Hanford Low Activity Waste (LAW) liquids will be extremely challenging. The LAW mission at Hanford involves treating and disposing anywhere from 60,000 to 100,000 MT of sodium in liquids, about one-half of which will need an as yet undefined process. For a twenty year mission, current plans at Hanford include an ILAW plant capacity of 45 MT/d (2x30 MT/d at 75% TOE is 74-120 MT ILAW/d for 15 wt% Na_2O loading and a 20 year mission). The DOE has committed to providing a solution for the remainder of the ILAW mission, 15-55 MT/d, by 2014.

The FBSR "reforms" carbon into water gas, CO + H_2 and water gas shift, CO_2 +H_2, with process heat provided by partial oxidation of coal as $CH_{0.5}$ + 1.125 O_2 –> CO_2 + ¼ H_2O. During this reformation plus oxidation, dewatering occurs, nitrate reduction occurs and a mineralized product forms while the residual vapor stream reacts in a second stage to N_2, CO_2 and H_2O. A pilot test in April and May 2008 showed FBSR operability and capability for Hanford LAW treatment. The test report detailed this ART (Advanced Remediation Technology) project that culminated several years of successful FBSR demonstrations for Hanford simulants at the Hazen facility in Golden, CO, and elsewhere [Olson 2004]. This is the most complete two-stage pilot test to date and includes for the first time all FBSR product solids and stack emission in a mass balance that comprises the entire FBSR process.

This demonstration showed hundreds of hours of plant operability at ~1.0 MT/d encapsulated product including efficient capture and handling of solids and fines as well as critical radionuclide surrogates with >99.99% mineral retention for Cs and Re (Re for Tc-99) and 94% capture of I in the mineral product as well.

The final FBSR product is a nepheline and nepheline-like mineral solid encapsulated with a GEO-7 binder at an overall 14 wt% simulant Na_2O (assuming no other sodium sources in feed). The PCT and TCLP leach characteristics of this product exceed Hanford disposal requirements. The FBSR product easily met required PCT leach resistance by an order of magnitude, 0.20 versus 2.0 g Na /m^2 and was actually superior to ILAW glass, 0.20 versus 0.38 g Na /m^2 [Vienna 2000].

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

Moreover, the highly crystalline nature of the nepheline FBSR matrix as well as its larger Al/Na ratio, 1:1 versus 0.45:1 compared to borosilicate glass both suggest that FBSR long term performance will actually be better than glass by a much wider margin.

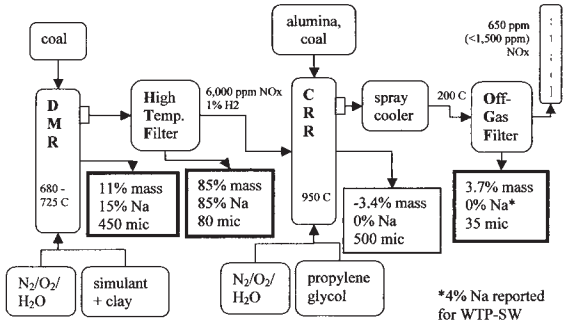
There were a series of seven objectives that covered process operability, process efficiency, and waste form qualification. This test met all its major objectives and has shown enough information to address the few non-radioactive semi-volatile metal emissions that appear slightly greater than MACT limits at the stack.

Process Description

The FBSR process consists of two steam-fluidized solids stages shown in Fig. 1. Hanford LAW (Low Activity Waste) Simulant mixed with clay and injected into the first FBSR, the DMR (Denitration Mineralizer Reformer), at 700-725ºC, resulted in two product fractions, DMR and HTF (High Temperature Filter). Then residual NO_x, CO, H_2, and other species pass to the CRR (Carbon Reduction Reformer) with a final solids fraction, OGF (Off-Gas Filter).

The FBSR process addresses three key aspects of LAW treatment. First, FBSR dewaters the liquid. Second, FBSR denitrates LAW (nominally 5 M NaNO3) to N_2. Finally, FBSR encapsulates all radionuclides and F, Cl, SO_4 into very stable sodium minerals, nepheline and others, that have very low leachability in soil disposal environments.

Initial scoping tests lasted 169 hours and resulted in 70 hours of operation at 0.2 gal/min feed rate that found optimal parameters. Then there were production runs with two simulants, an LAW 5 M Na and a WTP-SW at 2.7 M Na, each lasting 102 hours at ~0.2 gal/min feed.



2 of 5

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

Fig. 1. Schematic of two-stage Fluidized Bed Steam Reformer (FBSR) process showing Denitration Mineralization Reformer (DMR) and Carbon Reduction Reformer (CRR). Feeds were Hanford LAW (shown splits) and WTP-SW (similar splits) and three mineral products. Oxidation of coal and glycol provided 50-80 kW heat per stage.

The DMR and HTF solids represent the bulk of the FBSR product, 96%. The high temperature vapor stream further reacts in CRR to remove residual solids, H_2, CO, and NO_x, which has a base alumina loading to begin with, and attriting a solid to the OGF that is 3.7% and has some small amount of surrogate, ~0.4 wt%.

The test resulted in three solids fractions, two from the DMR and one from the OGF. The LAW test produced 6,932 lbs. among three solids as indicated in Fig. 1: 11% DMR, 85% HTF, -3.3% CRR, and 3.7% OGF. The main product was DMR + HTF, 96%, which occurred at 0.20 gal/min and 68.6 lbs/hr, or 0.75 MT/d. The theoretical Na_2O loading for nepheline is 20 wt%, the DMR + HTF product was 17% and the surrogate Na_2O was 15 wt% due to other sodium sources in the feed. The final monolith was 68.8 wt% solids product (GEO-7) meaning that surrogate was 10.3 wt% Na_2O from surrogate in the final form.

The DMR reductant was coal particles while the CRR reductant was propylene glycol with a small amount of coal. In the DMR, 78% of coal reacted with about 10% of that reacted coal enthalpy passing as water gas to CRR. The rough stoichiometry of the DMR reaction is:

$NaNO_3/NO_2$ + 6 $CH_{0.5}$ (coal) + 4.375 O_2 + ½ $Al_2O_3.2SiO_2.2H_2O$ (clay)
–> $NaAlSiO_4$ (nepheline) + ½ N_2 + 2.25 H_2O + 5 CO_2 + $CH_{0.5}$

Although DMR steam reforming produces some H_2 and CO, these are fully oxidized in the CRR and residual NO_x is nearly reduced in the CRR, and so are not shown in this balance. (Amount of NO_2^- is 16 mol% of NO_3^- in this LAW simulant, not shown in reaction, but nitrite can be much greater in other LAW.)

The main solids fraction (DMR + HTF) showed a mean particle size of 85 microns (Fig. 2). A 37 vol% cut between 75 and 150 microns showed 5.0 m^2/g BET surface area and a PCT of 0.10 g $Na/m^2/d$. The PCT goal is 2.0 g $Na/m^2/d$ and many borosilicate ILAW glasses show ~0.3 g $Na/m^2/d$ for the same particle size.

Products from the HTF and DMR were mixed, combined with a binder, and evaluated for PCT and TCLP. These materials showed PCT on the order of 0.2 g $Na/m^2/d$, once again, better than the glass criterion and slightly better than ILAW glass.

The FBSR treatment for Hanford LAW has evolved significantly over the past 7 years. The FBSR process results in a highly crystalline mineral product with a moderate BET porosity of ~5 m^2/g at 100 microns. After encapsulation with a binder, the bulk density is ~1.8 g/cm^3. The ILAW vitrification process, on the other hand, results in a non-crystalline glass with very low porosity, on the order of the geometric 0.16 m^2/g for 100 micron spherical particles at 2.65 g/cm^3. However, the relative long-term stability of these materials is related to this and many other factors at the ground disposal site [Mann 2003].

Highly crystalline materials are thermodynamically more stable against dissolution as has been demonstrated for albite, $NaAlSi_3O_8$. Crystalline albite shows over an order of magnitude lower dissolution rate as compared to albite glass [Jantzen 2008].

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

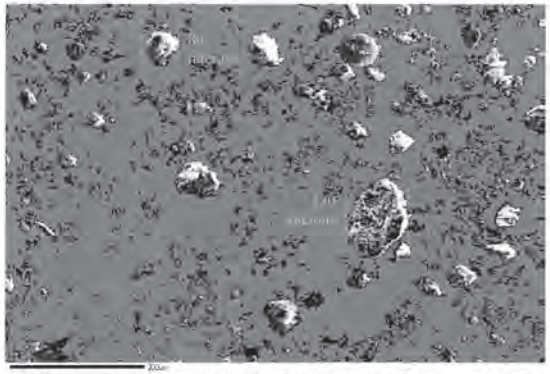

Fig. 2. Micrograph of HTF solids. A fraction between 75 and 150 microns is 37 vol% is often used in the PCT, but the entire FBSR solids was encapsulated and evaluated as PCT and TCLP.

Furthermore, dissolution of sodium can result in increasing porewater pH, which further accelerates leaching. Due to the greater FBSR nepheline Al content, alumina dissolved with Na buffers this effect and thereby enhancing the long term stability for FBSR nepheline with a mol ratio 1:1 Al:Na relative to borosilicate where the mol ratio is 0.45 Al:Na.

The vitreous state is unstable on the geologic time scale. This is well recognized and is taken into account for performance assessment modeling. The crystalline state is correspondingly more stable by its very nature and there are many more natural analogs as a result. Therefore, crystalline encapsulation is more desirable for long-term disposal.

The binder is very important for final disposal and there are many optimizations possible that would better facilitate direct disposal, including vitrification. The final Geo-7 encapsulation did meet or exceed all performance specifications.

4 of 5

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Commentor No. 261 (cont'd): Michael P. McNamara, President, THOR Treatment Technologies, LLC

THOR Treatment Technologies

References

A. Olson and B. Mason, *Report for Treating Hanford LAW and WTP SW Simulants: Pilot Mineralizing Flowsheet*, RT-21-002, Rev. 1, April 2009.

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C.M. Jantzen, *Durability Testing of Fluidized Bed Steam Reforming (FBSR) Products (U)*, WSRC-STI-2005-00214, Rev. 0, 2005.

B.P. McGrail, H. T. Schaef, P. F. Martin, D. H. Bacon, E. A. Rodriguez, D. E. McCready, A. N. Primak, R. D. Orr, *Initial Suitability of Steam-Reformed Low Activity Waste for Direct Land Disposal*, WTP-RPT-097, Rev. 0, January 2003.

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F.M. Mann, B.P. McGrail, D.H. Bacon, R.J. Serne, K.M. Krupka, R.J. Puigh, R. Khaleel, S. Finfrock, *Risk Assessment Supporting the Decision on the Initial Selection of Supplemental ILAW Technologies*, RPP-17675, Rev. 0, September 2003.

A.L. Olson, N.R. Soelberg, D.W. Marshall, G.L. Anderson, *Fluidized Bed Steam Reforming of Hanford LAW Using THORsm Mineralizing Technology*, INEEL/EXT-04002492, November 2004.

J.D. Vienna, B.M. Jorgensen, A. Juricka, D.E. Smith, B.P.McGrail, B.R. Allen, J.C. Marra, K.G. Brown, D.K. Peeler, I.A. Reamer, W.L. Ebert, *Hanford Immobilized LAW Product Acceptance: Initial Tanks Focus Area Testing Data Package*, PNNL-13101, February 2000.

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Commentoror Number 262 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 231.

Commentor No. 263: Phyllis I. Clausen

March 18, 2010

TC & WM EIS
P.O. Box 1178
Richland, WA 99352

Re: Draft Tank Closure & Waste Management EIS

Gentlemen:

I am writing to comment on the draft Tank Closure & Waste Management EIS. There are two main points I wish to make: USDOE needs to clean up 99.9% of the tank wastes and it must not add more radioactive waste to Hanford landfills. Hanford must not be made a national nuclear waste dump. The citizens of Washington state strongly oppose any attempt to circumvent our wishes, and we have made this clear time and time again. We wish to eliminate threats to the Columbia River and major cancer threats. *263-1*

Thank you for considering my comments.

Sincerely,

Phyllis I. Clausen

Phyllis I. Clausen
2804 S.E. Baypoint Drive
Vancouver, WA 98683

Tel: (▇) ▇-▇

263-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor Number 264 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 240.

Commentor No. 265: Robert Macdonald

U.S. DEPARTMENT OF ENERGY

Comment Form
Formulario para comentarios

Thank you for your input
Gracias por su participación

Date/Fecha: 03-16-2010

PLEASE PRINT / FAVOR DE ESCRIBIR CLARAMENTE

1. What comments do you have on the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS?)*
¿Que comentarios tiene usted sobre el *Borrador de la Declaración Sobre el Impacto Ambiental del Cierre de Contenedores y la Disposición de Desechos del Establecimiento de Hanford, Richland, Washington (TC & WM EIS?)*

Please treat the Hanford Site as a model nuclear waste repository. Clean up all existing nuclear contamination to 99.9%. 265-1
Begin the vitrification process immediatly and take care of our ground water, value the Columbia River and the people of Washington State. 265-2
My name is Robert Macdonald; I'm a 21 year old student studying Society, Ethics and Human Behavior at the University of Washington, Bothell, I am concerned with issues of social justice and the ethical treatment of the environment. Based on my research, the Washington State Department of Ecology estimates many millions of gallons of water is contaminated with nuclear waste. The tanks that have leaked need to be closed and all leaks into the soil and groundwater need to be fully investigated. I deeply care about the Hanford site, because I enjoy the majesty of the Columbia River and the idea of Chinook salmon contaminated with nuclear waste is deeply disturbing. I also recognize the problem of water shortage; if humans consume water contaminated with radiation in the future it will be unacceptable and morally deplorable. Make Hanford an example of anthropogenic uses of nuclear energy handled well. I will continue to discuss this issue in my public sphere, I will demand media coverage of the Hanford site and I will continue to request the proper treatment of the Hanford site by cleaning up the Hazards that pose a significant threat to humans. 265-3 265-4

** CONTINUE ON BACK FOR MORE SPACE **
** CONTINUAR AL DORSO PARA MÁS ESPACIO **

Name/Nombre: Robert Macdonald

Address/Dirección: 15738 Simonds Rd NE

City, State, Zip Code/Ciudad, Estado, Zona Postal: Kenmore, WA 98028

NOTE: Please do not include personal information (such as address or phone number) if you object to it being included in the *TC & WM EIS*. Comments received, including contact information, are published in the *TC & WM EIS* in their entirety.
NOTA: Favor de excluir información personal (dirección o número de teléfono) que desea que no aparezcan en el *TC & WM EIS*. Comentarios recibidos, incluyendo la información personal proporcionada, serán publicados en el *TC & WM EIS*.

For more information contact: Mary Beth Burandt, Document Manager, TC & WM EIS, P.O. Box 1178, Richland, WA 99352
Toll-free Telephone: 1-888-829-6347 • Toll-free Fax: 1-888-785-2865
E-mail: TC&WMEIS@saic.com

265-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

265-2 DOE has made significant progress on the design and construction of the vitrification plant. More than 80 percent of WTP design and more than 62 percent of construction are complete.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

265-3 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. The results of the risk analyses for air and groundwater releases to the Columbia River under the various alternatives are presented in Appendix P, Section P.3, Impacts on Columbia River Aquatic and Riparian Resources Resulting from Future Contaminant Releases.

265-4 This *TC & WM EIS* is an assessment of potential impacts of a variety of alternatives. Based upon this EIS and other appropriate factors, DOE will select an approach to cleanup of the site that is designed to protect public health and safety.

Additionally, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and

Commentor No. 265 (cont'd): Robert MacDonald

schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 266: W. L. (Walt) Hampson

"Draft TC&WM EIS Comments"

The schedule for eliminating ALL SSTs should be accelerated, if at all possible, thus eliminating the major source of leaks into non-Hanford environs. Uncertainties need to be minimized to improve credibility of future planning. Priorities for project execution need to reflect more urgency on those projects that prevent further adverse effects on the no-Hanford environment i.e. a prime example of this would be elimination of ALL SSTs and soil cleanup from previous leaks as soon as possible. *266-1*

Additional waste management from off-site nuclear-waste sources should be seriously considered since Hanford has the expertise and infrastructure to handle it safely without further pollution to the non-Hanford environment. *266-2*

I appreciated the opportunity to review this document and consider it to be very well done i.e. thorough and descriptive.

Sincerely, W. L. (Walt) Hampson
8145 Roe Ln
Boise, Idaho 83714-2566
Ph: [redacted]
Email: whampson4@hotmail.com

266-1 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

266-2 Comment noted.

Commentor No. 267: Jim Cavin

From: James Cavin [jrcavin@gmail.com]
Sent: Friday, March 26, 2010 11:00 AM
To: tc&wmeis@saic.com
Subject: Hanford Cleanup

I am opposed to using Hanford as a place to bring in and treat nuclear waste from outside sources. Waste storage at Hanford up to this point has created more than enough groundwater pollution with increased risk of cancer. The existing high level nuclear waste tanks need to be totally cleaned up and the leaks, whether accidental or planned from those tanks also need to be cleaned up. *267-1*

Thanks,

Jim Cavin

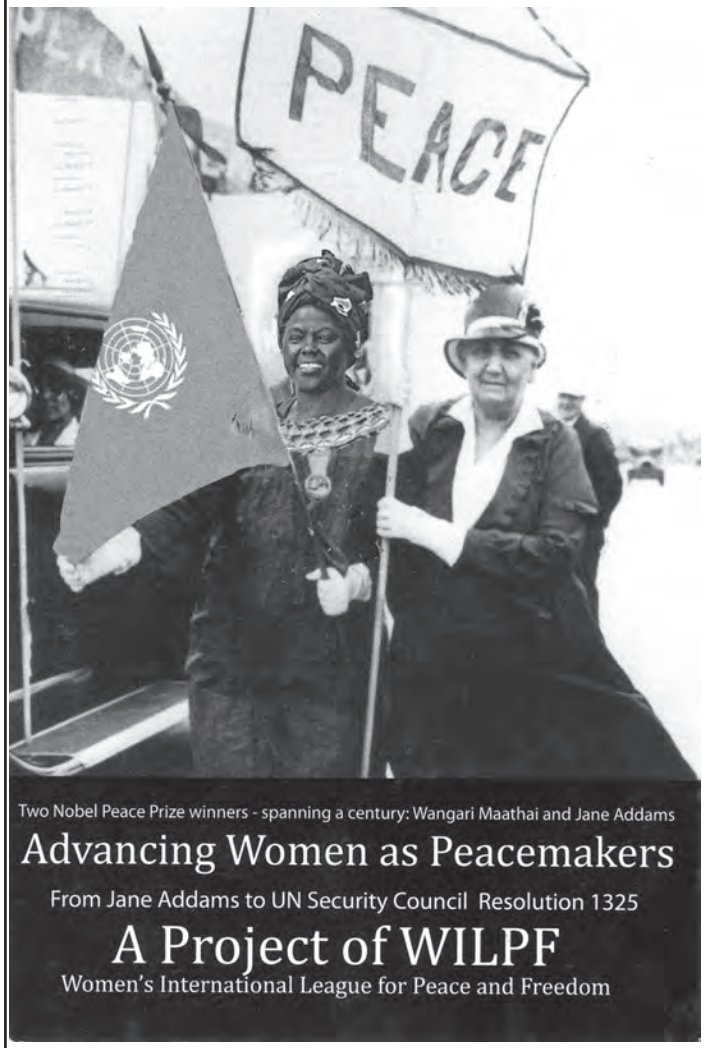
267-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

DOE appreciates the commentor's support for a complete tank cleanup, including past leaks. As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford.

One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Commentor No. 268: D. Freeborn



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Commentor No. 268 (cont'd): D. Freeborn

I support The People's Preferred Alternative(s) PORTLAND OR 972
clean it up 11 MAR 2010 PM 3 T
dumping of waste!!
The Columbia River is
too big A treasure - As
well as A vital resource - to
be endangered by Hanford's
nuclear waste - A U.S.
dump site is morbid!
Sincerely, D. Freeborn

Nobel Peace Prize recipient Wangari Maathai (b. 1940), holding the UN flag, joins WILPF founder and Nobel Peace Prize recipient Jane Addams (b. 1860-d.1935) in this composite photo, in recognition of women's historic and continuing commitment to peace.

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Bear. OR 97007

To learn more visit ADVANCING WOMEN AS PEACEMAKERS
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Women's International League for Peace and Freedom
565 Boylston St., 2nd floor, Boston, MA 02116
(p) 617-266-0999. www.wilpf.org
Photo courtesy of the Chicago History Museum

Mary Burandt
DOE Draft TC&WM EIS
Office of River Protection
P.O. Box 1178
Richland, WA
99352

268-1

268-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Commentor No. 269: Ellen Gray

From: Ellen Gray [askellengray@gmail.com]
Sent: Friday, March 26, 2010 9:31 PM
To: tc&wmeis@saic.com
Subject: Hanford waste

Dear Mary Beth Burandt, Document Manager

My name is Ellen Gray and I am a resident of Washington State. I have four children and three grandchildren.

Our environmental health is our responsibility and I urge you to Please consider: no addition ofoff site waste and don't stop cleaning up until future generations will be fully protected from the legacy of Hanford's plutonium production. *269-1*

Sincerely,

Ellen Gray

269-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

This *TC & WM EIS* addresses proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites.

Commentor No. 270: Karen Mitzner

From: Karen [co-create@comcast.net]
Sent: Sunday, March 28, 2010 11:24 PM
To: tc&wmeis@saic.com
Subject: Hanford nuclear Reservation

The plans the DOE have for Hanford clean up are grossly inadequate. All remaining waste must be dealt with so that contamination of groundwater no longer occurs; the FFTF reactor must be dismantled; clean closure of high level nuclear waste tanks must be accomplished. *270-1*

The Hanford Nuclear Reservation is already the most contaminated site in the Western Hemisphere. Please, please, we Oregonians beg you not to continue your plans to make Hanford a national site for dumping nuclear waste. Not only would the trucks bearing these wastes on our highways pose immediate hazards merely through their presence to adults and, especially, children, the potential long-term consequences of an accident or terrorist incident are horrible. Not only would the survivors have no place to live in the area surrounding the accident, the area would be uninhabitable for thousands and thousands of years. *270-2*

We refuse to accept your levels of "acceptable risk" for the Hanford Nuclear Reservation's waste-leakage problems! We refuse to accept the passage of trucks bearing even more waste on our highways!

We take this position not for ourselves alone, but for all who live here now and who will live here in the future and for all the life in this region.

Karen Mitzner

136 SE 63rd Ave
Portland, OR 97215
co-create@comcast.net

270-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Regarding FFTF, the commentor's preference for totally dismantling FFTF (essentially FFTF Decommissioning Alternative 3) is noted. However, although nearly all elements of FFTF and the two adjacent support facilities would be removed under this alternative, the lower portion of the RCB concrete shell would remain. This would be backfilled with either soil or grout to minimize void space. The area would be regraded and revegetated, with no need for a barrier. DOE's preference is for FFTF Decommissioning Alternative 2, under which some below-grade structures would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment.

270-2 This EIS addresses the environmental impacts of retrieval, treatment, and disposal of tank waste and final closure of the SST system. It also evaluates the impacts of FFTF decommissioning, including management of waste generated by the decommissioning process. Finally, this *TC & WM EIS* evaluates the potential environmental impacts of ongoing solid-waste management operations at Hanford, as well as the proposed disposal of Hanford LLW and MLLW and a limited volume of offsite LLW and MLLW.

Commentor No. 270 (cont'd): Karen Mitzner

The transportation of radioactive materials and waste, both coming to and leaving Hanford, must comply with DOT and NRC regulations that promote the protection of human health and the environment. This includes requiring the use of certified packaging that minimizes the radiation dose rate outside the transportation package. As indicated in the *TC & WM EIS* Summary, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that transportation of radioactive waste would cause an additional fatality as a result of radiation from either incident-free transportation or postulated transportation accidents.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 271: Cherie Eichholz, Executive Director, Washington Physicians for Social Responsibility

From: Cherie Eichholz [wpsr.cherie@gmail.com]
Sent: Monday, March 29, 2010 3:09 PM
To: tc&wmeis@saic.com
Subject: Comments regarding EIS
Attachments: EIS Written Comments - 032010.doc

Please see attached and confirm receipt.

Thank you.

Cherie Eichholz, Executive Director
Washington Physicians for Social Responsibility
www.wpsr.org ~ XXX.XXX.XXXX

Please consider the environment before printing this email!

Response side of this page intentionally left blank.

Commentor No. 271 (cont'd): Cherie Eichholz, Executive Director, Washington Physicians for Social Responsibility

Washington Physicians for Social Responsibility

Engaging the community to create a healthy, peaceful and sustainable world.

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WPSR Staff
Cherie Eichholz, Director
cherie@wpsr.org
Idil Levitas
dill@wpsr.org

29 March 2010

Mary Beth Burandt, Document Manager
US Department of Energy, Office of River Protection
PO Box 450, Mail Stop H6-60
Richland, WA 99353
Comments submitted via TC&WMEIS@saic.com
Comment deadline 19 March 2010

Dear Ms. Burandt:

We appreciate the opportunity to submit comments regarding the Draft Environmental Impact Statement (EIS) concerning Tank Farm Closure & Waste Management. We also appreciate the measures taken by the Department of Energy (DOE) to facilitate public comments, by allowing electronic submittal and by placing relevant documents on a publicly available web site. Following are comments on behalf of the Washington State Chapter of Physicians for Social Responsibility. In addition, the Oregon State Chapter of Physicians for Social Responsibility concurs with our sentiments and supports our comments.

DOE process for decision

We note that "a January 9, 2006, legal settlement required USDOE to prepare the *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*. The intent of the EIS is to provide a comprehensive and integrated look at near-term waste management and tank waste cleanup actions at Hanford" (http://www.hanford.gov/orp/?page=146&parent=0) as part of the EIS process, in person and written comments have been sought by USDOE from Washington and Oregon stake holders.

Hanford is not a suitable site for becoming a national repository for waste

Remediation at Hanford is far from complete, including for the major identified risk from approximately 50 million gallons of liquid high level radioactive wastes, still temporarily stored in aging tanks that have exceeded their design life spans and have leaked in the past. A DOE facility to immobilize those wastes in a stable glass form is about eight years behind schedule and about $8 billion over budget. Further, DOE is decades behind on its obligation to retrieve tank wastes; with millions of gallons of waste having seeped into the soil and groundwater, enormous areas of the region are contaminated, which affects not only ours, but future generations as well. *271-1*

Bearing this in mind, in 2004 Washington State voters passed the Cleanup Priority Act with 69% approval, a record margin for Washington State initiatives. We recognize that DOE succeeded in overturning this measure in the courts, but nonetheless, voters made clear their preference that DOE clean up all wastes at Hanford, including the tank wastes, and fully comply with environmental requirements before any new waste is imported to Hanford. DOE should recognize reality and respect this clear sentiment in determining where to send waste.

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271-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

DOE recognizes the potential negative impacts on Hanford groundwater that the offsite waste poses. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this final EIS.

271-2 The decision to leave 0.1 percent, 1 percent, or more of the waste in the SSTs is one of the decisions supported by this *TC & WM EIS* (see Section S.1.3.1 of the Summary and Chapter 1, Section 1.4.1). With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks, residual waste, and surrounding waste in the soil, requires preparation of detailed performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

271-3 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national

Commentor No. 271 (cont'd): Cherie Eichholz, Executive Director, Washington Physicians for Social Responsibility

This Draft TC & WM EIS proposes two "waste management" alternatives for waste generated from on-site cleanup activities, both of which include using Hanford as a national waste repository. An alternative in which Hanford is not used as a national repository is not proposed. As the Draft TC & WM EIS shows, offsite waste will contribute significantly to potential onsite inventories of iodine-129 (I-129) and technetium-99 (Tc-99) and will ultimately affect Hanford's groundwater. The end result is that groundwater would become contaminated to levels that are far beyond acceptable. Further, USDOE's analysis demonstrates that using either alternative will cause increased cancer risks for thousands of years.

271-1 cont'd

Given these realities, Washington Physicians for Social Responsibility supports the State of Washington in recommending a "no offsite waste disposal" alternative for the Final TC & WM EIS (Draft Tank Farm Closure & Waste Management Environmental Impact Statement Summary, page 8).

Clean up standard

This Draft TC & WM EIS evaluates several technologies for waste retrieval and retrieval benchmarks, in addition to no tank waste retrieval. The four waste retrieval benchmarks which were considered are: 0%, 90%, 99%, and 99.9%. USDOE's preferred alternative would be to retrieve 99% of waste.

Using any alternative (i.e. 0%, 90%, 99%, or 99.9%), this Draft TC & WM EIS demonstrates substantial increases in radioactive contamination of groundwater over thousands of years. However, removing 99.9% of tank wastes decreases contamination significantly compared to removing of 99% or 90%. Studies have demonstrated that the residue at the bottom of the tanks – in some cases hard to remove - has a disproportionate amount of radioactivity. Using the alternative which calls for removing 99% of waste would limit the amount of this bottom dwelling waste retrieved while working to retrieve 99.9% of waste will retrieve significantly more of the most dangerous waste.

271-2

In addition, if the 99% alternative is chosen, USDOE's own study illustrates that the cancer risk from drinking well water miles away from the tank farms would be approximately 50 times Washington State's cancer risk cleanup standard in the year 3600. If 99.9% of the wastes are removed and two tanks farms are cleaned up, the cancer risk from the well water is still nearly 10 times Washington State's cancer risk standard. Regardless, while cleaning up 99.9% of the waste will not eliminate the hazards, this alternative is far superior to the others offered.

Permitting anything less than 99.9% of the tank wastes to be removed would be a danger to public health and unconscionable. In addition, Washington Physicians for Social Responsibility finds it wholly reprehensible that the US government would knowingly seek anything except the most effective clean-up. If USDOE proceeds with the 99% standard or knowingly leaving as much as one million gallons or more of high-level nuclear waste in the soil, in effect USDOE is saying that the value of life is different for different people, with some people worth more than others. Already, far too many have been poisoned after working at Hanford or living in its path; considering anything but the most effective, safe and timely clean-up is utterly irresponsible.

271-3

Clean closure

"Clean closure refers to closure activities that result in full removal of all waste and full removal or decontamination of all structures, equipment, debris, environmental media (such as soil and ground water), and other materials affected by releases from a unit" (http://www.ecy.wa.gov/pubs/94111.pdf).

USDOE's preferred alternative still reflects the belief that tank leaks do not pose a significant risk. USDOE's preferred alternative in the TC & WM EIS is to cap the tank farm wastes in cribs and trenches with dirt, simply covering up the contamination. Using this method would allow continued contamination of the groundwater and the risk of developing cancer would be extraordinarily high for thousands of years.

271-4

Washington Physicians for Social Responsibility cannot and does not support anything except cleaning up Hanford using the "clean closure" method.

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policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*. In all cases, DOE will select an approach to cleanup of the site that reflects a commitment to protection of public health and safety.

271-4 With respect to the cribs and trenches (ditches), as noted in Chapter 1, Section 1.4.2, the six sets of cribs and trenches (ditches) that are contiguous to the SSTs are CERCLA past-practice units. These would fall under the barriers placed over the SSTs during closure. They are evaluated in this EIS as part of a connected action because they would be influenced by barrier placement. However, closure of these CERCLA past-practice units is not part of the proposed actions for this EIS. Closure of these units will be addressed at a later date.

See response to comment 271-3 regarding future DOE decisions. The commentor is directed to Chapter 4, Section 4.1.10, for a discussion of cancer risks associated with each of the Tank Closure alternatives.

271-5 To assist the public in navigating through the information presented in this *TC & WM EIS*, DOE issued a Reader's Guide. This guide serves as an introduction and guide to the contents of this EIS, highlights the key features of the reasonable alternatives, and provides references to specific sections of the document to assist the reader in reviewing the technical analyses presented. Recognizing that many people may not read beyond the EIS Summary, the information presented in both the Summary and the Reader's Guide attempts to strike a balance between those readers interested in the technical details regarding DOE's proposed actions and alternatives and readers seeking a simple overview. In addition, DOE held a 1-hour open house prior to each public hearing to allow the public to meet informally with members of the *TC & WM EIS* team, ask questions, and learn more about this EIS. Informative factsheets were provided at these open houses.

271-6 DOE sought input throughout the *TC & WM EIS* development process and worked with numerous stakeholders, including HAB, during development of the draft EIS. In addition, the groundwater flow model used in this EIS went through a rigorous technical review process that included review and comment by three groups: (1) Ecology, a cooperating agency on this EIS; (2) a Local Users' Group consisting of hydrogeologists and geologists from the Hanford community; and (3) a Technical Review Group of four experts with commercial, governmental, and academic experience in groundwater modeling and/or environmental

Commentor No. 271 (cont'd): Cherie Eichholz, Executive Director, Washington Physicians for Social Responsibility

Additional comments regarding the Draft TC & WM EIS

First, as was eloquently pointed out at the Seattle Public Hearing on 8 March 2010, the Draft TC & WM EIS, including the summary, is far from comprehensible for the lay citizen. If USDOE is truly seeking public comment, it would behoove you to consider a more understandable approach. In doing this, we believe the public would be significantly more inclined to get involved in this process. *271-5*

Second, independent consultants hired by the Hanford Advisory Board found a number of inconsistencies in USDOE's analysis. The discovery of even one of these errors should be cause for a total and complete review of the process and report. Without this review and the correction of errors, we cannot accurately understand the findings and recommendations or proceed with any semblance of fully understanding the picture. *271-6*

Third, as a public health voice for the residents of Washington State, Washington Physicians for Social Responsibility would be negligent if it did not point out one glaring issue with this Draft TC & WM EIS and the clean up of the Hanford Nuclear Reservation in general. Over the course of time, the US government has shelled out $5.5 trillion for our nuclear weapons program.

The result of this today, is nearly 10,000 nuclear weapons in the possession of our government, one quarter of them sitting in Poulsbo, Washington, ever ready for loading onto Trident Submarines. Each submarine cost approximately $3 billion to build. To operate, US taxpayers contribute $77 million per year per submarine (nearly $1.4 billion per year for all Trident Submarines). And when we need a new Trident II D-5 missile, $60 million is handed over. *271-7*

Approximately $30 billion has been spent at Hanford since 1989 (20+ years). Costs may reach the $120 billion mark. Again, costs MAY reach $120 billion.

Washington Physicians for Social Responsibility believes that money spent on Hanford clean up is money well spent and if we can find billions of dollars every year for our nuclear weapons complex, there is no reason why we cannot find the money to clean up Hanford.

Sincerely,

Karen Bowman, MN, RN, COHN-S, Hanford Advisory Board Member

Steven Gilbert, PhD, DABT, Board President, Washington Physicians for Social Responsibility

Cherie Eichholz, MA, Executive Director, Washington Physicians for Social Responsibility

Marylou Noble, MA, LPC, Board President, Oregon Physicians for Social Responsibility

Kelly Campbell, Executive Director, Oregon Physicians for Social Responsibility

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engineering. In addition, internal technical reviews by qualified professionals were conducted on each part of the draft EIS. In response to comments received on the *Draft TC & WM EIS*, DOE re-reviewed portions of the draft EIS to ensure it correctly states the results of DOE's analyses. During this review, inconsistencies (i.e., incorrect conversions of units and errors in the text as noted by the HAB independent consultant) were corrected. Chapter 1, Section 1.8.3.2, of this *Final TC & WM EIS* notes this as a change from draft to final. In addition, a note was added to the Measurement Units Metric Conversion Chart section of the *Final TC & WM EIS* to explain conversion from one measure of unit to another and how this may result in some conversions to appear to be incorrect.

271-7 Nuclear weapons production and its costs are not within the scope of this EIS. Chapter 2, Section 2.11, of this EIS, however, summarizes and compares the relative estimated costs of the proposed alternatives.

Commentor Number 272 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 201.

Commentor No. 273: Lynnette Eldredge

Lynnette Eldredge
141 Riverview Dr.
Sequim, WA 98382
[redacted]-[redacted]

Mary Beth Burandt, Document Manager
US Department of Energy, Office of River Protection
PO Box 450, Mail Stop Richland, WA 99353

March 22, 2010

To Whom It May Concern,

I have recently become aware of the DOE's EIS re: waste management/cleanup plans for the Hanford site, and I have grave concerns that financial expediency will trump common sense with regard to tank closure, vitrification, and especially the disposal of radioactive/chemical wastes from other sites at Hanford. *273-1*

I have read the Oregon State proposal, drafted in response to the EIS, and I urge you to adopt their guidelines, specifically: that ***at least 99%*** of tank waste be removed from each tank and vitrified at an expanded Waste Treatment Plant at Hanford, and that no other, less effective "supplemental technologies" be utilized; that high- and low-level vitrified waste be stored on-site, at least until high level waste can be deposited in a deep repository; and that DOE takes a tank-by-tank approach to removal and decontamination of seeped contaminants underneath. *273-2*

I especially urge the DOE to honor the wishes of Washington State voters (2004 initiative 297), and abandon any plan to accept off-site radioactive contaminants for disposal at Hanford. *273-3*

Thank you for your consideration of my comments in this matter.

Sincerely,
Lynnette Eldredge

273-1 Both DOE and Congress are committed to the cleanup efforts at Hanford, and DOE continues to seek funding for these efforts.

273-2 Chapter 2 of this *Final TC & WM EIS* has been revised to include a discussion of the Oregon Department of Energy's proposal in Section 2.6.4 and how DOE has addressed the range of reasonable alternatives for tank waste retrieval, treatment, and storage and remediation of the existing tank farms in its original Tank Closure alternatives in Section 2.5.2. DOE has carefully considered the Oregon proposal and, as explained in Section 2.6.4, has determined that it is not reasonable.

273-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor numbers 274 through 442 are found in the Hood River, Oregon; Portland, Oregon; La Grande, Oregon; Spokane, Washington; Eugene, Oregon; and Seattle, Washington, public meeting transcripts. These transcripts can be found in the second book of this Comment-Response Document (all campaigns and public meeting transcripts).

Commentor No. 443: Gabi Diane

From: Gabi Diane [gaianagram@gmail.com]
Sent: Friday, April 02, 2010 4:05 PM
To: tc&wmeis@saic.com
Subject: hanford - waterspot show - 4/1/10 - hoanw.org

i watched your discussion on 'waterspot' regarding hanford and am going to contact people per your suggestion - one thing that i would like clarification on, if you can help, is why more attention is not being given to 'transmutation' and 'phytoremediation' as possible methods for cleaning up the mess already there (and i do agree that we should focus on cleanup of present contamination and not proposing to add more). the DOE obviously does not know (no one seems to) what to do with the waste (and of course it would, therefore, be wise to diligently pursue alternative, cleaner sources of energy - so we don't keep 'overfilling the garbage truck', so to speak), but i have not heard anyone mentioning any alternative methods of dealing with this waste - are there problems with the these two alternatives (transmutation and phytoremediation), and what are they. these are the only other methods i have ever heard of (yet no one mentions them currently), and perhaps addressing them would facilitate their being viable solutions in the future. *443-1*

also, per your request for comments on the issue of the DOE's proposal, here are some that i have:

1. proposing to make a site that is not many miles away from a tectonic plate earthquake fault zone (washington/oregon/california coastline) THE 'national radioactive waste dumpsite' for the entire nation, and then proposing to 'monitor' it for thousands of years into the future, when seismologists themselves are unsure of the timeline for a future quake, is ludicrous - we should be hurrrying to clean up what is already there - and fast - to minimize the impact of the environmental damage from that site alone. *443-2*

2. to ignore the current contamination and leakage (both into groundwater and columbia river), and pretend that 'capping' it with fill dirt will actually prevent any future risks (even in 'lined'

ditches, which will apparently only be effective for 50 years or so) is, again, not only ludicrous but blatently irresponsible in its 'passing the buck' mentality. If both oregon and washington state plan to take water from the columbia river for aquifer storage (due to expected future water shortages), we should be focusing on making that water as pure as possible, not adding to its contamination. *443-3*

443-1 As discussed in Appendix E, Section E.1.2.3.5.1, DOE conducted a number of systematic reviews of possible technologies to support the treatment technologies analyzed in this *TC & WM EIS*. Vendors, national laboratories, and universities were consulted regarding such additional technologies for the purpose of establishing a list of possible LAW treatment technologies. Only technologies that could meet the criterion of closing the LAW treatment gap by accelerating cleanup and reducing risk while maintaining cleanup quality were retained for further characterization. Furthermore, Section E.1.3 discusses technology options that were initially considered, but were not analyzed in detail, as well as the rationale for selecting the technologies that were analyzed. The former are technologies that, due to their lack of maturity, cannot be analyzed in detail at this time using reasonable and conservative engineering estimates of the construction, operations, and decommissioning impacts.

Should continued R&D indicate additional benefits over the technologies analyzed in detail, these maturing technologies can then be analyzed in further detail and incorporated into the tank closure program. Transmutation and phytoremediation are technologies that are currently insufficiently mature to be analyzed further and, therefore, were not analyzed in this EIS. Section E.1.2.3.5.1 also states that those technologies that were not analyzed in detail in this EIS are not precluded from consideration as supplemental treatment technologies to treat tank waste. As related information matures, these candidate technologies can be evaluated by the decisionmakers in relative parity with the technologies analyzed in this EIS, and technologies other than those analyzed in detail in this EIS may be chosen for use. The known impacts of any candidate treatment technology can be evaluated against the impacts of the technologies analyzed in detail in this EIS. The impacts of that candidate technology would be evaluated relative to the impacts analyzed in this EIS; however, additional NEPA analysis would be required before selection of that treatment technology.

443-2 A discussion of the potential short-term impacts of seismic activity is in Appendix K, Section K.3, of this *TC & WM EIS*. The long-term groundwater analysis does not take credit for waste form container integrity.

443-3 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities

Commentor No. 443 (cont'd): Gabi Diane

3. to ignore (or apparently minimize concern about) the risks involved in transporting these wastes to the site (only I-5, 84, 205 and 90 were mentioned as routes affected - what about routes in the rest of the country - if this were a 'national' dumpsite, wouldn't these trucks be travelling through many other states?), indicates a rather superficial regard for the issue of safety of the population in general. *443-4*

While i could go on with reasons for not going ahead with the proposed plans (but these alone should indicate a wiser course, at least, of 'going back to the drawing board' for now), i myself cannot offer any alternative solution as to what to do with nuclear waste, other than 1/ reduce our dependence on nuclear energy (and its radioactive

wastes) as much as possible and more aggresively take steps necessary to implement cleaner energy production and, 2/ look into developing methods (like transmutation and phytoremediation) to clear up the waste already generated.

thank you for your work and caring regard.

downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. In addition, this EIS analyzes the potential impacts of DOE's proposed actions to store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. For analysis purposes, it was assumed that the modified RCRA Subtitle C barrier would be effective for 500 years, and the Hanford barrier would be effective for 1,000 years. Appendix E, Section E.1.2.5.4.1, of this *TC & WM EIS* provides additional information on these two barrier types.

443-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 444: Jan Gordon

From: Jan Gordon [janimals1@yahoo.com]
Sent: Monday, April 05, 2010 4:03 PM
To: tc&wmeis@saic.com
Subject: comment Hanford

I am not an expert but I am a resident of Wa. and I vote and am educated.

From what i understand there has been money allocated to cleanup of hanford and yet that is not happening , or not happening at the necessary timeline to prevent tragedy. Also, you want to bring truckloads of hazardous waste from the whole country to further contaminate this site without taking care of existing dangers. *444-1*

I keep hearing that this is or that is too expensive, yet we keep having to pay for cost cutting, Katrina, oil spills, landslides due to clearcutting, people dying from hazardous waste, ecosystems destroyed, cultures destroyed.

When do we learn to do it right first?

The unlined pits need to be cleaned up for forever. The reactor needs to be dismantled safely. I don't know how trucks could transport waste safely. Each one is a great terrorist target, particularly in urban areas. *444-2* *444-3*

Washingtonians voted to clean up hanford and not bring in more waste.

Once the columbia is contaminated with radioactive waste, there is no more opportunity to cleanup, it's too late.

Does it have to be your child who gets cancer before you care?

Sincerely
Jan Gordon
16544 colony Rd
Bow, Wa. 98232

444-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

444-2 Cleanup of Hanford is a major goal of implementing the Preferred Alternatives presented in this *TC & WM EIS*. While implementation of the Preferred Alternatives would go a long way toward achieving cleanup of the site, not all actions related to cleanup are addressed in this *TC & WM EIS*. As stated in Chapter 1, Section 1.4.2, of this EIS, the groundwater contamination in the non-tank-farm areas in the 200 Areas (including the burial grounds, cribs, and trenches [ditches]) is being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements.

Although nearly all elements of FFTF and the two adjacent support facilities would be removed under FFTF Decommissioning Alternative 3, the lower portion of the RCB concrete shell would remain. This would be backfilled with either soil or grout to minimize void space. The area would be regraded and revegetated, with no need for a barrier. DOE's preference is for FFTF Decommissioning Alternative 2, under which some below-grade structures would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment.

444-3 As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 445: Carol McDonald

From: c mcdonald [cikim62@clearwire.net]
Sent: Wednesday, April 07, 2010 3:54 PM
To: tc&wmeis@saic.com
Subject: draft EIS comments

April 7, 2010
Mary Beth Burandt
DOE Draft TC&WM EIS Comments
Office of River Protection
P.O. Box 1178
Richland, WA 99352
Subject: Draft TC&WM EIS comments

I am opposed to using Hanford for a National radioactive waste dump and to the transporting of that waste material over our roads to Hanford.

For many years we've been promised cleanup at Hanford. During that time the cleanup has been delayed and funds cut or diverted while the hazards from contamination of groundwater and ultimately the Columbia River remain.

To add more high level waste before the cleanup is complete would be irresponsible and would increase health risks, especially from cancer. *445-1*

The risks of transporting wastes over busy roadways is unacceptable, especially these days when terrorism is a real threat!

USDOE's "preferred alternatives" are unacceptable!

Please do not add to the waste at Hanford.

Thank you for this opportunity to comment.

Sincerely,

Carol McDonald
7709 28th St. SE
Everett, WA 98205

445-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 446: Wayne Ross

From: Wayne Ross [wadross@yahoo.com]
Sent: Friday, April 09, 2010 9:02 AM
To: tc&wmeis@saic.com
Subject: Comments on EIS

The selection of preferred alternatives and directions in the waste management activities has been directed by minor risks and political pressures. With the current and projected national financial problems, more emphasis needs to be given to the costs of the alternatives. The cost benefit ratios need to be looked at and utilized in the decision process. Large costs should not be undertaken without significant reductions to risk. The levels of natural contamination in the Columbia River from uranium and its daughters upstream and down stream needs to be considered in comparison to levels of contamination from waste management activities from the Hanford site. The balance in the decision process needs to recognize that funding will become more restricted during the coming years with the need to reduce Federal expenditures. In order to complete the waste management activities less expensive alternatives will need to be selected.

446-1

446-2

446-1 cont'd

Wayne Ross
1955 Pine Street
Richland, WA 99354

446-1 Chapter 2, Section 2.11, of this *TC & WM EIS* summarizes and compares the relative costs of the alternatives. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

446-2 For current operations, the annual Hanford Site environmental report (Poston, Duncan, and Dirkes 2011) present data from environmental monitoring on and around the site. The report for 2010, Tables C.3 and C.4, show that the average concentration of uranium in river water samples collected in Richland, Washington, downstream from Hanford over a 6-year period (2005 through 20010) are higher than concentrations collected at Priest Rapids Dam upstream from the site. The long-term impacts analysis in Chapter 5 of this *TC & WM EIS* indicates that, over time, uranium would be released to the river, the rate of release being controlled by migration from release locations through the vadose zone and groundwater.

Commentor No. 447: Susan K. Godfrey

From: S.K. Godfrey [gonzogodfrey@hotmail.com]
Sent: Saturday, April 10, 2010 2:32 PM
To: tc&wmeis@saic.com
Subject: Comment on Nuke Waste Disposal

Greetings:

I was raised in Eastern Washington and have a number of relatives living there. One was a cousin who lived in Richland, WA for many years and hunted and fished in the outflow from the Hanford, WA "nuclear reservation". He died from leukemia at a young age, with no histories of cancer in our family. His family chose not to be involved in one epidemiological study which was conducted in those years, as apparently there were a number of similar cases.

About that time I became involved in a WA statewide "Nuclear Safeguards Initiative" asking Hanford representatives to explain/be responsible for choosing a technology for safely disposing of the nuclear waste created at that plant, and to discourage new dumping of nuclear waste there until a good plan for disposal of current waste was tested and demonstrated. However, our Governor, Dixy Lee Ray advocated bringing all the nuclear waste throughout the nation to Hanford.

The engineers there, a number of whom I met and attempted discussion with, could not come up with a viable solution for that waste disposal and to my knowledge have not yet done so.

For that reason President Obama's recent comments that nuclear power can be added to the mix of domestic energy production are deeply disturbing. Lacking clear means to safely dispose of these wastes coupled with the abundance of safe and renewable energy sources makes reviving nuclear production a risky business proposition. *447-1*

I ask the industry spokespeople to step up and explain the "putting the dangerous wastes into glass/vitrification" technology being discussed and tell where they are putting the glass: back into Richland where there may be earthquake potential to release those poisons into the earth environment, blasting them into outer space or where? And at what cost? *447-2*

Nukes are just an expensive and dangerous way to boil water, so when there are other alternatives, why waste money on this one?

Please feel free to contact me if a formal statement is needed.

Sincerely,
Susan K. Godfrey
Seattle
Seattle, WA

447-1 Nuclear energy production and its resulting waste and the use of renewable energy sources are not within the scope of this *TC & WM EIS*. Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

447-2 Regarding the vitrified HLW, DOE is committed to meeting its obligations to manage and ultimately dispose of Hanford waste, including the HLW, HLW melters taken out of service, and selected tank closure waste (highly contaminated tank debris, equipment, soils, and rubble), which were analyzed in this *TC & WM EIS*.

See response to comment 447-1 regarding the Yucca Mountain program and the Blue Ribbon Commission.

Regarding vitrified LAW, this *TC & WM EIS* offers two alternatives, onsite disposal in an IDF or offsite disposal. Onsite disposal of the ILAW is analyzed under a number of Tank Closure alternatives, including Tank Closure Alternatives 2A, 2B, 3A, 3B, 3C, 4, 5, and 6C. Tank Closure Alternative 6B analyzes the impacts of disposing of the ILAW glass off site because the ILAW is assumed to be managed as IHLW. The long-term impacts on groundwater from disposing of ILAW glass on site are summarized in the Summary, Section S.5.5, and Chapter 2, Section 2.10, Key Environmental Findings. The estimated costs of each of these alternatives are presented in Chapter 2, Section 2.11. Appendix F, Section F.5, describes the measures DOE has taken to ensure the WTP and all Hanford waste facilities protect the public, workers, and environment from the adverse impacts of natural phenomena hazards, including earthquakes.

Appendix K analyzes and provides the results of a number of accident scenarios that could be caused by seismic events at Hanford. The accidents analyzed cover a wide range, including failure of the HLW melters in the WTP, complete collapse of the WTP during operations, and IHLW and ILAW glass canister drops during storage. As discussed in Appendix K, Section K.3, the impacts of these low-probability events would be small in terms of additional radiation dose and the LCFs that could result. As there would be no immediate release of (solidified) ILAW glass in a disposal facility such as an IDF during a seismic

Commentor No. 447 (cont'd): Susan K. Godfrey

event, no such event is analyzed in Appendix K. However, short- and long-term releases from the solidified waste forms, including ILAW glass, are analyzed in detail in Chapters 4 and 5, respectively, of this EIS and are summarized in the Summary, Sections S.5.3 and S.5.4, respectively.

Commentor No. 448: Carole Nervig

From: Carole [carolenervig@mac.com]
Sent: Sunday, April 11, 2010 1:12 PM
To: tc&wmeis@saic.com
Subject: Unacceptable dangers at Hanford and the Columbia River

I was shocked to read information about the current state of danger at the Hanford nuclear waste site and its environs, especially the Columbia River.

Even though we are in the midst of a funding crisis, what could be more essential than the immediate cleanup of Hanford? *448-1*

It is also unthinkable that additional nuclear waste could be shipped to Hanford.

We need JOBS, so why not use stimulus money to fund the vitrification program back on track and on schedule.

Regards,

Carole Nervig

448-1 Both DOE and Congress are committed to the cleanup efforts at Hanford, and DOE continues to seek funding for these efforts. However, in general, the scope of this *TC & WM EIS* does not include groundwater remediation activity or cleanup costs as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 449: Richard I. Smith

From: Richard I Smith [mailto:ri_smith@verizon.net]
Sent: Friday, April 09, 2010 4:24 PM
To: Burandt, Mary E
Cc: Gamache, Lori M
Subject: RE: EIS Comments

My comments are attached. I tried to send these to your comments address again later in the week and failed to get through again. I also gave a hard copy to Lori Gamache while in Portland to give to you, if all else failed. Let me know if you have received this copy. Thanks.

Dick Smith

From: Burandt, Mary E [mailto:Mary_E_Burandt@RL.gov]
Sent: Friday, April 09, 2010 2:51 PM
To: 'Richard I Smith'
Subject:

Dick,

I received your message on Monday that you tried to send your comments to the TC&WM EIS website. I am making sure we do not have any issues since it would not accept them. Please send your comments to me at this e-mail.

Mary Beth Burandt
Office of River Protection
NEPA Document Manager
TC&WM EIS
(509) 372-7772

Response side of this page intentionally left blank.

Commentor No. 449 (cont'd): Richard I. Smith

Comments on the Draft TC & WM EIS
Richard I Smith, P.E.
April 4, 2010

General Comments

I was frankly overwhelmed by the number and complexity of the alternatives examined. I have to assume that this large number of variations incorporated into the family of alternatives arose from the desire of DOE to have NEPA coverage for that large group of possibilities in order to increase their flexibility in selecting a preferred path for closing the tanks, treating the wastes, and disposing of the treated wastes. The proposed plans for retrieving, treating, and disposing of the tanks and their contained wastes at Hanford have changed somewhat since work on the EIS began. The inclusion of supplemental treatment processes that have since been essentially ruled out for application to tank (LAW) wastes at Hanford (bulk vit, cast stone, steam reforming) caused a lot of space being taken up by discussions and analyses of the use of those processes for LAW materials. Removing those supplemental treatment processes from the EIS could help reduce the confusion and complexity, and would allow evaluation of more realistic alternatives. *449-1*

None of the alternatives presented a scenario that represented reality. The many possibilities for action were distributed across the various alternatives in such a manner as to make it impossible to directly compare the effects of implementing or not implementing any given remedial action. For example, there is no way to directly compare the effects of clean closure to landfill closure, for the same tank residual levels. A direct comparison of the effects removing or not removing Tc-99 from the waste stream prior to vitrification (2B and 6C) is confused by assigning ILAW to be high-level waste in 6C. A presentation of the effect on residual risk produced by implementing a given remedial action should be provided for each of the proposed actions, to facilitate an understanding of which actions are more effective for reducing risk. *449-2*

It took a while to realize that none of the alternative results included any vadose zone or groundwater remediation. Because all of the resultant groundwater contaminants appeared to exceed allowable levels, it did not seem like any of the alternatives could be acceptable. The point needs to be clearly made in the summary that no vadose zone or groundwater remediation is included in the analyses. The reasons for excluding vadose zone and groundwater remediation from the analyses, should also be explained. Some discussion of whether any of the likely vadose zone and groundwater remediation processes could be expected to bring the contaminant levels into compliance, and how long it might take to achieve compliance, would also be appropriate. *449-3*

It is clear from the studies that the principal contaminants of concern are Technetium-99, Iodine-129, and Uranium. It is also obvious that the treatment processes in WTP have not been optimized to assure maximum capture of those contaminants in glass. Assumptions about partitioning factors and mass balances in the melter facilities and subsequently in the treatment facilities at ETF, are very important to the analytical *449-4*

449-1 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

449-2 DOE disagrees with the commentor's assertion that it is impossible to assess impacts of various options against each other. The alternatives presented in the *Draft TC & WM EIS* were developed under NEPA to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management), and to provide an understanding of the differences among the potential environmental impacts and the range of reasonable alternatives. Because several hundred impact scenarios could result from the potential combinations of the 11 Tank Closure, 3 FFTF Decommissioning, and 3 Waste Management alternatives, DOE analyzed a reasonable number of combinations of alternatives to represent key points covering the full spectrum of potential actions and associated overall impacts that could result from full implementation.

The analyses of potential environmental impacts are presented in detail in Chapters 4 ("Short-Term Environmental Consequences") and 5 ("Long-Term Environmental Consequences") of this *TC & WM EIS*, allowing an indepth comparison of the alternatives by resource area. The impact analyses presented in Chapter 2, Sections 2.8 and 2.9, are summaries of the short-term and long-term impacts presented in Chapters 4 and 5, respectively. In addition, Chapter 2, Section 2.10, presents an overview of the key environmental findings associated with the Tank Closure, FFTF Decommissioning, and Waste Management alternatives and discusses the key drivers contributing to these impacts. In particular, this section discusses the key findings associated with technetium-99

Commentor No. 449 (cont'd): Richard I. Smith

results. In particular, the current treatment processes at ETF are not likely to be able to immobilize the highly mobile Tc-99 and I-129 in any waste form other than glass, and the quantities of those contaminants arriving at ETF may be considerably greater than presently assumed. Thus, the analytical results for release of Tc-99 and I-129 from land disposal facilities such as IDF may significantly underestimate the risk to the environment arising from releases of these contaminants. *449-4 cont'd*

It was not immediately obvious how the cumulative concentrations of contaminants in the groundwater that arose from co-located or adjacent sources were developed. For example, the source from an emptied tank, plus the source from a leak at that tank, plus any nearby waste sites, etc., all contribute. Was each source location evaluated separately, and the individual source results summed to arrive at the total? If so, those individual source results and their risk implications should be presented somewhere in tables and figures, so that the reader could reach some conclusions about which sources are the most ones important to deal with during cleanup. These individual source results could also be useful when selecting the most viable remediation approaches for a given problem area, e.g., tank landfill closure with and without a cap, or clean closure versus landfill closure. *449-5*

Comments on the Adequacy of the Draft TC & WM EIS

Does the current draft adequately identify and evaluate most of the likely alternatives for Tank Closure and Waste Management?
YES (However, soil remediation activities for tank closure only considered Capping or deep excavation and soil washing. Future developments in treatment and removal technologies should not be excluded from consideration if shown to be beneficial.) *449-6*

Are the evaluations of the selected alternatives and their many individual actions carried out in a consistent and evenhanded manner?
YES (The analysis methodology was applied uniformly across the various actions. However, the actions that made up a given alternative seemed to be somewhat randomly assembled.)

Are the alternative scenarios assembled in a manner that facilitates easy comparison of impacts arising from the various parts of the rather complicated sets of possible actions?
NO (Each alternative is comprised of a number of individual actions. It is difficult, if not impossible, to directly compare the effects of implementing or not implementing single actions, e.g., attempting to evaluate the benefits of removing Tc-99 from the waste stream early in the pretreatment process.) *449-7*

Do the evaluated alternatives result in acceptable groundwater contamination levels?
APPARENTLY NOT (Because all of the curves of risk vs. time had no units on the risk axis, it was not possible to determine whether existing risk limits were met or exceeded.) *449-8*

Are any direct groundwater remediation actions evaluated for the alternatives?
NO (The evaluations did not include any analyses of groundwater remediation.) *449-9*

removal and different closure scenarios (i.e., landfill closure, selective clean closure, and clean closure).

449-3 Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives. As discussed in Chapter 5 of this *TC & WM EIS*, DOE acknowledges that benchmark standards could be exceeded in groundwater at the Core Zone Boundary and/or at the Columbia River nearshore at various dates. The term "benchmark standards" as used in this *TC & WM EIS* represents dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL, provided an MCL is available. This *TC & WM EIS* incorporates vadose zone remediation in some of the Tank Closure alternatives, which indicates improvement in the vadose zone and groundwater modeling results: Alternative 4 includes deep soil remediation beneath two tank farms, and Alternatives 6A and 6B include deep soil remediation beneath the tank farms and cribs and trenches (ditches).

449-4 Appendix E, Section E.1.2.3.3.1, describes the ETF process. The ETF currently produces two waste streams: the primary liquid waste stream, which is verified in the verification tanks and sent to the State-Approved Land Disposal Site for final disposition, and the secondary-waste stream, which is a solid-waste stream generated from the thin-film dryer. The powder and/or sludge solid-waste stream is packaged in 208-liter (55-gallon) drums and is directed to final disposition, depending on the source of the effluent that was processed. Waste from effluent that results from CERCLA remedial actions is sent to the ERDF for disposal. LLW and MLLW from ongoing site activities would be sent to the currently operational lined trenches 31 and 34 in LLBG 218-W-5 or an IDF for disposal. The ETF does not produce a glass waste form such as mentioned in the comment.

As discussed in Chapter 7, Section 7.1.6, of this EIS, this is a particular area of focus for DOE, especially with regard to partitioning and capture of iodine-129, a conservative tracer, in secondary-waste forms. Additional sensitivity analyses have been added to this *Final TC & WM EIS*. These additional analyses evaluate what changes in potential impacts might occur if partitioning of contaminants could be increased in primary-waste forms and/or if secondary-waste-form performance could be improved. The discussion found in Section 7.5 was added to summarize these results. The results of these analyses will aid DOE in formulating appropriate performance targets for secondary-waste forms. As referenced in the Section 7.5.2.8 discussion, DOE has drafted a roadmap that

Commentor No. 449 (cont'd): Richard I. Smith

Is the question of receiving DOE-owned wastes from other sites adequately evaluated? YES (Clearly, unless treated to meet ILAW standards, adding untreated wastes bearing Tc-99 and I-129 to IDF would result in a large long-term impact to groundwater. Any such additions to the Hanford site inventory should be prevented.) ***449-10***

Can DOE proceed from this draft EIS to the development of appropriate Records of Decision covering the actions needed to accomplish site cleanup related to the tank wastes, the associated facilities, and the disposition of existing buried wastes? MAYBE (However, careful stakeholder attention will be needed to insure that the final decisions encompass the best combinations of the remediation possibilities. Careful stakeholder scrutiny of the evaluations developed in the subsequent Remedial Investigation / Feasibility Study {RI/FS} and associated Work Plans will be needed to assure that the best combinations of solutions are selected.) ***449-11***

implements a strategy for development of better-performing secondary-waste forms.

Finally, DOE is currently studying the addition of a solidification capability to the ETF, but there was no "downselect" of a technology at the time of publication of this *Final TC & WM EIS*. Appendix E, Section E.1.2.3.3.4, has additional information on this subject. In lieu of a new solidification capability that is currently too immature for evaluation in this EIS, this final EIS bounds the potential impacts of this enhancement by including at least one full replacement of the current ETF under each of the Tank Closure alternatives. Due to their lengthy duration, under some of the alternatives, multiple ETF replacements are included.

449-5 To the extent possible, each source location was modeled separately and the results combined for the comparison of the alternatives. There are two exceptions to this general statement: (1) Retrieval losses (4,000 gallons per SST), releases from ancillary equipment, and releases from tank residuals were modeled together (on a tank-farm-by-tank-farm basis) for computational efficiency for the draft EIS. However, for this final EIS, these sources were modeled separately (on a tank-farm-by-tank-farm basis); and (2) Moderate- to high-discharge sources that are located reasonably close together were combined into a single model (e.g., the seven cribs in the group called the BY Cribs). The reason for this is that the moisture movement in the vadose zone for the combined system is not equivalent to a linear combination of the individual sources. DOE agrees with the commentor's view that there is utility in the superposition approach to combining sources; this discussion has been expanded in Appendices N and O in this *Final TC & WM EIS*.

449-6 As discussed in Chapter 2, Section 2.2.2.4, and Appendix E, Section E.1.2.5, landfill closure and clean closure, along with a hybrid combination of selective clean closure/landfill closure, were analyzed to provide DOE with the information necessary to determine the benefits of each and to envelope the closure options that are currently available. However, DOE is committed to continuing its support of R&D activities for new technologies and to monitoring their benefits compared with the technologies analyzed in detail in this EIS. If these technologies mature, they will be analyzed in further detail to determine their applicability to the River Protection Project (RPP) at Hanford.

449-7 The alternatives presented in the *Draft TC & WM EIS* were developed/assembled under NEPA to address the essential components of DOE's three sets of proposed

Commentor No. 449 (cont'd): Richard I. Smith

actions (tank closure, FFTF decommissioning, and waste management), and to provide an understanding of the differences between the potential environmental impacts and the range of reasonable alternatives. Because several hundred impact scenarios could result from the potential combinations of the 11 Tank Closure, 3 FFTF Decommissioning, and 3 Waste Management alternatives, DOE analyzed a reasonable number of combinations of alternatives to represent key points covering the full spectrum of potential actions and associated overall impacts that could result from full implementation.

The analyses of potential environmental impacts are presented in detail in Chapters 4 ("Short-Term Environmental Consequences") and 5 ("Long-Term Environmental Consequences") of this *TC & WM EIS*, allowing an indepth comparison of the alternatives by resource area. The impacts analysis presented in Chapter 2, Sections 2.8 and 2.9 (in tabular form for ease of comparison), is a summary of the short- and long-term impacts presented in Chapters 4 and 5, respectively.

449-8 The "benchmark standards" used in this *TC & WM EIS* represent dose or concentration levels that correspond to known or established human-health effects. For groundwater, the benchmark is the MCL if an MCL is available. For example, the benchmark for iodine-129 is 1 picocurie per liter; for technetium-99, it is 900 picocuries per liter. These benchmark standards for groundwater impacts analysis were agreed upon by both DOE and Ecology as the basis for comparing the alternatives and representing the potential groundwater impacts. In addition, this approach is also consistent with the MTCA standards Method A, which was used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs listed in the MTCA, Table 720–1. In this *Final TC & WM EIS*, DOE revised the graphs from the *Draft TC & WM EIS* to clarify the confusion readers and commentors seemed to have regarding the use of term "unitless" for the radiological risk depiction in the graphs located in the Summary, Section S.5.5, and Chapter 5, as well as other locations within this EIS.

449-9 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

449-10 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections describe the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

449-11 Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that may be needed and are feasible for DOE to implement to offset the potential impacts that might result from implementing an alternative. While DOE's Preferred Alternatives for tank closure, FFTF decommissioning, and waste management in this *TC & WM EIS* may not necessarily represent the most environmentally preferred alternatives, the ROD issued by DOE will identify any additional mitigation and monitoring commitments adopted by DOE and specify other factors considered by DOE in reaching its decision, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. In announcing its decision in the ROD based on the EIS analyses, DOE will be obligated to carry out the decision consistent with the requirements identified in this EIS. These requirements will be interpreted and applied by Federal, state, and local regulatory agencies through their independent authorities. These agencies may also impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA, which would include additional opportunities for public comment.

Commentor No. 450: Martha Tofferi

From: martha tofferi [mk_98199@yahoo.com]
Sent: Monday, April 12, 2010 1:37 PM
To: tc&wmeis@saic.com
Subject: Hanford Proposal

Until we are much closer to containing the atomic refuse at Hanford, we should not even consider adding more contaminated refuse. Hanford may look desolate and therefore inviting, but it is leeching 'bad stuff' into the Columbia which spreads it through southern Washington, northern Oregon, and the Pacific Ocean. *450-1*

It just does not make sense to add more contamination.

martha tofferi
seattle, wa

450-1 See Section 2.1 of this CRD, a volume of this *TC & WM EIS*, for more information regarding offsite waste.

DOE recognizes that groundwater contamination is a concern at Hanford and its potential impact on the Columbia River. See Sections 2.3 and 2.11 of this CRD for more information regarding remediation and mitigation activities at Hanford.

Commentor No. 451: Larissa Freier

From: Larissa Freier [larissa_freier25@hotmail.com]
Sent: Tuesday, April 13, 2010 10:55 PM
To: tc&wmeis@saic.com
Subject: NO MORE NUCLEAR WASTE!!!

It's hard to imagine that there is so much nuclear and radioactive waste polluting all this plant and animal life. Adding even more nuclear waste would be a huge mistake. It seems like the easy thing to do now but then later it will create an even bigger problem without an easy solution. The Columbia River and the surrounding environment is in danger and they should not pollute it any more! *451-1*

451-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 452: Rinnah Becker

From: Rinnah Becker [Rin.RosaliLane@olympus.net]
Sent: Wednesday, April 14, 2010 1:00 AM
To: tc&wmeis@saic.com
Subject: no more nuclear waste in Hanford! (or anywhere)!

Dear U.S. DOE, Washington State Department of Ecology, and all involved in TC & WM EIS,

I am a 14-year-old living in Port Townsend, Washington. I am emailing regarding Hanford and the DOE's preferred alternatives for cleaning it up. I do not think the country should be allowed to dump more nuclear waste at Hanford. I admit that if we make nuclear waste, we do have to figure out how to deal with it responsibly. It is not responsible to leave it where it will leak into the Columbia River. The Columbia River flows through Hanford for 50 miles. The Columbia is highly important, not only as an energy source, but also as a major water source for people and irrigation (irrigating the fruit orchards of Eastern Washington). There are also the salmon to worry about! I, for one, do not want to eat a radioactive apple or risk drinking radioactive water. *452-1*

Nobody should have to risk this. We need to clean up the waste that is at Hanford. We should not make more waste and put it there. If all we can do with waste is let it sit, we should not be making any more. It is irresponsible and a hazard to my health and the health of all other Washingtonians to ignore this problem.

I would also like to point out that initiative 297 (to clean up Hanford before any other waste is put there) passed by almost 70%. The federal government did not allow this initiative to be implemented. It seems as though the federal government is ignoring what the people want. 70% of us want Hanford cleaned up (and this does not even count the kids who really, really, really don't want to deal with nuclear waste in their futures).

I hope you seriously consider not following your preferred alternative and decide to clean up Hanford. *452-2*

Sincerely,

Rinnah Becker
9th grader at Port Townsend High School

452-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

452-2 Cleanup of Hanford is a major goal of implementing the Preferred Alternatives presented in this *TC & WM EIS*. The commentor is referred to Chapter 2, Section 2.12, for a discussion of the Preferred Alternatives for tank closure, FFTF decommissioning, and waste management. While implementation of the Preferred Alternatives would go a long way toward achieving cleanup of the site, not all actions related to cleanup are addressed in this *TC & WM EIS*. For example, as noted in Chapter 1, Section 1.4.2, the six sets of cribs and trenches (ditches) that are contiguous to the SSTs are CERCLA past-practice units. While these would fall under the barriers placed over the SSTs during closure, they are not a part of the proposed actions of this EIS. Closure of these units will be addressed at a later date. Other cleanup actions not covered in this EIS are discussed in Chapter 1, Section 1.4.2.

Commentor No. 453: Katherine Weybright

From: Katherine Weybright [kweybright@gmail.com]
Sent: Wednesday, April 14, 2010 10:41 AM
To: tc&wmeis@saic.com
Subject: Public Comment Period -- Hanford Draft Tank Closure

Hello -

I am a citizen of the great state of Washington. I am writing to express my extreme opposition to using Hanford as a national radioactive waste dump. *453-1* The US Department of Energy's *own* analysis shows that using either landfill (existing 200 East or proposed 200 West) will cause HIGH contamination and cancer risks for thousands of years. *453-2* Do you want this on your conscience? I sure don't. Please do not add any more waste to the Hanford site (we have enough to deal with already without taking waste from elsewhere!). *453-1 cont'd* Please complete the clean up of the high level nuclear waste tanks at Hanford.

Sincerely,

Katherine Weybright
Seattle, WA

453-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

453-2 DOE recognizes the potential negative impacts on Hanford groundwater that shipment of offsite waste to the site could pose. The *TC & WM EIS* analysis showed that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. One means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this final EIS.

Commentor No. 454: Polly Thurston

From: Polly Thurston [ptravennest@hotmail.com]
Sent: Thursday, April 15, 2010 7:35 PM
To: tc&wmeis@saic.com
Subject: Time to clean up Hanford

I would like to urge the powers that be to CLEAN UP HANFORD NOW and NO MORE WASTE dumped there. This is long overdue. Yes, we need more research to figure how best to clean it up and YES we need to start cleaning it up now. I used to swim in the Columbia River and now i hear it's contaminated with the Hanford waste. These are important issues for people NOW and for future generations. Please urge the federal government to start cleanup now and to not bring any more - enough damage has been done. *454-1*

As well - Time to stop creating the stuff. We have to consider the health and security of future generation, not the profits of corporations.

Polly

454-1 This *TC & WM EIS* addresses the environmental impacts of proposed actions to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites.

Commentor No. 455: Michael J. Chappell, Gonzaga Environmental Law Clinic

From: shackett@gonzaga.edu on behalf of Hackett, Sean [shackett@lawschool.gonzaga.edu]
Sent: Friday, April 16, 2010 3:55 PM
To: tc&wmeis@saic.com
Cc: chappell.law@comcast.net
Subject: TC&WMEIS Public Comments
Attachments: Hanford Comments.pdf

Dear Ms. Burandy,

Please accept these comments regarding DOE's EIS on Tank Closure and Waste Management at Hanford. These comments are submitted on behalf of the Gonzaga Environmental Law Clinic, The Lands Council, Kootenai Environmental Alliance, and the Spokane Riverkeeper. Please contact me if you have any questions.

Thank You,

Sean Hackett
Gonzaga University Legal Assistance
Environmental Law Clinic Intern
xxx-xxx-xxxx
shackett@lawschool.gonzaga.edu

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Commentor No. 455 (cont'd): Michael J. Chappell, Gonzaga Environmental Law Clinic

UNIVERSITY LEGAL ASSISTANCE
721 North Cincinnati Street
P.O. Box 3528
Spokane, Washington 99220-3528
Phone (509) 313-5791
Facsimile (509) 313-5805
TTY (509) 313-3796

Director
LARRY A. WEISER

Office Manager
JULIE CLARK

Supervising Attorneys
MICHAEL J. CHAPPELL
GEORGE A. CRITCHLOW
STEPHEN F. FAUST
JENNIFER A. GELLNER
GAIL HAMMER
JOSHUA J. KANASCATCCA
ALAN L. McNEIL
TERRENCE V. SAWYER

JAMES P. CONNELLY
MARK C. WILSON
Of Counsel

April 16, 2010

Mary Beth Burandy, Document Manager
Office of River Protection
Department of Energy
PO Box 1178
Richland, WA 99352
Attention: TC & WM EIS

Re: Tank Closure and Waste Management Draft EIS ("Draft EIS")

To Whom It May Concern:

I am writing on behalf of the Gonzaga University Environmental Law Clinic, the Spokane Riverkeeper, Kootenai Environmental Alliance, and The Lands Council.

The Gonzaga Environmental Law Clinic provides legal representation to not-for-profit environmental programs in the Inland Northwest, and strives to protect and restore the quality and integrity of the region's waters through advocacy and public interest litigation.

The Spokane Riverkeeper ("Riverkeeper") is a program of the Center for Justice ("CFJ"). CFJ is a not-for-profit legal organization which provides legal services to individuals and public interest organizations in the Inland Northwest. CFJ works to ensure that all individuals and public interest organizations of limited means have access to justice, including a clean and healthy environment. Riverkeeper conducts surveillance of the Spokane River and its tributaries and reaches out to river users who share its commitment to a river that is swimmable, fishable, and properly regulated. To further these goals, Riverkeeper actively seeks Federal and State agency implementation of the Clean Water Act and, when necessary, directly initiates enforcement actions on behalf of itself and the public. The Riverkeeper may be contacted at:

Rick Eichstaedt, Spokane Riverkeeper
Center for Justice
35 West Main, Suite 300
Spokane, Washington 99201
Phone: (509) 835-5211

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Commentor No. 455 (cont'd): Michael J. Chappell, Gonzaga Environmental Law Clinic

The Kootenai Environmental Alliance ("KEA") is a non-profit conservation organization located in Coeur d'Alene, Idaho. KEA's mission is to conserve, protect and restore the environment with particular emphasis on the Idaho Panhandle and the Coeur d'Alene Basin. KEA has been working to protect and restore the environment of the Idaho Panhandle and the Coeur d'Alene River Basin since 1972. To further these goals, KEA uses a grassroots collaborative approach; actively seeks Federal and State agency implementation of the Clean Water Act; and, where necessary, directly initiates enforcement actions on behalf of itself and its members. KEA may be contacted at:

Terry Harris, Executive Director
408 Sherman Avenue, Suite 301
Coeur d'Alene, ID 83814
(208) 667-9093

The Lands Council preserves and revitalizes Inland Northwest forests, water, and wildlife through advocacy, education, effective action, and community engagement. To achieve this goal, The Lands Council collaborates with a broad range of interested parties to seek smart and mutually respectful solutions to environment and health issues. The Lands Council may be contacted at:

Mike Petersen, Executive Director
25 W Maine, Suite 222
Spokane, WA 99201
(509) 838-4912

Members of the Environmental Law Clinic, Riverkeeper, Kootenai Environmental Alliance, and the Lands Council reside and recreate near areas that will likely be impacted by the Proposed EIS. For this reason, we are writing to voice our concerns about the Department of Energy's ("DOE") preferred alternatives for tank closure and waste management at Hanford. To summarize, we respectfully request that DOE: clean up all 53 million gallons of nuclear waste in the leaky single-shell tanks to 99.9% retrieval, and remove the tanks themselves; entirely drop the proposal to ship radioactive waste from across the nation to Hanford; clean up the millions of gallons of nuclear waste that has already leaked and is reaching to Columbia; implement the clean-closure option when closing the tanks; and under absolutely no circumstances whatsoever, should DOE transport hazardous radioactive waste along I-90 directly above the sole source Spokane-Valley/Rathdrum-Prairie Aquifer.

1. **DOE should clean up all 53 million gallons of nuclear waste in the leaky single shell tanks to 99.9% retrieval.**

DOE owes it to the citizens of Washington and Idaho to implement the most extensive cleanup option technologically available. While 99.9% retrieval might be the maximum practical removal of the waste from tanks, it is possible to remove the entire tank. The final .1% of waste may include higher concentrations of the long-lived heavy metal radionuclides that are currently present in the tanks. The less extensive alternatives are unacceptable as they would both allow for additional groundwater contamination and potential contamination of the Columbia River- the lifeblood of the Pacific Northwest. Past leaks from just a portion of

455-1

455-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation based on the proposed actions evaluated in this EIS, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process.

The *TC & WM EIS* closure alternatives considered for the tank farms include no action, landfill closure, selective clean closure, and clean closure, which would involve actions to remove the source of contamination. It does not include proposed actions to address potential groundwater impacts resulting from the tank farms (i.e., past leaks) as this will be addressed along with the 200 Area non-tank-farm area CERCLA process, which includes consideration of all applicable, relevant, and/or appropriate requirements under Federal and state laws and regulations.

This *TC & WM EIS* does consider the Washington State requirements under the MTCA. The "benchmark standards" used in this EIS represent dose or concentration levels that correspond to known or established human-health effects. For groundwater, the benchmark is the MCL if one is available. For example, the benchmark for iodine-129 is 1 picocurie per liter; for technetium-99, 900 picocuries per liter. These benchmark standards for groundwater impacts analysis were agreed upon by both DOE and Ecology as the basis for comparing the alternatives and representing potential groundwater impacts. In addition, use of the standards is consistent with the MTCA standards Method A used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs as listed in Table 720-1 of the MTCA. In this *TC & WM EIS*, the use of MCLs as benchmarks for purposes of determining potential groundwater contamination is thus consistent with the manner in which MCLs are considered in the CERCLA process and provides information to help inform future cleanup decisions.

Commentor No. 455 (cont'd): Michael J. Chappell, Gonzaga Environmental Law Clinic

Hanford's tanks are major contributors of potential additional long-term ground and surface water impacts. Under DOE's current plan, none of the leaked material would be retrieved and, thus, would eventually find its way into the groundwater and the Columbia River. In the interest of saving money, DOE is willing to gamble with the health and wellbeing of current and future residents of this State.

The Draft EIS recognizes that the preferred alternative will result in groundwater contamination that exceeds EPA's Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") Cleanup and Drinking Water Standards within 10,000 years. CERCLA requires that cleanups meet more protective state requirements. 42 U.S.C. § 9621(d)(2). However, the Draft EIS fails to even consider, let alone mention, Washington's more stringent cancer risk-based cleanup under the Model Toxics Control Act ("MTCA"). RCW 70.105D. Not only is this projected exceedance highly objectionable from environmental health and intergenerational equity perspectives, but it threatens to undermine the longevity of at least three very critical sectors of our state's economy: real-estate development along the Columbia River corridor: commercial fishing; and outdoor recreation. Further, the EIS fails to adequately take the increased healthcare costs that will be borne by private individuals as well as the public healthcare system in treating radiation induced cancers into account.

455-1 cont'd

In order to reduce these impacts as much as possible, we strongly urge DOE to implement the 99.9% retrieval alternative. Additionally, we urge DOE to commit to removing the entire tank after 99.9% retrieval for tanks where leakage or the actual composition of the residue creates risks that can be reduced through removal.

2. Drop the proposal to ship radioactive waste from across the nation to Hanford

DOE's preferred alternative to ship radioactive waste from across the nation to Hanford once the Waste Treatment Plant ("WTP") is operational defies logic and poses absolutely unacceptable short and long-term public health and environmental risks. DOE's preferred alternative for landfill closure of cribs and trenches adjacent to the tank farms would result in increased amounts of contamination reaching the groundwater and the river. As the Department of Ecology has recognized, "disposal of the proposed offsite waste would significantly increase groundwater impacts to beyond acceptable levels." *See* "Focus on Effects of Offsite Waste on Hanford," Washington Department of Ecology, 2010. The proposed influx of off-site waste from across the nation would likely add an additional 15 curies of iodine, which under current plans, would not be immobilized in glass and would be highly prone to leach into the groundwater and the Columbia River.

455-2

About 90% of the radioactive iodine that would be released from the landfill would come from imported waste, and about 74% of the radioactive technetium releases would come from imported waste. *See* "Focus on Technetium 99 Removal," Washington Department of Ecology, 2010. These releases are projected to peak 1,000 or 2,000 years in the future at 18 picocuries per liter; 18 times the drinking water standard. The impacts projected from offsite waste are based on hypothetical wastes and there is no rational basis for a claim that the assumptions regarding technetium 99 and Iodine levels estimated for the offsite wastes are conservative. The Appendices to the Draft EIS detail that the offsite waste composition used are mere guesses.

455-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

Commentor No. 455 (cont'd): Michael J. Chappell, Gonzaga Environmental Law Clinic

Couple this with the fact that existing contamination is already expected to result in excursions nearly 300 times higher than existing drinking water standards over the next 10,000 years, as well as the fact that DOE is eight years behind schedule and $8 billion over budget in meeting its legal obligations to clean up existing waste, the flaws in DOE's preferred alternative become painfully clear. **455-2 cont'd**

It is entirely inequitable to force Washington residents to bear a disproportionate burden of housing much of the nation's most hazardous substances given the fact that the citizens of Washington State have clearly and unequivocally voiced their opposition to becoming the nation's radioactive dumping ground. DOE's plan calls upon Washington residents to shoulder the entire burden of transporting and storing the nation's nuclear waste while, through the passage of Initiative 2004, the people of Washington overwhelmingly expressed their refusal to allow additional shipments of radioactive waste to Hanford until existing waste is cleaned up. Delaying the addition of more hazardous wastes until the WTP becomes operational in 2022 does absolutely nothing to protect the Columbia River and the health of our children for generations to come. **455-3**

In addition to these long-term adverse environmental health impacts, DOE's preferred alternative is highly problematic in the near-term, because transporting waste on the region's public roads unjustifiably exposes Washington, Oregon, and Idaho residents to hazardous levels of radiation. The Appendices to the Draft EIS disclose that there may be highly radioactive Remote Handled waste shipped to Hanford. Because there is no federally approved shipping cask for these wastes to be trucked in, and because there will be thousands of truckloads shipped through Washington communities, there is absolutely no way to ensure that the health of residents along I-5, I-84, or I-90 will be adequately safeguarded. This is highly objectionable from an environmental justice perspective because poor and/or minority communities are disproportionately more likely to be located near interstate highways than their affluent, white counterparts. *See generally,* FHWA Transportation and Environmental Justice Case Studies, 2000. **455-4**

One issue of particular concern is that DOE has yet to notify the public of its plans for designating those routes that will be taken by trucks transporting hazardous nuclear waste to Hanford. Without letting the public know whether or not their community will potentially be impacted by an influx of radioactive traffic heading to Hanford, any discussions surrounding the viability and desirability of DOE's preferred alternatives are illusory.

In the absence of any specific routes identified by DOE, we cannot help but assume that truckloads of nuclear waste will be passing directly through Coeur d'Alene and Spokane via I-90. At DOE's Spokane hearing regarding the Draft EIS, DOE staff Mary Beth Burandt acknowledged that truckers are free to choose their own route, and prefer interstate highways for shipments to Hanford from Eastern States, or from Hanford to the Idaho National Laboratory ("INL"). At the Spokane hearing, Spokane City Council Member Bob Apple, a former Teamster, suggested that the preferred route, especially in the wintertime, would be I-90 rather than the "representative route" shown in the Draft EIS. Residents of Spokane, Coeur d'Alene and the surrounding areas are particularly concerned with the unjustifiable hazards of transporting such a highly volatile substance along I-90. **455-5**

455-3 See response to comment 455-2 for a discussion on the transport and disposal of offsite waste.

455-4 As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

Note that transportation activities analyzed in this *TC & WM EIS* would not use Interstate 5, as shipments would originate from the east and southeast of Hanford. DOE has a national strategy for disposing of radioactive waste that requires transportation between DOE sites. This strategy was analyzed in the *WM PEIS* (DOE 1997). As part of this strategy, radioactive waste could be transported to Hanford for disposal and transported from Hanford for treatment and disposal at other DOE sites.

Transport packages are available for all proposed remote-handled waste streams analyzed for transport to Hanford for disposal. The transportation of radioactive materials and waste, both coming to and leaving Hanford, must comply with DOT and NRC regulations that promote the protection of human health and the environment. This includes requiring the use of certified packaging that minimizes the radiation dose rate outside the transportation package. The applicable regulations for the certified packages are summarized in Appendix H, Section H.3.1.

The referenced case studies regarding environmental justice do not conclude that poor and/or minority communities are disproportionately more likely to be located near interstate highways than their affluent, white counterparts. These case studies were screened and selected for the Federal Highway Administration's Transportation and Environmental Justice Case Studies booklet issued to "illuminate effective practices on how to better promote environmental justice principles." Furthermore, the agency actions considered under many of these case studies involve developing and constructing highways and addressing the impacts of dividing communities. Questions regarding which materials may or may not be transported along those highways are not considered. It is possible that radioactive waste could pass through minority and/or low-income communities during transportation; however, those shipments will also pass through communities characterized by low minority populations and fairly high incomes. As noted above, the results of the analysis conclude that the risks associated with transporting these materials would be small. Therefore,

Commentor No. 455 (cont'd): Michael J. Chappell, Gonzaga Environmental Law Clinic

Our concerns are particularly salient because I-90 lies directly above the highly efficient (i.e. rapidly moving) Spokane-Valley/Rathdrum-Prairie Aquifer ("SVRP Aquifer"). The SVRP Aquifer was designated as a "sole source" aquifer by the Federal Environmental Protection Agency in 1978 because it provides the only safe and affordable source of drinking water to more than 500,000 Idaho and Washington residents. Due to the high efficiency of this aquifer, if the unthinkable were to happen - and a truck containing radioactive waste were to release its payload over our aquifer - aquifer-wide contamination would be inevitable and over 500,000 people would be without a viable source of drinking water. Additionally, any trucks passing through Spokane via I-90 would come dangerously close to areas containing particularly vulnerable populations: Shriner's Hospital for Children; the Kids Clinic Spokane Pediatrics; Spokane Homeless Resource Center; Cancer Care Northwest; St. Luke's Rehabilitation Institute; and Lewis and Clark High School; to name just a few. **455-5 cont'd**

Furthermore, DOE has grossly underestimated the total number of fatal cancers that will result from trucking the nearly 3 million cubic feet of radioactive and mixed radioactive wastes to Hanford. The Draft EIS adopts the figure from DOE's 2003 Solid Waste Disposal Final EIS. DOE's figure is significantly flawed as it is based on models that do not independently calculate the cancer risks for children who will be exposed along those routes. This flaw is significant because children are three to ten times more susceptible to getting cancer from exposure to radiation than adults. *See,* Radiation and Children: The Ignored Victims. Nuclear Information and Resource Service, 2004. *See also* US EPA OSWER analyses, directives, and guidance; and, NAS BEIR VII Report; [March 3, 2003. http://epa.gov/ncea/raf/cancer2003.html "Draft Final Guidelines for Carcinogen Risk Assessment"]. Because of the increased susceptibility of children, it is unbelievable that DOE would transport radioactive materials right through Idaho and Washington neighborhoods containing schools and children's hospitals. Additionally, these models are flawed because of DOE's refusal to apply the most recent dose-risk calculations from the National Academy of Science (BEIR VII), which if applied, would likely increase the risk from given doses several times. **455-6**

Before endeavoring to host the nation's nuclear waste DOE should, at a minimum, fully comply with its legal obligations to clean up the existing contamination at Hanford. In order to do this, DOE should limit wastes in Hanford landfills to those amounts and types that won't result in leakage in the future and exceed the cancer risk and drinking water standards – including those from state law. DOE should dig up contaminated soil in unlined disposal ditches, and dispose of them in off-site landfills and/or permanent geologic repositories which are not directly adjacent to major interstate waterways or above critical drinking water supplies, as well as continuing the moratorium on importing additional off-site waste to Hanford. **455-7** **455-8**

To ensure an adequate source of drinking water for our progeny, to safeguard the long-term economic vitality of our State's commercial fishing and recreation industries, to avoid the unnecessary risks of transporting hazardous nuclear waste on the public's roads, to reduce the unnecessary cancer risks, and because of the increased threat to fish and wildlife along the Columbia River, DOE must focus exclusively on cleaning up existing pollution at Hanford and should reject all attempts to transfer additional waste to Hanford. **455-9**

transportation of radioactive waste would not pose disproportionately high and adverse impacts on minority and low-income populations.

455-5 This *TC & WM EIS* contains an analysis of transportation routes of specific origination/destination sites to and from Hanford, as shown in Appendix H, Figure H–4, Waste Management Alternatives – Analyzed Truck and Rail Routes. The actual routes used could vary due to changes in route characteristics and highway construction, but the risk results are expected to remain essentially the same. As described in Section H.4.1, DOE used TRAGIS [Transportation Routing Analysis Geographic Information System], a routing computer program, to generate the routes analyzed in this EIS. TRAGIS identifies highway routes that are in accordance with DOT regulations, which require the use of preferred routes (interstate highway, beltway or bypass, or state- or tribal-designated alternative), and precludes roads that are prohibited from transporting radioactive and hazardous materials.

The transportation of radioactive materials and waste, both coming to and leaving Hanford, must comply with DOT and NRC regulations that promote the protection of human health and the environment. This includes requiring the use of certified packaging that minimizes the radiation dose rate outside the transportation package. The applicable regulations for the certified packages are summarized in Section H.3.1.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

455-6 On February 2, 2006, DOE published an NOI (71 FR 5655) related to the revised scope of this EIS. Specifically related to offsite waste, a number of key points were addressed in the notice, including DOE's proposal to simplify the alternatives, update the volumes to be disposed of, and update the waste information. DOE also stated its intention to update the transportation analysis of offsite waste shipments to Hanford for disposal based on new information. More specifically, the *Draft* and *Final TC & WM EIS* analyses are based on (1) updated inventories of wastes to be shipped from specific points of origin; (2) an updated, standalone, *TC & WM EIS* analysis of transportation that draws independent conclusions that are not based on the *HSW EIS* (DOE 2004a); (3) current

Commentor No. 455 (cont'd): Michael J. Chappell, Gonzaga Environmental Law Clinic

3. Implement the "Clean Closure" option, clean up the millions of gallons of nuclear waste that have already leaked, and remediate soil and groundwater contamination before it reaches the Columbia River.

DOE's preferred alternative for cleaning up the millions of gallons of existing nuclear waste that are currently migrating toward the Columbia River is no cleanup at all; it's a cover up. DOE's plan to leave the bulk of the contamination from tank leaks, as well as the tanks themselves, and bury it under dirt caps ("landfill closure") reflects the recently defunct view that tank leaks do not pose a significant risk. Again, in the interests of saving money, DOE is willing to jeopardize the health and wellbeing of Washington's citizenry well into the foreseeable future.

WAC 173-303-675 requires, prior to landfill closure, all reasonable efforts must be undertaken to effect removal or decontamination of contaminated components, subsoils, structures, and equipment. Additionally, DOE must disclose and discuss meeting the State's cancer risk based cleanup standards under RCW 70.105D, as well as mitigation measures to meet the standards of compliance with the Washington State Environmental Policy Act ("SEPA") at RCW 43.21 C. DOE's proposed plan is devoid of any plans to mitigate soil and groundwater contamination at Hanford. If DOE's plan is left unchanged, plumes of hazardous contamination will continue to move toward the Columbia River and will result in a long-lived radioactive legacy. In order to avoid leaving such a legacy for future generations, DOE should remove the tanks (via the "clean closure" alternative) and investigate, excavate and mitigate the soil and groundwater contamination caused by tank leaks to the maximum extent technologically achievable. **455-10**

4. Decommissioning

While DOE claims that the impacts of releases are not significant for either of the decommissioning alternatives, as hereinbefore indicated, the risks associated with trucking radioactive waste back and forth to the Idaho Nuclear Laboratory are significant and unacceptable because there is no approved shipping cask for the highly radioactive components to be trucked in. For the reasons stated above, we strongly urge DOE to not put any more radioactive waste on the road unnecessarily. DOE should treat the exiting waste at Hanford on-site. **455-11**

We recognize that DOE has extended the comment period until May 3rd, 2010. However, we felt compelled to submit comments now because of our vehement opposition to shipping additional radioactive waste from around the nation through Washington communities. In recognition of the fact that the Draft EIS may be modified before the close of the extended comment period, we may submit an addendum to these comments before May 3rd.

Sincerely,

guidance and data bounding impacts on children; and (4) a No Action Alternative that does not include offsite waste shipments to Hanford (i.e., a No Action Alternative that assumes the status quo, including the offsite waste moratorium).

In the *Draft* and this *Final TC & WM EISs*, Appendix D, Section D.3.6, describes the methodology for selecting the sites and the waste inventory and associated uncertainties. Using updated information, Appendix H of the *Draft* and this *Final TC & WM EISs* contains an analysis of the potential impacts that would be associated with transporting radioactive waste to and from Hanford that is independent from the analysis performed for the *HSW EIS*. The transportation analysis in this *TC & WM EIS* is a standalone analysis with its own results for the radiation risks, as described in Appendix H. The *Draft* and this *Final TC & WM EISs* also contain an analysis of the transportation routes from specific origination sites to specific destinations that would most likely be used, as shown in Appendix H, Figures H–2 through H–4.

There is no existing guidance that recommends dose coefficients for children's exposure to external radiation. DOE acknowledges that children have an elevated sensitivity to radiation exposure. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) is used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult, but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance that provides this information has yet to be developed.

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths for the sex and age distribution of the U.S population in terms of the number of excess deaths per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing LCFs (DOE 2003a). The National Research Council report also shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose assuming a sex and age distribution (including infants, children, teens, and adults) similar to that of the entire U.S. population. The

Commentor No. 455 (cont'd): Michael J. Chappell, Gonzaga Environmental Law Clinic

Michael J. Chappell
Gonzaga Environmental Law Clinic

Rick Eichstaedt, Spokane Riverkeeper
Center for Justice

Mike Petersen, Executive Director
The Lands Council

(for)
Terry Harris, Executive Director
Kootenai Environmental Alliance

BEIR VII dose-to-risk conversion factor of 610 LCFs per million people per person-rem is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the *Draft* and *Final TC & WM EIS* transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs and the dose conversion factor used for the transportation analyses reflects impacts on infants, children, teens, and adults.

455-7 It is DOE policy to implement sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources impacted by DOE operations and cost-effectively meet or exceed compliance with applicable environmental, public health, and resource protection requirements. DOE is committed to comply with cleanup obligations and regulatory requirements.

455-8 The removal of waste in unlined disposal ditches at Hanford is not within the scope of this *TC & WM EIS* and, therefore, is not analyzed in this EIS. As described in Chapter 1, Section 1.4.2, Decisions Not to Be Made, of the *Draft TC & WM EIS*, these wastes are part of the CERCLA past-practice units and their closure will be addressed at a later date consistent with the TPA process, which includes consideration of NEPA values.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

455-9 This EIS addresses the environmental impacts of retrieval, treatment, and disposal of tank waste and final closure of the SST system. It also evaluates the impacts of FFTF decommissioning, including management of waste generated by the decommissioning process. Finally, this *TC & WM EIS* evaluates the potential environmental impacts of ongoing solid-waste management operations at Hanford, as well as the proposed disposal of Hanford LLW and MLLW and a limited volume of offsite LLW and MLLW.

455-10 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities

downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

455-11 As stated in the response to comment 455-4, DOE acknowledges that no DOT-approved transport casks capable of holding the FFTF RH-SCs are currently available, as indicated in Chapter 2, Section 2.5.1.2, FFTF Decommissioning Alternatives, and no transport of these components would occur until such a cask is available. The impacts associated with transporting these RH-SCs and other radioactive waste associated with FFTF decommissioning are summarized in the Summary, Section S.5.3, and Chapter 2, Section 2.8.2, of this EIS. For analysis purposes in this *TC & WM EIS*, DOE uses a dose rate of 10 millirem per hour at 2 meters (6.6 feet) from the casks. This dose rate is the maximum value allowed for any certified cask containing radioactive materials (10 CFR 71.47 and 49 CFR 173.411). Sections S.5.3 and 2.8.2 show that the risks of transporting these materials would be very low and would be unlikely to result in an LCF under all of the alternatives, regardless of whether the RH-SCs are treated at Hanford or at INL. In practice, for the expected concentration of nuclides with high ionizing radiation (i.e., cesium-137), the external cask dose rate would most likely be less than 10 millirem per hour at 2 meters, resulting in still lower risks.

Commentor No. 456: Rick and Janet Hogue

From: Janet Hogue [janethogue@gmail.com]
Sent: Friday, April 16, 2010 10:37 PM
To: tc&wmeis@saic.com
Subject: No to Hanford as National Dumping Site

To Whom It May Concern:

Twenty years ago, when my husband and I became aware of the environmental disaster called Hanford, we were appalled. We testified regularly at EPA hearings regarding clean-up efforts. We contemplated moving from the Pacific Northwest as efforts dragged on and on and storage tanks continued leaking radioactive waste or heated beyond control, threatening explosion. It became so upsetting to both of us that we had to withdraw from activist participation in efforts to regulate the clean-up and became donors to Heart of America Northwest, trusting the organization to do the hard leg-work that we could not maintain and continue to live here. We had to step-back and push the threat of Hanford from our daily lives.

However, neither of us would be surprised to wake up one morning to learn that a catastrophic explosion there threatened our water supply here in Portland, the air we breathe and our lives. We do not swim in the Columbia River or eat salmon caught from its waters or from the sea at its mouth. We do not drink wine from grapes grown downwind nor do we eat food grown in its shadows.

Hanford is the most dangerous environmental-disaster-waiting-to-happen in the western United States. I cannot conceive of making it a national dumping ground for more nuclear waste when the waste that is there is so unstable and threatens not only the Pacific Northwest but a large portion of our country. We need to completely stabilize the leaking high level nuclear waste storage tanks and contain the plumes of nuclear waste threatening the Columbia River. The contamination is already beyond control. We cannot add more to the mess that is already there. *456-1*

Sincerely,

Rick and Janet Hogue
16600 NW Joscelyn Street
Beaverton, OR 97006

456-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 457: Jeanne Raymond

From: Jeanne Raymond [raymondj@peak.org]
Sent: Monday, April 19, 2010 6:41 PM
To: tc&wmeis@saic.com
Subject: Hanford DOE Comments

April 19, 2010

To: Mary Beth Burandt
DOE TC&WM EIS Comments
Office of River Protection
PO Box 1178
Richland, WA 99685

I am in agreement with the State of Oregon, The City of Portland, The Alliance for Democracy, and Oregon Physicians for Social Responsibility in their opposition to using Hanford as a national radioactive waste dump site and to transporting nuclear waste on our highways through our communities.

As one who was an original participant of those who "joined hands across the river" with citizens of Washington State, to ask for the clean up of the Hanford Reservation, because of the danger to all of those living down wind and down stream, I again state that we must have a cleanup of all of the nuclear waste material, and the soil, and must prevent any more leakage into the Columbia river. We must not allow anymore radioactive hazardous waste to the site. *457-1*

I strongly disagree with allowing:

"The EIS's preferred alternatives which would result in continued and growing levels of radioactive waste leaking into the Columbia River. Receipt of off-site waste is projected to have significant adverse long-term impacts on the groundwater as well."

This additional waste (almost 3 million cubic feet which equals about 17,000 truckloads) shipped for storage at Hanford would be transported on our highways. Much of the waste is generated in California and reasonable expectation would see that transported up the I-5 corridor though major population areas. Per the US DOE's own study, over 800 cancer related deaths will result from the transport. Their study evaluates only adult males, but women and children are more susceptible (children 3 to 10 times more); therefore the real figure will be much higher. *457-2*

We must not allow hazardous nuclear wastes to travel through the I 5 corridor or any other Oregon/Washington transportation corridors, endangering our citizens and our environment.

457-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

457-2 On average, up to 2 trucks per day for 20 years would be involved in transporting about 14,200 truck shipments of LLW and MLLW to Hanford under the Waste Management alternatives, as presented in both the *Draft* and this *Final TC & WM EIS*, Chapter 4, Section 4.3.12, Public and Occupational Health and Safety—Transportation, and Table 4–151, Waste Management Alternatives – Estimated Number of Shipments. None of these shipments would originate from California. Transportation of radioactive waste shipments from DOE sites located in California was not analyzed in this *TC & WM EIS*; therefore, these shipments would not occur without additional NEPA analyses. As shown in Appendix H, Figure H–4, solid radioactive waste transports would originate from DOE sites to the east and southeast of Hanford; for this reason, Interstate 5 would not be used for transports analyzed in this EIS.

The value of 816 LCFs is from the results provided in the *GNEP PEIS* (DOE 2008b). This value represents the maximum impacts associated with 50 years of transportation activities supporting the operations of all existing U.S. commercial light-water reactors if they all were replaced with high-temperature, gas-cooled reactors. The *GNEP PEIS* was canceled by DOE on June 29, 2009 (74 FR 31017). As shown in the Summary of this EIS, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

There is no existing guidance that recommends dose coefficients for children's exposure to external radiation. DOE acknowledges that children have an elevated sensitivity to radiation exposure. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation)

Commentor No. 457 (cont'd): Jeanne Raymond

People of Oregon and Washington have already suffered ill health from this hazardous waste site. The cleanup was not initiated so that more hazardous waste would be shipped to Hanford, but so that the site would be cleaned up, and NO MORE WASTE would contaminate that soil, the ground water, or the Columbia River. *457-1 cont'd*

Oregonians cherish our environment; we cannot tolerate more radioactive wastes traveling through our state, endangering the health of our people and our environment.

Please follow the promise made to our citizens, to clean it up and shut it down.

Sincerely,

Jeanne Raymond
Corvallis, OR 97330

is used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult, but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance that provides this information has yet to be developed.

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths for the sex and age distribution of the U.S. population in terms of the number of excess deaths per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing LCFs (DOE 2003a). The National Research Council report also shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose, compared with about 42 out of 100 individuals who are expected to develop solid cancer or leukemia from other causes, assuming a sex and age distribution similar to that of the entire U.S. population. The BEIR VII dose-to-risk conversion factor is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the *Draft* and *Final TC & WM EIS* transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs.

Commentor No. 458: Robin Bloomgarden

From: Robin Bloomgarden [r.bloomgarden@gmail.com]
Sent: Monday, April 19, 2010 10:08 PM
To: tc&wmeis@saic.com
Subject: Hanford EIS

Mary Beth Burandt
DOE Draft TC&WM EIS Comments
Office of River Protection
PO Box 1178
Richland, WA 99685
April 17, 2010

Ms. Mary Beth Burandt,

Despite the very slow progress, and the billions of dollars already spent on cleanup, Hanford won't be clean for thousands of years, if ever, at this rate. I strongly protest the USDOE's continued stalling techniques in this regard!

You also have never considered my preferred alternative option, that of NOT bringing any more waste to Hanford. This, after saying in EIS that all options will be examined.

My other preferred alternatives are to Clean all the tanks to 99.9%, not 99%; Removal of the tanks, and cleaning the soil afterwards; and to finish Cleaning up the site BEFORE bringing any more waste onto the Reservation. *458-1*

I sincerely hope that YOU, nor any of your immediate family, ever are negatively affected by all this toxic waste, as I hope that none of us is. The only way to prevent this is to finish cleaning up the mess! Then, and only then, can we even begin to think about safely bringing any more nuclear waste to the site.

Sincerely,

Robin Bloomgarden
Portland, OR 97208
xxx-xxx-xxxx

458-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East. As described in the Summary and Chapter 2, the radiological risks increase by an approximate factor of seven. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford.

The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 459: Barbara Glancy

From: barbg07@peoplepc.com
Sent: Tuesday, April 20, 2010 12:52 AM
To: tc&wmeis@saic.com
Subject: Re: Hanford Nuclear to be national dumpsite - Action needed

Dear M.B. Burandt,

My Portland daughter got breast cancer probably as a result of living near the Columbia R. downstream from Hanford. It's high time that the site be cleaned up & cleaned up properly.

I agree with the Alliance for Democracy & Portland's Mayor Adams. I'd like the leaking tanks be cleaned including the sludge on the bottom. The tanks should then be removed & ground water cleaned before it seeps into the Columbia. No more nuclear waste should be shipped to Hanford until this is done. *459-1*

In fact, other sites in various parts of the country for nuclear waste should be selected. Regional sites would reduce much of the shipping of this dangerous material cross country.

Oregon & Washington have been tainted by this former nuclear plant & the inadequate storage of this dreadful material there. We have been subjected to it for too long already.

Barbara Glancy

459-1 DOE recognizes that groundwater from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies recently completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 460: Lise and Michael Brown

From: lise brown [sblise@yahoo.com]
Sent: Tuesday, April 20, 2010 1:13 PM
To: tc&wmeis@saic.com
Subject: Hanford Nuclear Dumpsite? No!

Dear Ms. Burandt:

The USDOE is currently seeking comment on the EIS which evaluates the environmental impacts of various alternatives for cleanup of Hanford's most toxic wastes, as well as using Hanford as a national radioactive waste dump. Of the alternatives evaluated, USDOE's preferred alternative is to use Hanford as a national radioactive waste dump for nuclear weapons programs, although this may not happen until after 2022.

The EIS's preferred alternatives would result in continued and growing levels of radioactive waste leaking into the Columbia River. Receipt of off-site waste is projected to have significant adverse long-term impacts on the groundwater as well.

This additional waste (almost 3 million cubic feet which equals about 17,000 truckloads) shipped for storage at Hanford would be transported on our highways. Much of the waste is generated in California and reasonable expectation would see that transported up the I-5 corridor though major population areas. Per the US DOE's own study, over 800 cancer related deaths will result from the transport. Their study evaluates only adult males, but women and children are more susceptible (children 3 to 10 times more); therefore the real figure will be much higher. ***460-1***

Other US DOE stated preferred alternatives include

1. removing only 99% of the tank waste which is currently in the on-site storage tanks, some of which are currently leaking. That leakage is spreading now into the Columbia River. While 99% sounds like a significant amount, in fact the 1% to be left is much more highly contaminated than the portion to be removed. ***460-2***

OUR PREFERRED ALTERNATIVE IS TO CLEAN THE TANKS TO 99.9%.

2. not cleaning the leaked contamination which is in the ground now. That contamination has been spreading through the underground water and is now leaking into the Columbia River. The US DOE's EIS acknowledges that, If left in the ground, it will continue leaking for centuries and flowing into the Columbia River. Yet their preferred alternative would leave the tanks in the ground. ***460-3***

460-1 On average, up to 2 trucks per day for 20 years would be involved in transporting about 14,200 truck shipments of LLW and MLLW to Hanford under the Waste Management alternatives, as presented in this *Final TC & WM EIS*, Chapter 4, Section 4.3.12, Public and Occupational Health and Safety—Transportation, and Table 4–151, Waste Management Alternatives – Estimated Number of Shipments. None of these shipments would originate from California. Transportation of radioactive waste shipments from DOE sites located in California was not analyzed in this *TC & WM EIS*; therefore, these shipments would not occur without additional NEPA analyses. As shown in Appendix H, Figure H–4, solid radioactive waste transports would originate from DOE sites to the east and southeast of Hanford; for this reason, Interstate 5 would not be used for transports analyzed in this EIS.

The value of 816 LCFs is from the results provided in the *GNEP PEIS* (DOE 2008b). This value represents the maximum impacts associated with 50 years of transportation activities supporting the operations of all existing U.S. commercial light-water reactors if they all were replaced with high-temperature, gas-cooled reactors. The *GNEP PEIS* was canceled by DOE on June 29, 2009 (74 FR 31017). As shown in the Summary of this EIS, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

There is no existing guidance that recommends dose coefficients for children's exposure to external radiation. DOE acknowledges that children have an elevated sensitivity to radiation exposure. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) is used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult, but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance that provides this information has yet to be developed.

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths

Commentor No. 460 (cont'd): Lise and Michael Brown

OUR PREFERRED ALTERNATIVE IS TO REMOVE THE TANKS AND CLEAN THE SOIL. *460-3 cont'd*

3. using Hanford as a national nuclear waste dump site. As noted above, they assume this throughout the 6,000 page EIS. The law which requires EIS states that all of the alternatives have to be evaluated; yet the alternative of not bringing more nuclear waste to Hanford was not considered. *460-4*

OUR PREFERRED ALTERNATIVE IS THAT HANFORD BE CLEANING UP FIRST BEFORE MORE NUCLEAR WASTE IS TRANSFERRED THERE

To make the situation at Hanford worse, President Obama has announced that, in his efforts to control nuclear proliferation, the United States will receive the world's nuclear waste. Hanford could be a likely destination for that international waste. *460-5*

*The Northwest should **not** be the dumping ground for the nuclear waste of California and the world. Please act to protect my family in Portland, Oregon and all families in the Northwest.* *460-4 cont'd*

Sincerely,

Lise and Michael Brown

for the sex and age distribution of the U.S. population in terms of the number of excess deaths per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing LCFs (DOE 2003a). The National Research Council report also shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose, compared with about 42 out of 100 individuals who are expected to develop solid cancer or leukemia from other causes, assuming a sex and age distribution similar to that of the entire U.S. population. The BEIR VII dose-to-risk conversion factor is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the *Draft* and *Final TC & WM EIS* transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs.

460-2 With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed on only a small number of SSTs and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks and residual waste, requires preparation of a performance assessment and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

460-3 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations.

The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

460-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5, and Chapter 2, Section 2.10, Key Environmental Findings. These sections describe the radiological risk differences between including and not including offsite waste disposal at IDF-East. As described in the Summary and Chapter 2, the radiological risks increase by an approximate factor of seven. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford.

460-5 Regarding the United States receiving nuclear materials from overseas, this subject is beyond the scope of this *TC & WM EIS*. The purpose of this EIS is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites.

Commentor No. 461: Sharon Fasnacht

From: Fasnacht [fasnacht@comcast.net]
Sent: Wednesday, April 21, 2010 12:36 PM
To: tc&wmeis@saic.com
Subject: HANFORD

I AM OPPOSED TO DESIGNATING HANFORD A NATIONAL NUCLEAR WASTE DEPOSIT (DUMP).

It requires shipping the waste which creates a hazard for everyone enroute.

It is being shipped to a site which has been unable to completely clean up it's own mess, so should not be asked to take on more. *461-1*

It is a known fact that we have nuclear waste leakage into the Columbia River, which flows into the Pacific. Get the picture? DUH!

It avoids requiring those that created the waste, or will continue creating more waste, from confronting the disposal - AND SEEKING A REAL SOLUTION!

THE TECHNOLOGY TO DISPOSE OF THE WASTE IS SIMPLY NOT THERE, INCLUDING VITRIFICATION WHICH HASN'T BEEN AS SUCCESSFUL AS HOPED. *461-2*

OUR MILITARY SHOULD NO LONGER BE CREATING NUCLEAR WASTE THEY CAN'T DISPOSE OF. IT'S STUPID.

PRIVATE ENTERPRISE AND LOCAL GOVERNMENT SHOULD NOT BE GIVEN LICENSE TO BUILD NEW NUCLEAR POWERED PLANTS. (I BELIEVE 19 NEW SITES WERE GIVEN THE GO AHEAD LATE IN THE BUSH/CHENEY ADMINISTRATION). *461-3*

That's my two cents, which I hope is worth, well, two cents.

Sharon Fasnacht
4006 113th Avenue SW
Olympia, WA 98512
(xxx) xxx xxxx

461-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Radioactive waste is transported in DOT-certified containers that meet strenuous technical standards established by NRC.

461-2 DOE is working diligently to bring the WTP online to treat the tank waste at the site as soon as possible. Chapter 1, Section 1.2.3, provides a brief history and background on DOE's efforts to reduce costs and speed up Hanford cleanup efforts. As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

As noted in the Summary, Section S.3.1.4, and Chapter 2, Section 2.2.2.2, the WTP is currently being constructed in the 200-East Area of Hanford. Site work associated with the project began in late 2001 and construction is more than 62 percent complete. Details regarding the WTP are provided in Appendix E, including its design and processes, waste-form performance, waste forms/disposal packages, and assumptions and uncertainties.

461-3 Nuclear energy and military weapons production and the management of their resulting wastes are not within the scope of this *TC & WM EIS*. Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 462: Elinor Gollay

From: Egollay@aol.com
Sent: Wednesday, April 21, 2010 5:06 PM
To: tc&wmeis@saic.com
Subject: Hanford Cleanup

To: Department of Energy

It is imperative that there be a TOTAL clean up of Hanford. This means no exclusions: the existing mess should be completely cleaned up in order to prevent further degradation of the environment not only in the immediate vicinity, but downstream along the Colombia River.

In addition, the very idea of ADDING MORE waste is outrageous, dangerous and clearly rooted in a poor understanding of the current circumstances. Why would the government want to ADD to what is already the most polluted spot in the country? Perhaps if it were in a completely unpopulated area with no threats of earthquakes, no possibility of leaching into drinking water, etc...perhaps then it MIGHT be plausible. But to take a situation that is already dire and make it worse is WRONG. *462-1*

I am a relatively new resident in Portland and I must admit to being appalled that I have moved so close to such a toxic area.

Without assurances to the contrary, it seems to me that wine from the immediate area around Hanford is best avoided since there would appear to be a high likelihood that the grapes were grown in heavily polluted soil and the water used could also easily be polluted.

If you combine the potential adverse impact on people's health, the adverse impact on the environment, and the potential adverse impact on local businesses that will be producing wine and other food in a polluted environment, the potential for harm seems very high to me. *462-2*

Why aren't we going the other direction and truly cleaning it up instead of making it worse?

Thank you,

Elinor Gollay
Portland, OR

462-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

462-2 Chapter 3, Section 3.2.10, of this *TC & WM EIS* summarizes data from the annual Hanford Site environmental report (Poston, Duncan, and Dirkes 2011) regarding doses from Hanford operations. These data indicate that, in 2010, the dose to a hypothetical MEI from airborne emissions and use of Columbia River water was 0.18 millirem. The EPA standard for protection of the MEI from the airborne emissions from DOE facilities is 10 millirem per year (40 CFR 61, Subpart H). Potential radiological impacts on the public from proposed activities at Hanford are presented in Chapter 4, Section 4.1.10, for Tank Closure alternatives; Section 4.2.10 for FFTF Decommissioning alternatives; and Section 4.3.10 for Waste Management alternatives. The potential impacts of combinations of alternatives are presented in Chapter 4, Section 4.4.9, which shows that the potential radiological impacts on an MEI residing near Hanford during the operational phase of the proposed actions would be about 10 millirem in the year of maximum impact.

Commentor No. 463: Kathy Radford

From: Kathy Radford [klradford@comcast.net]
Sent: Wednesday, April 21, 2010 5:57 PM
To: tc&wmeis@saic.com
Subject: Hanford draft Tank Closure & Waste Management Environmental Impact Statement

With regard to the subject impact statement:

- I oppose using Hanford as a national radioactive waste dump;
- I vote for the complete cleanup ("clean closure") of the High-Level Nuclear Waste Tanks; *463-1*
- I want the Department of Energy to cleanup the contamination from High-Level Nuclear Waste tank leaks & deliberate discharges

Kathy Radford
29790 Marine View Dr SW
Federal Way, WA 98023-3436
xxx-xxx-xxxx

463-1 The Preferred Alternative for waste management in this *TC & WM EIS* also includes limitations on, and exemptions for, offsite waste importation at Hanford, at least until the WTP is operational. The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

Commentor No. 464: Pat Dickason

From: Pat Dickason [p.dickason@comcast.net]
Sent: Wednesday, April 21, 2010 9:37 PM
To: tc&wmeis@saic.com
Subject: Hanford Cleanup Plan Comment

I have serious concerns about the proposed Hanford clean-up plan, and would like to see the following changes made:

1. Get the vitrification plant up and running, and in the meantime accept NO waste until it is fully functioning.
2. Move the target date up to 2030 for complete cleanup.
3. Remove 99.9% of tank wastes from the underground tanks.

I grew up in Pasco, and have been impacted by the exposure I received during my youth---it is NOT right to continue to delay getting this clean-up done. I urge your prompt attention to doing a complete, good-faith clean-up. Too many people have been harmed in the past, and we have no right to continue to create future harm both to people and the environment. *464-1*

Pat

Pat Dickason
xxx.xxx.xxxx
803 Cooper Pt. Loop SW, Unit D
Olympia, WA 98502
p.dickason@comcast.net

464-1 The Preferred Alternative for waste management in this *TC & WM EIS* included limitations on, and exemptions for, offsite waste importation at Hanford, at least until the WTP is operational.

The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

Commentor No. 465: Kevin O'Keefe

From: Kevin O'Keefe [k.kevinokeefe@verizon.net]
Sent: Thursday, April 22, 2010 10:28 AM
To: tc&wmeis@saic.com
Subject: Hanford - the insanity keeps coming!?

Folks –

The news that Hanford will become a repository for *more* waste saddens me deeply. As a New Jerseyan, living in the shadow of the country's oldest nuclear facility, I know that dollars, business and politics are more important to bureaucrats than people – a fact supported by the Hanfords and Oyster Creeks of America.

Stabilize the waste and shut down Hanford - an aged, broken & poisoned facility – enough is enough. It's already the most toxic site in America – does that mean *anything*? If Yucca Mtn. is not an option, at least vitrify the waste and render the 177 tanks inert. You can't possibly think that leaving 53 million gallons of waste in the ground is okay? If you don't help, who will? *465-1*

Kevin O'Keefe

465-1 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

Commentor No. 466: Jim Kight, Mayor, City of Troutdale, Oregon

From: Debbie Stickney [DSTICKNEY@ci.troutdale.or.us]
Sent: Friday, April 23, 2010 6:36 PM
To: tc&wmeis@saic.com
Subject: Comments on DOE Draft TC&SM EIC
Attachments: Nuclear Waste to Hanford - Opposition.pdf

Mary Beth Burandt,

Attached is a letter from Mayor Jim Kight expressing his opposition to the US DOE's proposal to send nuclear waste to the Hanford Nuclear Reservation near Richland, Washington.

Thank you,

Debbie Stickney, City Recorder
City of Troutdale
104 SE Kibling Avenue
Troutdale, OR 97060
xxx-xxx-xxxx

Response side of this page intentionally left blank.

Commentor No. 466 (cont'd): Jim Kight, Mayor, City of Troutdale, Oregon

CITY OF TROUTDALE

"Gateway to the Columbia River Gorge"

Mayor
Jim Kight

City Council
David Hermann
Matthew Ward
Norm Thomas
Glenn White
Barbara Kyle
Doug Daoust

City Attorney
David J. Ross

April 23, 2010

USDOE
Attn: Mary Beth Burandt

RE: DOE Draft TC&SM EIC Comments

I want to express my strong opposition to the U.S. Department of Energy's proposal to send tens of thousands of truckloads of new nuclear waste to the Hanford Nuclear Reservation near Richland, Washington, and the designation of Hanford as the National Waste dump for radioactive and "mixed" radioactive hazardous wastes.

As I understand it the nuclear waste would be trucked from California or over Idaho into Oregon using major routes including I-84 which passes through Troutdale. Assuming no accidents, the USDOE has estimated 816 cancer deaths to residents along the route, and to people in traffic near the trucks, from a similar proposal last year. That estimate is based on radiation doses for an adult male. The actual number of cancer deaths could be much higher. Truck accidents or acts of terror along the highway could lead to hundreds of square miles requiring long-term evacuation and thousands of deaths. *466-1*

Hanford is the most contaminated site of any kind in the western hemisphere. It is also clear that Hanford's radioactive materials flow into the Columbia River at an ever-increasing rate. Hanford's river location makes it a poor choice as a national waste site.

I urge you to seriously reconsider your proposal of transporting nuclear waste through Troutdale and one of the Oregon's most highly protected scenic areas, The Columbia River Gorge.

Sincerely,

Jim Kight
Mayor of Troutdale

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466-1 On average, up to 2 trucks per day for 20 years would be involved in transporting about 14,200 truck shipments of LLW and MLLW to Hanford under the Waste Management alternatives, as presented in this *Final TC & WM EIS*, Chapter 4, Section 4.3.12, Public and Occupational Health and Safety—Transportation, and Table 4–151, Waste Management Alternatives – Estimated Number of Shipments. None of these shipments would originate from California. Transportation of radioactive waste shipments from DOE sites located in California was not analyzed in this *TC & WM EIS*; therefore, these shipments would not occur without additional NEPA analyses. As shown in Appendix H, Figure H–4, solid radioactive waste transports would originate from DOE sites to the east and southeast of Hanford; for this reason, Interstate 5 would not be used for transports analyzed in this EIS.

The value of 816 LCFs is from the results provided in the *GNEP PEIS* (DOE 2008b). This value represents the maximum impacts associated with 50 years of transportation activities supporting the operations of all existing U.S. commercial light-water reactors if they all were replaced with high-temperature, gas-cooled reactors. The *GNEP PEIS* was canceled by DOE on June 29, 2009 (74 FR 31017). As shown in the Summary of this EIS, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

There is no existing guidance that recommends dose coefficients for children's exposure to external radiation. DOE acknowledges that children have an elevated sensitivity to radiation exposure. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) is used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult, but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance that provides this information has yet to be developed.

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths

Commentor No. 466 (cont'd): Jim Kight, Mayor, City of Troutdale, Oregon

for the sex and age distribution of the U.S. population in terms of the number of excess deaths per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing LCFs (DOE 2003a). The National Research Council report also shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose, compared with about 42 out of 100 individuals who are expected to develop solid cancer or leukemia from other causes, assuming a sex and age distribution similar to that of the entire U.S. population. The BEIR VII dose-to-risk conversion factor is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the *Draft* and *Final TC & WM EIS* transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs.

The *Draft TC & WM EIS* analyzes the transportation of RH-LLW from INL to Hanford for disposal. Based on the public's input and concerns about offsite waste disposal at Hanford, DOE has included in this *Final TC & WM EIS* an example of a potential mitigation measure that could be taken by DOE. Specifically, an offsite waste stream containing a significant inventory of iodine-129 (i.e., RH-LLW resins from INL) was eliminated from the analysis. This mitigation measure has been incorporated into the Waste Management alternatives. In addition, a sensitivity analysis is included that shows the impacts of limiting offsite waste streams containing iodine-129 and technetium-99. The results of this sensitivity analysis illustrate the difference this would make in potential groundwater impacts and are included in Appendix M. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this EIS.

DOE considers the threat of terrorist attack to be credible and makes all efforts to reduce any vulnerability to this threat. DOE considers, evaluates, and plans for potential terrorist attacks that could occur during transportation and storage of radioactive materials. The details of DOE's plans for terrorist countermeasures and the security of its facilities and transports are classified. DOE addresses acts of sabotage or terrorism related to the transport of radioactive materials and waste in this *TC & WM EIS*, Appendix H, Section H.6.6. DOE considers the analyses of sabotage events described in the *Yucca Mountain EIS* (DOE 2002) and its SEIS (DOE 2008a) to be enveloping analyses for this *TC & WM EIS*. The consequences of such acts were calculated to result in a dose to the MEI

Commentor No. 466 (cont'd): Jim Kight, Mayor, City of Troutdale, Oregon

of 40 to 110 rem (at 140 meters [460 feet]) for events involving a truck- or rail-sized cask, respectively. These events would lead to an increase in risk of fatal latent cancer to an MEI of about 2 to 7 percent, or from 2 in 100 to 7 in 100 (DOE 2002).

Commentor No. 467: Bill Bosch

From: Gina King [boschers@q.com]
Sent: Sunday, April 25, 2010 12:01 AM
To: tc&wmeis@saic.com
Subject: Hanford Tank closure and waste management EIS - comments

As a lifelong resident of Washington State, I provide the following comments on the "Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (DOE/EIS-0391)" on behalf of myself, my wife Gina M. King, and my 12-year-old daughter, Ellie. As a parent and a professional who has worked on Columbia River salmon restoration issues for the past 20 years on behalf of the Yakama Nation, I implore the United States to choose an alternative that best protects the futures of our children, grandchildren, and the "seventh generation". The United States should also be concerned with protecting the billions of dollars it has invested, along with those of us in the region, in Columbia River salmon and habitat restoration. The waters of the Columbia River MUST be protected from ANY further leakage of contaminated nuclear waste materials stored at Hanford. Any alternative that results in dumping more radioactive wastes at Hanford, and endangers public health and the environment is NOT acceptable. *467-1*

I have only had time to briefly review a summary of the EIS and the forward by the Washington State Dept. of Ecology. Proper disposal of contaminated wastes and cleanup of the Hanford site are critical as the Columbia River is the lifeblood to so many who live in the Pacific Northwest. If the United States can not demonstrate the ability to clean up the Hanford site so that ground and surface waters are protected in perpetuity, how can it possibly consider any future for nuclear energy anywhere in the U.S.?

Specifically, I agree with the WA Dept. of Ecology on the following points in the forward:

- I support only alternatives that involve the retrieval of 99 percent or more of the waste from each of the 149 single-shell tanks (SSTs). *467-2*
- The Nuclear Waste Policy Act requires permanent isolation of these (HLW and SNF) most difficult waste streams. Leaving these wastes stored at Hanford indefinitely is not a legal option, nor an acceptable option to the State of Washington. *467-3*

467-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

467-2 The removal of 99 percent or more of the tank waste is also DOE's preference, as discussed in Chapter 2, Section 2.12, of this *TC & WM EIS*. This level of waste removal would be achieved under all Tank Closure alternatives, with the exception of Alternative 1 (No Action) and Alternative 5. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

467-3 The draft EIS assumed that the IHLW canisters would not be shipped immediately after generation. Storage capacity for the IHLW canisters was analyzed under the short-term impacts analysis for onsite IHLW interim storage. Regarding the commentor's concern about the disposition of HLW, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 467 (cont'd): Bill Bosch

- Ecology is concerned about the glass standards and canister requirements for the IHLW. These standards were developed based on what was acceptable to Yucca Mountain. Now that Yucca Mountain is no longer the assumed disposal location, Ecology is concerned about what standards for glass and canisters will be utilized by the WTP. Ecology insists that DOE implement the most conservative approach in these two areas to guarantee that the glass and canister configurations adopted at the WTP will be acceptable at the future deep geologic repository. *467-4*
- Ecology does not agree with alternatives that do not require pretreatment of the tank waste. Such alternatives do not meet the intent of the Nuclear Waste Policy Act to remove as many of the fission products and radionuclides as possible to concentrate them in the HLW stream. For this reason, Ecology requests that DOE rule out any alternative that does not pretreat tank waste. *467-5*
- Ecology has legal and technical concerns with any tank waste being classified as mixed TRU waste at this time. DOE must provide peer-reviewed data and a strong, defensible, technically and legally detailed justification for the designation of any tank waste as mixed TRU waste, rather than as HLW. DOE must also complete the WIPP certification process and assure Ecology that there is a viable disposal pathway (i.e., permit approval from the State of New Mexico) before Ecology will modify the Hanford Sitewide Permit to allow tank waste to be treated as mixed TRU waste. *467-6*

Bill Bosch
116 N. 45th Avenue
Yakima, WA 98908

cc: Senator Patty Murray
Senator Maria Cantwell
Congressman Richard 'Doc' Hastings
Governor Christine Gregoire
Secretary of Energy Steven Chu

467-4 See response to comment 467-3 for a discussion of Yucca Mountain and the Blue Ribbon Commission. DOE will continue to monitor the commission's advice and recommendations and take the necessary actions to ensure that the WTP produces a waste form that is safe and meets the selected disposal site's disposal standards. Also, the impacts of storing all the IHLW canisters are analyzed under each Tank Closure alternative in this *Final TC & WM EIS*, pending a decision on their ultimate disposition.

467-5 As stated in Appendix E, Section E.1.2.3.5.2, of this final EIS, "Each of the *TC & WM EIS* alternatives that includes use of supplemental treatment technologies in the 200-East Area of Hanford would include use of the pretreatment capability provided by the WTP" (i.e., this supplemental treatment would be additional to pretreatment of the waste streams in the WTP). "In contrast, waste feeds for supplemental treatment technologies used in the 200-West Area would not undergo WTP pretreatment, but would instead be subject to solid-liquid separations activities. These activities would primarily entail the application of a solid liquid separations process that would be conducted in a new 200-West Area Solid-Liquid Separations Facility using waste feed from 35 SSTs that have tentatively been identified to contain cesium-137 concentrations of less than 0.05 curies per liter (0.19 curies per gallon) (see Table E–8). Waste contained in many of the 35 tanks was received from processing facilities that removed radionuclides, such as cesium, strontium, and transuranics. The extent of separations activities would depend on the waste feed being processed and the immobilization operation being used."

467-6 As stated in the Alternatives in Chapter 2, Section 2.12, of this *Final TC & WM EIS,* DOE prefers to consider the option to retrieve, treat, and package waste that may be properly and legally designated as mixed TRU waste from specific tanks for disposal at WIPP, as analyzed in Tank Closure Alternatives 3, 4, and 5. DOE would not, however, generate a waste stream without a clear path to disposal. Initiating retrieval of tank waste identified as mixed TRU waste would be contingent on DOE's obtaining the applicable disposal and other necessary permits, and ensuring that the WIPP Waste Acceptance Criteria and all other applicable regulatory requirements have been met. Retrieval of tank waste identified as mixed TRU waste would commence only after DOE had issued a *Federal Register* notice of its preferred alternative and a ROD.

Commentor No. 468: Caitlin Guthrie

From: Caitlin Guthrie [caitlinroseguthrie@gmail.com]

Sent: Sunday, April 25, 2010 2:32 AM
To: tc&wmeis@saic.com
Subject: Hanford draft Tank Closure & Waste Management Environmental Impact Statement

Hello,

As a child, I lived in Richland, WA for 2 years. I am currently a 24 year old AmeriCorps volunteer, and I will be attended UW next year for graduate studies. At the time when I lived in the tri-cities, I had no idea what Hanford was, and I had no idea of my potential exposure to radioactive material. It is not right to expose the people of our country (especially children who do not choose where they live!) to toxic chemical waste of this severity. It is for this reason that I strongly disagree with the preferred alternatives outlined in the EIS. Instead, there must be a complete cleanup (clean closure) of the High Level Nuclear Waste Tanks. We must do ALL that we can to clean Hanford up. For this same reason we must clean up the contamination from High-Level Nuclear Waste tank leaks and deliberate discharges. Finally, I strongly oppose using Hanford as a national radioactive waste dump! *468-1*

-Caitlin Guthrie

468-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 469: Lisa Hanson

From: Hanson, Lisa [lhanson@seattleu.edu]
Sent: Monday, April 26, 2010 2:49 PM
To: TC&WMEIS@saic.com
Subject: Hanford site

I am opposed to the use of Hanford as a national radioactive waste dump. The complete cleanup of Hanford is extremely important for the health of the people of the Northwest and the environment. Please follow through with complete clean up. Let's take care of our state, rather than further exploiting it. *469-1*

Lisa Hanson

469-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 470: Mike Moy

From: Mike Moy [theboyscout48@gmail.com]
Sent: Monday, April 26, 2010 5:47 PM
To: tc&wmeis@saic.com
Subject: Hanford comment period

It is not right to expose the people of our country to toxic chemical waste of this severity. It is for this reason that I strongly disagree with the preferred alternatives outlined in the EIS. Instead, there must be a complete cleanup (clean closure) of the High Level Nuclear Waste Tanks. We must do ALL that we can to clean Hanford up. For this same reason we must clean up the contamination from High-Level Nuclear Waste tank leaks and deliberate discharges. Finally, I strongly oppose using Hanford as a national radioactive waste dump. *470-1*

470-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 471: Joe Mitchell

From: Joe Mitchell [jjmit@comcast.net]
Sent: Monday, April 26, 2010 8:37 PM
To: tc&wmeis@saic.com
Subject: Comments

Dear Mary Beth Burandt,

Please no more waste to Hanford on our roads until the vitrification plant is fully functioning. *471-1*

PLEASE CLEAN THE CONTAINMENT TANKS TO 99.9% OR BETTER! AND,,,

We need to move the completion date up to 2030—no need to take longer!

Thanks for all that you do.

In heart,

Joe Mitchell Portland, Oregon

471-1 The Preferred Alternative for waste management in this *TC & WM EIS* included limitations on, and exemptions for, offsite waste importation at Hanford, at least until the WTP is operational.

The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 472: Warren Jones

6219 43rd Avenue NE
Seattle, WA 98115-7511
April 27, 2010

TC & WM EIS
P.O. Box 1178
Richland WA 99352

Comment on Tank Closure & Waste Management EIS:

The DOE's preferred alternative of removing 99% of tank wastes is reckless and irresponsible, considering that the residues at the bottom of the tanks contain a disproportionate amount of the radioactivity. The only acceptable solution is to remove 99.9% of the tank waste, or removal to the limits of technical capabilities. Even this higher level of cleanup still leaves troubling cancer risks. *472-1*

This is our legacy to future generations. Please don't cut corners with the clean up.

Sincerely,

Warren Jones

Warren Jones

472-1 The decision to leave 0.1 percent, 1 percent, or more of the waste in the SSTs is one of the decisions supported by this *TC & WM EIS* (see Section S.1.3.1 of the Summary and Chapter 1, Section 1.4.1). In regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, the draft EIS estimated the contents of the tank residuals because tank waste retrieval activities are ongoing. The EIS analysis shows that the level of waste retrieved is important in long-term impacts. Once the tank waste in a waste management area is retrieved, then the actual residuals would be evaluated during the closure process for that waste management area. Activities would include detailed examinations of the tanks and residual waste and preparation of a performance assessment and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

Commentor No. 473: Eldon Ball

From: Eldon Ball [eldonball@juno.com]
Sent: Wednesday, April 28, 2010 9:25 PM
To: tc&wmeis@saic.com
Subject: Remove Hanford Radioactive Waste!

Don't bring in any radioactive waste to Hanford! What is there now is leeching toward the Columbia River! A million people downstream would be affected! Find a permanent storage facility in the Great Basin, maybe Nevada. If there are any leaks, it won't get to the ocean. Discourage further radioactive waste, it's a problem for 10,000 years! Thanks. *473-1*

Sincerely,

Eldon Ball, 3200 NE 140th St., #11, Seattle, WA 98125

473-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 474: Marjorie Worthington

From: Marjorie Worthington [maworth@skynetbb.com]
Sent: Thursday, April 29, 2010 1:49 PM
To: tc&wmeis@saic.com
Subject: Clean Up the Mess NOW!

To: Mary Beth Burandt
DOE Draft TC&WM EIS Comments
Office of River Protection
Richland, WA

From: Marjorie Worthington
Enumclaw, WA

I have worked with Heart of America Northwest for many years, to get USDOE to clean up its mess [one of the basic rules of behavior set forth in Robert Fulghum's *All I Really Need To Know I Learned in Kindergarten*] before creating MORE of a mess....and time and time again, public hearing after public hearing, delay after delay, **I am at a loss to understand this agency's refusal to take responsibility for cleanup of readioactive waste on the Hanford Site!**

In addition to this outrageous position, we are now fighting the proposal to ADD MORE contamination, trucking it across our state, seriously endangering public health and the environment en route to the site, using Hanford as a National Radioactive Waste Dump, and abanding existing contamination, that is leaking toward the Columbia River watershed.

We MUST STOP this irresponsible plan in its tracks, and REQUIRE CLEANUP OF ALL THE EXISTING WASTE AT HANFORD!

Listen to the voices of the people who live in the areas thar will be devastated, , if USDOE forges ahead with its "preferred alternative".

474-1

474-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 475: Victoria Millard

From: Victoria Millard [quicktovic@yahoo.com]
Sent: Thursday, April 29, 2010 4:39 PM
To: tc&wmeis@saic.com
Subject: Hanford Waste Dumping

I strongly disagree with the Department of Energy's proposal to dump more radioactive waste at Hanford. Adequate studies have not been done regarding cancer occurrences in children who live next to such sites. In addition, only deaths of children have been documented, not those who have cancer but are hanging on. There is so much waste that has never been cleaned up, how can you even think of dumping more at this site? The vitrification plant will not get rid of all the waste, because it will be in a lesser, but still toxic, liquid form. The present state of miles of leaking barrels of toxic waste leaching into ground water is abominable. To ignore this, and talk about bringing in more is just folly and disregard for human health and life. Sincerely, Victoria Millard, Seattle, Wa.

475-1 *475-2* *475-3* *475-2 cont'd*

475-1 DOE acknowledges that the scientific data indicate that health effects from radiation exposure are more pronounced in children than adults. As discussed in Appendix K, Section K.1.1.6, of this *TC & WM EIS*, a number of authoritative studies provide guidance on risk factors relating health effects to dose. Section K.1.1.6 discusses the scientific evidence relating radiation dose to the incidence of cancers, fatal and nonfatal. The discussion indicates that the fatal cancer risk factor of 0.0006 reflects an age distribution that includes children and is generally regarded as conservative. Appendix Q, Section Q.2.4.2, explains that nuclide-specific risk coefficients, developed using techniques that account for gender and age, were used for the long-term human health impacts analysis.

475-2 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

475-3 Vitrification of radioactive waste into glass is an attractive option because it atomistically bonds the species in a solid glassy matrix instead of its current liquid form. Because radioactive constituents are bonded within the glass structure, the waste forms produced are very durable and environmentally stable over long time durations; however, they remain toxic. EPA has declared vitrification to be the best-demonstrated available technology for HLW disposal.

Commentor No. 476: Barbara Tombleson

From: Barbara Tombleson [bjt@coho.net]
Sent: Friday, April 30, 2010 2:41 AM
To: tc&wmeis@saic.com
Subject: Opposition to Hanford as a radioactive waste dump

Re: The US Dept. of Energy's Environmental Impact Statement, The Tank closure and Waste Management Plan at Hanford, Washington.

To : US Secretary of Energy Chu:

All leaking storage tanks holding high-level nuclear waste and all deliberate and accidental discharges need to be completely cleaned up with clean closure, (not just a feeble attempt to cap and leave behind polluted, contaminated soil and groundwater pollution) including the 40 miles of unlined soil trenches containing radioactive and chemical wastes, and all the single walled tanks. *476-1*

The plan to import low level and mid level radioactive wastes from other sites to Hanford after 2022 is totally and completely unacceptable and irresponsible. The entire Hanford site including all the tank farms need a thorough hazardous waste cleanup. *476-2*

Thank you for your consideration and serious thought in this important matter.

Sincerely, Barbara Tombleson
7526 SW Capitol Hill Rd.
Portland, OR 97219

476-1 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

476-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Commentor No. 477: Audrey Adams

From: audrey55 [audrey55@comcast.net]
Sent: Friday, April 30, 2010 4:08 PM
To: tc&wmeis@saic.com
Subject: No more radioactive waste dumping at Hanford!

The citizens of Washington refuse to be the nation's dumpsite for radioactive waste! Hanford needs to be cleaned up as promised. The health of our citizens and children are at stake. *477-1*

Audrey Adams
Renton, WA

477-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 478: Joyce Namba

From: milonamba@msn.com
Sent: Saturday, May 01, 2010 12:42 PM
To: tc&wmeis@saic.com
Subject: Re: Hanford

Mary Beth Burandt, Document Manager

U.S. Department of Energy, Office of River Protection

P.O. Box 1178, Richland,WA 99352

Dear Ms. Burandt,

I am in absolute agreement with Columbia Riverkeepers environmental organization that the Hanford Nuclear site must have all 55 million gallons of buried nuclear waste cleared to 99.9% retrieval. *478-1*

Any proposals to ship additional radioactive waste from across the United States to Hanford must be halted once the waste treatment plant is operational. Placing the Columbia River at higher risks is not acceptable. *478-2*

The "clean up first" must be the priority. I viewed the CBS "60 Minutes" program highlighting Hanford with Leslie Stahl's research. It was apparent that Hanford clean-up was decades behind. The millions of gallons of nuclear waste that has already leaked and is reaching the Columbia River is not acceptable. *478-3*

Columbia Riverkeepers states that the Department of Ecology must take measures to treat the soil and groundwater beneath the leaky storage tanks. DOE should excavate and fully clan miles of ditches and trenches that contain waste. If unchecked, plumes of this contamination are moving towards the Columbia River. *478-4*

It is a responsibility to protect our environment as citizens. It is a responsibility to see the big picture 100, 200... centuries down the road and not look toward just an immediate patch-up.

Young men and women involved with the United States Military have vowed to protect our country; the land that we have been fortunate to reside upon. And here, there is a direction to further pollute. It is an affront to those risking their lives and who have given their lives to make life more livable in the United States. The rivers, streams, oceans are tied across our planet. They are as one. What we do or not do here in the United States will affect citizens throughout our world. The big picture.

478-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

478-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

478-3 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

478-4 Comment noted.

Commentor No. 478 (cont'd): Joyce Namba

No man is an island, entire of itself
every man is a piece of the continent, a part of the main
if a clod be washed away by the sea,
Europe is the less, as well as if a promontory were,
as well as if a manor of thy friends or of thine own were
any man's death diminishes me, because I am involved in mankind
and therefore never send to know for whom the bell tolls
it tolls for thee.

-- John Donne

Thank you for your time.
Most sincerely,

Joyce Namba
Portland OR

Response side of this page intentionally left blank.

Commentor No. 479: Karen Axell

From: DAC/All-Source [source@pacifier.com]
Sent: Saturday, May 01, 2010 1:04 PM
To: tc&wmeis@saic.com
Subject: Hanford clean-up

Mary Beth Burandt
Document Manager
U.S. Department of Energy
Office of River Protection

As a Washington resident, clean water advocate and US citizen, I strongly oppose using Hanford as a national radioactive waste dump. *479-1*

I urge you to immediately begin a complete cleanup or "clean closure" of the High-Level Nuclear Waste Tanks and all contamination from tank leaks & deliberate discharges. This would include: *479-2*

- The clean up of all 55-million-gallons of radioactive and hazardous tank waste with over 99% retrieval
- The clean up of the millions of gallons of nuclear waste that has already leaked and is reaching the Columbia *479-3*

Lastly, I am firmly against any proposal to ship radioactive wastes from across the nation to Hanford. *479-1 cont'd*

Sincerely,

Karen Axell
PO Box 5183
Vancouver, WA 98668
source@pacifier.com

479-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

479-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

479-3 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Commentor No. 480: Sally Lider

From: Sally Lider [sally.lider@verizon.net]
Sent: Saturday, May 01, 2010 3:26 PM
To: tc&wmeis@saic.com
Subject: Hanford draft Tank Closure & Waste Management Environmental Impact Statement

As a citizen of the State of Washington and a sane person, I am strongly opposed to using Hanford as a national radioactive waste dump. In fact I urge you to clean up this mess once and for all! I plan on having grandchildren someday growing up in this state. I cannot imagine how our government can ignore all the contamination that is there already and actually consider bringing in more radioactive waste to store there forever!

I for one do not think that that we should only be concerned with our energy needs of the future and plod blindly along glossing over the dangers of oil spills, climate change and ocean acidification from increasing carbon emissions. But generating more nuclear wastes and burying them for future generations to deal with is not the answer either. Please stop this insanity now! Clean up Hanford and DO NOT turn Washington State into a radioactive wasteland! *480-1*

Sincerely,

Sally Lider

480-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Commentor No. 481: Noreen Parks

From: Noreen Parks [nmparks@q.com]
Sent: Saturday, May 01, 2010 3:40 PM
To: tc&wmeis@saic.com
Subject: Comments on the Hanford TCWMEIS

Comments on the draft Tank Closure & Waste Management EIS for Hanford nuclear reservation:

The situation at Hanford represents a grave endangerment to human health and one of the Pacific Northwests greatest economic and ecological assets, the Columbia River. Already over a million gallons of high-level nuclear waste has leaked from corroding tanks, and billions of gallons of waste have been discharged into reservation soils. The contamination is spreading rapidly to the groundwater and will continue to move toward the Columbia, where levels of contaminants from Hanford are rising. It is of the utmost urgency that DOE carry out comprehensive clean-up operations as quickly as possible, using the most powerful technologies available. *481-1*

The draft Tank Closure & Waste Management EIS reveals that all proposed management alternatives will significantly increase radioactive contamination of groundwater over the coming millennia. **DOE must commit to the highest possible level of tank waste removal, aiming for 99.9% of the tank wastes, or as much as feasible, to the limits of technical capabilities. Only this level would address the residues at the bottom of the tanks, which contain a disproportionate amount of the radioactivity.** *481-2*

Given the grave and long-enduring threats to public and ecological health posed by contamination from leaking tanks and radioactive discharges to soil, **DOE must follow legal closure procedures for the tank farms after the wastes have been removed. This includes cleaning up the soil and groundwater contamination and either cementing tanks with dirt caps or removing the tanks and pipe systems and cleaning up the underlying soil contamination.** *481-3*

In view of the magnitude and urgency of the clean-up at Hanford, the delays in completing the vitrification plant are unacceptable; this project requires a much faster timeline. Furthermore, since the EIS indicates the capacity of the long-awaited treatment plant will be limited to treating only half of the high-level waste. No matter how this waste is divided up or prioritized, this means that the DOE actually does not intend to fully clean up the waste. **DOE should plan immediately to begin work on a second vitrification plant. And, as recommended by the Hanford Advisory Board and the State of Washington, DOE should abandon supplemental treatment options that have been shown to be less effective and less protective of the environment.** *481-4*

481-1 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

481-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed on only a small number of SSTs and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks and residual waste, requires preparation of a performance assessment and a closure plan. These documents will provide the information and analysis necessary for DOE and the

Commentor No. 481 (cont'd): Noreen Parks

Finally, **NO MORE WASTE SHOULD BE SHIPPED TO HANFORD.** The fact that this nation and the current administration are ostensibly committed to reducing nuclear weapons must have bearing on the decisions about what to do at Hanford! Facilities that produce radioactive materials **do** have options for onsite storage, which must be their responsibility! Making Hanford a national repository for radioactive waste would involve the large-scale, highly perilous, long-distance shipment of the planets most dangerous substances. This strategy would potentially expose many areas of the county and their populations to greater cancer risks and other hazards. *481-5*

The operations at Hanford have exposed a portion of Washington State and the Columbia River to immeasurable hazard. Let it go no further!

Thank you for the opportunity to comment. I will be carefully watching the outcome of this process.

Noreen Parks, Science & Environmental Writer
52 Becker St.
Port Townsend, WA 98368
xxx xxx-xxxx

regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

481-3 DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; Section 1.2.7 discusses the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE order requirements that must be met for DOE to implement Tank Closure alternatives. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter.

481-4 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Under Tank Closure Alternative 2A, the entire tank waste inventory would be treated using the currently constructed WTP configuration, i.e., two HLW melters and two LAW melters. However, as noted in the Summary and throughout this EIS, completing this configuration would require approximately 75 years. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies, as well as the durability of the long-term groundwater protection provided by supplemental treatment of waste.

481-5 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Radioactive waste is transported in DOT-certified containers that meet strenuous technical standards established by NRC.

Commentor No. 482: Sandy Stienecker

From: Sandy Stienecker [sandyordon@comcast.net]
Sent: Saturday, May 01, 2010 4:37 PM
To: tc&wmeis@saic.com
Subject: Hanford

To Whom It May Concern,

My father died at 47 years of age from the effects of nuclear radiation created by his work in the aerospace industry in Southern California. Neighborhoods surrounding his workplace have high clusters of cancer throughout and there is evidence that many of the water ways are contaminated. It has taken years for the evidence to be identified and many have gotten sick and died from the affects of radiation. I am opposed to using Hanford as a national radioactive waste dump. Please clean up the contamination from High-Level Nuclear Waste tank leaks and deliberate discharges and engage in a complete clean up ("clean closure") of the High Level Nuclear Waste Tanks. *482-1*

Sandy Stienecker

482-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 483: Aleita Hass-Holcombe

From: Aleita Hass-Holcombe [aleita.hass.holcombe@gmail.com]
Sent: Saturday, May 01, 2010 6:08 PM
To: tc&wmeis@saic.com
Subject: Hanford

To Whom it May Concern (it is certainly a concern to many citizens in the Pacific Northwest Region):

I am in total opposition to using Hanford as a nuclear dump site and to transporting nuclear waste on our highways through our communities. *483-1*

Sincerely,

Aleita Hass-Holcombe
First Congregational United Church of Christ Just Peace Committee,Chair
Corvallis, Oregon

483-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 484: Madeline Smith

From: madeline marie smith [msmith28@uoregon.edu]
Sent: Saturday, May 01, 2010 7:35 PM
To: tc&wmeis@saic.com
Subject: Re: Comments on Draft TC and WM EIS

to: Mary Beth Burandy, Document Manager
Office of River Protection
U.S, Department of Energy
TC &MW EIS, P.O. Box1178
Richland Washington, 99352

May 1, 2010

Comments on Draft TC and WM EIS:

My concern is that there is no EIS regarding climate change in the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland/Washington (Draft TC &WM EIS), neither in the EIS prepared by Washington State Department of Ecology, pp1-9 nor in the Summary of Environmental Impacts: Key Findings, pp S53-4 nor within the carefully spelled out details of all impacts considered, pp S-54-S121.

This oversight is explained by Helen Caldicott as due to how nuclear scientists think about time. Scott Burnell, spokesman at NRC, is probably typical in thinking that, "...global warming occurs on a such a slow scale that we would be able to deal with any changes at the operational level as opposed to a policy level." (Nuclear Power is Not the Answer. Reported by Caldicott on p 87) *484-1*

Burnell can reasonably think this way because the science involved in nuclear waste is very different from that involved in climate change. While both have uncertainties, only climate can reach a temperature change of 350 degrees C (or over) anywhere between 2012 and 2050. Burnell is accustomed to thinking into the future hundreds of years.

The waste management plans for Hanford can, and needs to be reconfigured to include climate change. The plans ought to reduce waste costs so that as much money as possible goes to reducing carbon emissions to zero. This can easily be done if the plans for the vitrification plant are put on hold.

This is feasible. "As the bipartisan National Commission on Energy Policy recently explained, dry cask storage 'is a proven, safe, inexpensive waste-sequestering technology that would be good for 100 years or more, providing an *484-2*

484-1 DOE has reviewed and revised, as necessary, its analyses on the effects of climate change on various resources at Hanford and the possible effects on environmental impacts of the *TC & WM EIS* alternatives. As described in Chapter 6, Section 6.3.4, DOE has reviewed climate studies that forecast general trends in Hanford regional climate change. However, there are no reliable methodologies for projections of specific future climate changes in the Hanford region, and thus such changes have not been quantified in this EIS. To account for this uncertainty, Appendix O, Section O.6.2, describes the effects of enhanced infiltration such as that which may occur during a wetter climate. In the *Draft TC & WM EIS*, Appendix V focused on the potential impacts of a rising water table from a proposed Black Rock Reservoir. Following the retraction of this proposal, the focus of Appendix V was changed in this final EIS to analysis of potential impacts of infiltration increases resulting from climate change under three different scenarios. Appendix V includes sensitivity analyses of potential impacts at Hanford that could result from climate changes that may increase model boundary recharge parameters and the rise of the groundwater table. Additional qualitative discussion of the potential effects of climate change on human health, erosion, water resources, air quality, ecological resources, and environmental justice has been added to Chapter 6 of this final EIS. Additional discussion of the types of regional climate change that could be expected has also been added to Chapter 6, Section 6.5.2, Global Climate Change. The potential impacts of the alternatives on climate change are addressed in Chapter 6, Section 6.5.2, and Appendix G, Section G.5, of this *TC & WM EIS*. Current projections of temperature change reported by the Intergovernmental Panel on Climate Change are much less than those suggested by the commentor (IPCC 2007:Table SPM.3).

484-2 DOE is working diligently to bring the WTP online to treat the tank waste at the site as soon as possible. Chapter 1, Section 1.2.3, provides a brief history and background on DOE's efforts to reduce costs and speed up Hanford cleanup efforts. As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

Commentor No. 484 (cont'd): Madeline Smith

interim, back-up solution against the possibility that Yucca Mountain is further delayed or derailed-- or cannot be adequately expanded before a further geologic repository can be ready.' " (Climate Change and the Law ed.Chris Wold, David Hunter, Melissa Powers,2009; quote is in Fred Bosselman's article, The Ecological Advantages of Nuclear Power, p681)

The Climate Change EIS could well lead to changes in money allocations if and when all the ramifications of climate disasters were studied. Hanford managers might reasonably order the delay of the building of the vitrification plant exactly because a planetary 2 degree C increase in temperature might happen at any time.

Jimmy T Bell's article--Alternatives to High-Level Waste Vitrification: The Need for Common Sense, details the complexities in vitrification which make it very costly. In Table IV Bell compares most to least expensive costs. If all the nuclear waste tanks at Hanford are vitrified the estimated cost is between 43 and 63 billion dollars. If only 60 tanks are vitrified, then the cost is estimated at 18 billion dollars. If 60 tanks are dry-packed, the estimated cost is 3 billion dollars. *484-2 cont'd*

The vitrification phase is costly because it requires so many steps. Bell writes," These estimated costs for vitrification of only Hanford defense tank wastes should be compared to the recent DOE estimate of $50.3 billion for total environmental management (EM) costs (not restricted to tank waste) for Hanford over the years 1997 to 2070." (Nuclear Technology ,

vol 130 Apr.2000, p96). Since Bell doesn't estimate the total cost of dry casting for all Hanford waste, that figure would need to be estimated. That amount would surely be less than the cost of a vitrification plant.

If we achieve a carbon free future, the Climate Change EIS will have been a good precautionary exercise. On the other hand, if the planet goes over the tipping point, then Hanford would have plans in place for how to respond to extreme weather events like drought and scarce water or the opposite, like flooding and sea level rises. No one can really guess in which direction(s) the disaster might go. *484-3*

Therefore, it would take careful study of disaster possibilities to determine how best to secure Hanford.

As noted in the Summary, Section S.3.1.4, and Chapter 2, Section 2.2.2.2, the WTP is currently being constructed in the 200-East Area of Hanford. Site work associated with the project began in late 2001 and construction is more than 62 percent complete. Details regarding the WTP are provided in Appendix E, including its design and processes, waste-form performance, waste forms/ disposal packages, and assumptions and uncertainties.

It is not within the scope of this *TC & WM EIS* to put the plans for the vitrification plant on hold. As mentioned in the Summary, Section S.1.2.1, the WTP is the cornerstone of tank waste treatment at Hanford and, as discussed in Appendix E, Section E.1.1.3, a major component of the RPP's current program is treatment of waste in the WTP. The current RPP program is based primarily on implementing Phase I of the Preferred Alternative identified in the *TWRS EIS* (DOE and Ecology 1996). The WTP is critical to completing waste treatment at Hanford. Thus, construction and operation of the WTP is evaluated in this *TC & WM EIS*; delaying its progress is not. While DOE agrees that reducing carbon emissions needs to be a priority, DOE is convinced that the benefits gained from reducing the risks the tank waste represents to the environment outweigh the benefits of halting construction and operation of the WTP. Reducing these risks is also part of DOE's mission.

484-3 Carbon dioxide control and global and regional climate change are not within the scope of this EIS. This *TC & WM EIS* addresses proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. This EIS does address impacts of the alternatives on global climate change and the potential impacts of regional climate change on activities at Hanford (see Chapter 6, Section 6.5.2, Global Climate Change).

Commentor No. 484 (cont'd): Madeline Smith

I propose that the first priority ought to be that all available resources to go to preventing the planet going over the tipping point by stopping the carbon and other toxic chemical poisons problems. Then, having achieved climate control, there would be ample time to study good final phase nuclear waste solutions because a good intermediate solution, dry casking, had given Hanford, and possibly other nuclear waste facilities, that ample time. ***484-3 cont'd***

Madeline Smith

594 West 11 Ave.
Eugene, Or. 07401
or: e-mail: msmith@uoregon.edu
or: xxx-xxx-xxxx

P.S. I understand arguing that timing is critical can be viewed as an incentive to speed up all nuclear activity. But neither nuclear nor coal produces really clean energy. They are "dirty" in different ways. Another argument in favor of vitrification delay is that a cheaper and cleaner waste process might be invented exactly because Hanford management used precaution, because they were more concerned for the safety of U.S. citizens, than rushing into unknown/unknowable problematic nuclear processes. ***484-2 cont'd***

Response side of this page intentionally left blank.

Commentor No. 485: Jill Reifschneider

From: Michael, Jill, Noah, Nicholas [global_roamers@yahoo.com]
Sent: Sunday, May 02, 2010 12:07 AM
To: tc&wmeis@saic.com
Subject:

Thank you for listening. I oppose using Hanford as a national radioactive waste dump. Please completely cleanup ("clean closure") the High-Level Nuclear Waste Tanks. The Department of Energy must cleanup the contamination from High-Level Nuclear Waste tank leaks & deliberate discharges. This has been going on for way too long. Please protect us and our environment. Thank you. *485-1*

Jill Reifschneider
14846 73th Place NE
Kenmore, WA 98028

485-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 486: Deanne Belinoff

From: Deanne Belinoff [deanne@xprt.net]
Sent: Sunday, May 02, 2010 11:25 AM
To: tc&wmeis@saic.com
Cc: barbara bell; Tina wilson; poppy@poppydully.com; Penelope Schott; Nancy Turner; Nancy Carew; Melinda Fellini; Maxine Thomas; Marilyn Epstein; Maggie Chula; LaValle Linn; artkate Evans; ellen reed; Diane Waggoner; Diana Forester; CAROLHAZZARD@aol.com; jane smiley; "Mkohnstamm@quest.net"@smtp.gssf.org; artSandy Polishuk
Subject: not a hoax: checked it out.....

I am an artist, writer and activist. Please do not allow radioactive waste to contaminate Portland and the Columbia river. *486-1*

see www.hoanw.org

deanne belinoff
xxx xxx xxxx
www.deannebelinoff.com
deanne@xprt.net

486-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 487: Bart Bolger

From: bolgerbart@gmail.com on behalf of Bart Bolger [ripken3@comcast.net]
Sent: Sunday, May 02, 2010 12:47 PM
To: tc&wmeis@saic.com
Subject: Complete Clean-up; then consider more storage

I completely agree with the letter sent to you by the Alliance for Democracy in Portland:
Clean-up the site to 99.9%. Then consider additional storage and processing. *487-1*

We all live downstream.

Thank you,

Bart Bolger
vp & treasurer
Veterans For Peace Ch. 132, Corvallis, OR
www.vfpcorvallis.org

487-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 488: Lisa Crosby

From: Lisa Crosby [mailto:lisa.paulb@olympus.net]
Sent: Sunday, May 02, 2010 3:24 PM
To: TC&WMEIS@saic.com'
Cc: The.Secretary@hq.doe.gov'
Subject: comment on the TCWMEIS

Dear Sir/Madam,

I am writing to express my concern over the Energy Department's "preferred alternative" in the draft TCWMEIS which would use Hanford as a national radioactive waste dump for USDOE nuclear weapons and power programs. I oppose this for the following two reasons: *488-1*

1) **Hanford has not demonstrated an ability to safely contain radioactive waste**. Quite to the contrary, radioactive waste already present at Hanford is currently leaking toward and into the Columbia River. No more waste should be accepted at Hanford until this is completely cleaned up. *488-2*
2) **Hanford is in an environmentally sensitive area because of its proximity to the Columbia River.** Failure to contain waste at this site leads to contamination of a river vital to the health of humans and animals.

Lisa Crosby
Port Townsend, WA

488-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

488-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

Commentor No. 489: Dorothy Lamb

From: Dorothy Lamb [Dorothy16@comcast.net]
Sent: Sunday, May 02, 2010 10:50 PM
To: tc&wmeis@saic.com
Subject: Hanford

Dear DOE,

I want to ask you to do the right thing about nuclear waste. I am a downwinder from the 'thyroid belt.' I was born in the Milton-Freewater the 1942. I believe I was around five years old when my thyroid problem was discovered. I have been on thyroid medication ever since then. This year for some reason it got a lot worse. I am increasing my thyroid medication once again. A family member had their thyroid removed which is particularly bad since the amount of thyroid your body needs varies so to take the same amount every day is not desirable. I don't want to be a 'downstreamer' as well.

To not clean up what is already leaking into the beautiful Columbia River... To not seal the existing leaking tanks. This is very dangerous. I'm overwhelmed that this would be allowed. The Columbia Gorge will be ruined. Portland Oregon will be very contaminated/unlivable. I certainly wouldn't want to be living here when that happens. I don't know what to say because it seems so obvious. *489-1*

Please: Do a clean closure of the High-Level Nuclear Waste Tanks. Clean up the contamination from High Level Nuclear Waste Tanks. Clean up the contamination from the High-Level Nuclear Waste tank leaks and discharges. Do not let any more get into the Columbia River.

I can't believe that Obama is planning to make Hanford the national nuclear dump and to build even more nuclear plants. That means there will be trucks on major highways. (Are they unmarked trucks??!) which would be an easy target for terrorists. And that even if there are no terrorist attacks or accidents that people will die driving beside them on the freeways. This does not make sense to me!!! Why would anyone allow that?? But that is a different EIS… *489-2*

There must be reasons that are not apparent for this to be even considered. Is there a lot of underhanded money involved? Bribes? What is going on? I thought we had laws and safeguards and organizations like Environmental Protection etc etc to prevent this kind of thing.

489-1 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B; selective clean closure is represented by Tank Closure Alternative 4. For the Base Cases of both Tank Closure Alternatives 6A and 6B, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

489-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs. The dose to an MEI under incident-free transportation conditions was estimated for a person caught in traffic and located 1.2 meters (4 feet) from the surface of a remote-handled radioactive waste shipping container for 30 minutes. This dose was calculated to be 10 millirem for a single shipment. The dose would be less if the shipment were contact-handled radioactive waste or if the person were caught in traffic next to the waste shipment for a shorter period of time or were farther away. A dose of 10 millirem is roughly equivalent to that obtained from an x-ray of a broken bone, and the risk of incurring a fatal cancer from such a small dose would be 6×10^{-6}, or 6 chances in 1,000,000, which is very low.

Commentor No. 489 (cont'd): Dorothy Lamb

There are plenty of alternatives to nuclear energy. I would refer you to www.BreakthroughPower.net , www.integrityresearchinstitute.org . But there are many many more web sites and inventors I'm sure you know.

Please please do the right thing. Plan for a healthy future.

Sincerely,
Dorothy Lamb

Response side of this page intentionally left blank.

Commentor No. 490: Adrian Villarreal

From: Adrian Villarreal [dea557779@hotmail.com]
Sent: Sunday, May 02, 2010 10:57 PM
To: tc&wmeis@saic.com
Subject: TC&WMEIS Public Hearing Response Letter

May 2, 2010

TC & WM EIS,
P.O. Box 1178,
Richland WA 99352

To Whom It May Concern:

I am writing to protest against the TC&WMEIS preferred plan to dump nuclear waste at Hanford Washington. No further nuclear waste should be dumped at Hanford and the entire Hanford site needs to be decontaminated. There is no legitimate excuse for the continued pollution of nuclear waste into the Columbia River and exposing living organism in the United States, or the rest of the world to nuclear waste. The department of energy needs to clean up all the waste currently dumped in Hanford and the Department of Energy needs to use all the resources of the United States to complete the task. 99.9% of tank waste should be removed and anything less than this increases the risk of polluting our shortening water supply and potentiates the risk of exposure to American citizens. *490-1* *490-2*

Clean closure should be the method used to clean up Hanford and any other method defeats the mission to neutralize Hanford's current nuclear waste. The excuse stated by the DOE, that clean closure would increase the risk of exposing Hanford workers is hypocritical. Cleaning up Hanford is dangerous, and workers currently working at Hanford are already being subjected. Where was the concern for the Downwinders exposed to Hanford's nuclear waste? The DOE should acknowledge the efforts of these individuals by cleaning up all of the waste, and not use them as an excuse to not finish the job that these brave individuals started. The DOE should be asking itself, "Is it better to expose countless individuals to nuclear waste via the Columbia river versus exposing workers through the clean up process? Why is the Federal Government willing to sent troops to fight a war in other countries but is not willing to commit the resources needed to protect its citizens from nuclear exposure?" *490-3*

Part of the clean closure process involves cleaning up the Fast Flux Test Facility. The proposed plan to ship nuclear waste out of Washington State is idiotic to say the least. It is unacceptable to be shipping nuclear waste across state lines and risking exposure to American citizens. The FFTF needs to be cleaned at Hanford and only a clean closure process will be acceptable. *490-4*

490-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

490-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

490-3 The impacts of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B,

Commentor No. 490 (cont'd): Adrian Villarreal

In order to clean up Hanford, the DOE needs to complete the construction of the Vitrification plant and needs to immediately start the construction of the second Vitrification plant for the Low Activity Waste. Time is of the essence and we need to carefully clean up all of the nuclear waste our government dumped without thought. Now is the time for thinking and action. We need to build and complete these needed plants to stop the pollution of the Columbia River and have the ability to access our underground water supply, to decontaminate the much needed water supply available. *490-5*

The DOE needs to take responsibility and clean up the mess they have left at Hanford. The dumping of Class C or higher nuclear waste should not be dumped at Hanford and the United States government should be providing more security at Hanford to prevent terrorists from gaining access to the currently dumped nuclear waste. The cleaning up of Hanford needs to be completed and the United States needs to stop using Nuclear waste, and any other energy sources that are not reusable and severely increase the health implication of its citizens. *490-6*

Sincerely,

Adrian Villarreal

which evaluate clean closure of all or part of the SST system. As required by NEPA, this *TC & WM EIS* addresses the impacts on both the short- and long-term human environment. Workers related to the activities being analyzed are part of the human environment, and impacts on workers are presented in Appendix K, Section K.3.10, and Chapter 4, Sections 4.1.10, 4.2.10, and 4.3.10, of this EIS. See response to comment 490-2 regarding factors influencing future DOE decisions.

490-4 Radioactive waste is transported in DOT-certified containers that meet strenuous technical standards established by NRC.

490-5 DOE is working diligently to bring the WTP online to treat the tank waste at the site as soon as possible. Chapter 1, Section 1.2.3, provides a brief history and background on DOE's efforts to reduce costs and speed up Hanford cleanup efforts. As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

As noted in the Summary, Section S.3.1.4, and Chapter 2, Section 2.2.2.2, the WTP is currently being constructed in the 200-East Area of Hanford. Site work associated with the project began in late 2001 and construction is more than 62 percent complete. Details regarding the WTP are provided in Appendix E, including its design and processes, waste-form performance, waste forms/disposal packages, and assumptions and uncertainties.

490-6 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Operations of the plant and the security provided at Hanford are intended to prevent intentional destructive acts. Nevertheless, this *TC & WM EIS* includes analyses of the potential impacts of accidents and intentional destructive acts on workers and members of the public. The results of these analyses are presented in Chapter 4, Sections 4.1.11, 4.2.11, and 4.3.11. More-detailed descriptions

Commentor No. 490 (cont'd): Adrian Villarreal

of the scenarios and the methods of analysis are presented in Appendix K, Section K.3.11.

Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD. The potential for a GTCC LLW disposal facility at Hanford is addressed in Chapter 6, "Cumulative Impacts," of this *TC & WM EIS*.

Commentor No. 491: Richard and Tina Heggen

From: prvs=1739ECE54F=tubegeek@nventure.com on behalf of Dick Heggen [tubegeek@nventure.com]
Sent: Monday, May 03, 2010 12:28 AM
To: tc&wmeis@saic.com
Subject: Hanford TC&WM EIS comment submittal – Heggen
Attachments: EIS TC&WM comments - Heggen 5-1-10.doc

To whom it may concern,

Please accept our formal comments on the Hanford Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS) in the attached Word document. An acknowledgement of receipt would be appreciated.

Richard and Tina Heggen
6444 N. Five Views Rd.
Tacoma, WA

Response side of this page intentionally left blank.

Commentor No. 491 (cont'd): Richard and Tina Heggen

May 2, 2010

Comments on the Draft Tank Closure and Waste Management (TC&WM) EIS for the Hanford Site, Richland, WA. DOE/EIS-0391

Richard Heggen
6444 N. Five Views Road
Tacoma, WA 98407

1) The TC&WM EIS (EIS) seriously underestimates the actual uranium inventory for both US Ecology and the Environmental Restoration Disposal Facility (ERDF). For example, Page S-91, Table S-50b in the EIS lists US Ecology with 1,820 curies of uranium and ERDF with 54 curies of uranium. A March 1998 PNNL report (PNNL-11200) prepared for the US Department of Energy (USDOE) lists a far greater amount of uranium inventory for both facilities on page 3.31, Section 3.5.2.7 as follows: ERDF = 54,300 curies, and US Ecology = 10,900 curies. Although the PNNL report indicates the ERDF estimate may be somewhat overstated, it is still orders of magnitude greater than the 54 curies provided in the EIS. The EIS must be revised to include the actual uranium inventory. Risk modeling in the EIS must also be revised to accommodate the increased inventory

491-1

2) Uranium chemical inventory in kilograms is missing for both ERDF and US Ecology (Page S-141, Table S-76b). The EIS must be revised to include the actual uranium inventory. Revise the EIS risk modeling to account for the increased inventory.

3) Significant uranium inventory is missing from Appendix S. Although curie inventory for uranium chemical inventory is listed for many of the burial grounds, uranium chemical inventory is missing for all but two burial grounds. The two burial grounds are 218-W-4C and 218-W-5. While W-4C has 72.8 curies and 83 kilograms (kg) of uranium, W-5 has 654 curies and only 0.055 kg. It appears the chemical inventory for many burial grounds including W-5 is either missing or grossly underestimated. The EIS should be revised to more accurately reflect the actual chemical inventory. Revise the EIS risk modeling to account for the revised inventory.

491-2

4) Comparing the plutonium inventory kilogram estimates from the Hanford History of the 200 Area Burial Ground Facilities (September 1996 – Westinghouse Hanford Co. – WHC-EP-0912) to the plutonium curie estimates provided in the EIS indicates several discrepancies. While the EIS lists no plutonium curie inventory for 218-W-2A, W-3A, and W-4B, the Westinghouse report lists plutonium inventory at 6.38 kg, 29.32 kg, and 66.47 kg respectively for these same burial grounds. By comparison, the WHC report lists 218-W-3 plutonium inventory at 68 kg and the EIS has a corresponding 4,930 curies of plutonium for the same burial ground. These discrepancies indicate that thousands of curies of

491-3

491-1 DOE has reviewed the estimated ERDF inventory and revised the total uranium inventory from 54 curies to 412 curies. This revised estimate is based on the inventory of total uranium disposed of at the ERDF through March 2010, as reported in the Hanford Waste Management Information System. DOE recognizes this estimate may not represent the total inventory of uranium that may be disposed of at the ERDF, but it represents the best inventory estimate available at this time. DOE reviewed the *Retrieval Process Development and Enhancements FY96 Pulsed-Air Mixer Testing and Deployment Study* (Powell and Hymas 1996), and found no inventory data in the document to compare with the inventory estimates analyzed in this EIS. Without the correct document citation, a comparison cannot be conducted.

491-2 As discussed in Appendix S, "Waste Inventories for Cumulative Impact Analyses," DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication. None of the reviewed documents included a total uranium inventory estimate for these disposal sites. However, in response to comments received, DOE again reviewed the data and revised the ERDF and US Ecology inventories to include a calculated total uranium inventory. This inventory was included in this *Final TC & WM EIS* and analyzed appropriately.

Regarding the commentor's concern as to the accuracy of data, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

491-3 DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication. The primary source of referenceable inventory data for the burial grounds used in this EIS was the *Summary of Radioactive Solid Waste Received in the 200 Areas During Calendar Year 1995* (Anderson and Hagel 1996). As discussed in the introduction to this source document, the inventory data contained within included not only the inventory disposed of in 1995, but also the cumulative inventory through 1995. DOE's review of *The History of the 200 Area Burial Ground Facilities* (Anderson 1996) concluded that it may not be the best source for burial ground inventory data. The following statement is an excerpt from the preface to Anderson (1996): "Much of the information is not associated with referenceable documentation, and comes from the author's experiences and associations with others during the

plutonium are missing from above noted burial grounds. Revise all the burial ground inventory numbers to accurately state the correct amount of plutonium curies and chemical inventory in kilograms. Revise the risk modeling in the EIS to account for the increased inventory. **491-3 cont'd**

5) Throughout Appendix S, the relation between radioactive uranium inventory in curies and the chemical uranium inventory in kg varies drastically. The EIS provides no explanation for this wide range of ratios. For example, appendix S table S-43a lists a total of 914 curies uranium (almost all due to three burial grounds) and table S-69b lists a corresponding total of 3,127 kg uranium. This is in contrast to the ratio of uranium curies to kg found in tables S-48a and S-74b where the ratio of 25.45 curies to 106,530 kg is far different and not explained in the EIS. There are many examples of this apparent lack of consistency in similar data throughout the EIS. It appears that significant uranium inventory is missing. Revise the EIS and risk modeling to include the missing inventory. **491-4**

6) Appendix S, Table S-26 lists the volume of discharged liquid to ground for 216-B-3 pond at 280 billion liters which translates to 154 billion gallons. However, the 2005 Groundwater Monitoring Plan for the Hanford Site 216-B-3 Pond RCRA Facility (PNNL-15479), Section 1.1.1, page 1.3 lists the total liquid discharge to ground at over one trillion liters = greater than 260 billion gallons. The EIS needs to be revised to include the missing 106 billion gallons from 216-B-3 pond. **491-5**

7) There is a large difference in the ratio of uranium curies to kilograms between the total numbers for Appendix S and the total numbers for Appendix D (the specific tank farm area with selected discharge areas). The ratio found in appendix S for uranium kg to curies = 70:1 while the ratio for Appendix D = 633:1. This implies missing data or errors in the data. No explanation was found in the EIS. The EIS needs to be revised to either include an explanation or to include all missing data. Additionally, risk modeling must also be revised. **491-6**

8) The EIS lists the uranium chemical inventory as total uranium as soluble salt. Apparently the EIS omitted insoluble uranium compounds from the inventory data. If so, this is a serious oversight due to the toxicity of uranium as a chemical/metal which is in addition to the toxic effects of uranium due to radioactivity. The EIS needs to be revised to include all forms of uranium in the inventory data. All relevant risk modeling and discussion must be revised to reflect the additional uranium inventory and all associated risks for all forms of uranium. **491-7**

9) The EIS appears to focus strictly on water/liquid related pathways for all risk scenarios. Missing from this EIS is a future failed cover scenario that allows animal and plant life to access contamination remaining in the ground. There is a long history of plants and animals accessing and spreading toxic materials in the ground at Hanford, including radioactive plants (especially long rooted tumbleweeds), radioactive insects, and radioactive animals. Other soil **491-8**

time spent in the burial grounds which covered a quarter of a century." However, to address the example provided by the commentor, the 4,930 curies of plutonium estimated in Anderson and Hagel (1996) converts to 67 kilograms of plutonium when the appropriate specific activity (curies/grams) factors are applied; this is approximately the same inventory estimate provided in *The History of the 200 Area Burial Ground Facilities* (Anderson 1996). Therefore, DOE sees no discrepancy in this case.

491-4 See response to comment 491-2 regarding data usage in this EIS.

491-5 Appendix S, Table S–26, includes an estimate of 282.7 billion liters (74.7 billion gallons) that was discharged to this pond. The source of this estimate was SIM, Revision 1 (Corbin et al. 2005). Page A-88 of this report provides a detailed listing of the documents used to generate this estimate. A review of the *Groundwater Monitoring Plan for the Hanford Site 216-B-3 Pond RCRA Facility* (Barnett et al. 2005) found that its total estimate of discharges to the B-3 Pond is 260 billion gallons, but no data were found to support this estimate. Thus, DOE believes SIM (Corbin et al. 2005) represents the best-available and -defensible data for use in the analysis in this EIS.

491-6 See response to comment 491-2 regarding data usage in this EIS.

491-7 Regarding use of the term "soluble salts" for describing the total uranium inventories, the distinction "(soluble salts)" in the table was an error, and that term has been deleted. The inventories provided in the *Draft TC & WM EIS* did represent total uranium, not just the soluble salt form. DOE acknowledges the perception that some of the uranium chemical inventories in the cumulative impacts analysis inventories provided in Appendix S are underreported. DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in the draft EIS represented the best-available data at the time of the draft's publication. None of the reviewed documents included estimates of the total uranium inventory for certain sites, primarily burial grounds. However, DOE again reviewed the data and revised the Appendix S inventories to include a calculated total uranium inventory. This inventory was included in this final EIS and analyzed appropriately.

491-8 Facility closure activities and configurations of engineered barriers, including caps, are described in Appendix D of this *TC & WM EIS*. The analysis assumes failure of the facility cover (barrier). The closure designs and depth to the waste are such that biointrusion into facilities would be a small component of the direct human intrusion and groundwater release scenarios evaluated in

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disturbance mechanisms could also cause exposure to toxic radioactive and mixed toxic waste in the future. Exposure of humans and the environment could occur through direct contact, ingestion, and air pathways. Revise the EIS to include these risk scenarios. **491-8 cont'd**

10) The EIS fails to address options on how USDOE will address and cleanup significant shallow contamination related burial grounds, the miles of old contaminated transfer pipelines, in-ground contaminated sand filters, etc. shallow sources of contamination. The EIS must be revised to include all missing inventories as well as associated future risk scenarios. **491-9**

11) Missing in the EIS are miles of pipelines including the old SST cross-site pipelines that extend beyond the SST tank farm fencelines to interconnect with cribs, trenches ponds, vaults, and process facilities. Although USDOE included some selected cribs and trenches located beyond the SST fencelines, there is no mention of the large system of buried SST pipelines that remain in the ground. The EIS failed to address the contamination associated with these old abandoned pipelines. In the past, many if not most of these old pipelines were removed from service due to leaks, and plugging problems that rendered the lines inoperable. In a few cases the leaks were discovered when liquid waste formed wet areas above the defective piping. Revise the EIS to include a description of these structures and all estimates of associated leaked and plugged inventory remaining in the pipelines. Additionally, include a complete description of past leaks, associated inventory, and a description of how the leaks were remediated. Revise EIS risk modeling to account for this increased inventory and associated future risk scenarios. **491-10**

12) In section 6.4.3.1, Tables 6-31lists only lists mercury as having a potential cumulative impact to Ecological receptors via on-site surface soil. Under ecological risk (Table 2-46) other contaminants are addressed including benzene, toluene, xylene, and formaldehyde; however these limited additional compounds are assumed to only reach the environment through a water pathway. Missing from the ecological risk direct soil exposure (direct contact, ingestion, and air inhalation) are many other significant toxic isotopes, compounds, etc. Many toxic constituents are potentially available to the ecology the future due to either failed landfill covers or through natural or man-made disturbances to the site soil. Revise the EIS to include these additional contaminants and risk scenarios. **491-11**

13) The EIS failed to discuss Land Disposal Restriction (LDR) requirements with respect to all scenarios proposing to leave toxic material on site. LDR regulations require a comparison of best available technologies to meet land disposal treatment standards. Rationale for selection of technologies meeting LDR requirements must be included in the EIS. **491-12**

14) The EIS failed to provide a specific description and diagrams of all of the structures/equipment included in the "SST" system. The EIS must be revised to **491-13**

this EIS. Methods applied for evaluation of direct human intrusion are presented in Appendix Q, Section Q.2.3, while results of the analysis are presented in Sections Q.3.1 (Tank Closure alternatives), Q.3.2 (FFTF Decommissioning alternatives), and Q.3.3 (Waste Management alternatives). Direct-intrusion exposure pathways include worker inhalation and direct radiation and the complete set of residential farming pathways. Only a small fraction of the ecological populations at the site would be exposed to waste, given the closure designs and depth to the waste. There is no basis for quantitative comparison of risk to ecological receptors exposed by direct contact to waste in failed landfills under the different alternatives.

491-9 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activities or remediation of the burial grounds and old transfer lines included within the SST and DST systems as part of the proposed actions evaluated. However, the estimated inventories for these contaminated sites are included in Appendix S, "Waste Inventories for Cumulative Impact Analyses," and the long-term impacts included in Appendix U, "Supporting Information for the Long-Term Cumulative Impact Analyses." As described in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, DOE is not making decisions regarding a number of contaminated sites, including the above, as part of the NEPA process.

491-10 Appendix D, Section D.1.2, Tank Ancillary Equipment Waste, provides a discussion of the inventories for the ancillary facilities, including the transfer piping associated with the SST and DST farms within the permit and waste management areas. However, there are pipelines outside the permit and waste management areas. Tables D–9 through D–12 provide the radioactive and nonradioactive inventories for the SST and DST ancillary equipment.

491-11 As described in Chapter 6, Section 6.4.3, the selected COPCs are those with the highest Hazard Quotients under the three alternative combinations: mercury for receptors exposed to soil and air at the onsite maximum-impact location, and mercury and benzene for receptors exposed to sediment and Columbia River surface water. For these analytes, only the estimated cumulative concentrations of mercury in onsite surface soil for Alternative Combinations 2 and 3 pose a potential for adverse impacts on ecological receptors. The ecological risk analysis is a tool for comparing alternatives, and it does this with a limited set of contaminants. It is not meant to be an assessment of every possible contaminant potentially released in the past or future. All alternatives evaluate the same set of contaminants, which serve as indicators of the various types of contaminants

include a complete description of the entire SST system. The transfer lines and associated structures do not end at the tank farm fencelines. The revised description must include a discussion of exactly which structures are addressed in this EIS as well as which items are not addressed. **491-13 cont'd**

15) The EIS fails to discuss the realities of SST in-tank sampling at Hanford. All tank core samples stop short of the bottom of the tank to avoid damaging the tank steel shell. All SST tank shells (liners) are well beyond the engineered design life and the condition of the steel shell is unknown. The fact that many tanks have leaked, indicate the general condition of the SST steel shells is marginal at best. Several cores are taken from each tank and indicate that the layering of toxic tank sediments/constituents is uneven and therefore the information from a few cores in each tank is not very representative of the specific toxic nature of an individual tank. The original wastes were added to tanks in a liquid form and heavier materials concentrated in the bottom of each tank. Since no sample data is available from the bottom layers of any tank, drawing any conclusions relating to the heavier toxic materials including much of the radionuclide content is not acceptable. Revise the EIS to address this fact and include revised estimates of the residual heavy radionuclides projected to remain in the SSTs. **491-14**

16) There is a lack of sufficient characterization for many units at Hanford. Specifically there is very little characterization relating to burial grounds. This is especially a problem for the older burial grounds that lack records of materials dumped in the burial grounds. Additionally the older burial grounds operated with few restrictions and received a wider range of toxic materials than some of the newer burial grounds. Missing from the EIS is a basis for the estimated contamination listed in the EIS. A cross check of documents found discrepancies for estimated inventories in a number of burial grounds (see comments #3 and #4). Revise the EIS to include the basis for burial ground estimates in the EIS. **491-15**

17) The EIS fails to include a discussion of specific field sampling used to verify the results of modeling used in the EIS. Revise the EIS to include adequate modeling verification with field samples sufficient to validate the models used in the EIS. **491-16**

18) General: Due to the significant amount of contamination at Hanford (and at the adjacent US Ecology facility), the lack of adequate characterization, and the projected future impacts to human health and the environment, additional waste must not be brought to Hanford at any time in the future. **491-17**

19) Prior to 1997, I was the Washington State Department of Ecology SST system closure permit writer (now retired). USDOE contractors submitted a graph showing uranium groundwater contamination starting to increase after 10,000 years into the future; yet, at the time USDOE did not consider the information to be relevant since it exceeded a USDOE policy that excluded discussion of any impacts beyond a 10,000 year maximum timeline. The TC&WM EIS also did not **491-18**

that might be released, and which were judged to be sufficient for comparing the alternatives and cumulative impacts thereof.

491-12 Chapter 8 of this *TC & WM EIS* identifies the laws, regulations, and other requirements that potentially apply to the alternatives. Specifically, Section 8.1.4 identifies and summarizes the potential hazardous waste and materials management requirements, including the land-disposal-restriction requirements (40 CFR 268). This section also discusses the treatment standards for HLW. Actual implementation of the selected actions following issuance of DOE's ROD for this EIS would be subject to the more detailed evaluations and processes required under RCRA, the Washington State Hazardous Waste Management Act, and CERCLA, as applicable, including meeting Land Disposal Restriction requirements.

491-13 Several sections in Appendix E describe the SST system, its current operation, and the components analyzed in this EIS. Examples include Section E.1.1, Current River Protection Project, and Section E.1.2, Descriptions of Tank Closure Alternative Facilities and Operations.

491-14 Appendix D, Sections D.1.1, Current Tank Inventory of Radioactive and Chemical Constituents, and D.1.1.4, Uncertainty in Best-Basis Inventories, provide discussions of the tank waste inventories and the uncertainties in the inventory estimates. DOE believes the inventories used in this EIS represent the best and most-accurate data available at this time. A number of the SSTs are currently undergoing waste retrieval actions that are part of the tank closure process. The commentor is referred to Chapter 8, Section 8.1.4, for a description of RCRA closure, including landfill and clean closure for tank systems. In addition, this section provides details regarding the TPA, a legal agreement between DOE, Ecology, and EPA that is the mechanism for addressing and defining cleanup commitments and establishing goals for regulatory compliance and remediation with enforceable milestones. Chapter 2, Section 2.2.2.1.1, provides more discussion on how the retrieval benchmarks (0 percent, 90 percent, 99 percent, and 99.9 percent retrieval) coincide with Milestone M-45-00 and Appendix H of the TPA. The tank closure process will include detailed examinations of the tanks and residual waste, as well as preparation of long-term performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators (i.e., Ecology) to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

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include this projected increase in uranium groundwater contamination beginning around the 10,000 years from now. Was this due to the missing uranium data identified in my previous comments and/or a decision to exclude any future projections beyond 10,000 years? Revise the EIS to include this and other relevant projections of risk due to uranium and any other contaminants that are likely to increase beyond 10,000 years. *491-18 cont'd*

20) Appendix D, Section D.1.2, Page D-12 states: "The SST farm volumes were derived by assuming a deposition of waste solids with an average thickness of only about 0.01 to 0.02 centimeters (0.004 to 0,008 inches) on the surfaces of the pits and piping (DOE 2003a). Since USDOE has not performed any meaningful characterization of the inside waste deposition of old SST pipelines this assumption is unacceptable. It does not account for the fact that many old SST pipelines experienced plugging or leaks and were eventually removed from service by capping off the ends of the pipes. Most if not all of these old contaminated pipelines remain in the ground and need to be characterized, removed, treated, and properly contained. The assumption that all pipelines contain a miniscule coating of toxic waste does not match historical records and is inappropriate. Revise the EIS to reflect these facts. *491-19*

21) Using the existing waste inventory found in the current EIS, concentrations of some toxic constituents are estimated to exceed allowable risk limits in the future. When the site inventory is revised to include the missing waste inventory (discussed in prior comments), risk will only increase, likely causing even more toxic constituents to exceed risk limits in the future. Considering the increasing risk at Hanford, it is imperative that all waste that can be reached be removed, treated, stabilized, contained and properly disposed. At a minimum, this would include removal of single shell tanks and pipelines along with associated contaminated soil. Additionally all waste and associated contaminated soil in the unlined burial grounds must be removed, treated, stabilized, and contained. This should meet clean closure requirements for these items/units on site. *491-20* *491-21*

22) Although the EIS provided inventory estimates for many units at Hanford, the EIS was unclear about the end state (disposition) of many of these inventories. For instance there are large concrete storage pits inside T-plant containing significant radioactive and non-radioactive toxic materials. Additionally there are several areas outside of T-plant where toxic materials remain in the ground. There are other sources of both contained and in-ground contamination. The EIS is did not address or categorize the end state/disposition for these units. What are the assumptions for these and similar areas of contamination at Hanford? For those areas where the plan is to simply cover the waste, were these waste inventories factored into the cumulative risk calculations? If not identify the waste inventories involved. *491-22*

491-15 See response to comment 491-2 regarding data usage in this EIS. Appendix S, Section S.3.5, Analysis of Sites with Missing Inventory, describes from a macro perspective the availability and uncertainties of the cumulative impacts analysis data, including the data for the burial grounds. DOE agrees there is minimal characterization of the burial grounds waste, but has provided this insight to give the reader a sense of the uncertainties in the cumulative impacts analysis inventory estimates.

491-16 DOE disagrees with the supposition that the *Draft TC & WM EIS* fails to include specific field-sampling data. Appendix L, Section L.4.3.2, reveals that field-sampling data from over 5,000 boring logs were used to support lithologic encoding of the regional-scale flow model; Section L.6.1, that field-sampling data from approximately 1,800 groundwater wells were used to calculate the regional-scale flow model; and Appendix N, Section N.1.2, that field-sampling data from approximately 140 vadose zone boreholes were used to calibrate the vadose zone model as well as regional-scale groundwater plume measurements for the BY Cribs, BC Cribs, 216-T-26 Crib, and the REDOX and PUREX waste sites. Furthermore, in Appendix U, modeled contaminant plumes are compared against field measurements for the COPCs. DOE's view is that the overall level of characterization data for Hanford supports differentiation among the alternatives, which is a key feature of a NEPA analysis.

491-17 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

491-18 DOE disagrees with the commentor's assertion that the *Draft TC & WM EIS* does not include a projected increase in uranium groundwater concentrations. Uranium concentrations in groundwater for all of the alternatives are presented in Chapter 5, and the vast majority of them show groundwater concentrations increasing near the end of the 10,000-year simulation period. This issue is extensively discussed in the text of Chapter 5. A discussion of the causes of the increase and the implications for the comparison of the alternatives is presented in Appendix O, Section O.6, of the *Draft TC & WM EIS*.

491-19 Waste volumes in the old SST pipelines were developed from detailed analyses of three SST farms and then extrapolated to the remaining SST

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23) Are there any assumptions that a cover/cap over waste left in the ground will contain the waste forever? If so, revise the EIS to include the waste types and quantities the nuclear and non-nuclear toxic waste inventory involved. *491-23*

24) The EIS indicates that USDOE plans to transport significant amounts of radioactive and mixed waste to Hanford over many hundreds of miles of transportation routes with the assumption that some members of the public will be at risk to exposure. This is unacceptable for a number of reasons, including the potential public exposure and the fact that it will only add to the already high future risk of release of toxic materials at Hanford, in the area near Hanford and to the Columbia River. Revise the EIS to exclude the concept of bringing additional waste to Hanford. The idea of adding more waste to the most contaminated site in North America is unthinkable. *491-24*

Sincerely,

Richard and Tina Heggen

6444 N. Five Views Rd.
Tacoma, WA 98407

farms. This analysis is documented in the *Closure Technical Data Package for the Tank Waste Remediation System Environmental Impact Statement* (Kline, Hampt, and Skelly 1995) and represents the best-available data. In addition, DOE believes that many of these old SST pipelines may be removed or remediated in place during closure activities because they are located within several feet of the ground surface.

491-20 DOE conducted a detailed review of available inventory data and believes the waste inventories analyzed in this EIS represent the best-available data at the time of its publication. However, in response to a number of comments from the public, DOE undertook another detailed review of the tank past leaks inventory evaluated in the draft EIS and determined that the inventory for a number of unplanned releases needed to be revised. This inventory is relatively minor, but was updated in the inventory estimates and groundwater analyses in this *Final TC & WM EIS*. In addition, DOE found that many of the documents used to develop the cumulative impacts analysis inventory did not include a total uranium inventory estimate in their estimated uranium radioactive inventory. DOE calculated this total uranium inventory and added it to the cumulative impacts analysis inventory for analysis in this final EIS. Thus, the estimated radiological risks due to the additional inventory from the unplanned releases estimate are reflected in Chapter 5 and the Summary, Section S.5.5. The estimated human health impacts due to the additional calculated total uranium inventory are reflected in Appendix T, "Supporting Information for the Short-Term Cumulative Impact Analyses," and Appendix U, "Supporting Information for the Long-Term Cumulative Impact Analyses."

The scope of this *TC & WM EIS* includes non-groundwater remediation activities for tank closure and FFTF decommissioning. Other Hanford remediation activities required under RCRA, CERCLA, and/or the TPA are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. Cleanup decisions regarding the non-tank-farm contamination sites will be made in consultation with Federal and state agencies. The other Hanford remediation activities are considered in the *TC & WM EIS* cumulative impacts analysis, although this EIS is not able to fully reflect the effectiveness of remediation activities and does not consider groundwater remediation. There are significant uncertainties in estimating the degree of cleanup that can be achieved by the remediation activities. For example: (1) the inventories of contaminants released to the ground at many of the sites are uncertain; (2) for liquid release sites, the portion of the originally disposed contaminants remaining in the vadose

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zone and the portion that has migrated into the groundwater are uncertain; (3) the specific cleanup/containment methods for some sites have yet to be selected; and (4) the effectiveness of the cleanup/containment methods is uncertain. Therefore, the cumulative impacts analysis in this *TC & WM EIS* is conservative because it does not account for cleanup/containment of waste and contaminated soil at liquid release sites and cleanup/containment of current or future groundwater contamination.

In recognition of the concerns about the effects of the remediation activities, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

491-21 The clean closure options considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and contaminated soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that the removal of the contaminants from the vadose zone does not capture the contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

491-22 Appendix S, "Waste Inventories for Cumulative Impact Analyses," includes the status or future end states assumed for each of the waste sites or buildings within the cumulative impact analyses in Tables S–9 through S–34. The T Plant complex is included in Table S–19.

491-23 Full descriptions of both the modified RCRA Subtitle C and Hanford barriers are provided in Appendix E, Section E.1.2.5.4.1. It is noted in that section that the modified RCRA Subtitle C barrier is designed to provide long-term containment and hydrologic protection for a performance period of 500 years, while the Hanford barrier is designed for 1,000 years. As discussed in Chapter 2, Section 2.5.1.1, Tank Closure Alternatives, the end-state management of the tank farm systems after placement of a barrier includes postclosure care. Postclosure care is identified as the period following closure of a hazardous waste disposal system (e.g., a landfill) during which monitoring and maintenance activities must be conducted to preserve the integrity of the disposal system and continue preventing or controlling releases from the disposal unit.

For analysis purposes in this *TC & WM EIS*, it was assumed that the postclosure care period following landfill closure of the SST system would be extended to 100 years. The planned postclosure care program proposed for Hanford is described in Appendix E, Section E.1.2.5.4.2, Postclosure Care. As discussed in this section, it is recognized that, although these monitoring activities would not be performed for many years, it is important that general information on the various technologies and alternatives for monitoring be identified in this EIS. This section is provided as a general overview and description of the postclosure care program; specific design details (e.g., fencing) and specific administrative control details (e.g., access restrictions) are to be developed in the future.

491-24 Radioactive waste is transported in DOT-certified containers that meet strenuous technical standards established by NRC. See response to comment 491-17 for a discussion on the transport and disposal of offsite waste.

Commentor No. 492: Peter Stoel

From: Peter Stoel [peterfstoel@gmail.com]
Sent: Monday, May 03, 2010 2:32 AM
To: tc&wmeis@saic.com
Cc: Karen Josephson
Subject: Hanford tank closure and waste mgmt EIS

My comments on the TC&WM EIS:
I was born in Portland and lived there most of my life. I've long been very concerned about the waste contamination problem at Hanford, especially the current and future leakage of carbon tetrachloride and radioactive isotopes into the Columbia River some of which can come right down into Portland.

- -- I am alarmed at the "preferred alternative" course of action which will leave high-level radioactive waste that has leaked from tanks permanently under the old tanks despite its movement toward the River. These wastes must be cleaned up and sealed from further spread! *492-1*
- -- The lack of a thorough inventory of the wastes that was thrown into unlined dirt trenches decades ago. We must find out what is in these trenches, and estimated quantities, so we can responsibly manage these materials, monitor future leakage, and decide what cleanup must be done. *492-2*
- -- The FFTF needs to be dismantled and the dangerously radioactive materials disposed of properly in a national depository *492-3*
- -- **Do not bring any more radioactive waste to Hanford !** The DOE needs to find a truly geologically stable formation somewhere in North America and build a depository in that formation, not at Hanford with its leaky conditions and proximity to a major river. In the meantime do not bring in any more waste. *492-4*

Peter Stoel
3025 SW Morris Av
Corvallis OR 97333

Peter Stoel
RESULTS Corvallis volunteer

492-1 The Summary, Section S.5.5, and Chapter 2, Section 2.10, of this EIS discuss the key environmental findings associated with the alternatives, including findings related to potential long-term impacts on groundwater from closure of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford.

One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

492-2 DOE has taken responsibility for waste cleanup at Hanford. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

492-3 Regarding the total dismantlement of FFTF (essentially FFTF Decommissioning Alternative 3), although nearly all elements of FFTF and the two adjacent support facilities would be removed under this alternative, the lower portion of the RCB concrete shell would remain. This would be backfilled with either soil or grout to minimize void space. The area would be regraded and revegetated, with no need for a barrier. DOE's preference is for FFTF Decommissioning Alternative 2,

under which some below-grade structures would remain; however, these would be grouted in place to immobilize the hazardous constituents. The filled area would then be covered with a modified RCRA Subtitle C barrier to further isolate the entombed structures and prevent infiltration of water. These actions (grouting and barrier placement) would minimize the migration of any contaminants to the environment.

492-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections describe the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 493: Daniel Swink

From: Daniel Swink [drswink@pacifier.com]
Sent: Monday, May 03, 2010 2:58 AM
To: tc&wmeis@saic.com
Subject: TCWMEIS Comments
Attachments: 2010-5-2 Hanford Draft Tank Closure & Waste Management EIS (TCWMEIS) Comments.doc

Dear Mary Beth Burandt,

Please see the attached word document with comments on the Hanford Draft Tank Closure & Waste Management EIS (TCWMEIS).

Regards,

Daniel Swink

Response side of this page intentionally left blank.

Commentor No. 493 (cont'd): Daniel Swink

May 2, 2010

Mary Beth Burandt
Document Manager
U.S. Department of Energy
Office of River Protection
P.O. Box 1178
Richland, WA 99352
Email: TC&WMEIS@saic.com

RE: Hanford Draft Tank Closure & Waste Management EIS (TCWMEIS) Comments

Attention Mary Beth Burandt and the U.S. Department of Energy:

Given the extensive history of existing and continuing contamination expansion in the Hanford area, I continue to find it unconscionable and completely irresponsible of the government agencies involved, to even consider adding more radioactive waste without containing and cleaning up the existing contamination. *493-1*

Radioactive waste is already spreading through groundwater aquifers to the Columbia River and threatening all the humans, wildlife and plants that depend upon these water sources. The longer the contamination continues to exist and the more waste that is brought in, the greater the irreversible deadly threat that will spread through the various environmental conveyance systems and affect the whole Northwest region and beyond. *493-2*

I demand that the U.S. Department of Energy (DOE) implement the following:

1) Complete clean-up of all 55-million-gallons of radioactive and hazardous tank waste with over 99% retrieval. *493-3*

2) Complete cleanup of any additional tank waste.

3) Complete cleanup of the millions of gallons of nuclear waste that has already leaked into the groundwater and is reaching the Columbia River. *493-4*

4) Complete cleanup of the contaminated soil. *493-5*

5) Drop any proposal to import off-site radioactive or nuclear wastes from other parts of the U.S. or from other locations to Hanford. *493-6*

Thank you for your attention to this matter.

Sincerely,

Daniel Swink
PO Box 61884
Vancouver, WA 98666

493-1 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

493-2 The purpose of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. The results of the risk analysis for air and groundwater releases to the Columbia River under the various alternatives include potential impacts on human health (Appendix Q, Section Q.3) and ecological resources (including animals and plants) (Appendix P, Section P.3).

493-3 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the single SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

493-4 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s

Commentor No. 493 (cont'd): Daniel Swink

and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

493-5 Comment noted.

493-6 See response to comment 493-1 for a discussion on the transport and disposal of offsite waste.

Commentor No. 494: Paul J. Kollas

From: Paul Kollas [pkkollas@gorge.net]
Sent: Monday, May 03, 2010 12:18 PM
To: tc&wmeis@saic.com
Subject: Hanford and the Draft EIS

I hereby protest against the decision and proposals to import more nuclear and hazardous wastes into the Hanford operation. DOE has a long-standing record of inability to clean up in-place wastes. Adding to the problem with importation of off-site wastes hides the problems of waste disposal. The pressure to "go nuclear power" will increase because of the off-shore oil drilling problem. The as-yet-unsolved problems associated with nuclear power must be faced, and addressed by the public at large. Hiding the wastes at Hanford hides the problem. *494-1*

Paul J Kollas

494-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Nuclear energy production and its resulting waste, as well as renewable energy policies, are not within the scope of this *TC & WM EIS*. Regarding the safe disposal of waste generated from nuclear energy production, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

Commentor No. 495: Nelly Sangrujiveth

From: Nelly Sangrujiveth [nelly@uoregon.edu]

Sent: Monday, May 03, 2010 1:36 PM

To: tc&wmeis@saic.com

Subject: Comments to Hanford draft EIS

Attachments: Comments on Hanford Cleanup draft EIS.docx

To Whom it May Concern,

I've included my comments to the Hanford Cleanup program's draft Environmental Impact Statement in the body of this email below. For your convenience, I've also attached a copy of the comments.

Thank you,

Nelly Sangrujiveth

Response side of this page intentionally left blank.

Commentor No. 495 (cont'd): Nelly Sangrujiveth

Comments to Hanford Cleanup Site EIS — Page - 1

To Whom it May Concern:

I am writing this letter to comment on the Department of Energy's Environmental Impact Statement on the Hanford site. I have been living in the Northwest for 5 years and frequently use the Columbia River for recreational purposes. I understand that the proposed action will greatly affect the lives of current and future generations. My connections to this area and my concern for the environment compel me to write this comment.

After reading the Environmental Impact Statement prepared by the U.S. Department of Energy, I have the following comments:

(1) I urge the Department of Energy to reconsider its proposal to accept off-site waste by considering an alternative to not accept off-site waste altogether; *495-1*

(2) Isupport Washington State's preferred alternative to retrieve 99.9% of waste, as opposed to the Department of Energy preferred alternative to retrieve only 99% of waste; *495-2*

(3) I implore the Department of Energy to reevaluate cumulative impacts this project will have on water resources, which should include ocean water and marine natural resources given the fact that the Columbia River flows into the Pacific Ocean. *495-3*

1. The Hanford Site Should NOT Accept Off-Site Wastes

I am opposed to the Department of Energy's (DOE's) proposal to use the Hanford site as a national radioactive waste dump for off-site wastes; nothing in the Environmental Impact Statement (EIS) justifies using the Hanford site as such. *495-1 cont'd*

a. Health risks posed by off-site wastes are too high and the DOE must analyze the reason for accepting off-site wastes in accordance with NEPA.

Practically speaking, the health risks posed by utilizing the Hanford site as a national radioactive waste dump are too high. Statistics say that utilizing the 200 East landfill as a waste dump will increase radioactive contamination and cancer risk levels over the next thousand years by tenfold; this is 100 times the rate that is acceptable in Washington state's cancer risk standards. Another problem with using Hanford as an off-site waste dump is the health risk of transporting radioactive waste to Hanford. The DOE proposes to truck into Hanford nearly 3 million cubic-feet of radioactive and mixed radioactive wastes. That represents more than 2 trucks a day, every day for over twenty years. In other words, at least 14,600 trucks will be carrying radioactive wastes to the Hanford site on public highways where many privatecitizens risk exposure to radiation. *495-4*

Given the fact utilizing the Hanford site in this manner poses high public health risks, the DOEis obligated to elaborate why it is necessary for the Hanford site to store off-site waste.The National Environmental Policy Act (NEPA) is intended to be a vehicle for informing the public of the fundamental purpose of a project. The Hanford Cleanup project is for the purpose of cleaning up the atomic waste generated by the Department of Defense, and addingoff-site waste to the Hanford site while risking further contamination does not further that purpose. *495-1 cont'd*

Additionally, under NEPA, 40 C.F.R. § 1502.23, the DOE is required to conduct an analysis to *495-5*

495-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The purpose of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites.

495-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

495-3 While it is true that past operation of the Hanford production reactors along the Columbia River discharged cooling water containing radionuclides into the river, these practices were phased out over time and were discontinued in 1991 when the last reactor was shut down. As described in Chapter 3, Section 3.2.6.1.1, Surface Water, all radioactive contaminant concentrations measured in the Columbia River in 2009 were lower than applicable DOE derived-concentration guides for ingested water (DOE Order 458.1) and Washington State ambient-surface-water-quality criteria.

495-4 The *Draft TC & WM EIS* analyzes the transportation of RH-LLW from INL to Hanford for disposal. Based on the public's input and concerns about offsite waste disposal at Hanford, DOE has included in this *Final TC & WM EIS* an example of a potential mitigation measure that could be taken by DOE. Specifically, an offsite waste stream containing a significant inventory of

Commentor No. 495 (cont'd): Nelly Sangrujiveth

Comments to Hanford Cleanup Site EIS Page - 2

inform the public and the decisionmaker of the costs and benefits of environmentally different alternatives. Therefore, under NEPA, the DOE is obligated to analyze the cost-benefit of utilizing the Hanford site as an off-site waste dump versus not utilizing the Hanford site in this manner. No such analysis was conducted in the EIS. *495-5 cont'd*

b. The EIS failed to give a full and fair disclosure of the health effects accepting off-site waste poses, and this failure violates NEPA.

The EIS categorically excluded children from an analysis of the risks of accepting off-site wastes, which violates NEPA. The EIS's purpose is to foster informed decisionmaking and informed public participation. 40 C.F.R. § 1502.1.To accomplish this, an EIS must take a hard look at a proposal's environmental consequences. See 40 C.F.R. § 1502.2. This entails providing a reasonably thorough discussion of the significant aspects of the probable environmental consequences within the EIS. *Id.*In the Hanford EIS, there was no discussion as to how the health of children will be impacted in utilizing Hanford as an off-site waste dump. Undoubtedly, in transporting waste on public highways, both adults and children will be exposed to radiation that will pose health risks. Children are particularly vulnerable to health risks posed by radiation exposure. According to the American Academy of Pediatrics, children's bodies absorb and metabolize substances differently from adults, which makes them more likely to develop certain cancers from radiation exposure.[1]The Environmental Protection Agency (EPA) has also stated that children are more sensitive to radiation than adults. This is because "children are growing more rapidly [which means] there are more cells dividing and a greater opportunity for radiation to disrupt the process."[2] As a matter of policy, EPA's radiation protection standards take into account the difference in the sensitivity due to age and gender. The DOE must do the same. In leaving out an analysis as to how many children will be exposed and what type of health risks they will suffer, the DOE failed to take a hard look at environmental impact of its proposal and failed to do its duty to provide a fully comprehensive cumulative impacts analysis. *495-6*

The EIS also fails to analyze what type of risk will be posed from the consumption of agricultural products that were grown or raised with contaminated water. As the EIS indicated, groundwater will become contaminated from carbon tetrachloride, uranium, radioactive iodine, and other substances. After indicating that these substances in the water are carcinogenic and pose health risks, the EIS provided an analysis of how this will affect drinking-water well users, resident farmers, American Indian Resident Farmers, and American Indian Hunter-Gatherers. Although these population groups are pertinent, it is imperative to also include the population who will consume agricultural products grown with contaminated water as part of a comprehensive EIS. One study states: *495-7*

> "Internal irradiation can occur after inhalation of a radioactive gas or ingestion of contaminated food (including produce, grains, and milk from goats or cows that have been grazing on contaminated fields). Radiation effects can be direct, interacting with target tissues; or indirect, producing free radicals or other harmful molecules."

[1] American Academy of Pediatrics, "Radiation Disasters and Children," published in PEDIATRICS Vol. 111 No. 6 June 2003, available at http://aappolicy.aappublications.org/cgi/reprint/pediatrics;111/6/1455.
[2] http://www.epa.gov/rpdweb00/understand/health_effects.html#children

iodine-129 (i.e., RH-LLW resins from INL) was eliminated from the analysis. Implementing this mitigation measure reduced the number of shipments analyzed from about 16,600 in the *Draft TC & WM EIS* to about 14,200 in this *Final TC & WM EIS*, as presented in Chapter 4, Section 4.3.12. This mitigation measure has been incorporated into the Waste Management alternatives. In addition, a sensitivity analysis is included that shows the impacts of limiting offsite waste streams containing iodine-129 and technetium-99. The results of this sensitivity analysis illustrate the difference this would make in potential groundwater impacts and are included in Appendix M. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this EIS.

495-5 DOE disagrees with the commentor. Under "Cost-Benefit Analysis" (40 CFR 1502.23), a Federal agency may prepare a cost-benefit analysis; however, one is not required. Chapter 2, Section 2.11, of this *TC & WM EIS* summarizes and compares the relative consolidated costs of continued operation of existing facilities; construction, operation, and deactivation of new or modified facilities; and associated activities in support of the proposed actions, including administrative controls, institutional controls, and postclosure care.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

See response to comment 495-2 regarding future DOE decisions.

495-6 DOE acknowledges that the scientific data indicate that health effects from radiation exposure are more pronounced in children than adults. As discussed in Appendix K, Section K.1.1.6, of this *TC & WM EIS*, a number of authoritative studies provide guidance on risk factors relating health effects to dose. Section K.1.1.6 discusses the scientific evidence relating radiation dose to the incidence of cancers, fatal and nonfatal. The discussion indicates that the fatal cancer risk factor of 0.0006 reflects an age distribution that includes children and is generally regarded as conservative. Appendix Q, Section Q.2.4.2, explains that nuclide-specific risk coefficients, developed using techniques that account for gender and age, were used for the long-term human health impacts analysis.

Commentor No. 495 (cont'd): Nelly Sangrujiveth

Comments to Hanford Cleanup Site EIS — Page - 3

In another study that documented radiation exposure in communities that were near the Chernobyl disaster area, "it is estimated that approximately 90 percent of the total lifetime radiation dose to individuals in the population is due to internal exposure to radiation from radiocesium ingested in contaminated foodstuffs."[3] Additionally, the study also found that consumption of locally produced milk and milk products was a significant source of internal radiation exposure.

Studies like these show that it is imperative to analyze radiation exposure through agriculture because consumption of these agricultural products may pose health risks in humans. The EIS should contain an analysis of the cumulative impact of drinking well-water and consuming agricultural products grown with contaminated water or grown near the Hanford site, and not just an analysis of the risk of consuming contaminated ground water. *495-7 cont'd*

c. The cumulative impacts of accepting off-site high-level waste must be analyzed within this EIS.

The EIS also failed to fully analyze the cumulative impacts of accepting high-level off-site waste. The EIS briefly noted that the Hanford site is being considered as a candidate location for a new GTCC waste disposal facility; however, the cumulative impacts of including a GTCC disposal facility were not analyzed in conjunction with the current proposals for the Hanford site. Even though the DOE is analyzing impacts of a new GTCC facility within a separate EIS, NEPA requires that the cumulative impacts of both projects be discussed. *495-8*

d. NEPA requires that the EIS analyze an alternative of not utilizing the Hanford-site as an off-site waste dump.

The EIS failed to include an alternative of not using Hanford as a national radioactive waste dump in violation of NEPA. Under NEPA, the Department of Energy has the obligation to "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." 40 C.F.R. 1502.14(a). After rigorously exploring all the reasonable alternatives, the Department of Energy "shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1. This entails devoting "substantial treatment to each alternative considered in detail," 40 C.F.R. 1502.14(b), and providing a detailed statement that outlines the alternatives. 42 U.S.C. § 4332(2)(C)(iii). Whether an alternative is reasonable depends on whether it is feasible, effective, and consistent with basic policy objectives for the management of an area. *N. Alaska Envtl. Ctr.v. Kempthorne*, 457 F.3d 969, 978 (9th Cir. 2006). *495-9*

In this case, the EIS only considers which landfill should be used as a radioactive waste dump for outside sources of waste. This proposal and its alternatives unlawfully fail to consider not using landfills as a waste dump at all. Not using the Hanford Site as a storage area for outside waste is reasonable and promotes the overall objective of this project, which is cleaning

[3] Pavlo Zamostian, et. al., "Influence of various factors on individual radiation exposure from the Chernobyl disaster," Environmental Health: A Global Access Science Source 2002, available at http://www.ehjournal.net/content/1/1/4.

495-7 Chapter 5 of this EIS presents the long-term human health impacts of potential exposures to radionuclides and chemicals. The radiation dose to the population was calculated by multiplying the dose determined for the resident farmer, who uses surface water for drinking water and crop irrigation, by an estimated 5 million people in the downstream population. These results are included in those portions of the text dealing with the long-term human health impacts of each alternative. Details of the analysis are presented in Appendix Q, "Long-Term Human Health Dose and Risk Analysis," which also discusses and presents impacts of exposure to chemicals in the groundwater.

495-8 Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

495-9 See response to comment 495-1 for a discussion on the transport and disposal of offsite waste.

Commentor No. 495 (cont'd): Nelly Sangrujiveth

Comments to Hanford Cleanup Site EIS — Page - 4

up nuclear waste. The purpose of this cleanup project is to ensure that "appropriate response action" is taken as "necessary to protect the public health, welfare and the environment." The Tri-Party Agreement, Article III.14.A. This objective will be accomplished by prohibiting off-site waste from being store at the Hanford site since without the excess waste, there is less probability of leakage or further contamination of the site and the Columbia River. *495-9 cont'd*

2. 99.9% of the Wastes Should be Retrieved *495-2 cont'd*

The waste contamination problem at Hanford has been lingering for too long. As the Government Accountability Office noted in its 2004 audit report on the Hanford site, "[s]ome of the radioactive components can be very mobile in the environment and, if not checked, may migrate quickly to contaminate soils and groundwater."[4] With this in mind, the cleanup project should be as effective and efficient as possible. A plan to clean less than 99.9% of the waste is an incomplete cleanup and does not accomplish the public's desire to restore the environment.

3. Impacts of to Marine Resources Shouldbe Examined Further *495-3 cont'd*

The EIS neglects to analyze environmental impacts contamination will have on marine resources. Groundwater is hydrologically connected to the Columbia River, which flows into the Pacific Ocean. As the EIS noted, seepage of groundwater into the Columbia River has been documented along the Hanford Reach and occurs both below the river surface and on the exposed riverbank. Contaminants originating at Hanford have been documented in some of these discharges along the Hanford Reach. Because the river water will eventually flow into the Pacific Ocean and because contaminants will be found within salmonids, which are andronomous species, it is likely that contaminants will reach ocean waters and cumulatively impact marine resources. That possibility should be explored in the EIS.

Additionally, contamination of ocean waters should be analyzed in context of the cumulative impacts of man-made climate change and ocean acidification. The United Nations Environment Programme has acknowledged that the ocean serves as a controller of climate change by absorbing greenhouse gases.[5] Sea grasses, mangroves and salt marshes are among several marine and coastal ecosystems that act as natural defenses and water purification systems. If these systems are compromised by land use practices that leach contaminants into the streams, rivers, and oceans, humanity will lose the ocean as a resource to combat climate change. The UNEP Executive Director Achim Steiner has stated: *495-10*

[4] GAO-04-611 "Hanford Waste Treatment Project," June 2004.

[5] UNEP, "Ocean Acidification from CO2 Emissions Causes Substantial Irreversible Damage to Ocean Ecosystems," available at, http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=606&ArticleID=6417&l=en&t=long.

495-10 DOE has reviewed and revised, as necessary, its analyses on the effects of climate change on various resources at Hanford and the possible effects on environmental impacts of the *TC & WM EIS* alternatives. As described in Chapter 6, Section 6.3.4, DOE has reviewed climate studies that forecast general trends in Hanford regional climate change. However, there are no reliable methodologies for projections of specific future climate changes in the Hanford region, and thus such changes have not been quantified in this EIS. To account for this uncertainty, Appendix O, Section O.6.2, describes the effects of enhanced infiltration such as that which may occur during a wetter climate. In the *Draft TC & WM EIS*, Appendix V focused on the potential impacts of a rising water table from a proposed Black Rock Reservoir. Following the retraction of this proposal, the focus of Appendix V was changed in this final EIS to analysis of potential impacts of infiltration increases resulting from climate change under three different scenarios. Appendix V includes sensitivity analyses of potential impacts at Hanford that could result from climate changes that may increase model boundary recharge parameters and the rise of the groundwater table. Additional qualitative discussion of the potential effects of climate change on human health, erosion, water resources, air quality, ecological resources, and environmental justice has been added to Chapter 6 of this final EIS. Additional discussion of the types of regional climate change that could be expected has also been added to Chapter 6, Section 6.5.2, Global Climate Change. The potential impacts of the alternatives on climate change are addressed in Chapter 6, Section 6.5.2, and Appendix G, Section G.5, of this *TC & WM EIS*.

Commentor No. 495 (cont'd): Nelly Sangrujiveth

"If the world is to decisively deal with climate change, every source of emissions and every option for reducing these should be scientifically evaluated and brought to the international community's attention."[6]

One of the biggest challenges to maintaining balance within ocean ecosystems is ocean acidification. A study conducted by the Convention on Biological Diversity shows that:

"[i]ncreasing ocean acidification will mean that by 2100 some 70% of cold water corals, a key refuge and feeding ground for commercial fish species, will be exposed to corrosive waters. In addition, given the current emission rates, it is predicted that the surface water of the highly productive Arctic Ocean will become under-saturated with respect to essential carbonate minerals by the year 2032, and the Southern Ocean by 2050 with disruptions to large components of the marine food source, in particular those calcifying species, such as foraminifera, pteropods, coccolithophores, mussels, oysters, shrimps, crabs and lobsters, which rely on calcium to grown and mature."[7]

495-10 cont'd

The EPA also takes the position that marine resources need to be preserved and that water pollution contributing to ocean acidification should be regulated. As defined by EPA, "ocean acidification refers to the decrease in the pH of the Earth's oceans caused by the uptake of carbon dioxide from the atmosphere."[8]Section 304(a)(1) of the Clean Water Act requires EPA to develop and publish and periodically revise criteria for water quality to accurately reflect the latest scientific knowledge. In revising its water quality standards, the EPA is currently taking into account ocean acidification and plans to implement a policy pursuant to Section 304(a)(2) of the Clean Water Act.

The ocean is an important resource and any further contamination that compromises its ecosystems could lead to significant cumulative impacts. The DOE is obligated to note these cumulative impacts in its EIS.

We should keep in mind the fact that his project is officially known as the River Protection Project. The Columbia River flows through the site and this cleanup project is designed in part to keep contamination from reaching the river.

Sincerely,

Nelly Sangrujiveth

[6] Earth Times, "Indonesia, UN launch ocean climate initiative – Summary," http://www.earthtimes.org/articles/show/311193,indonesia-un-launch-ocean-climate-initiative--summary.html#ixzz0htEvOjMp.
[7] http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=606&ArticleID=6417&l=en&t=long
[8] See, Federal Register: April 15, 2009 (Volume 74, Number 71, page 17484-17487).

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Commentor No. 496: John Berry

From: John Berry [berryj1@seattleu.edu]

Sent: Monday, May 03, 2010 2:38 PM

To: tc&wmeis@saic.com

Subject: EIS Comment

Attachments: Hanford COmment.doc

Please find my comment to the TC & WM EIS attached.

John Berry
Seattle University School of Law
Class of 2010
(xxx)xxx-xxxx
berryj1@seattleu.edu

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Commentor No. 496 (cont'd): John Berry

John Berry
525 Belmont Ave E, Apt. 3C
Seattle, WA 98102

United States Department of Energy
TC & WM EIS
P.O. Box 1178
Richland, WA 99352

April 11, 2009

To Whom It May Concern:

I am writing to comment on the U.S. Department of Energy's (DOE's) *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*. This document discusses the potential environmental impacts of several aspects of the ongoing cleanup of the Hanford Site: tank closure, Fast Flux Test Facility (FFTF) decommissioning, and waste management. While the EIS presents a plethora of issues worthy of comment, my comments today will focus on the potential impacts of these cleanup activities on federally listed threatened and endangered species, specifically Columbia River Chinook and Steelhead salmon.

Endangered Species Act Duty to Consult

Section 7 of the Endangered Species Act ("ESA") is the heart of the ESA's protections related to federal actions. It imposes a strict substantive and procedural duty on federal agencies to ensure that their activities do not cause jeopardy to listed species or adverse modification to their critical habitat.[1] Not satisfied that federal agencies possessed the requisite expertise to satisfy this substantive requirement on their own, Congress added a strict procedural requirement – that the determination of whether any federal action would be likely to cause jeopardy or adverse modification would be made

[1] 16 U.S.C. § 1536(a)(2)

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"in consultation with and with the assistance of [the Services]."[2] This mandatory consultation is the key to Section 7; in fact, Congress titled Section 7 "Interagency Cooperation."

The ESA mandates such consultations to insure that an agency action "is not likely to jeopardize the continued existence of any" listed species or adversely modify their critical habitat.[3] The joint consultation regulations require such consultations whenever an action "may affect" a listed species.[4] Where an action is "likely to adversely effect" a listed species, the agency must, in the case of anadromous fish species, conduct formal consultation with the National Oceanic and Atmospheric Administration (NOAA). The end product of formal consultation is a biological opinion in which NOAA determines whether the action will cause jeopardy to the species or adversely modify designated critical habitat.[5]

In the joint consultation regulations, NOAA and the United States Fish and Wildlife Service (USFWS) have established a preliminary review process that can be used to sidestep formal consultation in limited situations. For all actions that "may affect" a listed species, the action agency must determine whether the action is "likely to adversely affect" or "not likely to adversely affect" the listed species.[6] The threshold for such a determination is very low.[7] An action that is "likely to adversely affect" a listed species or its critical habitat must undergo formal consultation that culminates with the Services' issuance of a biological opinion that complies with the ESA and regulatory

[2] *Id.*
[3] *Id.*
[4] *See* 50 C.F.R. § 402.14.
[5] 16 U.S.C. § 1536(b)
[6] 50 C.F.R. § 402.14(a)-(b)
[7] *See* 51 Fed. Reg. 19,926, 19,949 (June 3, 1986) (stating "Any possible effect, whether beneficial, benign, adverse or of an undetermined character, triggers the formal consultation requirement…").

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Commentor No. 496 (cont'd): John Berry

requirements.[8]

Under the joint regulations, a "not likely to adversely affect" determination can lead instead to an informal consultation, which consists of all discussions and communications between the agencies and ends with the Services' written concurrence in that determination.[9] If NMFS does not concur, the action is deemed "likely to adversely affect" and the agencies must conduct a formal consultation.[10] Utilization of informal consultation is optional in those instances where it is available.

An agency may avoid "consultation only when it has determined the proposed action is unlikely to adversely affect the protected species or habitat *and* the [regulatory agency] concurs with that determination."[11]

Among the forty-three species of fish present in the Hanford Reach are several endangered species, including the Upper Columbia River spring-run Chinook salmon and steelhead ESUs. Spring-run Steelhead trout (*Onchorhynchus mykiss*) spawning has been observed near gravel bars in the Hanford Reach from the 100-BC operable unit to wooded island. While spring-run Chinook salmon (*Onchorhynchus tshawytscha*) have not been documented spawning in the Hanford Reach, juveniles pass through the area during migration.[12] Additionally, incidental occurrences of other fish species listed as threatened under the ESA, including Middle Columbia River ESU Steelhead, Snake River Basin Steelhead, Snake River Fall Run Chinook, and Snake River Spring/Summer Run Chinook, have been documented in the Hanford Reach.[13]

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[8] *Id.* at §§ 402.02, 402.14(a)
[9] *Id.* at § 402.13
[10] *Id.* at §§ 402.02, 402.14(a).
[11] *Tinoqui-Chalola Council of Kitanemuk v. U.S. Dept. of Energy*, 232 F3d 1300 (9th Cir. 2000) (citing 50 C.F.R. § 402.14(b)) (emphasis added).
[12] *Threatened and Endangered Species Management Plan*, Department of Energy, DOE/RL 2000-27.
[13] *Interim Remedial Action ROD for 100-NR1 and 100-NR2 Operable Units* (September 1999).

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The TC & WM EIS indicates that DOE has engaged in informal consultation with the USFWS and NOAA regarding the potential impacts of the cleanup actions on endangered species.[14] The documents contained in Appendix C, however, fail to establish that DOE has met its consultation duty under Section 7 of the ESA. In Appendix C, DOE presents letters sent to USFWS and NOAA in 2003 asking for lists of endangered species that could be affected by the proposed actions. The documents indicate that DOE did not receive a response from USFWS or NOAA. These communications simply do not satisfy Section 7 requirements.

An agency may avoid "consultation only when it has determined the proposed action is unlikely to adversely affect the protected species or habitat *and* the [regulatory agency] concurs with that determination." *Tinoqui-Chalola Council of Kitanemuk v. U.S. Dept. of Energy*, 232 F3d 1300 (9th Cir. 2000)(citing 50 C.F.R. § 402.14(b)) (emphasis added). In its communications with NOAA, DOE did not make a determination that the proposed action is unlikely to affect protected salmonid species. Indeed, DOE even stated that "activities covered by the EIS may impact the Columbia River and its fisheries' references due to leaks from the tanks reaching the river via the groundwater pathway."[15] Furthermore, even had such a determination that the actions were unlikely to adversely affect protected species or habitat been made, Appendix C suggests that neither USFWS or NOAA made any statement concurring with such a determination. As such, DOE has not yet consulted with USFWS or NOAA, formally or informally, regarding the impacts of the proposed action in the *TC & WM DEIS* on endangered species.

[14] See *TC & WM DEIS*, Section 3.2.7.4.
[15] *TC & WM DEIS*, Appendix C at 43.

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496-1

496-1 In 2003, DOE initiated informal consultation with USFWS and NMFS, as well as the State of Washington, at a time when the proposed scope of this EIS was limited to the retrieval, treatment, and disposal of tank waste and closure of SSTs. However, since that time, the scope of this EIS has been expanded to include decommissioning of FFTF and waste management. Accordingly, DOE reinstituted informal consultation with USFWS, NMFS, and the state in 2008 (see Appendix C, Section C.2.1). While responses to consultation letters were received from the state, none was received from USFWS or NMFS (see Appendix C, Section C.2.3). Each agency was also provided a copy of the *Draft TC & WM EIS*; however, whereas USFWS commented on the document, NMFS did not. It should be noted that neither the 2003 nor 2008 letter to NMFS implied that the proposed actions "may affect" Columbia River resources, but rather sought information from the agency concerning what species DOE should consider in its analysis. In addition, while the *Threatened and Endangered Species Management Plan, Salmon and Steelhead* (DOE 2000b) defines DOE's commitment to stocks of steelhead and spring Chinook salmon, it was not used to support DOE's position relative to the commentor's statement.

Potential long-term impacts on salmonids of actions taken under the various alternatives presented in this *TC & WM EIS* are addressed in Appendix P, Section P.3. The analysis indicates that chromium is the only COPC that could have a potential toxic effect on salmonids (i.e., the Hazard Quotient was above 1 under all Tank Closure alternatives, including No Action, and some Waste Management alternatives). However, it should be noted that there is virtually no difference between the Tank Closure action alternatives and the No Action Alternative, indicating that a source(s) other than the tank farms is contributing significantly to the results. Further, when Hazard Quotients for chromium under Alternative Combinations 2 and 3 are compared with values that include Alternative Combinations 2 and 3 plus nontank sources (i.e., cumulative impacts), it can be seen that the Hazard Quotient of the latter is approximately 10 times that of the former (see Chapter 6, Section 6.4.3), again indicating that a source(s) other than the tank farms is contributing the majority of chromium at the Columbia River. Analysis has shown that the majority of chromium comes from the 100-K Mile-Long Trench, 216-C-1 Hot Semi Work Crib, 216-S-8 Trench, and certain ponds in the 200-West Area and 300 Area. Considering that the actions proposed in this *TC & WM EIS* would not be the major contributors to a Hazard Quotient that is greater than 1 for chromium at the Columbia River, they cannot lead to a finding of "may affect" relative to threatened or endangered

Accordingly, any actions taken under the *TC & WM DEIS* would violate the procedural requirements of Section 7 of the ESA.

DOE should consult with USFWS and NOAA before completing the Final TC & WM EIS. As DOE has recognized, the actions proposed in the draft *TC & WM EIS* "may affect" endangered spring-run Steelhead trout and spring-run Chinook salmon because of leaks from the tanks reaching the Columbia River via groundwater pathways. Additionally, the proposed actions "may affect" these endangered Columbia River species because of the potential impacts of the transportation of radioactive waste to and from the Hanford site.

Each of the proposed actions may affect the water quality of the Columbia River, and, by doing so, affect endangered salmon species. The tank closure decision, whether to cleanup 90%, 99%, or 99.9% of the High-Level Nuclear Waste contained in the shells and tanks at Hanford, could affect endangered salmon because of the varying amounts of contaminants that could leach into the Columbia River via groundwater pathways. Likewise, the FFTF decommissioning decision could impact endangered salmon because of the risks of accident or terrorist activities created by transportation of contaminated FFTF parts to the Idaho National Laboratory. A transportation spill adjacent to the Columbia River could have enormous impacts on endangered salmon. Similarly, the waste management proposals – specifically, the decisions to store off-site waste at Hanford – could impact endangered salmon because of transportation risks created by moving off-site low-level radioactive wastes to Hanford for disposal. The transportation routes to the Hanford site are in close proximity to the river, and the potential effects of

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species, or critical habitat, associated with the river. Thus, further consultation with NMFS is not indicated.

It should be noted that the analyses of impacts on threatened and endangered species presented in this *TC & WM EIS* address construction and normal operations. Any analyses of potential impacts of accidents would be highly speculative, considering the very low probability of an accident (see Chapter 4, Section 4.1). Regardless of the source(s) of the chromium, a Hazard Quotient above 1 does not necessarily indicate a high risk to aquatic biota, including salmonids, at the Columbia River. The assumptions applied to the analyses are conservative. For example, the chromium toxicity reference value for hexavalent chromium used to calculate the salmonid Hazard Quotient was the sensitive species test effect concentration affecting 20 percent of the test population (EC20). Further, hexavalent chromium is more toxic than the trivalent form, which is more likely to occur in oxygenated aquatic environments. Additionally, the modeled concentrations in nearshore surface water and sediment overestimate risk because they assume that all groundwater discharge would occur within the 40-meter (130-foot) nearshore zone, when in reality groundwater would likely discharge over a larger area of the riverbed and, therefore, would be more diluted. Thus, while hexavalent chromium Hazard Quotients were used to compare the alternatives, they should not be used as the sole basis for concluding that ecological resources at the Columbia River would be adversely impacted.

Commentor No. 496 (cont'd): John Berry

transportation accidents or terrorist incidents on endangered should be properly examined.

DOE has, in the past, responded to public comments regarding the duty to consult with NOAA and USFWS by claiming that the 2000 *Threatened and Endangered Species Management Plan, Salmon and Steelhead*[16] created in 2003 fulfills DOE's requirements under Section 7 of the ESA. However, this document does not consider any site or action specific effects of DOE actions. Rather, the document simply speaks in generalities about potential effects on listed species from unspecific actions and efforts made by DOE to limit additional adverse impacts. Significantly, the Plan was not submitted to NMFS for a concurrence finding as required by the ESA implementing regulations.[17] The Plan clearly fails to meet the ESA's requirements for consideration of action-specific effects on listed species and should not be considered a site-wide or action-specific consultation document.

Given the presence of endangered salmon and the potential effects of cleanup actions on the water quality of the Columbia River, I believe that DOE has a duty to consult under Section 7 of the ESA. The proposed actions relating to the tank closures, FFTF decommissioning, and waste management at the Hanford site "may affect" endangered salmon in the Columbia River. As such, I hope that DOE will fulfill its Section 7 duty by consulting with NOAA before taking any of the actions proposed in the *TC & WM EIS*.

496-1 cont'd

[16] *Salmon and Steelhead Management Plan*, Department of Energy, DOE/RL 2000-27
[17] 50 C.F.R. § 402.13

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Commentor No. 496 (cont'd): John Berry

Thank you for providing the opportunity to comment on the *TC & WM EIS* and for extending the comment period. I look forward to receiving your response to this comment.

Sincerely,

John Berry

525 Belmont Ave E
Apt. 3C
Seattle, WA 98102

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Commentor Number 497 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 499.

Commentor No. 498: Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

From: Dahmen, Lois (ECY) [ldah461@ECY.WA.GOV]
Sent: Monday, May 03, 2010 3:00 PM
To: tc&wmeis@saic.com
Cc: Dahl, Suzanne (ECY)
Subject: Comments on Draft TC & WM EIS
Attachments: Letter & Comments on Draft EIS - 04-30-2010.pdf

Here are the Washington State Department of Ecology's comments on the draft EIS, including a cover letter.

Lois K. Dahmen

Program Manager's Assistant
Nuclear Waste Program – Richland
Department of Ecology
xxx-xxx-xxxx

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Commentor No. 498 (cont'd): Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
3100 Port of Benton Blvd • Richland, WA 99354 • ([redacted]

April 30, 2010

Ms. Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
P.O. Box 1178
Richland, Washington 99352

Re: Washington State Department of Ecology's Review of *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site*, Richland, Washington, DOE/EIS-0391, dated October 2009

The Washington State Department of Ecology (Ecology) reviewed the *Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site* (Draft EIS). This Draft EIS is important in defining options for the cleanup of Hanford's tank waste and disposal of waste at Hanford. This letter provides Ecology's general comments about the content of the Draft EIS. The enclosure provides more specific comments.

We are requesting changes in the Final EIS. These changes will provide more specific analyses to support upcoming permitting decisions we must make. Without the analyses, we will lack information important to us in framing permits and making decisions about cleanup.

Cooperating Agency

As a cooperating agency in the development of this Draft EIS, Ecology provided our perspectives in a Foreword that appears in the *Readers Guide* and the *Summary*. Those perspectives were based on our reviews of a pre-decisional draft in November 2008. After reviewing this draft Tank Closure & Waste Management (TC&WM) EIS, we have developed further perspectives and specific comments.

We think the data gathering, modeling, and quality assurance were conducted in an adequate manner and the Draft EIS objectively analyzes and predicts the impacts of the reasonable alternatives and the cumulative inventory. Overall, we note that the quality of the Draft TC&WM EIS analyses improved from those we reviewed in the Hanford Solid Waste EIS. In particular:

- The United States Department of Energy (USDOE) improved the quality assurance and quality control of the data that the EIS contractor used to analyze impacts to the groundwater.

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Commentor No. 498 (cont'd): Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

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- USDOE improved the integration of analyses of all waste types that may be disposed in Hanford landfills. This change will address ongoing and proposed waste management activities in the Hanford Solid Waste Environmental Impact Statement.
- USDOE improved the quality of the cumulative impact analyses to include wastes already adversely affecting the environment from past releases and disposal practices.

Mitigation Measures Required

We note that certain combinations of alternatives in the Draft EIS are more protective of human health and the environment than other alternatives appearing in this document. It is significant that none of the Draft EIS alternatives bring impacts to acceptable cancer risk levels or meet the safe drinking water standards. However, the Draft EIS is helpful in pointing out the important fact that more effective cleanup is needed across the Central Plateau.

It is our intent to be able to adopt all or part of the Final EIS to meet our State Environmental Policy Act (SEPA). We would use the adopted portions as our basis to take permit actions necessary to advance Hanford cleanup. However, we could not adopt the EIS "as is" because it lacks an analysis that determines how much USDOE must reduce the total Hanford mobile inventory to be protective of the State's groundwater resources. *498-1*

We request that you develop an analysis that establishes inventory reduction goals and discusses achievable mitigation measures to reach those goals. We request that you include this analysis in the Final EIS and include your methods to achieve the goals in the Record of Decision. The inventory reduction goals would then be the basis for specific mitigation measures discussed and committed to in the USDOE Mitigation Action Plan.

SEPA authorizes Washington State to require mitigation measures in its permitting actions. We intend to establish enforceable conditions in permits to ensure that the USDOE completes mitigation measures. Ecology requests the following items to support mitigation:

- To better inform all of the Tri-Parties Agreement (TPA) agencies, we propose adding enforceable milestones to the TPA for USDOE to develop and maintain a cumulative impact assessment (risk budget) tool. Before any waste disposal plans or cleanup decisions become final, USDOE would evaluate each action to determine its contribution to cumulative impacts. Ecology will also propose milestones for all land disposal facilities that require performance assessments using a process similar to that used for Waste Management Area C. *498-2*
- Any Mitigation Action Plan must identify distinct approaches for near-term impacts (50-100 years), mid-term impacts (1000 – 5000 years), and long-term impacts (7000 -10,000 years). USDOE should submit the Mitigation Action Plan to Ecology for review and comments. *498-3*

498-1 The intent of the EIS process is to analyze the range of reasonable alternatives that provides some comparative quality between alternatives so that sound decisions can be made in the future. As discussed in Chapter 5 of this *TC & WM EIS*, DOE acknowledges that "benchmark standards" could be exceeded in groundwater at the Core Zone Boundary and/or at the Columbia River nearshore at various dates. The term "benchmark standards" as used in this *TC & WM EIS* represents dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL, provided an MCL is available. Ecology may impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA.

In response to comments received on the *Draft TC & WM EIS* concerning potential long-term impacts on groundwater resources, additional sensitivity analyses were performed and are included in this final EIS. The additional analyses evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. Furthermore, sensitivity analyses that evaluate improvements in IDF performance (e.g., infiltration rates) and in secondary- and supplemental-waste-form performance (e.g., release rates) were performed and are included in this final EIS. Chapter 7, Section 7.5, was added to discuss and summarize these results. The results of these analyses will aid DOE in formulating an appropriate mitigation action plan subsequent to this EIS and its associated ROD and in prioritizing future Hanford remedial actions that would be protective of human health and the environment and would reduce long-term impacts on groundwater. As referenced in the Section 7.5.2.8 discussion, DOE has drafted a roadmap that implements a strategy for the development of better-performing secondary-waste forms.

498-2 DOE is receptive to suggestions to improve the process of evaluating waste disposal and cleanup plans, but reserves the right to evaluate the details of any such suggestions before making a final decision. DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5. Ecology may also impose additional performance milestones through future permitting processes or RCRA/CERCLA remedial actions within the scope of the TPA.

Commentor No. 498 (cont'd): Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

Ms. Mary Beth Burandt
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Ecology will take the following actions to support mitigation:

- Ecology will put specific conditions in dangerous waste permits to mitigate past releases to the soils and to inhibit releases in the future.
- When we issue a SEPA Determination of Significance and a Notice of Adoption, we will list the sections of the Final EIS we are adopting. The adoption will be contingent upon our review of the USDOE Mitigation Action Plan.

Areas of Concern for Ecology

- Offsite waste disposal, as proposed in the Draft EIS, results in significant groundwater impacts. The Final EIS alternatives that consider disposal of offsite waste at Hanford should be eliminated. *498-4*
- The preferred alternative for Supplemental Treatment should be a second low activity waste (LAW) vitrification facility. The other alternative waste forms are not protective of groundwater and not as "good as LAW glass." *498-5*
- Disposal of secondary waste derived from treatment of tank waste must be mitigated to avoid unacceptable adverse impact to the groundwater. *498-6*
- Future landfill disposal was analyzed in the Draft EIS. For the scenarios selected for analysis, disposal in the 200 East Area appears to be more protective of human health and the environment than disposal in the 200 West Area, because the contaminants concentration disperse more quickly in 200 East.
- Because the residual tank waste contributes significantly to future groundwater impacts, mitigation must include retrieval of tank waste to the maximum extent possible. Tanks should be retrieved to the limits of technology or at least 99 percent removal, whichever results in greater retrieval. *498-7*
- If Landfill Closure is to be used, it will need to be augmented with significant corrective actions to the vadose zone, including the deep vadose zone, to avoid unacceptable future impacts. *498-8*
- To avoid recontamination of the groundwater and unacceptable future impacts, some past practice units in the Central Plateau will need more extensive remediation than was assumed in the Draft EIS. *498-9*

Ecology, the USDOE, and the United States Environmental Protection Agency are discussing a sensitivity scenario in the Final EIS. That scenario will illustrate reduction of inventory through mitigation for inclusion in the Final EIS. Ecology is encouraged by USDOE's willingness to develop this scenario.

498-3 Chapter 7, Section 7.1, discusses potential mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives. In response to comments received on the *Draft TC & WM EIS* concerning these potential impacts on groundwater resources, additional sensitivity analyses were performed and are included in this final EIS. Consequently, the discussion found in Section 7.5 was added to summarize these results and appropriate mitigation measures. The sensitivity analyses and mitigation discussion recognize that an appropriate mitigation action plan would involve different strategies for mitigating short-, mid-, and long-term impacts. Following issuance of this *Final TC & WM EIS* and its associated ROD, DOE is required to prepare a mitigation action plan that addresses mitigation commitments expressed in the ROD.

498-4 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

498-5 Comment noted.

498-6 See response to comment 498-4 regarding mitigation and associated sensitivity analyses included in this final EIS. As referenced in the Chapter 7, Section 7.5.2.8, discussion, DOE has drafted a roadmap that implements a strategy for the development of better-performing secondary-waste forms.

Commentor No. 498 (cont'd): Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

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Ecology regards this Draft EIS as a useful resource, but we will continue to require additional modeling and evaluation for specific tasks before we make permitting decisions. We would like to discuss our comments and concerns with you. Please call Suzanne Dahl at 509-372-7892 to begin discussions.

Sincerely,

Jane A. Hedges
Program Manager
Nuclear Waste Program

Enclosure

cc w/enclosure:
Dennis Faulk, EPA
Shirley Olinger, USDOE
Bill Taylor, USDOE
Stuart Harris, CTUIR
Gabriel Bohnee, NPT
Russell Jim, YN
Susan Leckband, HAB
Ken Niles, ODOE
Administrative Record: TC&WM EIS
Environmental Portal
USDOE-ORP Correspondence Control

498-7 As discussed in Chapter 2, Section 2.12.1, DOE prefers the range of Tank Closure alternatives that would remove at least 99 percent of the tank waste. Note that at least 99 percent of the tank waste would be removed under all of the Tank Closure alternatives except the No Action Alternative and Alternative 5 (90 percent removal).

498-8 The scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and the closure of the SST system. This closure includes the tank system along with the vadose zone as impacted by the tank farms (i.e., past leaks). The *TC & WM EIS* Tank Closure alternatives considered for the tank farm include no action, landfill closure, selective clean closure, and clean closure, which would involve actions to remove the source of contamination. Landfill closure could include corrective actions to address vadose zone contamination. In particular, Tank Closure Alternative 4 addresses selective clean closure, which would involve both landfill closure and clean closure of specific tank farms (i.e., BX and TX tank farms).

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor and at other tank farms than those included in Tank Closure Alternative 4. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

498-9 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 498 (cont'd): Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

Washington State Department Ecology
Specific Comments on the Draft Tank Closure and Waste Management Environmental Impact Statement

General Comments

1. The Washington State Department of Ecology (Ecology) is a Cooperating Agency with the United States Department of Energy (USDOE) for the Draft Tank Closure and Waste Management Environmental Impact Statement (Draft EIS). We have actively participated in the process for the EIS since its initial development. We provided guidance, reviewed data, and participated in briefings to the public. We also provided detailed comments on the pre-decisional draft of the EIS, participated in the comment resolution process, and agreed with the resolution of our comments.

   Based on our reviews, the independent reviews of our consultant, the review of the Model Technical Review Group used by USDOE's EIS contractor, and the Government Accountability Office's review, Ecology agrees that the data used are adequate, that adequate Quality Assurance (QA) procedures are in place to control changes, and that the EIS contractor implemented the procedures correctly.

2. Ecology believes the inventories that the modelers used are reasonable. They could be higher in some cases, but lower in others; overall, they are probably fairly close.

3. Ecology requests that USDOE's EIS contractor insert into the Summary more of the tables and graphs that depict long-term impacts in Chapter 5. We also request that in the Summary, the contractor summarize the discussion about these constituents that appears in Chapter 5. *498-10*

4. On page S-6, the retrieval goal of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement or TPA) is misstated. The language should be changed to match the TPA. The TPA's retrieval goal is 99% or as much as is technically possible— whichever results in greater retrieval. Thus, the goal is as much as technically possible beyond the 99%. *498-11*

5. USDOE did not select the final preferred alternative in the Draft EIS. However, USDOE stated that TPA requirements for retrieval will be preferable, that it must provide treatment for secondary wastes before disposal, and that it prefers to construct an additional disposal facility in the East Area on the Central Plateau. In addition, the Draft EIS shows that disposal of off-site waste at the Hanford Site will have significant adverse impacts, and the agency will be extending its moratorium on the receipt of off-site waste shipments. Ecology agrees with the actions that the Draft EIS presented as USDOE preferences (except for USDOE preference on supplemental treatment). With respect to off-site waste, Ecology requests that USDOE include in the Final EIS and adopt in a record of decision (ROD) a preferred alternative to not dispose of any off-site waste at Hanford. *498-12*

April 30, 2010 Page 1

498-10 In response to comments that there was not enough summary information on long-term impacts in the draft EIS, DOE added a more extensive discussion of long-term impacts analysis to the Summary of this *Final TC & WM EIS*.

498-11 The language has been revised as follows: "...closure will follow retrieval of as much tank waste as technically possible, the goal being at least 99 percent."

498-12 Consistent with the CEQ regulations (40 CFR 1502.14(e)), DOE has identified its Preferred Alternatives for tank closure, FFTF decommissioning, and waste management in this final EIS, except for a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW. When DOE is ready to identify a preferred alternative regarding supplemental treatment for LAW, this action will be subject to NEPA review as appropriate.

See response to comment 498-4 for a discussion on the transport and disposal of offsite waste, as well as mitigation and associated sensitivity analyses included in this final EIS.

Commentor No. 498 (cont'd): Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

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Specific Comments on the Draft Tank Closure and Waste Management Environmental Impact Statement

Groundwater Modeling

1. Based on reviews by Ecology and its consultant (Shannon and Wilson), we think that the modeling is adequate for the purposes of the EIS.
2. Reading the Draft EIS does not lead to clarity on modeling issues. Shannon and Wilson stated in their report that the 2005 carbon tetrachloride and uranium-238 plume modeling has some problems. The document does not clearly explain what factors contributed to problems in modeling. *498-13*
3. The plume maps for carbon tetrachloride appearing in Appendix U, Figures U-29 through U-32, (with written description on page U-10) and elsewhere in the document should be corrected. The 2005 plume map shows a plume that is much more extensive than the plume appears in other maps. The Final EIS must address why model failed to describe this plume accurately. *498-14*
4. USDOE's contractor must clarify why they chose the Base Case Flow Model (with 38% flow towards Gable Gap and 62% flow towards east). That model does not use the assumptions that form the bases of other Hanford flow models (for example, 72% flow though Gable Gap and 38% towards east). *498-15*
5. The text does not state whether the base case model incorporates part of the alternate case model (lowering of the Top of Basalt by 3 meters). To Ecology, there appears to be a significant amount of flow though Gable Gap independent of the model selected. The rationale for the selection of the low flow rate must appear in the Final EIS. *498-16*
6. There are unusual fluctuations of predictive modeling analysis of both risk assessment (for example, figures 2-90, 2-91, 5-330, 5-331) and contaminant transport analysis (for example, figure 5-409, 5-410, etc.). Some of the fluctuations are of several orders of magnitude, which should not be the case. Text modifications are needed to explain these unusual fluctuations of predictive analysis. *498-17*

Waste Disposal

1. The sensitivity studies that USDOE's EIS contractor performed for Ecology as a cooperating agency need more data, results, and analysis in the Final EIS. Ecology requests that the EIS contractor develop graphs of concentrations, peak concentration tables, and text for key contaminants at the 200-East Integrated Disposal Facility (IDF) boundary, the 200 Area core zone, and near the Columbia River shore. The contractor should make these additions for the sensitivity study using a recharge rate of 3 millimeters per year. *498-18*
2. It is clear to Ecology that if USDOE disposes of offsite waste in the preferred location in the 200-East IDF, those wastes will cause significant adverse impacts at the landfill's point of compliance and further down gradient. The impacts are even more pronounced when the Draft EIS models disposal of offsite waste in the 200 West IDF location. The impacts are significant because disposal of the offsite waste will result in concentrations that will exceed drinking water standards. *498-19*

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498-13 In response to this and similar comments, the discussion in Appendix U has been revised in this *Final TC & WM EIS* to expand and clarify the discussion of modeled results versus measured results.

498-14 In response to this and similar comments regarding plume maps, the discussion in Appendix U has been expanded in this *Final TC & WM EIS*.

498-15 As stated in the text of Appendix L, Section L.1.3, the selection of the Base Case flow model was predicated on the *Technical Guidance Document* (DOE 2005). Analysis of the results suggests that it may be more useful (in the context of the comparative analysis) to think about the range of fluxes through Gable Gap that is consistent with the field characterization data. This *Final TC & WM EIS* contains an expanded discussion of this issue.

498-16 The Base Case flow model and the Alternate Case flow model are completely separate analyses with separate calibrations (see Appendix L, Section L.10, of the *Draft TC & WM EIS*). The flux through the unconfined aquifer in Gable Gap is a calculated consequence of the boundary conditions and the calibrated material properties (primarily the hydraulic conductivities), not an input parameter or a selection that was made. Both the Base Case and Alternate Case flow models show a significant flux through Gable Gap, which appears to be a requirement of a well-calibrated model. This result suggests that it may be more useful to discuss the issue in terms of the range of flux through Gable Gap allowed by the characterization data, rather than "northerly versus easterly" or "higher top-of-basalt cutoff elevation versus lower top-of-basalt cutoff elevation." A more detailed discussion of this issue is included in Appendix L, Section L.8, of this *Final TC & WM EIS*.

498-17 A detailed discussion of fluctuations in concentration versus time plots has been added to this *Final TC & WM EIS* in response to this and similar comments.

498-18 An analysis of IDF systems performance has been added to this *Final TC & WM EIS* in response to this and similar comments. The results of this analysis are presented in Chapter 7, Section 7.5, of this final EIS.

498-19 DOE agrees with the view that the impacts of disposal of a variety of waste streams in an IDF present complexities in modeling and interpreting the results. In response to this and similar comments regarding assumptions about waste-form performance, infiltration at the IDF(s), and the importance of a clear understanding of the contributions of all waste forms to the impacts at IDF barriers, this *Final TC & WM EIS* contains an additional analysis that includes

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Ideally, landfills should not impact groundwater. When we compared the concentrations of contaminants in several of the alternatives, a distinct peak represented the release of contaminants from the offsite waste component at the 200-East IDF boundary. Offsite waste results approximately in concentrations of 17 pCi/l for Iodine-129 and 1500 pCi/l for Technitium-99 at the peaks.

- Ecology would like USDOE's EIS contractor to separate the impacts associated with offsite waste from impacts of onsite waste. We request that a discussion of the results appear in chapter 5 and the Summary. Ecology also requests that the contractor show the impacts on the environment that result from disposal of onsite waste only.
- Ecology requests USDOE's EIS contractor analyze and describe specific mitigation measures that would reduce the impacts of any offsite waste disposal. This analysis must be sufficient to ensure that the resulting concentrations of all contaminants will be below health standards when the offsite waste releases are combined with all the other wastes that USDOE has already disposed and plans to dispose at Hanford.
  - Ecology requests that USDOE's contractor add an explanation to the text and summary if the most reliable mitigation for this offsite waste is to prohibit its disposal.
  - Ecology requests that USDOE's EIS contractor analyze USDOE's preferred alternative without offsite waste and incorporate the results of the analyses into the Final EIS.
  - Ecology requests that USDOE add disposal of offsite waste as a sub-alternative to distinguish the impacts that result from offsite waste.
  - Ecology's analysis shows that the impacts from offsite waste disposal to the groundwater begin early and last throughout the 10,000-year modeling period. Early releases of contaminants result in violations of the drinking water standards in the Central Plateau. As time elapses, the contaminants migrate from the Central Plateau to the Columbia River.
  - The offsite waste appears to be a one of the primary reasons why all the alternatives result in unacceptable impacts.

498-19 cont'd

3. Secondary waste causes significant adverse impacts at the 200-East IDF boundary. Ecology does not consider it acceptable for a new landfill containing treated waste to significantly increase groundwater contamination. The Draft EIS shows that several contaminants of potential concern will exceed the levels that ensure safety in groundwater. Most health impacts result from tritium, iodine-129, technetium-99, uranium-238, chromium, nitrate, and total uranium (toxic), which are common to all of the Draft EIS alternatives.

498-20

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variations in assumptions regarding infiltration, waste-form performance, and the inventory of offsite LLW and MLLW. This analysis is presented in Chapter 7, Section 7.5, of this *Final TC & WM EIS*.

498-20 In response to comments received on the *Draft TC & WM EIS* concerning potential long-term impacts on groundwater resources, additional sensitivity analyses were performed and are included in this final EIS. The additional analyses evaluate the potential impacts if IDF performance (e.g., infiltration rates) and/or secondary- and supplemental-waste-form performance (e.g., release rates) were improved. Chapter 7, Section 7.5, was added to discuss and summarize these results.

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Given the uncertainty of mass balance within the Waste Treatment Plant (WTP) and the variety of secondary waste forms, Ecology requests that USDOE address specific mitigation measures in the Final EIS that would prevent as much of the impact on the groundwater as possible. These measures could include: *498-20 cont'd*

- Segregating the key constituents that exacerbate the risk, and sending them offsite for disposal.
- Creating robust secondary waste forms specific for each waste type.
- Additional recycling at the WTP to maximize retention of these constituents in the vitrified glass.

4. The results are clear that locating IDF in its full size in the 200 East has much less lasting impact on the environment than locating a similar facility in the 200 West Area. Ecology requests that USDOE select the 200 East Area IDF location as the preferred alternative in the Final EIS and ROD. *498-21*

5. The Draft EIS describes many alternative scenarios for disposal of different waste forms that result from processing of tank waste. The USDOE contractor will dispose of that waste in one or two IDF facilities. All of the disposal scenarios result in adverse impacts. The models predict that the concentrations of contaminants in the groundwater will be higher than the drinking water standards. When the contaminants become mobile, they will create a relatively small plume with a very high peak concentration. To mitigate these excessive concentrations, USDOE must improve the waste forms so that it takes longer for the contaminants to become mobile. This is particularly important for secondary waste, assuming that all the low activity waste (LAW) is immobilized in glass. *498-22*

Supplemental Treatment and Pretreatment

1. Ecology will accept only a supplemental treatment technology that vitrifies the low activity waste at least as well a second LAW vitrification facility. All the other alternatives do not protect the groundwater to within acceptable standards and are not "as good as LAW glass." Ecology asks USDOE to choose construction and operation of a second LAW facility as its preferred alternative in the Final EIS and ROD. With the expansion of the LAW vitrification system (2nd LAW) to include four more LAW melters, USDOE will be able to treat the 60% to 70% of the single-shell tank waste that the current WTP cannot. *498-23*

We support a second LAW facility of this capacity because without it the high level waste (HLW) vitrification facilities cannot operate at full capacity. If the WTP does not operate at full capacity, treatment will extend decades beyond the design life of the WTP, and waste will stay in the single-shell tanks longer. LAW technology does not require any further development. Ecology has already issued a dangerous waste permit for the existing design, and the first facility is under construction.

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498-21 As addressed in Chapter 2, Section 2.12.3, Waste Management Alternative 2 is DOE's Preferred Alternative.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

498-22 In response to comments received on the *Draft TC & WM EIS* concerning potential long-term impacts on groundwater resources, additional sensitivity analyses were performed and are included in this final EIS. The additional analyses evaluate the potential impacts if IDF performance (e.g., infiltration rates) and/or secondary- and supplemental-waste-form performance (e.g., release rates) were improved. Chapter 7, Section 7.5, was added to discuss and summarize these results.

498-23 Comment noted.

Commentor No. 498 (cont'd): Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

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Ecology requests that USDOE not expend limited resources to develop or prove other treatment technologies when LAW vitrification is sufficient and already developed and designed. We ask USDOE to preserve those resources to address other problems with no current solutions. *498-23 cont'd*

2. Sulfate Removal: We propose a revision to Draft Tank Closure and Waste Management Appendix E, Section E.1.2.3.9, Sulfate Removal. The method described in this section involves treatment of the WTP LAW feed solutions, namely the removal of sulfate by treatment with strontium nitrate solution after appropriate pH adjustment of the LAW feed. The sulfate is removed as a strontium sulfate precipitate. The proposed revision involves the use of barium nitrate solution. This proposal is based upon several factors:

   - Barium sulfate is much more inert in the environment (soil, water, et cetera). Barite (barium sulfate) has been used in the oil industry as an oil-base and water-base drilling mud (drilling lubricant) additive for more than 70 years; it is an inert weighting component. *498-24*
   - Barium sulfate has a solubility product of 1.1×10^{-10}, whereas strontium sulfate has a solubility product of 3.2×10^{-7}, which is a factor of 3,000 in favor of the stability of barium sulfate.
   - The acidic pH conditions do not have to be as rigorous for the formation of barium sulfate precipitate in contrast with the formation of strontium sulfate precipitate. So initially, less nitric acid would be needed for precipitation and subsequently the caustic demand would also be less.
   - Due to the superior inertness of barium sulfate, more disposal options would be available in the IDF.

3. In Alternative 5 of the Draft EIS, USDOE proposes that sulfate be removed from the LAW stream. After the compound is removed from the treated LAW stream, it would be immobilize in a grout matrix and then dispose of it at Hanford.

   The advantages of such a sulfate removal treatment lie in the extension of the vitrification melter life and the resulting reduction in the frequency of melter replacement. Removing sulfate may also increase sodium levels in the LAW glass, resulting in the need for fewer glass canisters and shorter treatment regimens. The drawbacks include the need for two additional facilities to support sulfate removal: (1) a sulfate removal facility and (2) a sulfate waste grout facility. *498-25*

   Ecology remains concerned with the durability of any grout matrix over time, as well as with the partitioning of contaminants between the grout and the liquid stream that would return to the WTP LAW facility.

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498-24 The process analyzed in this EIS is considered "representative" and a change from the use of strontium nitrate to barium nitrate appears to be plausible. As discussed in Appendix E, Section E.1.2.3.9.1, screening tests were conducted in which barium nitrate solution was added to a pretreated LAW solution derived from Hanford tank 241-AN-102 supernatant (which had been acidified by the addition of nitric acid) to evaluate radionuclide partitioning in the strontium sulfate precipitate. The percentages of radionuclides removed from the tank are provided in the bulleted items that follow the relevant text in this section. The results of these screening tests concluded that, although barium nitrate was used in the tests, the radionuclide partitioning is expected to be similar if strontium nitrate were used, with the exception of strontium-90. Because any strontium in solution would be isotopically diluted by the addition of nonradioactive strontium nitrate, this EIS assumes that essentially all of the strontium-90 would precipitate and end up in the grouted waste form. Thus, use of strontium nitrate instead of barium nitrate would be acceptable in the sulfate removal process described in this EIS. If this supplemental treatment technology were chosen for implementation in the ROD, DOE would review the use of different precipitation reagents (e.g., strontium, barium) to determine which best suits Hanford waste management purposes and whether additional NEPA analysis would be necessary.

498-25 Comment noted.

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4. Technetium-99 Removal: In Alternative 2B, USDOE proposes to incorporate more technetium-99 (Tc-99) into the HLW glass. That glass must eventually go to an offsite deep geologic repository. Ecology supports the incorporation of Tc-99 into the glass because the isotope is a particularly troublesome contaminant to treat otherwise: it is highly soluble and mobile in groundwater, and plants and animals uptake it readily. It has a long half-life, so it remains dangerous for millennia. Capturing Tc-99 in a glass waste matrix will inhibit its ability to move readily through the environment.

   USDOE does not currently include Tc-99 removal in its WTP design. The original design, however, did include an ion exchange system to remove the isotope from the LAW stream. Alternatives 2B and 3B evaluate the impacts of including Tc-99 removal. In 2B, USDOE would remove Tc-99 from the existing LAW vitrification and a second LAW vitrification feed streams and route to HLW vitrification. In 3B, USDOE would remove the Tc-99 from the LAW feed streams for the 200-East cast stone facility and send it to HLW for vitrification. No other alternative would remove Tc-99 from the LAW feed.

   Ecology reviewed the information in the Draft EIS and found that Tc-99 in groundwater originates from other solid secondary waste, not the immobilized LAW. If the Tc-99 goes to the LAW stream, a smaller amount will remain free after treatment than after HLW treatment. LAW melters appear to capture Tc-99 more efficiently than HLW melters. Regardless of the treatment process, any Tc-99 that treatment does not capture will end up in the melter offgas system. Wastes from that system undergo treatment and become solid waste. If the WTP operates without the capture of Tc-99, the process will release slightly less Tc-99.

   Overall, the impacts to the groundwater from the presence of Tc-99 are significant if Alternative 3B cast stone is the waste matrix. If USDOE removes Tc-99 in the WTP LAW facility and the supplemental 200 East Area cast stone, the Tc-99 concentrations at release are 5,022 pCi/ L (about five times the drinking water standard of 900 pCi/L).

   This EIS analysis shows that moving the Tc-99 to the HLW stream does not affect the risk to the groundwater. However, Ecology would support sending more of Tc-99 offsite in HLW glass if that would not cause more problems with secondary waste disposal. Significant uncertainties in chemical partitioning during the treatment, other uncertainties about retention in the glass during treatment, and long isotope life and high mobility add to the desire to remove Tc-99 and send it into the HLW glass. If USDOE were to determine that including Tc-99 capture is their preferred alternative, Ecology would support restoring the original ion exchange process that incorporates more Tc-99 into the HLW glass, rather than developing another process. That restoration would not delay WTP construction or worsen the treatment of secondary waste.

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498-26

498-26 DOE notes the commentor's support for removing technetium-99 from waste in the WTP Pretreatment Facility and immobilizing it as IHLW.

Commentor No. 498 (cont'd): Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

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Mitigations Needed in Final EIS

1. All the tank closure options result in significant adverse impacts to the groundwater at the boundary of the facilities and at the core zone. Ecology requests that USDOE's EIS contractor add a discussion of potential mitigation strategies that could lessen these impacts and help decrease the concentrations of the contaminants to bring them closer to drinking water standards. This discussion should appear in the Final EIS and be integral to USDOE's decisions as they appear in the ROD. *498-27*

2. The cribs and trenches and waste from past tank leaks are significant sources of contamination that have adverse impacts on the deep vadose zone. Capping does not stop contamination. To prevent impacts to the groundwater beyond the core zone, USDOE must develop mitigation measures very soon. The Final EIS and ROD must provide mitigation for the deep vadose zone.
   - Peak concentrations from the deep vadose occur in the groundwater in 2050. This results from the very deep contamination that is just above the groundwater table and currently in the groundwater. This is a short-term impact in relative terms that requires a distinctive mitigation approach. To be effective, mitigation measures must be developed to address the deep vadose zone contamination on a site-wide basis and be ready for full-scale deployment in the Central Plateau soon. *498-28*
   - A large amount of the known soil inventory (that is not as deep) would impact the groundwater far beyond 2050. A distinct midterm mitigation approach should be developed for this zone. And the near surface needs a separate mitigation approach.

3. None of the Draft EIS alternatives bring the impacts below acceptable cancer risk or meet the safe drinking water standards
   - SEPA authorizes Ecology to establish enforceable mitigation measures in permitting decisions.
   - All land disposal facilities must account for the risk term created by disposal to the facility (e.g., as provided through performance assessments). *498-29*
   - The Mitigation Action Plan must identify distinct approaches for near-term impacts, mid-term impacts, and long-term impacts.
   - Ecology must be able to review and provide input into the Mitigation Action Plan.
   - Ecology intends to put conditions in dangerous waste permits to mitigate past releases to the soils and to inhibit releases in the future.

4. Where appropriate and necessary, Ecology intends to make mitigation a condition of adoption of the Final EIS under SEPA. When we issue a SEPA Determination of Significance and a Notice of Adoption, we will list those sections we are adopting. We will inform the public that we are adopting the analyses on cumulative impacts on vadose zone and groundwater contingent on Ecology review and input into the USDOE Mitigation Action Plan. The goal of remedial action should be to protect against further soil and groundwater contamination. *498-30*

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498-27 The NEPA evaluation process is conducted early in agency planning, when details of the proposed project are not yet well enough defined for specific mitigation measures to be developed. Chapter 7, Section 7.1, discusses potential mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives. As discussed in Chapter 5 of this *TC & WM EIS*, DOE acknowledges that "benchmark standards" could be exceeded in groundwater at the Core Zone Boundary and/or at the Columbia River nearshore at various dates. The term "benchmark standards" as used in this *TC & WM EIS* represents dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL, provided an MCL is available.

In response to comments received on the *Draft TC & WM EIS* concerning potential long-term impacts on groundwater resources, additional sensitivity analyses were performed and are included in this final EIS. The additional analyses evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. Furthermore, sensitivity analyses that evaluate improvements in IDF performance (e.g., infiltration rates) and in secondary- and supplemental-waste-form performance (e.g., release rates) were performed and are included in this final EIS. Chapter 7, Section 7.5, was added to discuss and summarize these results. The results of these analyses will aid DOE in formulating an appropriate mitigation action plan subsequent to this EIS and its associated ROD and in prioritizing future Hanford remedial actions that would be protective of human health and the environment and would reduce long-term impacts on groundwater.

498-28 This *TC & WM EIS* incorporates vadose zone remediation in several of its alternatives: Tank Closure Alternative 4 analyzes selective clean closure at two tank farms, the Base Case under Tank Closure Alternatives 6A and 6B analyzes deep vadose zone remediation beneath tank farms, and the Option Case under Tank Closure Alternatives 6A and 6B analyzes deep soil remediation under the B and T cribs and trenches (ditches). In response to this and similar comments received on the *Draft TC & WM EIS* concerning these potential impacts on groundwater resources, additional sensitivity analyses were performed and are included in this final EIS. Consequently, the discussion found in Chapter 7, Section 7.5, was added to summarize these results and appropriate mitigation measures. The sensitivity analyses and mitigation discussion recognize that an appropriate mitigation action plan would involve different strategies for

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- The preferred alternative should not result in the permanent loss of use of the aquifer.
- We know that further groundwater contamination is going to result from the existing soil contamination as it continues to travel downward.
- Ongoing monitoring and groundwater cleanup are the best near-term responses to the impacts.
- The EIS contractor used assumptions in the Draft EIS for cumulative analysis. Those assumptions were based on the Central Plateau Strategy. The cumulative results show that remedial action is necessary. Capping without removing and treating the waste in some contaminated sites may be unacceptable. More mitigation is essential to future Central Plateau decisions.

498-30 cont'd

5. The Cumulative Impacts indicates that the Hanford Site needs to make decisions in non tank farm contamination sites to reduce contamination in the soil and protect the groundwater from further contamination.

498-31

Fast Flux Test Facility (FFTF) Decommissioning

1. Ecology supports USDOE's preference for entombing the FFTF. We agree with USDOE's proposal to remove all above-grade structures, including the reactor building. We do not object to the below-grade structures, the reactor vessel, piping, and other components remaining in place. We consider the proposal to fill the below-grades structures with grout to immobilize the remaining radiological and hazardous constituents to be protective of the environment.
2. We also support USDOE's proposal to construct an engineered barrier over the filled area to prevent intrusion to be protective. Burial in the IDF of any radiologically or chemically contaminated waste that the entombment activities will generate will be appropriate if the release of contaminants does not increase the concentrations of contaminants in the soil or groundwater.
3. Ecology supports using the bulk sodium inventories that came from the FFTF in the WTP. We also agree with USDOE's proposal to process the remote handled-special components at the Idaho National Laboratory.

498-32

Tank Waste Farm Closure

1. In regard to tank waste, the biggest reduction in impacts comes from removing as much as possible from the tanks during initial retrieval. The closure actions of mixing any remaining waste with grout and capping the tank farms makes only a limited difference in the long run because both the grout and the caps break down before the risk term of the waste is exhausted. Thus, these closure actions only serve to delay the release and spread it out over time. The bar graphs in Chapter 5 showing releases to the Columbia River clearly reflect this. The Final EIS and ROD should include and select a preferred alternative that supports as much retrieval as possible.

498-33

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mitigating short-, mid-, and long-term impacts. Specifically, the sensitivity analyses evaluate what the past leaks and cribs and trenches (ditches) contribute to impacts on groundwater. Other sensitivity analyses evaluate potential impacts if certain remediation activities are conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. Following issuance of this *Final TC & WM EIS* and its associated ROD, DOE is required to prepare a mitigation action plan that addresses mitigation commitments expressed in the ROD. This plan would be prepared before DOE would implement any action that is the subject of a mitigation commitment. DOE is aware and understands the timing of being able to mitigate deep vadose contamination.

498-29 See response to comment 498-27 regarding potential mitigation measures.

Copies of any mitigation action plan developed by DOE will be made available for inspection in appropriate DOE Reading Rooms and will be made available upon request. Ecology may also impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA, which include additional opportunities for public comment.

498-30 See response to comment 498-27 regarding potential mitigation measures.

498-31 Regarding contamination originating from non-tank-farm contamination sites and the need to make decisions on these sites, it should be noted that decisions on such sites are outside the scope of this *TC & WM EIS*. Cleanup decisions regarding the non-tank-farm contamination sites will be made in accordance with RCRA, CERCLA, and/or the TPA, and in consultation with Federal and state agencies. These contamination sites are considered in the *TC & WM EIS* cumulative impacts analysis. DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

498-32 Comment noted.

498-33 As explained in Chapter 2, Section 2.12.1, DOE's Preferred Alternative with respect to waste retrieval is the removal of at least 99 percent of tank waste. This would occur under all Tank Closure alternatives, with the exception of

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2. The Draft EIS shows the intrinsic relationship between the decisions concerning tank system closure and remediation of past tank leaks. The tank farm systems closure actions are influenced by effectiveness of past leak mitigation and vice-versa. The decisions cannot be undertaken separately. The Final EIS and the ROD needs to reflect this fundamental interrelationship. *498-34*

3. All alternatives in the Draft EIS include an estimated leak loss from each retrieved tank based on a volume of 4,000 gallons. For the particular EIS impact analysis presented, the estimate of the leak losses should be presented separately from the "other" category. This will improve our understanding of the impacts of the "other" category evaluated, and provide clarity to the reader and decision-maker.

   This highlights a mitigation measure that the EIS contractor should identify in the USDOE Mitigation Implementation Plan or in the Final EIS. The mitigation measure should include retrieval leak detection that is adequate to ensure detection of leaks. Tank Waste Retrieval Work Plans must also have an adequate pre-retrieval risk assessment that provides decision-makers with sufficient information to determine a response to a leak. *498-35*

4. All alternatives indicate that deep soil contamination will continue to have impacts that exceed regulatory minimums for various durations. These impacts will require response actions for the duration of the Hanford remediation activities. *498-36*

5. USDOE selected Landfill Closure as its preferred alternative for the Tank Farms in the Draft EIS. It does not identify additional mitigation that USDOE must conduct to support landfill closure. The following mitigation measures must appear in the Mitigation Plan and in the Final EIS:
   a) The enhanced monitoring requirements in the vadose zone within each Tank Farm, following closure.
   b) The need for groundwater flow evaluations that will support the development of a sufficient monitoring system to detect any discharges that Vadose Zone Monitoring may not detect. *498-37*
   c) Mitigation measures to address the near surface soil, mid level soil and deep soil contamination.
   d) Mitigation measures to address emerging groundwater plumes.

6. Ecology is not making a decision now, based solely on a Draft EIS, with respect to tank farm closure. Ecology will make future decisions in Tank Farm Closure Plans, which will be subject to public comment. This EIS and the Tank Farm-specific Performance Assessments will be used as information for those Closure Plans. However, from this Draft EIS, Ecology can see that: *498-38*
   a) Clean Closure has significant challenges, including exposure to workers and the nearby public and an increased cost and duration of cleanup.
   b) Removing the tank shells does not seem to yield a great deal of risk reduction.

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Alternative 1 (No Action) and Alternative 5; under Alternatives 4, 6A, and 6B, 99.9 percent of the waste would be retrieved (see Chapter 2, Table 2–2). As discussed in Chapter 2, Section 2.2.2.1.1.5, DOE has developed a tiered strategy for maximizing tank waste retrieval while minimizing the potential for causing leakage. The tank closure process, which includes detailed examinations of the tanks and residual waste, requires the preparation of a performance assessment and a closure plan. These documents would provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

498-34 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

See response to comment 498-21 regarding factors influencing future DOE decisions.

498-35 To clarify the potential impacts associated with retrieval leaks, the impacts of the three components that make up the "other sources" (ancillary equipment, retrieval leaks, and tank residuals) have been split out for presentation purposes under Tank Closure Alternative 2B in Chapter 5, Section 5.1.1.3, as well as in the associated Appendices M, N, and O. Chapter 7, Section 7.1, of this *TC & WM EIS* discusses mitigation measures that could be used to avoid or reduce potential impacts on all resource areas. Many of the mitigation measures discussed would apply across all alternatives because of the similar nature of some of the activities analyzed in this EIS (e.g., construction of facilities). However, the resource subsections of Section 7.1 do acknowledge specific alternatives where only certain mitigation measures would apply or where additional mitigation consideration may be warranted. Following issuance of this *Final TC & WM EIS* and its associated ROD, DOE is required to prepare a mitigation action plan that addresses mitigation commitments expressed in the ROD. This plan would be prepared before DOE would implement any action that is the subject of a mitigation commitment. Copies of any mitigation action plan developed by DOE will be made available for inspection in appropriate DOE public reading room(s) and will also be available upon request.

498-36 See response to comment 498-34 regarding groundwater contamination and remediation at Hanford.

Commentor No. 498 (cont'd): Jane A. Hedges, Program Manager, Nuclear Waste Program, Washington State Department of Ecology

Washington State Department Ecology
Specific Comments on the Draft Tank Closure and Waste Management Environmental Impact Statement

c) Removing as much tank residual as possible does provide a decrease in risk, as does remediating the contamination in the vadose zone.

d) It may be that different tank farms are closed differently depending on the tank farm specific conditions.

e) Landfill Closure combined with maximum retrieval and significant soil remediation may turn out to be a viable option.

498-38 cont'd

7. Appendix O, page 3, identifies what "lines of analysis" USDOE's contractor used to evaluate impacts of these alternatives. Chapter 5 includes tables that report maximum impacts for each alternative.

The Final EIS should provide more detail about the effects of installing each tank farm barrier. This information would help decision-makers evaluate the impact of peak concentrations of contaminants on each element and to identify the benefit of any mitigation USDOE considers. USDOE should also provide future maximum impacts in the peak tables.

498-39

Landfill Closure would include:

- Leaving some amount of mixed waste in place.
- Removing some soil and equipment to meet standards in WAC 173-340 and the requirements of WAC 173-303-610 and -640.
- Responding to releases to the uppermost aquifer.

8. In the Mitigation Action Plan, USDOE must provide mitigation measures for both radiological and non-radiological contaminants. The Mitigation Action Plan must include development of milestones for submittal and approval of TPA primary documents for monitoring of the vadose zone and groundwater, and mitigation measures that address significant adverse environmental impacts. USDOE will include applicable portions of this plan in the Resource Conservation and Recovery Act closure permit application.

a) USDOE's contractor must initiate the process for Corrective Action investigations for the areas that are identified as "B," "S," and "T" Barriers immediately (page O-4, Appendix E, pp.148 and 149). The contractor must complete an additional groundwater sensitivity evaluation to consider the effects of cleaning up T/TX/TY contamination with similar assumptions to those in Alternative 4 cleanup action for the B/BX and S/SX tank farm areas. The Mitigation Action Plan must include milestones to initiate early corrective action investigations for the mostly highly contaminated Tank Farms immediately.

b) The Mitigation Action Plan must include any necessary technology development to remediate or mitigate soil contamination that could result in unacceptable risks to human health and the environment. USDOE must provide milestones for further development of technology that would mitigate the contamination in the deep vadose zone.

498-40

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498-37 See response to comment 498-27 regarding potential mitigation measures.

498-38 See response to comment 498-21 regarding factors influencing future DOE decisions.

498-39 DOE believes this information was provided in the *Draft TC & WM EIS*. Appendix O, Tables O–8 through O–84 of this *TC & WM EIS* provide the maximum COPC concentrations at each of the lines of analysis, including the individual tank farm, FFTF, IDF-East, IDF-West, and RPPDF barriers, as appropriate. Chapter 5 of this *TC & WM EIS* provides concentration versus time for COPCs under each alternative. These figures provide an indication of the trend and identify peaks that could occur during the 10,000-year analysis period (through calendar year 11,940).

498-40 Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives. These mitigation measures address both radioactive and chemical COPCs. In response to comments received on the *Draft TC & WM EIS* concerning potential long-term impacts on groundwater resources, additional sensitivity analyses were performed and are included in this final EIS. The additional analyses evaluate potential impacts if certain remediation activities are conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. Specific sensitivity analyses that evaluate the effects of clean closure for the T/TX-TY tank farms were performed and are included in this final EIS. Chapter 7, Section 7.5, was added to discuss and summarize these results. The results of these analyses will aid DOE in formulating an appropriate mitigation action plan subsequent to this EIS and its associated ROD and in prioritizing future Hanford remedial actions that would be protective of human health and the environment and would reduce long-term impacts on groundwater. Ecology may also impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA, which include additional opportunities for public comment. As referenced in the Section 7.5.2.8 discussion, DOE has drafted a roadmap that implements a strategy for the development of better-performing secondary-waste forms.

Commentor No. 499: Gerry Pollet, Executive Director, Heart of America Northwest

From: Gerry Pollet [gerry@hoanw.org]
Sent: Monday, May 03, 2010 3:16 PM
To: tc&wmeis@saic.com
Cc: office@hoanw.org; John Price (ECY); Alberich, Jason (ECY); Erik Olds; Olinger, Shirley J; jhed461@ecywa.gov
Subject: Comments on draft TCWMEIS from Heart of America Nrthwest and HoANW Research Center
Attachments: Heart of America Northwest comments on the draft TCWMEIS 5-3-10.pdf

Attached are the comments of Heart of America Northwest and Heart of America Northwest Research Center on USDOE's draft TC & WMEIS. Please note that these supplement oral testimony and the presentation previously submitted as formal comments.

To Ecology recipients, please note that we believe Ecology must review and respond to appropriate comments for SEPA purposes.

Gerry Pollet, JD;
Executive Director,
Heart of America Northwest
"The Public's Voice for Hanford Clean-Up"
(xxx)xxx-xxxx
gerry@hoanw.org

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Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

Heart of America Northwest
The Public's Voice for Hanford Cleanup
1314 NE 56th St Suite 100 - Seattle, Wa 98105
Voice: (206)382-1014 - Fax: (206)382-1148 - http://www.hoanw.org

USDOE Must Withdraw Decisions to Use Hanford as a National Radioactive Waste Dump and Issue a New Draft Tank Closure and Waste Management EIS for Comment

Draft Tank Closure and Waste Management Environmental Impact Statement (TCWMEIS)
Joint Comments of Heart of America Northwest and
Heart of America Northwest Research Center
May 3, 2010
Submitted to U.S. Department of Energy (USDOE)
and to Washington Dept. of Ecology (cooperating agency)

These comments supplement our presentations made at hearings and submitted as a Powerpoint presentation to USDOE, which are also part of our formal comments. Our organizations also adopt as comments, and support, the formal advice issued by the Hanford Advisory Board (HAB) on March 4, 2010, which our organizations made a considerable effort to assist in development of. *499-1*

USDOE's plans for Hanford Clean-Up, outlined in the "preferred alternatives" in the Draft TCWMEIS, are more properly described as a "cover-up", not a clean-up. The preferred alternatives – USDOE's planned actions – are to leave large amounts of waste and contamination in tanks and in soil sites under ineffective caps, which will not prevent the spread of contamination to groundwater at levels which will cause cancer in large numbers of people who are reasonably expected to be using the Hanford site and Columbia River for thousands of years. *499-2*

1. **USDOE Should Withdraw its Decisions to Use Hanford as a national radioactive waste dump and commit to a preferred alternative and decision not to add any more wastes to Hanford. The impacts to health and the environment from existing wastes and contamination are shown in the draft TCWMEIS to be so high as to make it unconscionable, as well as illegal, to add more wastes.** *499-3*

USDOE proposes two major "waste management" alternatives for waste generated from on-site cleanup activities. Both alternatives for disposing of radioactive & mixed radioactive/hazardous wastes in landfills at Hanford **include using Hanford as a national waste dump,** starting when USDOE operates the vitrification plant. *There is no alternative presented in which Hanford would not be used* *499-4*

499-1 The HAB comment document is included in this CRD as comment document 218.

499-2 DOE disagrees with the commentor's opinion on the Preferred Alternative.

While DOE's Preferred Alternatives for tank closure, FFTF decommissioning, and waste management in this *TC & WM EIS* may not necessarily represent the most environmentally preferred alternatives, the ROD issued by DOE will identify any additional mitigation and monitoring commitments adopted by DOE and specify other factors considered by DOE in reaching its decision. Please see Section S.5.5 of the Summary and Section 2.10 of Chapter 2 of this *TC & WM EIS* for more information on key environmental findings.

499-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

499-4 DOE does not believe it is in violation of NEPA. The Waste Management No Action Alternative excludes offsite waste disposal in an IDF at Hanford; it includes continued disposal in existing burial grounds of certain waste types. Offsite waste is not a part of these waste types, except for certain allowances or waste generated from tank closure and FFTF decommissioning activities. For a more comprehensive discussion on the transport and disposal of offsite waste and the use of Hanford as a regional disposal facility, see Section 2.1 of this CRD.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

as a national radioactive waste dump.[1] *This is a significant violation of the National Environmental Policy Act (NEPA), which requires that all reasonable alternatives be considered in the EIS.* **499-4 cont'd**

THE ALTERNATIVES

- Disposal of onsite & offsite generated wastes in two large landfills at Hanford's Central Plateau Core Zone: 200 East (currently exists) & 200 West (USDOE would construct this). These wastes include the vitrified Low Activity Waste from the tanks.
- Disposal of all onsite & offsite wastes in the 200 East landfill.

USDOE'S PREFERRED ALTERNATIVE

Using Hanford as a national radioactive and mixed waste landfill beginning when the vitrification plant operates and disposing of all the wastes in the currently existing 200 East landfill (Integrated Disposal Facility, or IDF).

2. THE MISSING ALTERNATIVES – USDOE fails to consider these reasonable alternatives, which is a violation of the National Environmental Policy Act (NEPA):

- Not using Hanford as a national radioactive and radioactive/hazardous waste dump;
- Disposing of significant amounts of treated waste from Hanford Clean-Up at other sites that are not next to major rivers or above drinkable groundwater.
  - The draft TCWMEIS shows that the levels of groundwater contamination and health risks from the wastes already at Hanford (including releases from proposed new landfills to dispose of vitrified tank wastes and River Protection Project wastes) will be hundreds of times the Drinking Water Standards for hundreds and thousands of years.
  - Plutonium 239 levels, for example, are projected to be nearly 300 times the Drinking Water Standard at the Columbia River shoreline one thousand years from now.[2] Uranium 238 levels on Hanford's Central Plateau outside the "Core Zone" are projected to rise to approximately 200 times the Drinking Water Standard. Technetium 99, Iodine and chemical contaminant levels will also be far above Drinking Water Standards. **499-5**
  - The Drinking Water Standard is set at a level at which one adult out of every ten thousand who drink average amounts of water will die of cancer. Children are three to ten times more susceptible to cancer from the same exposure as an adult.
  - The only responsible alternative to reduce the impacts projected from existing wastes is to remove from Hanford large quantities of wastes in the ground an projected to be created from treatment processes (e.g., secondary wastes and ILAW) for proper disposal in landfills that are not above potable aquifers or along major Rivers or in deep geologic repositories.

[1] The no action alternative is not a meaningful alternative as presented (e.g., it would violate numerous laws and the terms of the Hanford Clean-Up Agreement and Consent Order), and it ignores that USDOE has existing decisions to use Hanford as a national radioactive and mixed waste dump. Therefore, under the no action alternative, Hanford would still be used for disposal of offsite waste.
[2] Table U-2.

499-5 DOE does not believe there are "missing alternatives." The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance (see "Forty Most Asked Questions Concerning CEQ's NEPA Regulations," question 1a; 46 FR 18026, March 23, 1981), this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and they meet the agency's purposes and needs. For a more comprehensive discussion on the transport and disposal of offsite waste and the use of Hanford as a regional disposal facility, see Section 2.1 of the CRD. Also, please see response to comment 499-4 regarding the use of Hanford as a regional disposal facility.

The disposal at other sites of treated waste from Hanford cleanup is not within scope of this EIS. However, the disposal of treated waste from tank closure, onsite operations, offsite DOE facilities, and FFTF decommissioning is included within the scope of this EIS. In accordance with the *WM PEIS* ROD, Hanford ships nuclear waste to WIPP in New Mexico for disposal.

DOE presented information in this *TC & WM EIS* on the potential impacts on the groundwater of treated waste disposal. Table 6–19 in Chapter 6 of this *Final TC & WM EIS* lists the maximum COPC concentrations at the Core Zone Boundary and the Columbia River nearshore in the peak year of the 10,000-year period of analysis under Alternative Combination 2, which includes vitrified tank waste disposed of in an IDF and tank cleanup waste disposed of in the RPPDF. For several of the COPCs, the benchmark standard is exceeded. However, in most cases, this is due to past practices at Hanford. The term "benchmark standards" as used in this *TC & WM EIS* represents dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL, provided it is available. Some of the Tank Closure alternatives in this *TC & WM EIS* incorporate vadose zone remediation, which indicated improvement in the vadose zone and groundwater modeling results, i.e., Tank Closure Alternative 4 includes deep soil remediation under two tank farms, and Tank Closure Alternatives 6A and 6B include deep soil remediation under the tank farms and cribs and trenches (ditches).

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

- USDOE is obligated under NEPA to consider the reasonable alternative of disposing of wastes offsite at regulated facilities. USDOE has adopted commitments to consider commercial regulated facility disposal of its wastes in cleanup decisions, which it failed to consider in the draft TCWMEIS.

- Exhuming much more of Hanford's buried wastes and contamination for treatment and proper disposal, with all Plutonium and Transuranic wastes removed, treated and disposed in deep underground repositories.
  - USDOE should exhume significant quantities of waste, including the 161,000 cubic meters of TRU buried or disposed in soil prior to 1970, and send those wastes to be disposed offsite.

499-5 cont'd

THE IMPACTS

Even without using a landfill in 200 East or 200 West as a national radioactive and "mixed" radioactive hazardous waste dump, USDOE's analysis shows that either landfill location would cause very high contamination and high cancer risks lasting for thousands of years. USDOE prefers to use only the 200 East location because using the 200 West landfill would cause very high contaminant levels heading towards the Columbia River much faster than the 200 East IDF landfill.

Using the 200 East landfill at Hanford as a national radioactive waste dump for the wastes analyzed (which do *not* include USDOE's proposal to also import and bury highly radioactive "Greater Than Class C" wastes) would increase radioactive contamination and cancer risk levels over the next thousand years by tenfold – to 100x WA State's cancer risk standards for toxic cleanup sites.[3]

499-6

Even without disposing of more offsite waste and LAW vitrified waste, the cancer risks from the wastes in Hanford's soil and unlined ditches – which USDOE proposes to leave – will cause shockingly high cancer risk rates to future groundwater users along the River. Plutonium levels entering the Columbia River are projected by USDOE to reach 300 times the Drinking Water Standard in the next thousand years – without adding any more waste to Hanford.[4]

HOANW'S RECOMMENDATION FOR USDOE's PREFERRED ALTERNATIVE:

- NO MORE WASTE GETS ADDED TO HANFORD. Delaying the addition of more wastes until the vitrification plant operates does nothing to protect the River and the health of children for thousands of years.
- Limit disposal in Hanford landfills to amounts and types of Hanford clean-up wastes which won't cause future leakage at levels which will violate cancer risk and other standards. This would involve using off-site landfills that are not next to major rivers or above drinkable groundwater, and not importing off-site waste to Hanford.

499-7

[3] TCWMEIS Figure S-21. page S-100. Peak risk shown from inclusion of off-site waste disposed in 200 E IDF is 1E-4 (one additional fatal cancer for every ten thousand adults exposed). WM Alt 3 has a peak fatal cancer risk greater than 1E-3 (one in one thousand) at the Core Zone Boundary between the years 3000 and 4000. WM Alt 3 includes disposal of offsite waste in IDF West. Neither of these risk estimates include the additional risks from proposed disposal of River Protection Project Disposal Facility releases, which add between 1E-5 and 1E-4 of additional risk at peak periods. See Figure S-22, page S-101. Nor do these risk estimates include impacts from the disposal of GTCC wastes from other sites, which USDOE is improperly considering in a separate EIS, rather than disclosing and considering in this EIS.

[4] Appendix U of TCWMEIS, Table U-2.

The plutonium isotope concentrations listed in Table 6–19 are about 170 percent above the benchmark standard in calendar year 7725 at the Core Zone Boundary and well below the benchmark standard at the Columbia River nearshore. As noted in this *Final TC & WM EIS*, the primary source of this exceedance of the benchmark standard is from a direct injection into the aquifer that occurred in the past.

There is no existing guidance that recommends dose coefficients for children's exposure to external radiation. DOE acknowledges that children have an elevated sensitivity to radiation exposure. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) was used in the *TC & WM EIS* analyses. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult, but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance that provides this information has yet to be developed.

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths for the sex and age distribution of the U.S. population in terms of the number of excess deaths per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing LCFs (DOE 2003a). The National Research Council report also shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose assuming a sex and age distribution (including infants, children, teens, and adults) similar to that of the entire U.S. population. The BEIR VII dose-to-risk conversion factor of 610 LCFs per million people per person-rem is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the *Draft* and *Final TC & WM EIS* transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs and the dose conversion factor used for the transportation analyses reflects impacts on infants, children, teens, and adults.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

- Dig up Plutonium and other "Transuranic" wastes in unlined soil disposal ditches and tank leaks, treat the wastes and dispose of them in deep geologic repositories. Dig up other wastes from unlined soil ditches and tank leaks, treat them, and dispose of them in a regulated commercial radioactive waste facility which is not above drinkable groundwater or next to a river. *499-7 cont'd*

- **USDOE should withdraw the Records of Decision to use Hanford as a national waste dump for radioactive Low-Level Waste (LLW) and Mixed Radioactive – Hazardous Waste (MW), instead of continuing to pursue its misguided and unsupported decisions to use Hanford as a national radioactive waste dump to bury 3 million cubic feet of radioactive wastes.** *499-8*

- **USDOE should adopt a Record of Decision (RoD) that it will not add more waste to Hanford, due to the unacceptably high contamination and risk levels projected in the draft TCWMEIS from existing wastes.** As shown in our comments, and those of Tribes and individuals, the TCWMEIS underestimates projections of contamination from existing wastes and risk by failing to include the full inventory of radionuclide and chemical wastes and contamination in the soil and likely to be left on-site. *499-9*

USDOE has no credibility claiming that it prioritizes cleanup of Hanford while seeking to dump more waste at Hanford. The only way for USDOE's cleanup program to move towards credibility is to withdraw the prior decisions to use Hanford as a national radioactive waste dump and issue a new decision that it will not add more waste to Hanford. USDOE can no longer feign ignorance that its plans to abandon existing wastes and contamination create unacceptable levels of risk, even without adding any more waste. Thousands of people have submitted comments to USDOE on the draft urging this. USDOE's only credible course of conduct it to issue an immediate response that the preferred alternative will be revised to reflect a decision that more waste will not be added to Hanford. *499-10* *499-8 cont'd*

- **USDOE should commit to follow the principle of "Clean-Up First." Under this principle, contamination would be demonstrably cleaned up and existing wastes brought into compliance, before USDOE considers adding more waste to a site.** This principle was overwhelmingly supported by Washington's voters in adoption of Initiative 297 in 2004, which USDOE spent four years and millions of dollars to overturn in federal court. Only after cleanup actions are completed will the public, USDOE or regulators know how much residual contamination and risk will remain at Hanford (or how well remedies perform) *499-11*

The draft TCWMEIS continues USDOE's misguided efforts to pursue a "preferred alternative" under which a landfill in Hanford's 200 East Area (the IDF, or Integrated Disposal Facility) will be ***used as a national radioactive waste dump for approximately 3 million cubic feet of offsite radioactive Low-Level Waste (LLW) and Mixed Radioactive – Hazardous Waste (MW)*** (82,000 cubic meters is the quantity of off-site waste proposed for addition to Hanford under the preferred alternative, presented as implementing the 2004 Record of Decision. The 82,000 cubic *499-12*

The remediation of burial grounds is not within the scope of this EIS. However, Appendix S includes DOE's inventory estimates for the burial grounds, and Appendix U provides supporting information on the long-term cumulative impact analyses that includes the burial ground inventories.

499-6 Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

The draft EIS inventory database for non–*TC & WM EIS* sources used the inventories for waste sites 316-1, 316-2, and 316-5, as reported in SIM (Corbin et al. 2005), which relied upon a surrogate waste stream from the PUREX process cooling-water/steam condensate, including 12.8 curies of plutonium-239 and -240. This resulted in model results (listed in Table U–2 in Appendix U) close to 300 times over the benchmark standard at the Columbia River nearshore, as noted in the comment. Since the issuance of the draft EIS, a correction to SIM (Mehta 2011) has been issued (in June 2011), which entails deletion of the plutonium inventory at these three waste sites. As a result, the entire inventory of 12.8 curies of plutonium-239 and -240 for the 300 Area was deleted in the reanalysis. This plutonium inventory correction is evaluated in the SA (DOE 2012) in Section 3.1, Item 6, 300 Area Process Trenches inventory corrections. The SA analysis and conclusions are that the soil concentrations at the Core Zone Boundary and the Columbia River nearshore did not change. This *Final TC & WM EIS* reports a maximum plutonium concentration of 2 picocuries per liter at the Columbia River nearshore, which is below the benchmark standard. However, there are still exceedances of the benchmark standard for plutonium at the Core Zone Boundary. This is due primarily to a reverse well, where plutonium was injected directly into groundwater in the past.

499-7 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The remediation of burial grounds, including digging up plutonium and other TRU waste, is not within the scope of this EIS. However, Appendix S includes DOE's inventory estimates for the burial grounds, and Appendix U provides

meters is proposed to be comprised of 62,000 cubic meters of LLW and 20,000 cubic meters of MW).[5] 499-12 cont'd

The Prior Decisions to Use Hanford as a National Radioactive Waste Dump Which Need to be Withdrawn:

In 2000 and 2004, USDOE issued Records of Decision to use Hanford to dispose of off-site wastes, following issuance of the Waste Management Programmatic EIS (WMPEIS) and the Hanford Solid Waste Disposal EIS. Neither of those prior impact statements properly considered the impacts of disposing of offsite waste at Hanford. The WMPEIS Record of Decision stated that USDOE would perform a site specific impact analysis of its national level decision to use Hanford as one of two national waste disposal sites, acknowledging that the WMPEIS did not have any site specific impact analysis.

The Final Hanford Solid Waste Disposal EIS was issued after USDOE had to withdraw and reissue the initial draft due to woeful inadequacies. Thousands of people attending hearings and submitted comments on the drafts objecting to USDOE's proposal to use Hanford as a national radioactive waste dump and objecting to the serious shortcomings of the EIS. After issuance of the Solid Waste Disposal EIS, USDOE's internal analyses, revealed in legal discovery, showed that USDOE acknowledged that the EIS was inadequate in regard to human health risk analyses, transportation risk and groundwater risk analyses. USDOE agreed in settlement of WA v. Bodman, to a moratorium on waste import to Hanford until a new impact statement was completed, which USDOE hopes will be the TCWMEIS. Thus, the draft TCWMEIS represents USDOE's fourth effort to prepare a legally adequate impact statement to support the improper decision made by USDOE in 2000 to use Hanford as a national radioactive waste dump. And, like the prior three efforts, the draft TCWMEIS fails. 499-13

The Draft TCWMEIS Summary misrepresents that Washington State has agreed to USDOE's plan to import and dispose of 62,000 cubic meters of offsite waste at Hanford. The Summary, in reporting on public comment on scoping the TCWMEIS states that USDOE's response is "This is the amount indentified in the Settlement Agreement for disposal at Hanford." (page S-15.) 499-14

The Settlement Agreement sets this quantity as a limit and included a formal moratorium on offsite waste disposal until USDOE prepared and adopted a Final EIS that cured the inadequacy of the groundwater and cumulative impact analyses in the Hanford Solid Waste Disposal EIS.

Even though USDOE failed to revise analyses in the draft TCWMEIS for each of the areas in which the Solid Waste Disposal EIS was "indefensible" and inadequate, the draft TCWMEIS, nonetheless, demonstrates that adding offsite waste is indefensible. 499-15

[5] We urge USDOE to present waste quantities in units more easily understood and envisioned by the public, cubic feet, which are commonly used in USDOE's internal documents regarding waste disposal. Use of cubic meters is clearly designed by USDOE to downplay the volume to the public. The conversion to cubic feet is presented in parentheses in the Summary. However, it should be the primary unit of communication throughout the EIS and in materials provided to the public. Cubic feet are appropriate for presenting and analyzing the individual components of offsite waste proposed to be added to Hanford.

supporting information on the long-term cumulative impact analyses that includes the burial ground inventories.

499-8 In the *WM PEIS*, DOE indicated that additional analyses would be prepared to implement DOE's programmatic decisions. The *Draft TC & WM EIS* analyzed the potential environmental impacts associated with a number of proposed actions, including disposal of LLW and MLLW potentially shipped to Hanford from offsite DOE locations. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*. In all cases, DOE will select an approach to cleanup of the site that reflects a commitment to protection of public health and safety.

Depending on the outcome of this *Final TC & WM EIS* and its ROD, DOE will evaluate whether additional NEPA reviews or updates to previous decisions are appropriate, as needed.

See response to comment 499-3 for a discussion on the transport and disposal of offsite waste.

499-9 In response to comments, DOE reviewed the available inventory data and updated, as necessary, the inventory estimates analyzed in this EIS. DOE believes these estimates represent the best-available referenceable data. See the SA for more information on the reanalysis results.

499-10 Both DOE and Congress are committed to the cleanup efforts at Hanford, and DOE continues to seek funding for these efforts. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

499-11 See response to comment 499-3 for a discussion on the transport and disposal of offsite waste.

499-12 The volume of this offsite waste was established in the "Record of Decision for *the Solid Waste Program, Hanford Site, Richland, WA*: Storage and Treatment

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

The TCWMEIS (EIS) identifies unacceptably high impacts to human health and the environment due to contamination which will reach the groundwater from disposal, on-site, of existing waste and wastes which are projected to be created during Hanford clean-up. These impacts are compounded by high levels of groundwater contaminants, as estimated from USDOE's preferred alternatives for High-Level Nuclear Waste tanks and their wastes (landfill closure). ***499-16***

Approximately three million cubic feet of offsite waste imported to Hanford landfills is projected in the EIS to increase the contamination levels in groundwater by as much as tenfold for key contaminants of concern. It could reach a cancer risk level for groundwater, over the next thousand years, in excess of one hundred times Washington State's cancer risk standard for cleanup and landfills. (Another serious inadequacy of the draft TCWMEIS requiring revision and reissuance is USDOE's failure to present and discuss Washington State's cancer risk and cleanup standards, discussed later in these comments). ***499-17***

USDOE undermines its credibility by seeking to include the import and burial of 82,000 cubic meters of offsite waste (approximately 3 million cubic feet of waste) in the TCWMEIS while saying that it will honor a moratorium on importing waste until the vitrification plant is operational – projected for the year 2022. ***499-18***

3. Inadequate Assessment of the Impacts from the 3 Million Cubic Feet of Waste Which USDOE Proposes to Import and Bury at Hanford:

Appendix D notes that projecting wastes which USDOE would be importing from 2010 through 2035 is unquantifiable as to specific volumes, sources and great uncertainty as to its composition, because the waste is mostly yet to be generated. Compounding this problem is USDOE's poor management practice under which it discontinued forecasting specific waste streams which it will be generating and needing to dispose. Contrary to public assertions by officials at the TCMEIS hearings, the waste proposed to be disposed at Hanford is NOT from cleanup of existing legacy contamination at USDOE sites, but will be newly generated wastes (including from decommissioning of facilities). Even before USDOE said it would not import waste to Hanford until after the vitrification plant is operational, the contractor preparing the draft TCWMEIS warned that the nature of the wastes to be disposed at Hanford under the proposed preferred alternative could only be guessed at. ***499-19***

If USDOE intends to honor the moratorium on import until the vitrification plant is operational (estimated for the year 2022, then the uncertainty as to waste streams is greatly compounded. The draft EIS in Appendix D includes a "cover your a__" memo by SAIC about the uncertainty in waste stream estimates beginning in 2010. This uncertainty undermines the necessary quality of the site specific impact analysis required for NEPA and SEPA purposes for the Hanford TCWMEIS. If the estimates were uncertain for 2010, they are nothing short of politically motivated guesses as to waste streams for after 2022.[6] ***499-20***

[6] It is illegal to store the mixed wastes without treatment and disposal for the decade plus time period between 2010 and 2022. Therefore, the vast majority of Mixed Wastes generally described in Appendix D as being potential wastes for shipment and disposal at Hanford would have been treated and disposed of long before any waste would be sent to Hanford (unless USDOE does not honor its voluntary moratorium). Presumably, cleanup agreements and consent orders will also forbid prolonged storage of LLW at the USDOE sites as well. As noted, since USDOE

of Low-Level Waste and Mixed Low-Level Waste; Disposal of Low-Level Waste and Mixed Low-Level Waste, and Storage, Processing, and Certification of Transuranic Waste for Shipment to the Waste Isolation Pilot Plant" (69 FR 39449). The volumes are limited to 62,000 cubic meters (81,100 cubic yards) of LLW and 20,000 cubic meters (26,200 cubic yards) of MLLW. This volume was determined to be a reasonable starting point and followed the 2006 Settlement Agreement and its associated MOU between DOE and Ecology, and was reflected in the 2006 NOI (71 FR 5655). The Preferred Alternative for waste management in the draft and final EISs also included limitations on, and exemptions for, offsite waste importation at Hanford, at least until the WTP is operational.

All metric numbers used throughout this EIS, not just in the Summary, are converted to the English system for readers not familiar or comfortable with SI units (the abbreviation for the Système international d'unités). A conversion table is also provided in the beginning of the *TC & WM EIS* Summary and each volume of this EIS.

499-13 See response to comment 499-3 for a discussion on the transport and disposal of offsite waste.

499-14 The responses provided in the *Draft TC & WM EIS* Summary, Section S.1.4.1, and Chapter 1, Section 1.6.1, as well as the discussion of the Settlement Agreement in the Summary, Section S.1.2.3, Hanford Solid Waste Program, have been revised in this *Final TC & WM EIS* to clarify that this volume was determined to be a reasonable starting point and followed the 2006 Settlement Agreement and its associated MOU between DOE and Ecology, and was reflected in the 2006 NOI (71 FR 5655).

499-15 DOE respectfully disagrees with the commentor that DOE failed to revise the analysis from the *HSW EIS*. See Appendix D, Section D.3.6, of this *TC & WM EIS* for more information.

See response to comment 499-3 for a discussion on the transport and disposal of offsite waste.

499-16 DOE recognizes the potential negative impacts on Hanford groundwater that offsite waste poses without mitigation. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, potential means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford or to generate a better-

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

In addition, these off-site waste streams have not been properly identified, with the EIS relying on unverifiable estimates. The Appendix acknowledges that there is no reliable information but does note that a significant portion may be extremely radioactive "Remote-Handled" wastes and contain large amounts of Transuranic elements just below the threshold which would require disposal in a deep geologic repository.

The contractor noted in Appendix D of the draft TCWMEIS, that the information used to model impacts from offsite waste – which would also affect the ability to project impacts from transportation – is not reliable:

> "The information needed for the EIS was not readily available, so efforts were undertaken to use existing corporate information, supplemented by information from DOE waste managers. The EM program has corporate performance metrics that capture the actual and projected volume of LLW and MLLW for disposal from "baselined" projects. The information was not sufficiently detailed for modeling purposes, e.g. LLW and MLLW are combined, and data on radionuclide or hazardous chemical constituents is not collected and maintained corporately."
> Page D-126.

499-21

> "(T)here are significant uncertainties in waste volume projections because waste is yet to be generated, and little characteristic information is available as previously discussed. This is a change from the situation during the early years of the EM program when most MLLW was in storage awaiting treatment and disposition.

> "In addition to uncertainties in waste volume, the newly collected LLW and MLLW waste data did not include radionuclide or hazardous chemical data needed for EIS modeling. EM has not collected radionuclide and hazardous constituent information since the 1990's, when data was collected to support the Federal Facilities Task Force and the WMPEIS development. Documented information on radionuclides is found in the *Low-Level Waste Capacity Report*, Revision 2, produced in 2000. This document continues to serve as a source for waste characteristics.

> "It is difficult to predict the radionuclide and hazardous chemical composition of waste projected in the future…," Page D-127

Significant amounts of mixed waste with Plutonium and other TRU just below the legal cutoff requiring disposal in a deep geologic repository is likely to be included in the offsite waste sent to Hanford… However, the Draft TCWMEIS acknowledges that no reliable chemical composition data is available. E.g. LANL and West Valley, NY wastes. Pages D-127 and 128.

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sought to ship waste to Hanford following the 2004 RoD and court settlement imposed moratorium, the wastes which USDOE claimed had to be disposed at Hanford have been, instead, largely disposed in the regulated commercial facility run by Energy Solutions in Clive, UT. It is likely that all of the projected lower activity wastes forecasted for potential disposal at Hanford in Appendix D will be disposed at the Utah facility before 2022. This would greatly increase the concentrations of hard to treat chemical wastes and the proportion of highly radioactive wastes with Plutonium and other Transuranic elements, Uranium, Tc 99 and Iodine to be disposed at Hanford. This would greatly increase the impacts at Hanford compared to the already unacceptable impacts forecast in the draft TCWMEIS.

performing waste form. Other mitigation measures are discussed in Chapter 7, Section 7.5, of this final EIS.

499-17 DOE disagrees with the commentor that this EIS is inadequate and must be revised because cancer risk and cleanup standards are not addressed. Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives, as well as the permits and approvals DOE must obtain from Federal, state, and local agencies.

The potential doses to, and health impacts on, the public and workers from past Hanford operations have been the subject of a number of studies. Summaries of these studies are presented in Chapter 3, Section 3.2.10.3, of this EIS. As indicated in that section, the question of whether the population around Hanford has elevated cancer incidence or cancer mortality is unresolved. One past study showed no elevated levels of cancer around nuclear facilities, including Hanford; another study of 16 counties near Hanford determined that cancer incidence in white males and females was below the national average in most counties. The counties in which the incidences of cancer were higher than the national average were not those downwind of Hanford.

The Hanford Dose Reconstruction Project evaluated doses to, but not health effects on, members of the public from releases from 1944 through 1972. Airborne releases of iodine-131 from 1944 through 1957 were responsible for most of the doses from air emissions. The largest organ doses were estimated to be 24 to 350 rad to the thyroid. The maximum total effective dose equivalent to an adult from air emissions over the period from 1944 through 1972 was estimated to be 1 rem. The risk of a fatal cancer associated with a dose of 1 rem is about 1 in 1,600. The maximum dose through releases to the Columbia River (from eating nonmigratory fish) was estimated to be 1.4 rem.

Through this EIS, DOE evaluates the potential environmental and human health impacts of proposed actions that would contribute to the cleanup of Hanford, namely, alternatives for the storage, retrieval, treatment, and disposal of tank waste generated from defense plutonium production activities; closure of SSTs; and FFTF decommissioning. This EIS also addresses disposal of LLW and MLLW. The analyses include potential human health impacts (through the air pathway) of normal operations, presented in Chapter 4, with details in Appendix K ("Short-Term Human Health Risk Analysis"), as well as long-term impacts (including through the groundwater and river pathway), presented in Chapter 5, with details in Appendix Q ("Long-Term Human Health Dose and Risk Analysis").

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The method used to estimate these wastes is not reliable and reflects inherent biases from utilizing interviews with site managers seeking to ensure that wastes from their sites would be included in a decision to dispose of wastes at Hanford. **499-21 cont'd**

The amounts and hazards of the wastes proposed to be shipped to Hanford and buried are significant, even with this inherent bias: over 6,800 cubic meters of the wastes are projected to be extremely radioactive Class C and Remote Handled Wastes (over 200 mrem radiation at the cask surface); 1,800 Curies of Technetium 99 (which is a major concern because of the projected release of Tc 99 from the IDF landfill in excess of standards even without adding offsite waste); 1.5 Curies of Iodine 129 (similar concern about violation of standards fro IDF releases); and 54.5 Curies of Plutonium 239 and 240. Pages D-134 and 135. **499-22**

Despite estimating that the offsite wastes will include $5.34x10^1$ curies of Uranium isotopes, the chemical estimate has NO Reported Uranium. Throughout the TCWMEIS, we have found that USDOE failed to include Uranium as a chemical of concern with significant toxicity hazards, even when documenting that Uranium was present in large quantities in the radionuclide inventories. **499-23**

Since the IDF landfill is already built in 200 East, the only reason for the Waste Management portion of the EIS is to provide support for the decision to import and bury additional waste – which USDOE says it will not do for twelve years. **499-24**

USDOE can not use the results of unreliable guesstimates about waste quantities and composition provided by site managers or from questionable assumptions that pas cleanup wastes will be similar to future generated wastes, in assessing the impacts from disposing of those future wastes at Hanford. USDOE should withdraw the decisions to use Hanford as a national waste dump, and commit not to add any wastes to Hanford's problems. Then, if in 2022, if the vitrification plant is operational and if USDOE has significantly reduced the hazards and long term groundwater impacts from Hanford's existing wastes, then USDOE could issue a new reliable EIS utilizing real waste data. **499-25**

The EIS's cumulative impact analysis projects that the Hanford site will persist in re-contaminating groundwater and the Columbia River over the next hundred to thousand of years, even after current allocated budgets and identified cleanup is done. There is no acknowledgement within the EIS of the need for additional retrieval from burial grounds, tank leaks, tank bottoms and other sources - where there are significant amounts of waste discharges and buried waste, in order to drive down cumulative impacts. **499-26**

The quantity of waste already in the ground at Hanford and proposed to be buried in shallow landfills after being created during vitrification and other processes is simply too high. The waste volumes proposed to be disposed and already in the soil are projected by USDOE to result in extremely high contamination levels exceeding health and groundwater risk standards by magnitudes. These impacts are compounded by USDOE's intention to add more waste to the site.

- **NEPA requires that USDOE disclose and consider reasonable alternatives. USDOE failed to present reasonable alternatives: a) to using Hanford as a national waste dump; or, b) for retrieving, treating and removing wastes from Hanford for disposal** **499-27**

499-18 See response to comment 499-3 for a discussion on the transport and disposal of offsite waste.

499-19 Regarding the commentor's concern as to the accuracy of data, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

499-20 It is unclear what the commentor is referring to. DOE is not aware of a "cover" memorandum prepared by Science Applications International Corporation in Appendix D of this EIS. The EIS analyses are appropriate and properly disclose uncertainties as required under NEPA. Section D.3.6 describes the process for determining the inventory and the uncertainty related to disposal of these future waste streams.

499-21 Appendix D, Section D.3.6, includes an excerpt from *Analysis of Offsite-Generated Waste Projections, "Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site"* (DOE 2006a), which was prepared by the EM Office of Disposal Operations. This DOE report documents the methodology and analysis applied to offsite LLW and MLLW that potentially could require disposal at Hanford and states clearly that "It is difficult to predict the radionuclide and hazardous chemical composition of waste projected in the future, particularly from cleanup programs, because the waste does not exist until the cleanup work progresses." DOE believes the offsite waste inventory presented in Section D.3.6 and analyzed in this EIS is appropriate to use.

499-22 The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. It is also noted that the commentor referred incorrectly to the inventories for iodine-129 and plutonium-239 and -240 listed in Appendix D, Table D–81, of the draft EIS. The correct inventory estimates for these radionuclides are 15.3 and 545 curies, respectively. One means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford.

In response to comments about offsite waste disposal at Hanford, DOE has included in this *Final TC & WM EIS* an example of a potential mitigation measure that could be taken. Specifically, an offsite waste stream containing a significant inventory of iodine-129 and technetium-99 was eliminated from the analysis by applying proposed waste acceptance criteria. A sensitivity

in geologic repositories and landfills which are not projected to cause impacts to groundwater in violation of standards. *499-27 cont'd*

New monitoring data showing contamination levels higher than projected in the EIS' model, e.g., chromium upwelling into the Columbia River and contamination spreading from tank leaks and discharges, cast doubt that the modeling projecting very high impacts is conservative. As discussed above, the modeling for impacts from offsite waste is NOT conservative, since the forecasts of wastes are unverifiable estimates, with a likelihood that the wastes awaiting disposal beginning in 2022 will be of higher radioactivity levels and have greater concentrations of Plutonium, Uranium, Tc99, Iodine 129 and harder to treat chemicals than those projected in appendix D as available for disposal starting in 2010. *499-28*

The EIS should contain a full evaluation of the potential to reduce cumulative impacts by exhuming burial sites, to the degree practical, before capping; and, consider reasonable alternatives which would remove and treat long-lived, extremely radioactive or mixed chemical hazardous wastes for disposal in deep geologic repositories or regulated offsite landfills which are not projected to cause contamination in excess of relevant standards (e.g., remove and dispose in a deep geologic repository TRU buried before 1970 or in soil discharge sites; and, remove and dispose of tank farm equipment, piping, equipment and residues as Greater Than Class C waste in a geologic repository). *499-29*

4. NEPA and SEPA both require that USDOE disclose and discuss all relevant laws and standards:

One key law ignored by USDOE in the TCWMEIS is known as the Offsite Waste Rule of the federal Superfund law (CERCLA). CERCLA 121(d), 42 U.S.C.A. § 9621(d); and 40 CFR 300.440.

Under the Offsite Waste Rule, waste from other Superfund sites may not be added to landfills of units which are not in compliance, are releasing contaminants, or which are located on a facility at which other units or sites have uncontrolled releases of contamination into the environment.

USDOE proposes to use Trenches 31 and 34 for offsite waste at Hanford, prior to utilizing the IDF landfill and under the No Action Alternative, ignoring that these trenches have never been permitted. They were opened in the 1990s without a RCRA/HWMA Part B permit – illegally. They still have no permit. *499-30*

As the TCWMEIS makes amply clear, there are hundreds of sites at Hanford with uncontrolled releases of contamination spreading into the environment. Some of them will not be subject to a specific remedial action decision or closure decision for decades. These are not "controlled." Thus, under the Offsite Waste Rule, neither the IDF landfill nor the existing MW Trenches 31 and 34 are eligible to receive wastes from other USDOE sites undergoing closure or cleanup under the Superfund law.[7]

[7] USDOE sites do not need to be on the National Priority List (NPL) to be under Superfund's authority for cleanup.

analysis is also included that shows the impacts of limiting offsite waste streams containing iodine-129 and technetium-99. The results of this sensitivity analysis illustrate the difference this would make in potential groundwater impacts and are included in Appendix M. Other mitigation measures are discussed in Chapter 7, Section 7.5, of this EIS.

499-23 Estimates of the total uranium inventory were not provided in the table. DOE revised the Appendix D inventories to include a calculated total uranium inventory. Note that the uranium inventory was included in the analysis of both the draft and this final EIS, but was not entered as a total in the table.

499-24 A permit was issued by the state for construction of IDF-East and disposal of ILAW glass. This *TC & WM EIS* evaluates these activities as required by NEPA and informs DOE's decisionmaking on Hanford LLW and MLLW disposal.

499-25 The EM report cited in Appendix D, Section D.3.6, states clearly that "It is difficult to predict the radionuclide and hazardous chemical composition of waste projected in the future, particularly from cleanup programs, because the waste does not exist until the cleanup work progresses." DOE's analyses conservatively account for the reasonably foreseeable range of potential impacts, and uncertainties are discussed in accordance with NEPA requirements for incomplete and unavailable information (40 CFR 1502.22). DOE believes the offsite waste inventory presented in Section D.3.6 and analyzed in this EIS is the best-available data at the time of its publication.

See response to comment 499-3 for a discussion on the transport and disposal of offsite waste.

In a *Federal Register* notice published on December 18, 2009 (74 FR 67189). DOE also included GTCC waste as part of that moratorium. DOE has not changed its Preferred Alternative in this final EIS concerning this extended moratorium. DOE's inclusion of the moratorium in its ROD following issuance of this final EIS would result in its enforceability.

499-26 As stated in Chapter 1, Section 1.4.2, of this *TC & WM EIS*, groundwater contamination in the non-tank-farm areas of the 200 Areas (including the burial grounds, cribs, and trenches [ditches]) is being addressed under CERCLA remedial action, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements. Contamination in the vadose zone resulting from tank farm past leaks will be addressed as part of the SST closure process. The cumulative impact analyses for

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The IDF landfill permit conditions are never mentioned in the TCWMEIS. Under both NEPA and SEPA, USDOE and Ecology are obligated to assess – in the draft EIS for public review – the adequacy of those conditions as mitigation measures to prevent the forecasted releases from IDF from violating standards in the future. Under NEPA and SEPA, USDOE is also obligated to present the permit conditions for IDF as relevant legal standards, which the TCWMEIS fails to do. Because no EIS was prepared for IDF, and the draft shows probable significant impacts to health and the environment from projected releases, the TCWMEIS must assess both the impacts and adequacy of mitigation measures (conditions in the permit). *499-30 cont'd*

State Clean-Up Standards and laws Ignored:

The EIS fails to discuss and consider the relevant State cleanup standards (MTCA) in comparing projected contamination levels to what are referred to in the EIS as "benchmark standards". MTCA standards are more protective of human health for cancer risk than the levels shown in the EIS. Washington's MTCA (RCW Chapter 70.105D) is not even listed in the draft EIS' list of authorities. As we discuss in the section on SEPA adoption in greater detail, this failure requires revision and reissuance of the draft for comment. *499-31*

In preparing the draft TCWMEIS and developing its preferred alternatives, USDOE has failed to consult with the National Marine Fisheries Service (NMFS) and USFWS as required by the Endangered Species Act (ESA):

To cure this serious defect, USDOE must consult under Section 7 of the ESA and provide the public with the opportunity to comment on the results of that consultation in a revised draft EIS.

USDOE's proposed actions and the contamination from existing wastes are shown in the draft TCWMEIS and numerous other USDOE documents to affect the critical habitat of listed endangered salmonid species in the Hanford Reach of the Columbia River. For example, chromium and Uranium levels flowing into the River and at shorelines are currently unacceptably high and are projected to grow. *499-32*

USDOE's proposed actions are "actions" under the ESA triggering formal consultation requirements with the expert agencies regarding whether the proposed actions will impact critical habitat or harm the endangered species.[8] For example, USDOE must consult as to whether

[8] 15 USC 1536

(a) Federal agency actions and consultations

(2) Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

this *TC & WM EIS* (see Chapter 6 and Appendix U) include the vadose zone in the 200 Areas, as well as other areas of Hanford.

The commentor brings up the issue of integration and cleanup of CERCLA and RCRA units, which could influence each other. Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

499-27 DOE disagrees with the assertion that the alternatives are not reasonable. The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

See response to comment 499-3 for a discussion on the transport and disposal of offsite waste.

499-28 A new discussion has been added to Appendix U (described throughout Section U.1.2) in this final EIS that addresses the impacts of chromium in the Central Plateau, as well as flux of chromium to the Columbia River nearshore. In general, chromium fluxes to the river as modeled are within an order of magnitude of current estimates from field data. Modeled impacts at the Central Plateau are somewhat higher than current observations, although still within an order of magnitude.

Regarding the commentor's concern as to the accuracy of data, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty

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contaminants projected to flow into the River are of concern to salmon and critical habitat, and what levels should require additional actions:

> Section 7(a)(2) of the ESA requires the Secretary of the Interior to ensure that an action of a federal agency is not likely to jeopardize the continued existence of any threatened or endangered species. To this end, section 7(b) sets out a process of consultation whereby the agency with jurisdiction over the protected species issues to the Secretary a "biological opinion" evaluating the nature and extent of jeopardy posed to that species by the agency action. 16 U.S.C. § 1536(b). In order to maintain the status quo, section 7(d) forbids "irreversible or irretrievable commitment of resources" during the consultation period. *Id.* § 1536(d).
>
> Section 7 specifically provides that a federal agency (the "action" agency) *shall* "in consultation with ... the Secretary [of the Interior], insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species...." *Id.* § 1536(a)(2) (emphasis added).
>
> Procedural guidelines for complying with this consultation requirement are codified at 50 C.F.R. Part 402. The FWS implementing regulations under the ESA require agencies to review their action "at the earliest possible time to determine whether any action may affect listed species." *Id.* § 402.14(a). The FWS defines agency "action" broadly to include "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies...." *Id.* § 402.02.

Lane County Audubon Society v. Jamison, 958 F.2d 290 at 294 (9th Cir. 1992).

499-32 cont'd

Washington State's State Environmental Policy Act (SEPA) requires that an agency disclose for comment specific conditions that will mitigate projected impacts in order to bring a facility into compliance; and, requires enforceable mitigation commitments as part of SEPA. The EIS could not, as currently written, support RCRA/HWMA permitting under SEPA.

The impacts of relying on caps without remediation are shown to greatly exceed relevant standards. USDOE does not discuss, within the EIS, state requirements to remove contamination, to the degree practicable, before capping.

Secondary waste disposal, from the Waste Treatment Plant, is projected to cause significant groundwater impacts. Technetium is a driver for elevated impacts.

499-33

> **(3)** Subject to such guidelines as the Secretary may establish, a Federal agency shall consult with the Secretary on any prospective agency action at the request of, and in cooperation with, the prospective permit or license applicant if the applicant has reason to believe that an endangered species or a threatened species may be present in the area affected by his project and that implementation of such action will likely affect such species.
> **(4)** Each Federal agency shall confer with the Secretary on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under section 1533 of this title or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. This paragraph does not require a limitation on the commitment of resources as described in subsection (d) of this section.

still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

499-29 The scope of this *TC & WM EIS* did not include the remediation of the burial grounds as part of the proposed actions evaluated. However, Appendix S includes DOE's inventory estimates for the burial grounds, and Appendix U provides supporting information concerning the long-term cumulative impact analyses that includes the burial ground inventories.

DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

499-30 CERCLA requirements pertaining to Hanford environmental restoration cleanup activities are implemented under the TPA, as described in the *Draft TC & WM EIS*, Chapter 8, Section 8.1.4.

As a waste generator, DOE complies with the provisions of the CERCLA "Offsite Rule" and has issued guidance concerning application of the rule to DOE waste management facilities. The CERCLA Offsite Rule allows CERCLA waste to be transferred by the generator to an offsite RCRA Subtitle C land disposal facility, including a facility regulated under the "permit-by-rule" provisions (40 CFR 270.60), i.e., interim-status facilities or those that do not yet have final permits, such as Hanford. Such transfers may occur even where a nonreceiving unit located at the facility is releasing hazardous waste constituents or hazardous substances if the release is controlled by an enforceable agreement or a corrective action under RCRA Subtitle C or other applicable Federal or state authority (40 CFR 300.440(b)(2)(ii)(B) and (D)). Releases are "deemed" to be controlled upon issuance of the order, permit, or decree that initiates and requires compliance under an RCRA (or federally delegated state law) Facility Investigation/Corrective Measures Study or upon corrective measures implementation (40 CFR 300.440(f)(3)(iv) and (f)(3)(v)).

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5. Because of the serious deficiencies in the draft TCWMEIS, USDOE should withdraw the draft and revise it for reissuance – dropping any proposal to add offsite waste to Hanford. *499-34*

The draft TCWMEIS fails to include known inventories of key wastes and contaminants, rendering the cumulative impact analysis inadequate. Other examples of serious inadequacies include: *499-35*

i) Human health impacts are not presented from projected exposures, violating NEPA; *499-36*

ii) The draft TCWMEIS fails to include site specific transportation route analyses for USDOE's plan to truck 3 million cubic feet of waste to Hanford, despite court decisions that a legally adequate EIS must include route specific impact analyses; *499-37*

iii) The draft TCWMEIS fails to consider and disclose the direct and cumulative impacts from pending formal proposals to add other wastes to Hanford, particularly USDOE's pending proposal to import and bury large quantities of highly radioactive mixed wastes referred to as "Greater Than Class C" (GTCC) and "Greater Than Class C like" wastes; *499-38*

iv) Failing to present and consider Washington State's cleanup standards, including its cancer risk standard, in comparison to USDOE's projected contamination levels from its proposed actions and cumulative impacts; *499-39*

v) Failing to present and commit to substantive mitigation measures designed to bring proposed actions into compliance with relevant state and federal standards. Failure to present mitigation measures for comment in the draft EIS and failing to include proposed mitigation measures for adoption (e.g., RCRA permit limits) means that the TCWMEIS can not be accepted for use by Washington Ecology under the Washington State Environmental Policy Act (SEPA).

- USDOE has responded orally to this concern by saying it will prepare a separate mitigation summary document after adoption of the Final EIS.

- SEPA requires that Ecology offer the public the opportunity to review and comment on the proposed mitigation measures in the EIS; and, that Ecology propose adoption of specific mitigation measures. The draft TCWMEIS is devoid of all reference to specific mitigation measures to bring proposed actions and contaminant or risk levels into compliance with relevant standards. Indeed, based on our review seeking references to MTCA and Washington's HWMA and RCRA permit, there appears to be not one reference in the entire draft EIS to either Washington's MTCA standards and rules or to any potential provisions in the RCRA/HWMA permit for Hanford to achieve standards (except in the language quoted below in Ecology's Foreword). *499-40*

The public is entitled to review and comment on an adequate and complete draft EIS. Therefore, USDOE should commit to cure the significant errors and omissions in the draft TCWMEIS and resubmit the EIS for public comment. This view is shared by the Hanford Advisory Board (HAB) in its formal advice to USDOE and Washington Ecology (Adopted March 4, 2010). The flaws in the current Draft TCWMEIS, despite USDOE having spent $50 million in preparation, are an embarrassment, heightened by the apparent incompetence and/or bias of the contractor which prepared the draft EIS, SAIC. *499-34 cont'd*

In Hanford's case, the "release control mechanism" would be the TPA, which integrates the requirements of CERCLA, RCRA, and the Washington State Hazardous Waste Management Act. The release remains controlled as long as the facility is in compliance with the order, permit, or decree and enters into subsequent agreements for implementation. Note that it is EPA, not DOE, that determines the receiving facility's acceptability. EPA has previously determined that the Central Waste Complex and LLBGs currently in use at Hanford are "acceptable" for purposes of the CERCLA Offsite Rule. EPA consulted with the State of Washington in making its determinations that the Central Waste Complex and LLBGs appeared to be in substantial compliance with applicable Federal and state environmental regulations and notification requirements. EPA's determinations noted that releases or threatened releases of hazardous constituents and hazardous substances from other areas of Hanford are being addressed under CERCLA or RCRA corrective action authority. EPA's determinations also require that future shipments be coordinated with EPA and Ecology. EPA's acceptability determination may change based on future compliance issues, judicial challenge, or discovery of a significant release for which emergency action is necessary. DOE has not received a notice from EPA that the acceptability status of the Central Waste Complex or LLBGs has changed since EPA's original determinations.

499-31 The "benchmark standards" used in this *TC & WM EIS* represent dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL if an MCL is available. For example, the benchmark for iodine-129 is 1 picocurie per liter; for technetium-99, it is 900 picocuries per liter. These benchmark standards for groundwater impacts analysis were agreed upon by both DOE and Ecology as the basis for comparing the alternatives and representing the potential groundwater impacts. In addition, this approach is consistent with the MTCA standards Method A, which is used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs listed in Table 720-1 of the MTCA.

499-32 In 2003, DOE initiated informal consultation with USFWS and NMFS, as well as with the State of Washington, at a time when the proposed scope of this EIS was limited to the retrieval, treatment, and disposal of tank waste and closure of SSTs. However, since that time, the scope of this EIS has been expanded to include decommissioning of FFTF and waste management. Accordingly, DOE reinstituted informal consultation with USFWS, NMFS, and the state

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Ecology's Foreword to the Draft TCWMEIS (presented in the Readers' Guide and Summary) misrepresents the standards under SEPA in regard to when the public must be able to review and comment on proposed mitigation measures. The Foreword states:

> "After this *TC & WM EIS* is finalized, Ecology will proceed with approving regulatory actions required to complete the Hanford cleanup. These include actions under the Hanford Federal Facility Agreement and Consent Order (HFFACO, or Tri-Party Agreement) and actions that require state permits or modifications to existing permits, such as the Hanford Sitewide Permit. This permit regulates hazardous waste treatment, storage, and disposal activity at Hanford, including actions such as tank closure and supplemental treatment for tank waste.
>
> Ecology must comply with SEPA when undertaking permitting actions. It is Ecology's hope that the *Final TC & WM EIS* will be suitable for adoption in whole or in part to satisfy SEPA."[9]

The TCWMEIS, however, can not be "suitable for adoption in whole or in part to satisfy SEPA" unless the draft for public comment was prepared and the comment period conducted in a manner which satisfies SEPA. As of now, USDOE has failed to prepare a draft for public review which meets fundamental requirements of SEPA. For example, the public has been denied its rights to review and comment on a draft EIS which discloses and considers Washington State's cleanup and cancer risk standards, mitigation measures, reasonable alternatives, and even a summary for public review which presents impacts and mitigation measures. These violations of SEPA are substantive and can not be cured in a Final EIS. They can only be cured by revision and reissuance of the draft EIS for comment. **499-41**

Pursuant to WAC 197-11-792, alternatives to be presented for review and for the agency officials to act upon are "mitigation measures", which may include measure outside the proposed action (e.g., regulatory actions beyond USDOE's proposals).

WAC 197-11-440(4) requires that the Summary of the EIS include a statement of " the effectiveness of mitigation measures."

The Summary – like the rest of the EIS – is devoid of discussion of mitigation measures. This is not only the view of our organizations, but also of the Hanford Advisory Board (representing a wide range of geographically diverse communities of interest).

To be adopted by Washington State, the DRAFT EIS must present for public review and comment a section (or incorporate into the sections describing the impacts and loss of use of resources from impacts [e.g., loss of use of groundwater due to projected contamination – which the EIS fails to discuss]) describing specific mitigation measures. WAC 197-11-440(6) requires:

> (6) **Affected environment, significant impacts, and mitigation measures.**
>
> (a) This section of the EIS shall describe the existing environment that will be affected by the proposal, analyze significant impacts of alternatives including the proposed action, and discuss reasonable mitigation measures that would significantly mitigate these impacts….

[9] Foreword Sec. III, page 3.

in 2008 (see Appendix C, Section C.2.1). While responses to consultation letters were received from the state, none were received from USFWS or NMFS (see Appendix C, Section C.2.3). Each agency was also provided a copy of the *Draft TC & WM EIS*; USFWS commented on the document, while NMFS did not. It should be noted that neither the 2003 nor 2008 letter to NMFS implied that the proposed actions "may affect" Columbia River resources, but rather sought information from the agency concerning what species DOE should consider in its analysis. In addition, while the *Threatened and Endangered Species Management Plan, Salmon and Steelhead* (DOE 2000b) defines DOE's commitment to stocks of steelhead and spring Chinook salmon, it was not used to support DOE's position relative to the commentor's statement.

It should be noted that the analyses of impacts on threatened and endangered species presented in this *TC & WM EIS* address construction and normal operations. Any analyses of potential impacts of accidents would be highly speculative, considering the very low probability of an accident (see Chapter 4).

499-33 Under "Adoption — Procedures" (WAC 197-11-630), which is part of the regulations implementing SEPA, a state agency such as Ecology may choose to adopt an existing environmental document (e.g., this *TC & WM EIS*) to satisfy SEPA requirements for a proposed future permit instead of preparing its own separate document. The agency must independently review the contents of the existing environmental document and determine that it meets the agency's environmental review standards and needs for purposes of issuing a future permit. The existing environmental document is not required to meet the agency's procedures for preparing a separate document (such as circulation, commenting, and hearing requirements) to be adopted.

As a cooperating agency (as defined under CEQ regulations) in DOE's preparation of this *TC & WM EIS*, Ecology has independently reviewed the *Draft TC & WM EIS* and will review this *Final TC & WM EIS* for the express purpose of ensuring that this EIS satisfies Ecology's SEPA needs. The State of Washington has agreed that the descriptions of the alternatives identify the information needed to meet SEPA requirements. Ecology expects that the analysis provided in this *Final TC & WM EIS* will provide enough information to adequately inform its permitting requirements. Permits needed to implement the actions identified in the ROD would be processed under Washington State's Hazardous Waste Management Act and other applicable authorities, which generally require a separate opportunity for public comment on any proposed permits developed by Ecology. SEPA authorizes (but does not require) Ecology

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(iii) Clearly indicate those mitigation measures (not described in the previous section as part of the proposal or alternatives), if any, that could be implemented or might be required, as well as those, if any, that agencies or applicants are committed to implement….

(v) Summarize significant adverse impacts that cannot or will not be mitigated.

The Hanford Advisory Board (HAB) formally found that mitigation measures were not considered or presented – representing a widespread consensus about the draft TCWMEIS, and advised USDOE and Ecology (in advice we share and include as part of our comments to be responded to):

> "Most tank closure and the waste management alternatives appear to lack necessary actions to ensure that soil and groundwater are not further contaminated, that risk to human health and the environment does not increase in the future, and that the soil and groundwater are restored." (HAB Advice 229, March 4, 2010, Page 3)

> "Each alternative presented in the draft TC & WM EIS should be amended to identify mitigation measures to protect the soil, groundwater, environment and uncounted future generations." Id page 4

> "The draft TC & WMEIS should include specific conditions to mitigate impacts from all wastes supposed (sic) for disposal, which include treatment methods and waste acceptance criteria, to prevent contamination of groundwater above standards from any landfill." HAB Advice 229 Page 11

> Also, at page 12, the HAB advice found:
> "The estimated risk arising from the quantity of waste already in the ground at Hanford and from the proposed volumes to be buried in shallow landfills… exceeds Model Toxics Control Act (MTCA) standards. Mitigation measures should be identified to reduce this risk to meet regulatory standards. These risks would be further compounded by DOE's intention to add more waste to the site."

The only way to cure this major deficiency of the EIS, if it is to be adopted by Ecology for support of RCRA/HWMA and TPA actions is for dramatic revision of the EIS to incorporate the elements describing:

a) limits on the use of resources;
b) human health impacts from reasonably foreseeable exposures; and,
c) a description of potential regulatory measures and changes to the proposed actions which would mitigate the impacts.

If mitigation will not bring proposed actions into compliance with standards (which is likely that it is impossible to do), then changes to the proposed actions must be included in the EIS description of alternatives. *Such mitigation measures and changes should include regulatory and permit provisions barring any addition of offsite waste; requirements barring capping of all waste disposal, tank farm and unplanned release sites without characterization of releases and "distribution of hazardous substances" in trenches, burial grounds, discharge sites and*

499-41 cont'd

to include enforceable mitigation measures in its future permitting decisions for the IDF(s). Following completion of the mitigation action plan, Washington State RCRA/Hazardous Waste Management Act permit decisions will be made to ensure the necessary mitigation measures are implemented. The permitting process will consider the mitigation measures provided in this *TC & WM EIS* and may include other measures that the State of Washington determines are necessary for protection of human health and the environment. The State of Washington's "Dangerous Waste Regulations" (WAC 173-303) implement the Hazardous Waste Management Act of 1976 and provide the requirements for cleanup- and permit-related decisionmaking. These regulations ensure that, as cleanup begins, public input will be sought and the state MTCA cleanup standards will be considered. Please see Ecology's foreword to this *Final TC & WM EIS* for Ecology's perspective as a cooperating agency.

499-34 DOE has satisfied NEPA requirements by preparing a complete and technically accurate EIS, responding to public comments in this CRD, and making changes to this EIS where appropriate and necessary. In accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE prepared an SA to evaluate information previously presented in the *Draft TC & WM EIS* that has been updated, modified, or expanded to determine whether a supplement to the draft EIS is warranted. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* was not required. See Chapter 1, Section 1.8.2, for more information.

499-35 DOE disagrees with the commentor's assertion that the cumulative impact analyses are inadequate. Appendix S of this *TC & WM EIS* explains the process used to develop the inventory data set for the cumulative impact analyses and discusses data uncertainty.

499-36 This *TC & WM EIS* presents the potential human health impacts of projected exposures in Chapters 4 and 5. Potential short-term radiological human health impacts of proposed activities at Hanford are presented in Chapter 4, Section 4.1.10, for Tank Closure alternatives; Section 4.2.10 for FFTF

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contaminated soil sites (SEE WAC 173-340-350(7)(c)(iii): remedial investigation must be sufficient to characterize the "distribution of hazardous substances as well as the threat….").

- Ecology must propose a mitigation measure under which no further waste is added to the site, so long as existing wastes and proposed actions are projected to violate relevant standards; and, because the projected impacts from disposal of offsite waste will violate relevant standards. As noted earlier, Figure S-21 at S-100 demonstrates that offsite wastes increase the degree of violation above MTCA's risk and cleanup standards ten-fold.

- Energy's proposed voluntary, unenforceable moratorium on offsite waste until the vitrification plant is "operational" does NOTHING to mitigate the long term violations of standards or to reduce the long-term contamination and health impacts from adding offsite waste over hundreds and thousands of years. And, in addition to the lack of reducing any long-term impact, because it can be lifted at any time, USDOE's voluntary moratorium is not even a proper mitigation measure. ***499-41 cont'd***

For Ecology to adopt the TCWMEIS, the TCWMEIS must be revised and reissued for public comment with specific shortcomings addressed, including, but not limited to, presentation for comment of specific mitigation measures, a summary which describes the likely impacts on health and the environment from proposals, and a description of resources whose use will be limited due to contamination or other impacts. To be legally adequate, the draft EIS should be reissued for comment with identification of specific mitigation conditions that could bring proposed landfills and other waste management units into compliance with relevant state and federal standards.

For Ecology to adopt the TCWMEIS, it must independently review and respond to comments – it can not merely accept and adopt USDOE's (the polluter's) comments. ***499-42***

These shortcomings are not solely relevant to adoption of the TCWMEIS by Ecology. The TCWMEIS fails to meet CEQ guidelines and NEPA requirements and must be revised and reissued for public comment. ***499-43***

A serious legal inadequacy of the draft TCWMEIS requiring revision and reissuance is USDOE's failure to present and discuss Washington State's cancer risk and cleanup standards NEPA requires discussion of relevant standards. Under the federal Superfund law, CERCLA, Washington State's cleanup standards are "applicable and relevant standards" for the cleanup decisions at Hanford. Under federal hazardous waste laws, including RCRA and the Federal Facilities Compliance Act, Washington's closure standards govern mixed waste units such as the High-Level Nuclear Mixed Waste tanks. Washington's cleanup standards, including Washington's cancer risk standard for residual contamination used to establish cleanup levels, are found in the Model Toxics Control Act (MTCA), RCW Chapter 70.105D, and WAC Chapter 173-340. ***499-44***

The most fundamental cleanup standard under State law is the cleanup carcinogen risk level

Decommissioning alternatives; and Section 4.3.10 for Waste Management alternatives, with details presented in Appendix K, "Short-Term Human Health Risk Analysis." Potential long-term impacts are presented in Chapter 5, and details of the potential long-term human health impacts, in Appendix Q, "Long-Term Human Health Dose and Risk Analysis."

499-37 The *Draft TC & WM EIS* contains an analysis of transportation routes of specific origination/destination sites to and from Hanford, as shown in Appendix H, Figure H–4, Waste Management Alternatives – Analyzed Truck and Rail Routes. The actual routes used could vary due to changes in route characteristics and highway construction, but the risk results are expected to remain essentially the same.

499-38 Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

499-39 Please see response to comment 499-31 regarding the commentor's reference to appropriate cleanup standards.

499-40 Additional sensitivity analysis has been added to this *Final TC & WM EIS* for potential secondary-waste mitigation, offsite-waste mitigation, vadose zone soil mitigation, and the IDF. Following issuance of this *Final TC & WM EIS* and its associated ROD, DOE is required to prepare a mitigation action plan that addresses mitigation commitments expressed in the ROD. This plan would be prepared before DOE would implement any action that is the subject of a mitigation commitment. Copies of any mitigation action plan developed by DOE will be made available for inspection in appropriate DOE public reading room(s) and will also be available upon request.

Following completion of the mitigation action plan, Washington State RCRA/Hazardous Waste Management Act permit decisions will be made to ensure the necessary mitigation measures are implemented. The permitting process will consider the mitigation measures provided in this *TC & WM EIS* and may include other measures that the State of Washington determines are necessary for protection of human health and the environment. The State of Washington's "Dangerous Waste Regulations" (WAC 173-303) implement the Hazardous Waste Management Act of 1976 and provide the requirements for cleanup- and permit-related decisionmaking. These regulations ensure that, as cleanup begins, public input will be sought and the state MTCA cleanup standards will be considered.

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Nowhere in the draft EIS is there a single mention of these standards.

This is either a deliberate choice, reflecting political beliefs by Department officials that they do not wish to meet State standards (continuing a decades long fight against application of state cleanup standards by the Department – despite clear Congressional direction), or gross incompetence.

The EIS section describing "Hanford Regulatory Requirements" (Section 1.2.1) fails to mention MTCA or Washington's Hazardous Waste Management Act (HWMA), RCW Chapter 70..105, which governs "closure", construction and operation of tank systems and other units used to store, treat or dispose of hazardous wastes. Closure of tank systems and past practice units under HWMA requires compliance with MTCA's standards. WAC 173-303-64620.

Washington State's cleanup standards in the Model Toxics Control Act [MTCA], RCW Chapter 70.105D and WAC Chapters 173-303 and 340, are important guide posts regarding acceptability of health impacts from projected levels of contamination. Failure to discuss the standards and failure to provide the public with comparisons of proposed actions to the standards can only be cured by revision and reissuance of the Draft TCWMEIS for public comment.

- CERCLA applies at federal facilities "in the same manner and to the extent as such guidelines, rules, regulations, and criteria are applicable to other facilities" 42 USC 9620 (a)(2).
- State Cleanup laws apply to federal facilities that are not on the Superfund National Priorities List (NPL) to the same extent that they apply generally to all other sites in the state. 42 USC 9620 (a)(4).
- If Hanford does not meet state cleanup standards when taken off the NPL, it would be subject to cleanup under the state's more protective Model Toxics Control Act standards.
- Because a more protective state cleanup standard would apply after a federal facility is removed from the CERCLA NPL… cleanup of the federal facility should meet the state's more protective cleanup standards when designing the cleanup. Therefore:
  CERCLA requires that cleanups meet more protective state requirements:
- any applicable, relevant and appropriate standard or requirement under state laws or rules for any pollutant that would remain after cleanup. 42 USC 9621(d)(2).

- CERCLA's requirement from Sec. 120 that applicable or relevant state standards (ARARs)be applied in selecting the remedy requires that standards which EPA may not view as enforceable must still be explicitly considered and applied if they are "relevant".
- Thus, Washington State's standard for total carcinogen risk is a requirement that must be met whether the site is being cleaned up under CERCLA or Washington's Hazardous Waste Management Act (using delegated authority under the federal RCRA hazardous waste law, which allows the state to have more protective standards).
- The applicable and relevant Washington State standard for carcinogens – explicitly including all radionuclides – is one additional cancer for every one hundred thousand persons exposed (expressed in scientific notation as 1E-5). SEE RCW Chapter 70.105D and WAC Chapter 173-340; and, RCW 70.105E.050

499-44 cont'd

499-41 Under "Adoption — Procedures" (WAC 197-11-630), which is part of the regulations implementing SEPA, a state agency such as Ecology may choose to adopt an existing environmental document (e.g., this *TC & WM EIS*) to satisfy SEPA requirements for a proposed future permit instead of preparing its own separate document. The agency must independently review the contents of the existing environmental document and determine that it meets the agency's environmental review standards and needs for purposes of issuing a future permit. The existing environmental document is not required to meet Ecology's procedures for preparing a separate document (such as circulation, commenting, and hearing requirements) before it can be adopted.

As a cooperating agency (as defined under CEQ regulations) in DOE's preparation of this *TC & WM EIS*, Ecology has independently reviewed the *Draft TC & WM EIS* and will review this *Final TC & WM EIS* for the express purpose of ensuring that this EIS satisfies Ecology's SEPA needs. The State of Washington has agreed that the descriptions of the alternatives identify the information needed to meet SEPA requirements. Ecology expects that the analysis provided in this *Final TC & WM EIS* will provide enough information to adequately inform its permitting requirements. Permits needed to implement the actions identified in the ROD would be processed under Washington State's Hazardous Waste Management Act and other applicable authorities, which generally require a separate opportunity for public comment on any proposed permits developed by Ecology. SEPA authorizes (but does not require) Ecology to include enforceable mitigation measures in its future permitting decisions for the IDF(s). Following completion of the mitigation action plan, Washington State RCRA/Hazardous Waste Management Act permit decisions will be made to ensure the necessary mitigation measures are implemented. The permitting process will consider the mitigation measures provided in this *TC & WM EIS* and may include other measures that the State of Washington determines are necessary for protection of human health and the environment. The State of Washington's "Dangerous Waste Regulations" (WAC 173-303) implement the Hazardous Waste Management Act of 1976 and provide the requirements for cleanup- and permit-related decisionmaking. These regulations ensure that, as cleanup begins, public input will be sought and the state MTCA cleanup standards will be considered. Please see Ecology's foreword to this *Final TC & WM EIS* for Ecology's perspective as a cooperating agency.

499-42 As discussed in the Summary, Section S.1, and Chapter 1, Section 1.1, of this *TC & WM EIS* and in Ecology's foreword, which is located in the front section of

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- CERCLA includes radionuclides in definition of hazardous substances and authority for cleanup, including for federal facilities.
- MTCA standards apply at federal facility Superfund cleanups as ARARs
- Fundamental Difference is Cancer Risk:
- CERCLA risk range allows up to one additional fatal cancer for every 10,000 adults exposed (1x10-4; or 1E-4)
- MTCA protects more sensitive individuals to one additional cancer for every 100,000 persons exposed (1x10-5: or 1E-5) from ALL carcinogens at site

MTCA has a more protective standard than CERCLA requiring use of permanent remedies to ***maximum*** extent practicable. RCW 70.105D.030(1)(b):

> "In conducting, providing for, or requiring remedial action, the department shall give preference to permanent solutions to the maximum extent practicable and shall provide for or require adequate monitoring to ensure the effectiveness of the remedial action"

- Caps are recognized as not being preferred permanent remedies versus removal and treatment.

- This is yet another failure of the draft TCWMEIS to address and present relevant Washington State standards applicable to cleanup at Hanford; and, a failure to meet SEPA's requirement that mitigation measures must be presented in the draft EIS. Clearly, use of Washington's preference for use of permanent remedies, in contrast to USDOE's preferred alternatives' reliance on the use of caps without retrieval of waste discharges, buried wastes or tank leaks, must be considered in any EIS under SEPA as a mitigation measure.

The public deserves to see how proposed releases from individual units (e.g., the IDF landfill, tank farm units) and cumulative impacts from releases of all sites and units on the Central Plateau compare to Washington State's cleanup standards and determinations of "acceptable" cancer and toxicity or other illness risks. Only if this comparison is provided in a revised draft for public comment will the public have this vital opportunity to consider and comment.

Mitigation measures must include actual characterization of wastes in tanks, in soils and in discharge and burial ground/ landfill units. Instead, USDOE proposes to cap without characterization. This fails to meet legal requirements:

- The HWMA requires characterization ***for investigation*** of contamination at units, including burial grounds, cribs and release sites. See WAC 173-340-350(7)(a).
- WAC 173-340-350(7)(c)(iii) requires that field investigations shall be: "Sufficient investigations to **characterize** the distribution of hazardous substances present at the site, and threat to human health and the environment." (emphasis added).

Without providing an opportunity for the public to comment on a revised draft TCWMEIS that discusses the projected impacts, contamination and risk levels in comparison to State standards, **Washington State's Department of Ecology CAN NOT accept and adopt the TCWMEIS for use in its decisions on tank farm closure and other RCRA/HWMA decisions.**

499-44 cont'd

this EIS, Ecology is participating in this NEPA activity as a cooperating agency; as such, it is responsible for reviewing the content of this *TC & WM EIS* under the authority of SEPA (RCW 43.21C) to ensure it satisfies state requirements and supports its proposed action to issue permits under its Hazardous Waste and Toxics Reduction Program.

499-43 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences among the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and they meet the agency's purposes and needs.

499-44 DOE disagrees that this EIS is inadequate because it does not address the MTCA, CERCLA, and state cancer risk. This EIS was prepared under NEPA and is not intended to be a CERCLA decision document; CERCLA standards do not apply to the decisions to be based on this *TC & WM EIS*. Chapter 8, Section 8.1, discusses the MTCA, and Chapter 5 and Appendix Q present information on risk. Washington State regulations are identified where appropriate in both the draft and this final EIS.

The commentor's bulleted list of requirements is based on CERCLA. DOE agrees that Hanford is a CERCLA cleanup site; however, the proposed actions are activities permitted under RCRA and subject to evaluation under NEPA.

The "benchmark standards" used in this *TC & WM EIS* represent dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL if an MCL is available. For example, the benchmark for iodine-129 is 1 picocurie per liter; for technetium-99, it is 900 picocuries per liter. These benchmark standards for groundwater impacts analysis were agreed upon by both DOE and Ecology as the basis for comparing the alternatives and representing the potential groundwater impacts. In addition, this approach is consistent with the MTCA standards Method A, which is used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs listed in Table 720-1 of the MTCA.

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Essentially, USDOE will have wasted $50 million on the TCWMEIS unless it is revised and reissued for comment with a full discussion of Washington State's cleanup standards. *499-44 cont'd*

6. Health Risks Not Considered and Failure to Disclose and Commit to Application of Applicable and Relevant Standards:

USDOE failed to disclose and consider Washington State's cancer risk standard governing cleanup; and, failed to assess how proposed actions would violate this level of "acceptable" risk:

- CERCLA's requirement from Sec. 120 that applicable or relevant state standards (ARARs) be applied in selecting the remedy requires that standards which EPA may not view as enforceable must still be explicitly considered and applied if they are "relevant".
- Thus, Washington State's standard for total carcinogen risk is a requirement that must be met whether the site is being cleaned up under CERCLA or Washington's Hazardous Waste Management Act (using delegated authority under the federal RCRA hazardous waste law, which allows the state to have more protective standards).
- The applicable and relevant Washington State standard for carcinogens – explicitly including all radionuclides[10] – is one additional cancer for every one hundred thousand persons exposed (expressed in scientific notation as 1E-5). SEE RCW Chapter 70.105D and WAC Chapter 173-340; and, RCW 70.105E.050
- CERCLA includes radionuclides in definition of hazardous substances and authority for cleanup, including for federal facilities.
- Cancer Risk under CERCLA is less protective than MTCA; However, USDOE only presents impacts in comparison to the CERCLA NCP risk level or USDOE's own far less protective radiation exposure limits: *499-45*
    - CERCLA risk range allows up to one additional fatal cancer for every 10,000 adults exposed (1x10-4; or 1E-4)
    - MTCA protects more sensitive individuals to one additional cancer for every 100,000 persons exposed (1x10-5: or 1E-5) from ALL carcinogens at site

USDOE fails to present the potential non-cancer health impacts from exposure to radionuclides and fails to present any potential impacts from chemical exposures. These should be presented in the summary. Sadly, they are not to be found anywhere in the EIS.

USDOE errs in presenting cancer risk in its impact statements in terms of additional adult fatal cancers rather than total cancers caused from exposure: USDOE presents risks in terms of fatal cancers only, and removes from its estimates individuals who die early from exposure but would eventually have died from a cancer.

[10] The official Explanatory Statement for MTCA, adopted by Ecology, is the binding legal interpretation of the State cleanup law. It explicitly interprets MTCA's carcinogen risk cleanup standards as governing cleanups of radionuclide releases to the environment. CERCLA, the federal Superfund law, includes radionuclide releases as releases of hazardous substances subject to the total cancer risk standard for determining cleanup levels at Superfund sites. SEE OSWER.

The State of Washington's "Dangerous Waste Regulations" (WAC 173-303) implement the Hazardous Waste Management Act of 1976. These regulations provide requirements for cleanup- and permit-related decisionmaking.

DOE disagrees that information on IDF and tank farm releases and on the cumulative impacts of all releases was not made available to the public. Information related to analysis results at the source unit boundaries, the Core Zone Boundary, and the Columbia River nearshore was presented in the *Draft TC & WM EIS* for the proposed alternatives. Cumulative impacts at the Core Zone Boundary and Columbia River nearshore were presented. In addition, combinations of the cumulative impacts and a range of proposed alternatives were presented in the alternative combinations discussions.

In response to comments received on the *Draft TC & WM EIS* concerning potential long-term impacts on groundwater resources, additional sensitivity analyses were performed to evaluate the potential impacts if certain remediation activities were conducted in the future at some of the more prominent waste sites on the Central Plateau and along the river corridor. The discussion found in Chapter 7, Section 7.5, Long-Term Mitigation Strategies, was expanded to summarize these results. Prior to implementing any closure actions, DOE will develop a tank farm system closure plan that will be implemented for each of the waste management areas. The plan will be reviewed to ensure regulatory compliance by Ecology and presented for public comment before approval as a permit modification to the Hanford sitewide permit. Additional information on the relationship of actions analyzed in this final EIS and closure activities is provided in Section 7.1.

499-45 Please see response to comment 499-31 regarding the commentor's reference to appropriate cleanup standards.

The commentor indicates that noncancer health impacts due to exposure to radionuclides were not presented in this EIS. As discussed in both the draft and this final EIS, Appendix K, Section K.1.1.6, a number of authoritative studies provide guidance on risk factors relating health effects to dose. Section K.1.1.6 discusses the scientific evidence relating radiation dose to the incidence of cancers, fatal and nonfatal. This discussion indicates that the fatal cancer risk factor of 0.0006 reflects an age distribution that includes children and is generally regarded as conservative. Appendix Q, Section Q.2.4.2, explains that nuclide-specific risk coefficients, developed using techniques that account for gender and age, were used for the long-term human health impacts analysis.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

See for example, draft GNEP PEIS At C.2, page C-8:

"Current DOE guidance (DOE2002h) from estimating public and worker cancer risk from exposure to ionizing radiation recommends using a conversion factor of 6x10-4 fatal cancers per rem, and a factor of 8x10-4 per rem for estimating excess cancer morbidity (incidence). Based on this guidance , the probability of an individual worker or member of the public contracting a fatal cancer is 6x10-7 per rem….

This approach estimates excess cancer fatalities (i.e., those above the naturally occurring annual rate).

The "number of cancer fatalities" corresponding to a single individual's exposure over a (presumed) 70-year lifetime to 0.3 rem per year is the following… = .01 cancer fatalities… estimated effect of background radiation exposure on the exposed individual would produce a 1.3 percent chance that the individual might incur a fatal cancer caused by the exposure."

499-45 cont'd

7. USDOE failed to disclose the pending and closely related formal proposal to truck to Hanford, and bury in Hanford landfills, highly radioactive mixed wastes, referred to as "Greater Than Class C" (GTCC) and "Greater Than Class C – like" wastes.

USDOE has a separate pending formal proposal to use Hanford to bury an undisclosed large quantity of GTCC and GTCC-like wastes. USDOE has announced that it will prepare a separate programmatic EIS on disposal of these wastes, and that Hanford is one of several leading proposed sites for disposal.

Instead of presenting the impacts from the related actions of using Hanford as a national radioactive and radioactive hazardous waste dump for 3 million cubic feet of waste disclosed in the draft TCWMEIS and from a yet to be disclosed quantity of GTCC wastes, USDOE seeks to impermissibly "piecemeal" disclosure and analysis of the impacts in separate impact statements. This deprives both the public and regulators, as well as USDOE officials, of the information needed to determine if regulatory conditions (mitigation measures) should bar all or some of the wastes.

The GTCC and GTCC-like wastes are highly radioactive – so radioactive that they are referred to as "Remote-Handled", barring direct human handling. There is no facility in the USDOE complex available to assay and characterize or treat these wastes, which USDOE has acknowledged as mixed wastes.[11] Amongst the GTCC-like wastes are wastes which USDOE had previously sought to ship to Hanford under its Western Hub proposal for consolidation of

499-46

[11] See RH-TRU and WMPEIS decisions for acknowledgement that these are legally Mixed Wastes. GTCC is presumed to be Mixed Waste because of the likelihood that the processes creating the wastes including hazardous or dangerous wastes, and because it is not possible to characterize them in existing USDOE facilities. Therefore, for legal purposes, these wastes must be considered Mixed Wastes.

499-46 Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

Remote-Handled Transuranic Waste (RH-TRU). Heart of America Northwest along with WA State and other co-plaintiff citizen groups successfully sued and obtained an injunction against USDOE shipping these wastes to Hanford in May, 2003, without an adequate EIS.

USDOE issued a formal Record of Decision in 2000, following adoption of the Waste Management Programmatic EIS that Hanford would be one of two "regional" disposal sites in the nation for USDOE's Mixed and Low-Level wastes. Despite the use of the word "regional", this designation is to use Hanford as a national mixed waste and LLW dump.

The other "regional" site designated for disposal of offsite LLW and MW is the Nevada Test Site. The State of Nevada has formally informed USDOE that the existing MW disposal landfill must be closed by the end of 2010. That leaves Hanford as the sole site for disposal of the GTCC and GTCC-like wastes under USDOE's existing Record of Decision.

NEPA (and SEPA as well) requires that all related proposals and any formal or informal pending proposal which may increase the cumulative impacts of proposed actions must be disclosed in the EIS with cumulative impacts considered and alternatives with mitigation measures presented. USDOE's GTCC proposal is not only related, but USDOE's existing RoDs make it likely that Hanford will be the selected site for disposal. Therefore, in the draft TCWMEIS, USDOE must present the quantities of GTCC waste which it may truck to, and bury at, Hanford along with the impacts, cumulative impacts, alternatives and mitigation measures.

The impacts of disposing of GTCC wastes at Hanford are likely to be high, exasperating the already impacts from proposed actions leaving wastes in the soil and from landfills. USDOE estimates that the releases from both the IDF landfill and River Protection Project landfill will greatly exceed relevant standards. Adding GTCC wastes will add large unknown impacts, which the public and regulators must be allowed to see and comment upon in one EIS.

Appendix S of the Draft TCWMEIS states that USDOE is preparing a draft EIS for GTCC waste and is considering Hanford for a burial site. Page S-15 last paragraph states that "These (GTCC) inventories were not included in the groundwater analysis for this TC&WM EIS because the Draft GTCC EIS is still under development."

USDOE can not piecemeal the analysis in this manner. In its settlement of WA v. Bodman, USDOE committed to perform a cumulative impact analysis for all wastes at Hanford and proposed to be disposed at Hanford. USDOE is failing to meet this obligation by failing to include the impacts from storing, treating and disposing of GTCC wastes at Hanford.

GTCC wastes not only pose serious disposal impacts, they also greatly increase the cumulative potential impacts of trucking wastes to Hanford along specific truck routes which USDOE may use. The public is entitled to see and comment on the proposed cumulative impacts from USDOE's related pending proposals to truck both 3 million cubic feet of LLW and MW as disclosed in the draft TCWMEIS plus the additional highly radioactive, and high risk GTCC wastes to Hanford.

499-46 cont'd

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Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

Because they are highly radioactive – as "hot" as Spent Nuclear Fuel High-Level Nuclear Waste at the surface of the cask (above 200 mrem/hour) – the GTCC wastes create significant increased impacts from trucking the wastes to Hanford. In the USDOE's 1998 draft GNEP (Global Nuclear Energy Partnership) EIS, USDOE estimated that trucking Spent Nuclear Fuel to Hanford for storage – with its similar radiation levels – would result in 816 fatal cancers in adults along the truck routes. Those 816 fatal cancers in adults would be from the radiation emanating from the shipping casks on the trucks even if there were no accident or terrorist attack on any shipment.

Clearly, the truck route matters in regard to exposure. If the trucks are travelling through cities such as Spokane, Portland, Salem, then the exposure will be greater. The impacts from a reasonably foreseeable accident with fire or terrorist attack are also far greater. In the Powerpoint presentation we have submitted accompanying these comments, we show the modeled impacts from either a reasonably foreseeable accident with high temperature fire or terrorist attack (using explosive power estimates from the Department of Defense for readily available terrorist weapons or explosive devices and NRC models for radiation dispersion) at the intersection of Interstate 5 and 205 in Portland.[12] Over a thousand cancer deaths would result, and over 300 square miles of Portland would require evacuation and a never before attempted decontamination effort.

Therefore, as we discuss below in the section on transportation impacts, USDOE must assess the route specific impacts from both the 3 million cubic feet of waste presented in the draft TCWMEIS and the impacts from trucking GTCC wastes to Hanford, along with their cumulative impacts.

499-46 cont'd

8. The risks of transporting radioactive waste to Hanford:

The Draft TCWMEIS fails to properly present and consider impacts from trucking 3 million cubic feet of radioactive wastes to Hanford:

USDOE proposes to truck nearly 3 million cubic feet of radioactive and "mixed" radioactive wastes to Hanford under its "preferred alternatives."

That equals approximately 17,500 truckloads of radioactive wastes heading to Hanford up I-5, I-84, or I-90 – or, more than 2 trucks a day, every day for over twenty years.

Even without an accident or terrorist attack on a truckload of radioactive wastes, these shipments will cause cancer in our communities along the truck routes.[13]

499-47

[12] The full 2004 report on the risks from trucking radioactive RH-TRU to Hanford, similar to GTCC and GTCC-like wastes, is available on our website for reference or available upon request.
[13] Id.

499-47 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The *Draft TC & WM EIS* analyzed the transportation of RH-LLW from INL to Hanford for disposal. In response to the public's input and concerns about offsite waste disposal at Hanford, DOE has included in this *Final TC & WM EIS* an example of a potential mitigation measure that could be taken by DOE. Specifically, an offsite waste stream containing a significant inventory of iodine-129 (i.e., RH-LLW resins from INL) was eliminated from the analysis. Implementing this mitigation measure reduced the number of shipments analyzed from about 16,600 in the *Draft TC & WM EIS* to about 14,200 (about 2 trucks per day) in this *Final TC & WM EIS*, as presented in Chapter 4, Section 4.3.12, Public and Occupational Health and Safety—Transportation. This mitigation measure has been incorporated into the Waste Management alternatives. As shown in the Summary of this EIS, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

USDOE has an obligation under NEPA to consider the route specific impacts from its proposal to truck these wastes to Hanford. Instead, USDOE officials admitted (at the Spokane public hearing in response to questions from Spokane City Council Member and Heart of America Northwest board member Bob Apple) that the TCWMEIS only analyzed what USDOE and SAIC refer to as "a representative route."

The "representative route" presented in the TCWMEIS is NOT representative of conditions and potential impacts along the other routes likely to be used for truck shipments to Hanford: Interstate 90 through Spokane, and Interstates 5, 205 and 84 through Portland, Eugene, Salem and other Western Oregon cities and the Columbia Gorge.

499-48

The draft TCWMEIS preferred alternative is for trucking and disposing at Hanford of the same quantity of wastes (approximately 3 million cubic feet, or 82,000 cubic meters) analyzed as the preferred alternative in USDOE Final Solid Waste Disposal EIS.

In the Solid Waste Disposal EIS, USDOE acknowledged that "incident free" transportation of the upper bound volume of wastes considered would cause 9 or 10 fatal cancers – in adults – along the transportation routes. ***USDOE failed to consider impacts on children*** and the number of other non-fatal health effects from transportation of wastes.[14]

USDOE 's figure of 9 to 10 fatal cancers in adults was based on transportation figures that reduced the impacts by over 50% compared to its own prior analyses[1], and failed to consider that Remote Handled TRU trucks, with the most radioactive of wastes, would not be able to stay solely on interstate highways, which was the basis of USDOE's analysis. [1]

499-49

USDOE has reduced the total waste volume from 12 million cubic feet to 3 million. The total number of fatal cancers should, at minimum, be reported by USDOE as one quarter of the number in the SWEIS. That should be 2.5 fatal cancers.

In the USDOE' s 2004 Solid Waste Disposal Final EIS, USDOE's estimate for the same LLW and MW it proposes to ship to Hanford (82,000 m3, approximately 2.9 million cubic feet) would result in approximately 2.5 fatal cancers. This was not calculated for children. The draft TCWMEIS adopts the transportation analysis in the prior Final Solid Waste Disposal EIS along with the estimate of waste volume and the waste streams to be shipped to Hanford for disposal. USDOE continues to assert that the Record of Decision for the Solid Waste EIS and the Waste Management Programmatic EIS (2000) remain in effect, designating Hanford as the disposal site

[14] Final Hanford Solid Waste Disposal EIS, USDOE, Feb. 2004, page S.35: "…9 to 10 LCFs were estimated for the Upper Bound waste volume." LCFs = Latent Cancer Fatalaties. USDOE calculated only for adult exposure. USDOE also used assumption that 10,000 person rem = 6 LCFs (Table 5.145, page 5.251), whereas 50% of people exposed to 200 rem will die of acute radiation exposure; and annual exposures of adults to 15 mrem are estimated by NRC and EPA to cause 3 fatal cancers per 10,000 exposed. That estimate of cancer risk was increased significantly by the National Academy of Sciences BEIR VII Report (Biological Effects of Ionizing Radiation, VII, 2005). The BEIR report is supposed to serve as the basis for risk-dose calculations, but USDOE has refused to utilize BEIR VII for this EIS or for Hanford Clean-Up decisions.

499-48 See response to comment 499-3 for a discussion on the transport and disposal of offsite waste.

499-49 DOE disagrees with the commentor's assertion that the analysis presented in the *Draft TC & WM EIS* relied on the *HSW EIS* (DOE 2004a) and that no new transportation analysis was completed. The *Draft TC & WM EIS* analyses are based on updated inventories of wastes to be shipped from specific points of origin and groundwater, ecological resource, and human health analyses, as well as updated transportation analysis, that are not based on the *HSW EIS*.

Specific to the comment about whether DOE considered impacts on children, there is no existing guidance that recommends dose coefficients for children's exposure to external radiation. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) was used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult, but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance that provides this information has yet to be developed.

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths for the sex and age distribution of the U.S. population in terms of the number of excess deaths per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing LCFs (DOE 2003a). The National Research Council report also shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose, compared with about 42 out of 100 individuals who are expected to develop solid cancer or leukemia from other causes, assuming a sex and age distribution similar to that of the entire U.S. population. The BEIR VII dose-to-risk conversion factor is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the *Draft* and *Final TC & WM EIS* transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

for 82,000 m3 of LLW and MW. On this basis, USDOE claims it need not analyze the alternative of NOT using Hanford for disposal of these offsite wastes.

USDOE's analysis of transportation impacts in the Solid Waste EIS was one of five areas that its internal review documents found to be "technically indefensible." That internal review was the basis of the settlement suspending the record of decision for groundwater analysis and a moratorium on offsite waste. However, Washington State did not ask that the transportation analysis be withdrawn. Nonetheless, USDOE can not rely on the Solid Waste Disposal EIS analysis for TCWMEIS purposes. Inexplicably, USDOE relies on the prior Solid Waste Disposal EIS, fails to perform any new route specific analysis for trucking wastes through the much more populated cities along I-90, I-5, I-205 and the Columbia Gorge compared to I-84 through Eastern Oregon, and, yet, somehow inexplicably arrived at a lower number of cancer fatalities for trucking the same wastes to Hanford.

499-49 cont'd

Site Specific Transportation Analysis Required under NEPA and relevant Hanford specific court decisions:

In 2003, Heart of America Northwest was joined by WA State, Columbia Riverkeeper and others in challenging USDOE's transportation of Mixed TRU waste to Hanford for storage without an Environmental Impact Statement.

499-50

In its Order Granting Plaintiffs' Motion for Preliminary Injunction (No. Ct-03-5018-AAM, May 3, 2003), the U.S. District Court for Eastern WA held (at 16, 18) that USDOE had failed to perform a site and route specific environmental impact statement when it sought to rely on a national programmatic EIS without site specific and route specific analyses:

> It is not, however, just the language in the PEIS which gives the court pause as to whether the PEIS is comprehensive enough to cover the site-specific impacts of treating and storing off-site TRUW at Hanford, and/or whether the PEIS requires supplementation in order to consider new and significant information concerning transportation risk. In April 2002, before DOE decided to ship off-site TRUW to Hanford, it issued a "Draft Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement" ("HSW EIS"). The

499-50 DOE disagrees with the commentor's assertions that no new analysis was completed. Consistent with the Settlement Agreement between DOE and Washington State ending litigation concerning the *HSW EIS* (DOE 2004a) that was signed on January 6, 2006, DOE has updated and revised the *HSW EIS* analyses of various resource areas or reanalyzed them as necessary and provided quality assurance review, as appropriate, to reflect the latest waste inventories and analytical assumptions used for *TC & WM EIS* analysis purposes.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

It is difficult to ignore plaintiffs' argument that DOE intended the 2002 Draft HSW EIS to constitute the future sitewide or project-level NEPA review alluded to in both the May 1997 WM PEIS and the January 1998 ROD, and that the Draft amounts to an acknowledgement by DOE that additional NEPA review was necessary before it could ship off-site TRUW to Hanford. As plaintiffs point out, a Draft HSW-EIS does not end DOE's NEPA review obligation.[4] The plaintiffs say a sufficient Final HSW EIS covering the site-specific impacts of treating and storing off-site TRUW at Hanford and updating transportation risks would satisfy DOE's NEPA obligation.

The decision at 32 and 33 addresses the failure to consider route specific impacts, when, as now with the draft TCWMEIS, USDOE instead chose to analyze only conceptual or representative routes, instead of the actual routes:

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Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

The September 6, 2002 ROD discussed transportation risk and concluded the risks were not significant based on information in the WIPP-SEIS II and the 1990 Environmental Assessment (EA) for Battelle Columbus Laboratories Decommissioning Project. The WIPP-SEIS II did not propose shipment of TRUW from Battelle to Hanford and therefore, DOE had to rely on the 1990 EA which preceded the PEIS by seven years.[1] There is no reference to the 1990 EA in the PEIS, specifically the transportation analysis contained in Appendix E to the PEIS. Indeed, the PEIS selected "conceptual transportation routes . . . which may not be the actual routes that will be used in the future." (PEIS, Vol. IV at p. E-2). The PEIS added that:

> Actual routes will be determined during the transportation planning process.
>
> Transportation mode and routing decisions will be made on a site-specific basis during the transportation planning process. Sites can use the transportation analyses in this WM PEIS to make site-specific transportation decisions or, if necessary, conduct additional transportation analyses. . . . .

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Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

(Id.) (Emphasis added)."

The 2002 Draft HSW EIS relies on 2000 census data, as opposed to the 1990 census data relied on by the PEIS and WIPP SEIS II, and the 1980 census data relied upon by the Battelle EA. The 2002 Draft HSW EIS observes that the population of Benton County increased from 26.6 percent from 1990 and that the Franklin County population increased 31.7 percent. (Draft HSW EIS, Vol. I at 4.80-4.81). Furthermore, the March 2003 Revised Draft HSW EIS contains a section regarding "Transportation Impacts Within Washington and Oregon of Offsite Shipments." The section calculates the impacts of offsite transportation of solid wastes to and from Hanford. (Revised Draft HSW EIS, Vol. II at H.32-H.38).

Just as there is a "serious question" whether the Draft HSW EIS represents implicit acknowledgement by DOE that the WM PEIS contemplated a sitewide or project-level NEPA analysis before off-site TRUW could be treated and stored at Hanford, there is a "serious question" whether the Draft HSW EIS represents implicit acknowledgement by DOE that reevaluation of transportation risk is necessary because of the recent decision to ship off-site TRUW to Hanford.

"there is a risk of release and exposure from handling and transporting TRUW." (at 32).

The sources of waste in the TCWMEIS and assumptions about the chemical composition and whether//how the waste will be treated prior to shipment to Hanford are areas which we and others have found to be inadequately supported and contain significant errors.

499-51

499-51 Regarding the commentor's concern as to the accuracy of data, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

In addition, the three million cubic feet / 82,000cubic meters of off-site waste streams have not been properly identified, with the EIS relying on unverifiable estimates, for purposes of: a) projecting truck routes; b) sites and dates for shipping; c) modeling impacts from exposure along the truck routes (incident free); and, d) projecting impacts from accidents or terrorist attacks on trucks carrying hypothetical waste loads to Hanford (The EIS does not use reasonable maximum potential waste types in regard to potential harm, such as RH-TRU shipments, despite the fact that similar shipments may be part of the waste streams trucked to Hanford). The Appendix acknowledges that there is no reliable information but does note that a significant portion may be extremely radioactive "Remote-Handled" wastes and contain large amounts of Transuranic elements just below the threshold which would require disposal in a deep geologic repository.

The contractor noted in Appendix D of the draft TCWMEIS, that the information used to model impacts from offsite waste – which would also affect the ability to project impacts from transportation – is not reliable:

> "The information needed for the EIS was not readily available, so efforts were undertaken to use existing corporate information, supplemented by information from DOE waste managers. The EM program has corporate performance metrics that capture the actual and projected volume of LLW and MLLW for disposal from "baselined" projects. The information was not sufficiently detailed for modeling purposes, e.g. LLW and MLLW are combined, and data on radionuclide or hazardous chemical constituents is not collected and maintained corporately."
> Page D-126.

The contractor's interviews with site managers seeking to ship waste to Hanford, the basis for the waste estimates used in the draft EIS, revealed that a large amount of the waste proposed to be shipped to Hanford will be extremely radioactive Class C and Remote-Handled Wastes. This requires that the TCWMEIS should present a bounding estimate of the potential impacts from incident free exposure to RH wastes along each potential truck route – e.g., trucks going directly past Lewis and Clark High school in Spokane – and of the impacts from a potential accident or terrorist attack involving mixed Remote Handled wastes with a maximum Plutonium inventory.

499-51 cont'd

9. The TCWMEIS fails to address the likely impacts from climate change (global warming):

Projections of increased precipitation and significant precipitation events in Eastern Washington have been forecast by Washington State and independent scientists due to the impacts of global climate change. The forecasts also call for significant reductions in the summer flow of the Columbia River due to decreased snow pack and snow melt.

These two important sets of projections have not been taken into account by USDOE in preparing the TCWMEIS. Instead, USDOE has assumed a constant value for infiltration from precipitation for ten thousand years, in modeling the migration of contaminants in soil and under caps. This is likely to result in a serious error in forecasting the releases from individual waste sites and the cumulative impacts from releases on groundwater, health and the River (and,

499-52

499-52 DOE has reviewed and revised, as necessary, its analyses on the effects of climate change on various resources at Hanford and the possible effects on environmental impacts of the *TC & WM EIS* alternatives. As described in Chapter 6, Section 6.3.4, DOE has reviewed climate studies that forecast general trends in Hanford regional climate change. However, there are no reliable methodologies for projections of specific future climate changes in the Hanford region, and thus such changes have not been quantified in this EIS. To account for this uncertainty, Appendix O, Section O.6.2, describes the effects of enhanced infiltration such as that which may occur during a wetter climate. In the *Draft TC & WM EIS*, Appendix V focused on the potential impacts of a rising water table from a proposed Black Rock Reservoir. Following the retraction of this proposal, the focus of Appendix V in this final EIS was changed to analysis of potential impacts of infiltration increases resulting from climate change under three different scenarios. Appendix V includes sensitivity analyses of potential impacts at Hanford that could result from climate changes that may increase model boundary recharge parameters and the rise of the groundwater table. Additional qualitative discussion of the potential effects of climate change on human health, erosion, water resources, air quality, ecological resources, and environmental justice has been added to Chapter 6 of this final EIS. Additional discussion of the types of regional climate change that could be expected has also been added to Chapter 6, Section 6.5.2, Global Climate Change. The potential impacts of the alternatives on climate change are addressed in Chapter 6, Section 6.5.2, and Appendix G, Section G.5, of this *TC & WM EIS*.

In this EIS, DOE does not assume access control for 10,000 years. For analysis purposes, the period of time assumed for postclosure care is 100 years. For disposal facilities licensed by NRC for the disposal of Class A and Class B LLW without special provisions for intrusion protection, institutional control of access to the site is required for up to 100 years. For hazardous waste management disposal units, RCRA and Ecology hazardous waste regulations require a 30-year postclosure care period; however, due to the types of waste planned for disposal, it was assumed that this period would be extended to 100 years.

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potentially on fauna, since increased precipitation and uptake by plants may lead to increased exposure).

Reduced flow rates in the Columbia River will increase the relative concentrations of contamination in the River as well as in the groundwater flowing into the River (due to decreased River bank storage and River infiltration inland). This will increase the exposure from reasonably foreseeable use of groundwater; river shorelines (e.g., Native Americans exercising their treaty rights to live along and fish the Hanford Reach); consumption of fish, plants and other animals; and the River itself.

Withdrawals of water from the River will be far less likely to be allowed in the future. This will increase pressure on the use of groundwater resources. USDOE erroneously asserts that it will control access to Hanford for thousands of years and that there will be governmental reviews of proposed uses of groundwater which will prevent use in conflict with CERCLA or RCRA decisions. However, under Washington State law, no permission is needed to drill and withdraw significant amounts of water for domestic use by fewer than five households. It is reasonably foreseeable that over the next hundred years, and certainly a thousand years, that people will use the groundwater resource under Hanford. If wastes are not cleaned up via retrieval, the TCWMEIS shows that preferred alternatives of leaving waste in place under caps – the cover up, rather than clean up plan - will result in many cancer deaths.

Under NEPA and new directives from the Council on Environmental Quality, USDOE is obligated to take into account the projected impacts of global warming / climate change in the TCWMEIS. The EIS must be revised to do so.

499-52 cont'd

10. The cumulative impact analysis fails to provide the relevant view of likely human health impact and risk from all projected releases of existing wastes and wastes proposed to be disposed.

TCWMEIS fails to include the full estimated Uranium releases from the US Ecology company operated commercial low-level waste dump in the center of Hanford along with the resulting radiation doses and likely cancers in the cumulative impact analysis for the Hanford Central Plateau and groundwater. This is compounded by the failure to include the full inventory of Uranium, Plutonium, TRU and chemical wastes in the commercial LLW dump.

Washington Departments of Ecology and Health have released an Addendum to the Final EIS for the US Ecology site closure and licensing which estimates that Uranium releases from the US Ecology site alone will result in radiation doses of 22 millirem per year to a reasonably foreseeable resident adult at the fence line of the commercial LLW dump facility, and 107 millirem per year for a resident Native American living within the boundary after a reasonably foreseeable intrusion into the landfill for drilling of a well.

USDOE says that the US Ecology EIS prepared by the State agencies was the basis for the Uranium inventory presented in the draft TCWMEIS.

499-53

499-53 This *TC & WM EIS* does include consideration of materials disposed of at US Ecology. Appendix S explains the process used to develop the inventory data set for the cumulative impact analyses. Listed in that appendix are all modeled disposal sites, i.e., all sites for which inventory was identified and considered to be potential contributors to cumulative impacts on groundwater. The inventories for these sites, including US Ecology, were identified using the most recent information available. For US Ecology, the total uranium increased from 0 kilograms in the draft EIS to 4.51×10^6 kilograms in this final EIS. Estimates of the total uranium inventory (i.e., chemical uranium) were not provided in the original source document. DOE revised the Appendix S inventories to include a calculated total uranium inventory for US Ecology. Note that uranium isotope inventories were included in the analysis for both the draft and this final EIS.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

However, the draft TCWMEIS fails to show levels of Uranium releases or radiation doses from the state forecasted exposures. The fence line of the US Ecology site is either at or beyond the "core zone boundary" utilized as the point of analysis in the draft TCWMEIS for cumulative impacts.

Figures 6-8 and 6-9 show Uranium 238 and Total Uranium levels far above Drinking Water Standards

Uranium 238 is projected in Figure 6-8 to reach concentrations of approximately 3E3 (3 x 10^3), or 3,000 picocuries per liter; or approximately 200 times the Drinking Water Standard (15 picocuries per liter) around the year 3100 and remain in the vicinity of 8E2 for another 7,000 years before rising again to 1E3. *499-53 cont'd*

Uranium 238 levels entering the Columbia River are projected to be above the Drinking Water Standard for another 1,500 years.

Plutonium 239 levels in groundwater at the Columbia River shoreline are projected to peak at 300 times the Drinking Water Standard in one thousand years.

11. The EIS is based on Woefully Inaccurate and Inadequate Estimates of Radioactive and Chemical Wastes and Contamination, Seriously Underestimating Health and Environmental Impacts:

Documentation of all hazardous chemical constituents should be included in the EIS (e.g., chemicals known to be disposed in, or releasing from, landfills; and, total uranium).

The chemical inventory is incomplete; certain chemicals are missing or under-reported from the non-tank inventories (**e.g., numerous volatile organic chemicals in burial grounds, or uranium volumes**) and certain chemical analyses appear to be lacking as well. (Uranium, which has to be considered a toxic metal as well as a radionuclide, is under reported for tank discharges and leaks, and entirely missing from chemical toxicity inventory for proposed imported wastes along with volatile organic chemicals). *499-54*

The US Ecology company operated commercial Low-Level Waste Landfill located in the center of Hanford's Central Plateau provides a case study in the serious shortcomings of the draft TCWMEIS in regard to inventory and failing to present cumulative health impacts from releases. The US Ecology landfill is between the 200 East and 200 West areas and within the "core zone" lines drawn by USDOE for the draft TCWMEIS analyses and for USDOE's proposed Central Plateau Strategy (which is a formal proposal that USDOE failed to present for the public to review in this EIS). It is close to the ERDF landfill (which is leaching Uranium at rates higher than projected, which the draft TCWMEIS fails to disclose and consider) and adjacent to the contaminated B-C Cribs Control Area.

499-54 Estimates of the total uranium inventory (i.e., chemical uranium) were not provided in the original source document. DOE revised the Appendix S inventories to include a calculated total uranium inventory for burial ground inventories. Note that uranium isotope inventories were included in the analysis for both the draft and this final EIS.

See response to comment 499-53 for a discussion regarding US Ecology.

Specific to the comment that, in general, it was believed that chemical inventories were not analyzed in this EIS, although no specifics were identified except US Ecology, additional text was added to Appendix Q, Section Q.2, in this final EIS describing the screening process used to select a set of COPCs.

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Washington Dept. of Ecology is conducting a MTCA investigation of the documented releases from US Ecology's trenches of numerous hazardous chemicals, particularly volatile organic chemicals (VOCs) that are dangerous to human health and the environment. The WA Dept. of Health is reviewing Uranium release data and reports that it projects uranium release from the landfill to result in doses of 22 millirem per year and 107 millirem per year to an offsite resident adult using groundwater on the Central Plateau and to a resident adult after well intrusion on-site. SEE Addendum to Final EIS for the US Ecology LLW Facility jointly issued by WA Health and Ecology, April, 2010.

The documented high levels of VOC in soil gases escaping from the trenches has been available for over a year.

However, nowhere in the draft TCWMEIS is there any data on these hazardous substances already documented as being released from the US Ecology landfill. Indeed, the inventory in the draft TCWMEIS fails to show ANY of the VOCs as even being present!!!!

The 43 miles of unlined burial grounds operated by USDOE on the Central Plateau are also likely contain numerous VOCs similar to the US Ecology site (which took USDOE and US Navy wastes) – yet, the inventory for the cumulative impact analysis fails to show any VOC other than Carbon Tetrachloride (and fails to show any chloroform, which is the degradation product of Carbon Tetrachloride).

499-54 cont'd

In regard to health impacts from releases, the cumulative impact analysis should show the estimated dose for reasonable maximum exposure scenarios (Native American children exercising treaty rights to live on and utilize the resources on, Hanford's Central plateau and river shore) from all sources. We know that the state agencies estimated the dose from releases of Uranium from this one landfill to be 22 millirem per year, equal to a cancer risk of 6 to 18 fatal cancers for every ten thousand adult males exposed. Children are three to ten times more susceptible to develop cancer from the same dose – which USDOE fails to address.[15] We believe it is genocidal for USDOE to propose actions with cumulative health impacts which would result in cancers in significant numbers of Native Americans exercising treaty rights to live on, and use the resources at, Hanford.

499-55

The following is a list of additional major inventory failings of the draft TCWMEIS, provided by HoANWRC consultant and board member Richard Heggen:

1) The EIS grossly underestimates the actual uranium inventory for both US Ecology and the Environmental Restoration Disposal Facility (ERDF). Page S-91, Table S-50b in the EIS lists US Ecology with 1,820 curies of uranium and ERDF with 54 curies of uranium.

499-56

[15] EPA limit for NESHAP release to air is 10 mrem/year. Based on EPA and NRC pre-BEIR VII radiation standards, 6.8 mrem per year would result in approximately 1 to 2 fatal cancers in every 10,000 adults exposed. EPA now acknowledges that the same dose from a carcinogen will result in 3 to 10 times more cancers in children than in adults (EPA draft guidelines for cancer risk assessment, released March 3, 2003. http://epa.gov/ncea/raf/cancer2003.htm). Under BEIR VII, the risk level should be reported as several times greater than the pre-BEIR VII estimates.

499-55 The *TC & WM EIS* analysis recognizes that uptake rates may be different for children. As described in Appendix K, "Short-Term Human Health Risk Analysis," soil could be inadvertently ingested, resulting in an internal dose. The *Hanford Site Risk Assessment Methodology* (DOE 1995) assumes ingestion rates of 200 milligrams (0.0071 ounces) per day for children and 100 milligrams (0.0035 ounces) per day for adults. In this *TC & WM EIS*, a single rate of 120 milligrams (0.0042 ounces) per day was used. This is the weighted average of the values in the *Hanford Site Risk Assessment Methodology*—ingestion of 200 milligrams (0.0071 ounces) per day over a 6-year period and ingestion of 100 milligrams (0.0035 ounces) per day over a 24-year period.

Appendix Q, Section Q.2.1, describes the hypothetical receptors analyzed in the human health dose and risk analysis. The receptors include an American Indian resident farmer and an American Indian hunter-gatherer. As described in Appendix Q, Section Q.2.2.2, the American Indian resident farmer scenario considers radionuclide and chemical exposures from the drinking of contaminated groundwater, consumption of contaminated plants from a domestic garden, consumption of contaminated domestic livestock, inadvertent ingestion of soil, consumption of contaminated fish, inhalation of contaminated dust, and participation in ceremonial sweat lodge/sauna ceremonies. The American Indian hunter-gatherer scenario is similar, except the exposed adult American Indian is assumed to live a more traditional American Indian lifestyle. For the hunter-gatherer scenario, the domestic garden exposure pathway is replaced by consumption of wild plants; consumption of domestic livestock and game animals, specifically deer, is assumed. An important difference between the American Indian hunter-gatherer scenario and the American Indian resident farmer scenario is that the hunter-gatherer is exposed to contamination from both surface water and groundwater. These exposure scenarios were developed in consultation with American Indian representatives, and DOE believes they adequately represent the range of exposure scenarios for American Indian peoples.

Regarding children's elevated sensitivity to radiation exposure, there is no existing guidance that recommends dose coefficients for children's exposure to external radiation. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) was used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult,

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A March 1998 PNNL report (PNNL-11200) prepared for the US Department of Energy (USDOE) lists a far greater amount of uranium inventory for both facilities on page 3.31, Section 3.5.2.7 as follows: ERDF = 54,300 curies, and US Ecology = 10,900 curies. Although the PNNL report indicates the ERDF estimate is perhaps too high, it is still orders of magnitude greater than the 54 curies provided in the EIS. The EIS must be revised to include the actual uranium inventory. Risk modeling in the EIS must also be revised to accommodate the increased inventory **499-56 cont'd**

2) Uranium chemical inventory in kilograms is missing for both ERDF and US Ecology (Page S-141, Table S-76b). The EIS must be revised to include the actual uranium inventory. Risk modeling in the EIS must be revised to accommodate the increased inventory. **499-57**

3) Significant uranium inventory is missing from Appendix S. Although curie inventory for uranium chemical inventory is listed for many of the burial grounds, uranium chemical inventory is missing for all but two burial grounds. The two burial grounds are 218-W-4C and 218-W-5. While W-4C has 72.8 curies and 83 kilograms (kg) of uranium, W-5 has 654 curies and only 0.055 kg. It appears the chemical inventory for many burial grounds including W-5 is either missing or grossly underestimated. See table and respond to concerns attached at end of these comments. **499-58**

4) Comparing the plutonium inventory kilogram estimates from the Hanford History of the 200 Area Burial Ground Facilities (September 1996 – Westinghouse Hanford Co. – WHC-EP-0912) to the plutonium curie estimates provided in the EIS reveal several discrepancies. While the EIS lists no plutonium curie inventory for 218-W-2A, W-3A, and W-4B, the Westinghouse report lists plutonium inventory at 6.38 kg, 29.32 kg, and 66.47 kg respectively. By comparison, the WHC report lists 218-W-3 plutonium inventory at 68 kg and the EIS has a corresponding 4,930 curies of plutonium for the same burial ground. It appears that thousands of curies of plutonium are missing from above noted burial grounds. **499-59**

5) Throughout Appendix S, the relation between radioactive uranium inventory in curies and the chemical uranium inventory in kg varies drastically. The EIS provides no explanation for this wide range of ratios. For example, appendix S table S-43a lists a total of 914 curies uranium (almost all due to three burial grounds) and table S-69b lists a corresponding total of 3,127 kg uranium. This is in contrast to the ratio of uranium curies to kg found in tables S-48a and S-74b where the ratio of 25.45 curies to 106,530 kg is far different and not explained in the EIS. There are many examples of this apparent lack of consistency in the data. At first glance it seems that some uranium inventory is missing. **499-60**

6) Appendix S, Table S-26 lists the volume of discharged liquid to ground for 216-B-3 pond at 280 billion liters which translates to 154 billion gallons. However, the 2005 Groundwater Monitoring Plan for the Hanford Site 216-B-3 Pond RCRA Facility (PNNL-15479), Section 1.1.1, page 1.3 lists the total liquid discharge to ground at over **499-61**

but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each life stage (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance has yet to be developed that provides this information.

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess death for the sex and age distribution of the U.S. population in terms of number of excess death per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing an LCF. The report shows that the maximum number of excess LCFs would be 610 per million people per person-rem of dose, compared with about 42 out of 100 individuals who are expected to develop solid cancer or leukemia from other causes, assuming a sex and age distribution similar to that of the entire U.S. population (National Research Council 2006). The BEIR VII dose-to-risk conversion factor is essentially equivalent to the 600 LCFs per million people per person-rem that is used in the analysis in this *TC & WM EIS*. The health risk effect in the analysis is therefore consistent with BEIR VII in determining the number of LCFs.

DOE respectfully disagrees with the reasoning regarding tribal rights at Hanford. Substantial documentation indicates that the tribes understood at the time of treaty signing that lands were no longer "unclaimed" when they were claimed for the purposes of the white settlers' activities. Most of Hanford had been so "claimed" at the time it was acquired for Government purposes in 1943. DOE is not aware of any judicially recognized mechanisms that would allow these lands to revert to "unclaimed" status merely through the process of being acquired by the Federal Government. The portion of Hanford that remained in the public domain in 1943 (those lands now having underlying BLM ownership), as well as all the acquired lands, was closed to all access initially under authority of the War Powers Act and later the Atomic Energy Act. It is therefore DOE's position that the Hanford Site lands are neither "open" nor "unclaimed."

499-56 DOE has reviewed the estimated ERDF inventory and revised the total uranium inventory from 54 curies to 412 curies. This revised estimate is based on the inventory of total uranium disposed of at the ERDF through March 2010, as reported in the Hanford Waste Management Information System. DOE recognizes this estimate may not represent the total inventory of uranium that

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one trillion liters = greater than 260 billion gallons. The EIS needs to be revised to include the missing 106 billion gallons from 216-B-3 pond. **499-61 cont'd**

7) There is a large difference in the ratio of uranium curies to kilograms between the total numbers for Appendix S and the total numbers for Appendix D (the specific tank farm area with selected discharge areas). The ratio found in appendix S for uranium kg to curies = 70:1 while the ratio for Appendix D = 633:1. This implies missing data or errors in the data. No explanation was found in the EIS. The EIS needs to be revised to either include an explanation or to include all missing data. **499-62**

8) The EIS lists the uranium chemical inventory as total uranium as soluble salt. Apparently the EIS omitted insoluble uranium compounds from the inventory data. If so, this is a serious oversight due to the toxicity of uranium as a chemical/metal which is in addition to the toxic effects of uranium due to radioactivity. The EIS needs to be revised to include all forms of uranium in the inventory data. All relevant risk modeling and discussion must be revised to reflect the additional uranium inventory and resulting risks. **499-63**

9) The EIS appears to focus strictly on water/liquid related pathways for all risk scenarios. Missing from this EIS is a future failed cover scenario that allows animal and plant life to access contamination remaining in the ground. There is a long history of plants and animals accessing and spreading toxic materials in the ground at Hanford, including radioactive plants (especially long rooted tumbleweeds), radioactive insects, and radioactive animals. In addition, in the future, direct exposure of humans may occur if the waste is exposed through direct contact and air pathways. Although much of the tank farm contamination may be deeper than other areas at Hanford, the EIS lacks information about how USDOE will address and cleanup significant shallow contamination related to the miles of pipelines related to tank farms and other units. The EIS must be revised to include these potentially significant future risk scenarios. **499-64**

10) In section 6.4.3.1, Tables 6-31lists only lists mercury as having a potential cumulative impact to Ecological receptors via on-site surface soil. Under ecological risk (Table 2-46) other contaminants are addressed including benzene, toluene, xylene, and formaldehyde; however these limited additional compounds are assumed to only reach the environment through a water pathway. Missing from the ecological risk direct soil exposure (direct contact, ingestion, and air inhalation) are many other significant toxic isotopes, compounds, etc. Many toxic constituents are potentially available to the ecology the future due to either failed landfill covers or through natural or man-made disturbances to the site soil. Revise the EIS to include these additional contaminants and scenarios. **499-65**

11) The EIS failed to discuss Land Disposal Restrictions with respect to any scenario that proposes to leave toxic material on site. This would include a comparison of best available technologies to meet equivalent land disposal treatment standards. **499-66**

may be disposed of at the ERDF, but it represents the best inventory estimate available at this time. DOE reviewed the *Retrieval Process Development and Enhancements FY96 Pulsed-Air Mixer Testing and Deployment Study* (PNNL-11200), dated August 1996, (Powell and Hymas 1996) and found no inventory data in the document to compare with the inventory estimates analyzed in this EIS. Without the correct document citation, a comparison cannot be conducted.

499-57 Regarding the comment about the lack of uranium inventories in the cumulative impact analyses for the ERDF and US Ecology, estimates of the total uranium inventory (i.e., chemical uranium) were not provided in the original source document. DOE revised the Appendix S inventories to include a calculated total uranium inventory for the ERDF and US Ecology. Note that uranium isotope inventories were included in the analysis for both the draft and this final EIS.

499-58 Regarding the comment about the lack of uranium chemical inventories for a number of the burial grounds, estimates of the total uranium inventory (i.e., chemical uranium) were not provided in the original source document. DOE revised the Appendix S inventories to include a calculated total uranium inventory for the burial grounds. Note that uranium isotope inventories were included in the analysis for both the draft and this final EIS.

499-59 Regarding the comment about the plutonium inventories in the cumulative impacts analysis for a number of burial grounds, DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data. The primary source of referenceable inventory data for the burial grounds used in this EIS was the *Summary of Radioactive Solid Waste Received in the 200 Areas During Calendar Year 1995* (Anderson and Hagel 1996). As discussed in the introduction to this source document, the inventory data contained within included not only the inventory disposed of in 1995, but also the cumulative inventory through 1995. DOE's review of *The History of the 200 Area Burial Ground Facilities* (Anderson 1996), which is referenced in the comment, concluded that it may not be the best source for burial ground inventory data. The following statement is an excerpt from the Anderson (1996) preface: "Much of the information is not associated with referenceable documentation, and comes from the author's experiences and associations with others during the time spent in the burial grounds which covered a quarter of a century." However, to address the example provided by the commentor, the 4,930 curies of plutonium estimated by

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

12) The EIS failed to provide a specific description and diagrams of all of the structures/equipment included in the "SST" system. The EIS must be revised to include a complete description of the entire SST system. **499-67**

13) Missing in the EIS are miles of pipelines including the old SST cross-site pipelines that extend beyond the SST tank farm fencelines to interconnect with cribs, trenches ponds, vaults, and process facilities. Although USDOE included some selected cribs and trenches located beyond the SST fencelines, there is no mention of the large system of buried SST pipelines that remain in the ground. The EIS failed to address the contamination associated with these old abandoned pipelines. In the past, many if not most of these old pipelines were removed from service due to leaks, and plugging problems that rendered the lines inoperable. In a few cases the leaks were discovered when liquid waste formed wet areas above the defective piping. Revise the EIS to include a description of these structures and all estimates of associated leaked and plugged inventory remaining in the pipelines. Additionally, include a description of how the past leaks were remediated. **499-68**

14) The EIS fails to discuss the realities of tank sampling at Hanford. All tank core samples stop short of the bottom of the tank to avoid damaging the tank steel shell, which is well beyond the engineered design life and the condition of which is unknown. Several cores are taken from each tank and indicate that the layering of toxic tank sediments/constituents is uneven and therefore the information from a few cores is not very representative of the specific toxic nature of an individual tank. Finally, the original wastes were added to tanks in a liquid form and heavier materials concentrated in the bottom of each tank. Since no sample data is available for the bottom layers of any tank, drawing any conclusions relating to the heavier toxic materials including all the radionuclide content would be flawed. Revise the EIS to address this fact and include revised estimates of the residual heavy radionuclides projected to remain in the SSTs. **499-69**

15) There is a lack of sufficient characterization for many units at Hanford. Specifically there is very little characterization relating to burial grounds. This is especially a problem for the older burial grounds that lack records of materials dumped in the burial grounds. Additionally the older burial grounds operated with few restrictions and received a wider range of toxic materials than some of the newer burial grounds. Missing from the EIS is a basis for the estimated contamination listed in the EIS. A cross check of documents found discrepancies in a number of burial grounds (see comments #3 and #4). Revise the EIS to include the basis for burial ground estimates in the EIS. **499-70**

16) The EIS fails to include a discussion of specific field sampling used to verify the results of modeling used in the EIS. Revise the EIS to include adequate modeling verification with field samples sufficient to validate the models used in the EIS. **499-71**

Anderson and Hagel (1996) converts to 67 kilograms (148 pounds) of plutonium when the appropriate specific activity (curies/grams) factors are applied; this is approximately the same inventory estimate provided in *The History of the 200 Area Burial Ground Facilities* (Anderson 1996). Therefore, specific to the comment made, DOE sees no discrepancy in this case.

499-60 Regarding the comment about the lack of uranium chemical inventories for a number of the burial grounds, estimates of the total uranium inventory (i.e., chemical uranium) were not provided in the original source document. DOE revised the Appendix S inventories to include a calculated total uranium inventory for the burial grounds. Note that uranium isotope inventories were included in the analysis for both the draft and this final EIS.

499-61 Appendix S, Table S–26, includes an estimate of 282.7 billion liters (74.7 billion gallons) that was discharged to 216-B-3 Pond. The source of this estimate was SIM (Corbin et al. 2005), which DOE believes represents the best-available data at the time of this EIS's publication. Other estimates have been developed using a variety of methods and assumptions. A comparative analysis of the different estimates is difficult because (1) the B Pond is divided into several segments, and the historical records are not clear as to which portions of the pond were in operation during different discharge regimes; and (2) assumptions about overflow and evaporation from the ponds during discharge vary. In general, DOE chose the SIM inventory for analysis in this EIS because it was considered the most comprehensive and internally consistent reference for this calculation. SIM provides estimates of the uncertainty of discharges, and the uncertainty for the B Pond source was estimated at 25 to 50 percent, which is consistent with the variation quoted by the commentor. It should also be noted that the time series of water discharges from this source were used as inputs to the MODFLOW regional-scale flow model, which produced a flow field in satisfactory agreement with historical waste-level measurements (agreement within approximately 2 meters [6.5 feet] across all areas of the site throughout the operational period).

499-62 Regarding the comment about the lack of uranium chemical inventories in the cumulative impacts analysis inventories provided in Appendix S, estimates of the total uranium inventory (i.e., chemical uranium) were not provided in the original source document. DOE revised the Appendix S inventories to include a calculated total uranium inventory for the burial grounds. Note that uranium isotope inventories were included in the analysis for both the draft and this final EIS.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

12. How much High-Level Nuclear Waste will USDOE remove from leaky Single Shell Tanks?

THE PROBLEM:

53 million gallons of deadly liquid High-Level Nuclear Waste are stored in 177 aging underground tanks. 35 million gallons are in the oldest Single Shell Tanks (SSTs), which have already leaked over a million gallons. USDOE is seeking Washington State agreement to delay the deadlines for emptying the SSTs by 22 years, from 2018 to 2040.

THE OPTIONS:

USDOE evaluated removing:

- 90% of tank wastes;
- 99% of tank wastes;
- 99.9% of tank wastes

USDOE's PREFERRED ALTERNATIVE:

Removing 99% of tank wastes.

THE IMPACTS:

The EIS shows very significant increases in radioactive contamination of groundwater over thousands of years from all alternatives, but the removal of 99.9% of tank wastes decreases contamination significantly compared to removal of 99% or 90%. The tough to remove residues have a disproportionate amount of the radioactivity in the tanks.

USDOE's own analysis shows that the cancer risk from drinking well water miles away (at the Core Zone Boundary) due to the residues in tanks under USDOE's preferred alternative – leaving 1% of the tank wastes and capping the areas instead of cleaning up past leaks – would be approximately 50 times the State's cancer risk cleanup standard in the year 3600. Even if 99.9% of the wastes are removed and only two tanks farms are cleaned up, the cancer risk from the well water is nearly 10 times the State's cancer risk standard.[16] *499-72*

HOANW'S RECOMMENDATION:

USDOE must remove 99.9% of the tank wastes, or remove to the limits of technical capabilities. This must be followed by a formal commitment that USDOE will characterize contamination caused from leaks and discharges from the tank systems and commit to a risk based retrieval (permanent remedy) of contaminated soils instead of continuing to pursue just "capping" vast areas of the tank farms and liquid waste discharge crib areas. USDOE's current plan amounts to "cover-up" instead of "clean-up." *499-73*

[16] (TCWMEIS Figure S-18 and S-14. S-14 shows 99.9% retrieval (Alt. 4) contributes a lifetime fatal cancer risk in the year 3050 which is nearly 1 E-4 (1 in 10,000), or ten times the total cancer risk from all sources allowed under MTCA (which is 1E-5). If 99% is retrieved, the fatal cancer risk never drops below 1 E-5 over the next ten thousand years. This is solely due to residuals and retrieval leaks – not including contamination from past deliberate discharges and other sources.

499-63 Regarding use of the term "soluble salts" for describing the total uranium inventories, the term "(soluble salts)" in the table has been deleted in this final EIS to avoid confusion. The inventories provided in the *Draft TC & WM EIS* did represent total uranium, not just the soluble salt form. Please see response to comment 499-62 regarding the perception that some of the uranium chemical inventories in the cumulative impacts analysis inventories provided in Appendix S are underreported.

499-64 Facility closure activities and configurations of engineered barriers, including caps, are described in Appendix D of this *TC & WM EIS*. The analysis assumes failure of the facility cover (barrier). The closure designs and depth of the waste are such that biointrusion into facilities would be a small component of the direct human intrusion and groundwater release scenarios evaluated in this EIS. Methods applied for evaluation of direct human intrusion are presented in Appendix Q, Section Q.2.3, while results of the analysis are presented in Sections Q.3.1.1.8 (Tank Closure alternatives), Q.3.2.1.4 (FFTF Decommissioning alternatives), and Q.3.3.1.4 (Waste Management alternatives). Direct-intrusion exposure pathways include worker inhalation and direct radiation and the complete set of residential farming pathways. Only a small fraction of the ecological populations at the site would be exposed to waste, given the closure designs and depth of the waste. There is no basis for quantitative comparison of risk to ecological receptors exposed by direct contact to waste in failed landfills under the different alternatives.

Cleanup activities for shallow contamination are presented in Appendix D. Potential impacts of subsurface pipelines associated with the tank farms are evaluated in this EIS under the ancillary equipment category. Impacts of ancillary equipment removal from the BX and SX tank farms are evaluated under Tank Closure Alternative 4; from all tank farms, under Tank Closure Alternatives 6A and 6B.

499-65 Appendix D, Section D.1.1, Current Tank Inventory of Radioactive and Chemical Constituents, discusses the process by which chemicals and radionuclides are determined and evaluated in this EIS. The evaluation of impacts of air releases included chemicals such as benzene, toluene, xylene, and formaldehyde, as indicated in Chapter 4, Table 4–4. This EIS does not assume that these compounds would reach the environment only through a water pathway. Data are available for these constituents in the Hanford Site Evaluation Surveillance Data Reports for 2004–2006, and these data were considered in the cumulative impacts

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

13. How – *or if* – the 149 Single Shell Tanks and High-Level Nuclear Waste leaks will be cleaned up after the wastes are removed

THE PROBLEM

Over a million gallons of High-Level Nuclear Waste has leaked from Single Shell Tanks (SSTs), and *billions* of gallons of waste was discharged from tanks into the soils near the "tank farms".[17] The contamination is spreading rapidly through soil to groundwater and will move towards the Columbia River.

USDOE must legally "close" the tanks and tank farms after the wastes have been removed (with options ranging from removing 90% to 99.9% of the wastes). Legal closure includes cleaning up the contamination in the soil column and groundwater; and, either adding a cement grout to tanks with dirt caps on top of the tank farms and contamination (called "landfill" closure), or, removing the tanks and pipe systems and cleaning up the contamination in the soil (called "clean closure). Washington State's hazardous waste law says that landfill closure can only be used after practical efforts to cleanup contamination have been attempted.

Until fairly recently, USDOE claimed that tank leaks posed no significant environmental risk. However, characterization of tank leaks in the SX Tank Farm found that gamma radiation emitting Cesium 137 had moved deeply to the depth of groundwater. Cesium 137 is far less mobile in soil and groundwater than many other radionuclides. USDOE issued a report which acknowledged,

> "(T)he SX Tank Farm vadose zone work essentially disproved some long-held assumptions that the contamination from the tanks did not migrate and therefore was not a significant environmental risk."[18]

Unfortunately, USDOE's preferred alternative still reflects the old views that tank leaks are not a significant risk. USDOE's preferred alternative in the TCWMEIS is to leave forever the bulk of the contamination from tank leaks and deliberate discharge under caps, instead of cleaning up the contamination.

THE OPTIONS:

- Not investigating the leaks & wastes in trenches; not cleaning up or capping the tanks ("no-action alternative")
- Adding a cement grout to the tanks & leaving them in place; not investigating or cleaning up the leaks & wastes in trenches; capping the tanks ("landfill closure")
- Investigating and cleaning up only two of the tank farms and leaving the other tank farms and their contamination under caps

[17] "Historical Vadose Zone Contamination from A, AX and C Tank Farms"; RPP 7494, Rev. 0; Aug. 8, 2001; Fluor Federal Services for USDOE. Report documents 3.8 billion gallons of deliberate discharges to the cribs, trenches and ditches associated with the A, AX and C Tank Farms as tank wastes were decanted.

[18] DOE/RL-98-48, Vol. II; **State of Knowledge** Rev. 0; *GW/VZ Integration Project Background Information and State of Knowledge;* June 30, 1999 4-52

assessment, although only the worst cases are presented in Chapter 6, Table 6–32. As stated in Appendix P, only the potential impacts of airborne releases during operations and the potential impacts of groundwater discharges under the various alternatives are evaluated in this *TC & WM EIS*. The purpose of the risk analysis is to compare the alternatives quantitatively. The risk analysis is not intended to fully characterize the risk, as might occur in an ecological risk assessment under laws such as CERCLA; therefore, every exposure pathway and its incremental contribution to a potential impact is not quantified.

499-66 Chapter 8 of this *TC & WM EIS* identifies the laws, regulations, and other requirements that potentially apply to the alternatives. Specifically, Section 8.1.4 identifies and summarizes the hazardous waste and materials management requirements, including the land-disposal-restriction requirements (40 CFR 268).

499-67 This *TC & WM EIS* provides a detailed description of the SST system in Appendix E, Section E.1.1.1.1, Tank Farm Facilities, including the primary components of the tank farm system in the 200-East and 200-West Areas of Hanford. Table E–1 identifies the distribution of SSTs among the tank farms.

499-68 Appendix D, Section D.1.2, Tank Ancillary Equipment Waste, provides a discussion of the inventories for the ancillary facilities, including the transfer piping associated with the SST and DST farms. Tables D–9 through D–12 provide the radioactive and nonradioactive inventories for the SST and DST ancillary equipment.

499-69 Appendix D, Sections D.1.1, Current Tank Inventory of Radioactive and Chemical Constituents, and D.1.1.4, Uncertainty in Best-Basis Inventories, provides discussions of the tank waste inventories and the uncertainties in the inventory estimates. DOE believes the inventories used in this EIS represent the best and most accurate data available at this time.

499-70 As discussed in Appendix S, "Waste Inventories for Cumulative Impact Analyses," DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data. Section S.3.5, Analysis of Sites with Missing Inventory, describes from a macro perspective the availability and uncertainties of the cumulative impacts analysis data, including the data for the burial grounds. DOE agrees there is minimal characterization of the burial ground waste, but has provided this insight to give the reader a sense of the uncertainties in the cumulative impacts analysis inventory estimates.

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- Removing the tanks and investigating and cleaning up the soil contamination in all the tank farms ("clean closure").

USDOE'S PREFERRED ALTERNATIVE

Dirt caps ("landfill closure") over the tank farms without removing tanks or pipelines; and without, investigating or cleaning up the contamination from tank leaks and discharge of tank wastes.

THE IMPACTS:

The EIS shows that the contribution to groundwater contamination and cancer risks for future site users from tank leaks would be very high for thousands of years – growing worse over time. Capping does not prevent the contamination from spreading.

For example, the EIS predicts that in the year 3890, Uranium from tank farm releases under USDOE's preferred alternative would contaminate groundwater below the areas that are expected to be open for public use to levels 10x higher than currently acceptable standards. [19]

HOANW'S RECOMMENDATION:

USDOE must remove the tanks ("clean closure") and investigate and remediate the soil contamination from tank leaks. Abandoning the contamination from tank leaks and deliberate discharges is not acceptable. *499-74*

Cumulative Impacts Without Adding More Waste or Considering Tank Wastes:

Maximum Peak Year Concentrations of the COPCs from Non–*TC & WM EIS* Sources at the Core Zone Boundary and the Columbia River Nearshore

- Table U-2

Contaminant	Max concentration Central Plateau Inner (year)	Max concentration River shore (year)	DW Standard or benchmark
Plutonium (inc Pu239, 240)	2,660 (11,848)	4,250 (2983)	15 pCi/L
I-129	50.9 (4043)	9.1 (4540)	1. pCi/L
Chromium	2540 (2216)	16,100 (1978)	100

USDOE projects that Plutonium 239 levels at the River shore will increase to 300 times the Drinking Water Standard in the next thousand years under USDOE's proposed actions, including from unlined discharge and burial grounds that USDOE plans to cap, instead of cleaning up

[19] TCWMEIS at 6-109.

499-71 DOE disagrees with the supposition that the *Draft TC & WM EIS* fails to include specific field-sampling data. Field-sampling data from the following sources were used as stated in the draft EIS: (1) over 5,000 boring logs to support lithologic encoding of the regional-scale flow model (Appendix L, Section L.4.3.2); (2) approximately 1,800 groundwater wells to calculate the regional-scale flow model (Section L.6.1); and (3) approximately 140 vadose zone boreholes to calibrate the vadose zone model, as well as regional-scale groundwater plume measurements for the BY Cribs, BC Cribs, 216-T-26 Crib, and the REDOX and PUREX waste sites (Appendix N, Section N.3.4). Furthermore, in Appendix U, modeled contaminant plumes are compared against field measurements for the COPCs. DOE's view is that the overall level of characterization data for Hanford supports differentiation among the alternatives, which is a key feature of a NEPA analysis.

499-72 At this time, DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

499-73 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. Tank Closure Alternatives 6A and 6B evaluate 99.9 percent retrieval of the tank waste and clean closure of the SST system. The decision on the selected course of action and supporting rationale will be documented in DOE's ROD for this EIS.

499-74 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process. See response to comment 499-6 regarding factors influencing future DOE decisions.

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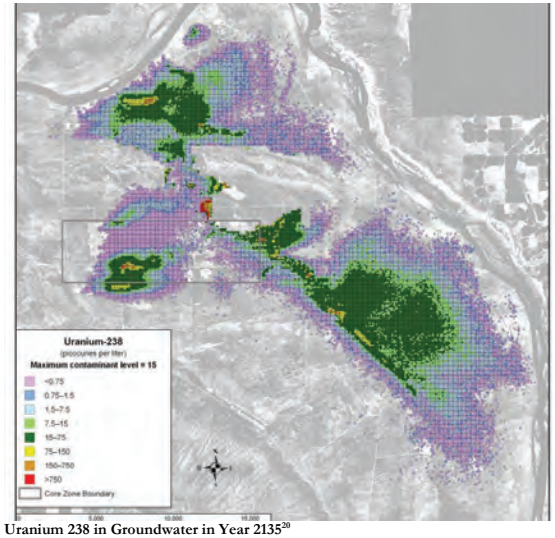
New plumes from tank leaks, residues and discharges will grow for thousands of years under USDOE's plans to NOT cleanup tank leaks, waste discharge trenches and cribs, and to leave 1% in tanks (so-called "Landfill Closure") Uranium as an Example:



Uranium 238 in Groundwater in Year 2135[20]
Dark red >50x Drinking Water Standard (DWS)
DWS is set at level at which 1 adult male in 10,000 dies of cancer. This is just one contaminant out of many which will greatly exceed the Drinking Water Standard.

The draft TCWMEIS fails to provide maps or charts disclosing the cumulative risk from all contaminants to Native American children and other reasonably foreseeable exposed populations over time. It is very foreseeable that the scarcity of water, including restrictions *499-75*

[20] **Figure 6–65. Alternative Combination 2 Spatial Distribution of Cumulative Groundwater Concentration for Uranium-238 During Calendar Year 2135**

499-75 The long-term human health impacts analysis of this *TC & WM EIS* estimates impacts on a set of four onsite receptors and the offsite population to provide a reasonable basis for evaluation of the alternatives. The estimates of excess lifetime radiological risk presented in this EIS use risk coefficients that are integrated over age and gender using age-specific intake rates and weights that represent all members of the population. With respect to estimation of dose, it is recognized that children may form a sensitive group; regulatory guidance is evolving toward detailed consideration of such groups. The current basis of impact assessment data, e.g., radiation dose conversion coefficients, is not sufficiently developed to support estimates of impact on this sensitive subpopulation. The *Implementation Guide for Use with DOE M 435.1-1* (DOE G 435.1-1) directs that calculations for performance assessment of LLW facilities use dose conversion factors for adults. In addition, the EIS impacts analysis presents extensive evaluation of the potential impacts on the groundwater resource, including estimates of contaminant concentrations in groundwater and of human health impacts related to groundwater use.

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on further Columbia River withdrawals and the projected decrease in River flow due to climate change, will lead to use of the immense groundwater resource under Hanford. *499-75 cont'd*

Uranium 238 in Year 3890 under Alt 2 - Uranium into River:

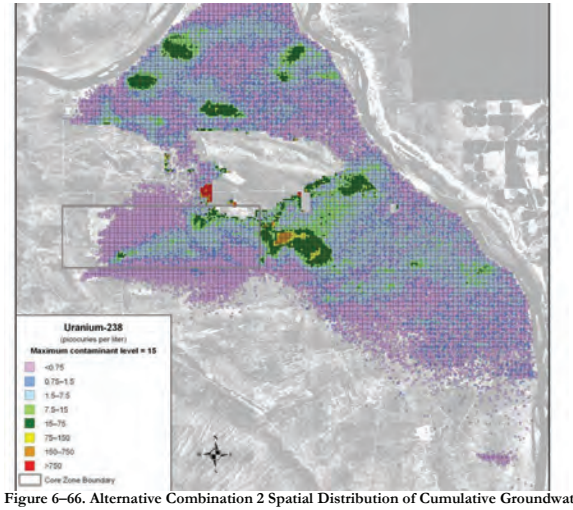

Figure 6–66. Alternative Combination 2 Spatial Distribution of Cumulative Groundwater Concentration for Uranium-238 During Calendar Year 3890 . Discussion page 6-70.

Note that the area USDOE uses to report groundwater contamination levels is what it refers to as the "Core Zone Boundary", shown in charts as the box on the Central Plateau. This exceeds the 200 Area fence lines, and is a significant distance from the boundaries of the regulated hazardous waste units – allowing for significant dilution in groundwater before reaching the location USDOE is reporting on. Hazardous waste laws, however, require meeting the drinking water standard at the boundary of the unit itself – not allowing USDOE to contaminate large areas outside the units. *499-76*

It is not realistic for USDOE to assume that the location of wells for drinking and irrigation will be where USDOE has drawn this line, since the area outside the fence line today will be unrestricted public access and use… and, it is foreseeable that there will be uses within the 200 Areas when the fences disappear.

499-76 For the alternatives groundwater impacts analysis, three lines of analysis were considered: the barrier boundaries, the Core Zone Boundary, and the Columbia River nearshore. The peak groundwater contaminant concentrations (during the 10,000-year period of analysis) and maximum contaminant concentrations as a function of time are reported for these lines of analysis. Information on the spatial distributions of contaminants for the entire unconfined aquifer is provided in Chapter 5 of this *TC & WM EIS*. These lines of analysis were chosen to: (1) represent the potential near-, mid-, and far-field groundwater impacts; (2) meet Ecology's SEPA requirements; and (3) provide a point of comparison with anticipated analyses for permitting requirements. DOE's views are that the three lines of analysis allow an unbiased comparison of the potential impacts of the alternatives, meet the anticipated needs of the cooperating agencies, and provide a reasonable point of comparison for future studies.

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See Figure 6–78. Alternative Combination 3 Cumulative Concentration Versus Time for Uranium-238:

Uranium 238 over time in groundwater: increases on Central Plateau to 100 x DWS in 1,000 years. Sources include tank residues, leaks, and *billions* of gallons discharged to cribs.

Heart of America Northwest's review has found that USDOE has omitted billions of gallons of discharges from tanks and numerous other sources of buried or discharged Uranium from its analysis of cumulative impacts in the TCWMEIS.

499-77

499-77 Regarding the concern about the lack of uranium chemical inventories, estimates of the total uranium inventory (i.e., chemical uranium) were not provided in the table or the original source document. DOE revised the Appendix S inventories to include a calculated total uranium inventory for those sites that reported uranium isotopes. Note that uranium isotope inventories were included in the analysis for both the draft and this final EIS. This change does not impact the figure in Chapter 6.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

14. How to treat the High-Level Nuclear Waste?

THE PROBLEM:

The 53 million gallons of liquid High-Level Nuclear Waste at Hanford need to be treated and turned into a stable glass form, through a process called vitrifcation. The current vitrification plant under construction (called the Waste Treatment Plant, or WTP) is $8 billion over budget and 8 years behind the 2011 schedule for opening in the Hanford Clean-Up Agreement (TPA). For $12 billion, it is only planned to have the capacity to treat half of the volume from the High-Level Waste tanks.

USDOE has planned to separate the highest radioactive wastes with 90% of the radiation into 10% of the volume of the wastes to be vitrified as "High Activity Waste." This glass would be stored until sent to a deep geologic repository. USDOE proposes to bury the other 90% of the waste volume (called Low Activity Waste, or "LAW")) – which still has a tremendous amount of radioactivity and chemical waste –, in a landfill at Hanford. The LAW portion of WTP is largely complete, but, it only has melter capacity to treat half of this waste stream in coming decades. Whether to vitrify or find another way to solidify LAW waste is a major controversy, referred to as "supplementary treatment."

THE OPTIONS:

- Use only the vitrification capacity currently being built at the Waste Treatment Plant (WTP) – this will take until 2095 and require replacing the plant after 60 years.[21]
- Supplement the Low Activity Waste vitrification portion of the WTP with another LAW plant with four melters, instead of just two. This would allow treatment to be completed around 2045.[22]
- Supplementing WTP with thermal treatment for the 50% of the LAW volume which WTP will not vitrify by 2050 using "bulk vitrification"; "steam reforming",, or non-thermal treatment such as "cast stone," which involves mixing wastes with grout. None of these will protect groundwater as well as vitrified LAW.
- Remove or not remove Technetium-99 (Tc99) and sulfate from wastes before treatment – Tc99 is a major source of future groundwater contamination.

USDOE'S PREFERRED ALTERNATIVE

To separate the wastes into High-Level and Low Activity Waste streams; and, choose after the year 2015 whether to treat the other 50% of the LAW waste using vitrification, steam reforming, bulk vitrification or cast stone.

[21] Alternative 2A. Page S-23. Note, we use 2095 end date because the Alternative starts up vitrification in the year 2018. WTP is not slated to begin operations until the end of 2019; and, this alternative assumed waste from nearly 20 tanks would never be vitrified, but classified as TRU and sent to WIPP. The reclassification has been removed from USDOE's preferred alternatives per notice in the Federal Register.

[22] Alternative 2B. Page S-23.

Response side of this page intentionally left blank.

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THE IMPACTS

Early startup of the LAW portion of the Vitrification Plant could enable USDOE to retrieve more waste from leaky Single Shell Tanks prior to 2022. None of USDOE's alternative include this possibility.

Vitrification of LAW waste is the least problematic portion of the WTP, while the other technologies that USDOE wants to spend years researching have significant drawbacks, particularly for future contamination of groundwater and cancer risk if LAW is buried in a landfill at Hanford. If USDOE does not plan to start design and construction of a second LAW plant before 2015, the timelines for emptying tanks will be stretched out significantly.

HOANW'S RECOMMENDATION:

USDOE should plan to start up the LAW vitrification portion of WTP prior to 2019; and start funding a second LAW facility in 2012 in order to have it ready to operate by 2022. The "supplemental treatment" options should be discarded as they are less effective and protective of the environment. The Hanford Advisory Board and the State of Washington also object to the supplemental treatment options for these reasons; however, Washington recently gave tentative approval to allow USDOE to take until after 2015 to decide. This does not give USDOE a basis for failing to present in the TCWMEIS the reasonable alternative of early startup of the LAW facility or the construction of new Double Shell Tanks to ensure that wastes are retrieved from SSTs prior to 2040. *499-78*

USDOE must address the potential impacts from its delaying retrieval of SSTs from 2018 to 2040, including the risks from leaks and catastrophic failure or accidents.

499-78 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies, including supplemental treatment waste form performance (durability) for long-term groundwater protection.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning. Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* (WRPS and BNI 2011) evaluates some of the elements identified in earlier DOE reports, but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, Analytical Laboratory, and BOF, as well as the Pretreatment Facility and HLW Vitrification Facility. For more information regarding the *2020 Vision*, please see Appendix E, Section E.1.3.3.2.

With regard to DOE's contingency planning for potential tank leaks, Appendix E, Sections E.1.1.1.1.2 through E.1.1.1.2.6, provide insight into the site's tank farm operations, maintenance, surveillance and monitoring, and safety programs that DOE has instituted to ensure that, if new tank leaks develop, they do not contribute to environmental impacts. Regarding the construction of new waste tanks, DOE currently has no plans to do so; however, this *TC & WM EIS* does analyze the impacts of constructing and operating new DSTs, if needed, under Tank Closure Alternatives 2A and 5. Additionally, as discussed in

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

15. Additional significant comments regarding Cumulative Impacts:

1. Points of compliance and analysis of groundwater contaminant levels and health risks should be disclosed at unit boundaries; not taking credit for dilution of contaminants in groundwater at the edge of what USDOE designates the "Core Zone Boundary". It is important to present River shore data as well. *499-79*
2. Cumulative impacts should be analyzed and disclosed for exposure to all sources at the point of highest contamination where it is reasonably foreseeable that there will be future wells, buildings, intrusions – without assuming that there will be a fence or demarcation of a "Core Zone Boundary" surrounding the 200 Areas in 100 or 2,000 years. *499-80*
3. USDOE should present in the Summary and in the body of the EIS projected future maximum concentrations for all potential contaminants rather than reporting concentrations in groundwater which occurred in the past while liquid wastes were being discharged straight to the soil. These past concentrations are of historic interest, but are not relevant to the impacts from proposed actions. The tables presenting maximum concentrations should be prospective, rather than retrospective – otherwise, USDOE decision makers, regulators and the public are denied the ability to see projected impacts from current wastes and proposed actions. *499-81*

16. Decommission the Fast Flux Test Facility, a prototype breeder nuclear reactor, by fully removing the core and restoring the site:

THE PROBLEM:

In 2001, as a result of massive public outcry, the FFTF, a 400 megawatt nuclear reactor at Hanford, was finally deactivated. However, it still stands at Hanford and it is time for finalizing its decommissioning. *499-82*

THE ALTERNATIVES

For decommissioning the reactor:

- Entombing the FFTF reactor in cement
- Removing all of the above surface structures and restoring the site

For removing & treating radioactive sodium and highly radioactive components:

- Shipping the sodium and components for treatment at Idaho National Lab (INL) and reshipping it back to Hanford
- Treating the sodium at Hanford, with some of it reused in the vitrification plant

USDOE'S PREFERRED ALTERNATIVE:

Entomb the reactor without dismantlement and removal. Treat the sodium at Hanford, but send the extremely radioactive pieces of the FFTF to INL for treatment.

THE IMPACTS:

The risks from trucking the radioactive sodium back and forth to Idaho could be significant, and there is no approved shipping cask for the highly radioactive components to be trucked. *499-83*

Section E.1.2.2.8, this EIS analyzes the impacts of the construction, operation, and deactivation of four WRFs, each with three 568,000-liter (150,000-gallon) tanks, under all Tank Closure alternatives except Alternatives 1, 2A, and 6A. The WRFs could be used to facilitate retrieval of waste from the SSTs and miscellaneous underground storage tanks to the DST system, as well as to condition the waste through dissolution, dilution, and size reduction, if necessary.

499-79 Please see response to comment 499-76 regarding maximum contaminant concentrations at the lines of analysis.

499-80 The alternatives analysis and the cumulative impacts analysis both use points of analysis so that they can be combined and compared across each alternative in a similar fashion, as required by NEPA. These points of analysis include the Core Zone Boundary and the Columbia River nearshore; for human health impacts analysis, the Columbia River is also included. The points of analysis were identified in the *Technical Guidance Document* (DOE 2005), signed in March 2005 by DOE and Ecology, for use in the cumulative impacts analysis. This approach ensured that all sources within the Core Zone Boundary were captured together to enhance reader understanding of the interaction of the sources within the 200 Area's Central Plateau and the Columbia River nearshore, as well as the interaction of all sources across Hanford.

499-81 Tables in this *TC & WM EIS* provide information on the peak concentrations of various COPCs. Footnotes to these tables specify that this peak occurred in the past for some COPCs. However, the relationship of past to future COPC concentrations is presented in the time-versus-concentration plots provided in this EIS.

499-82 This EIS will support decisions regarding the end state of FFTF's aboveground, belowground, and ancillary support structures.

499-83 DOE acknowledges that no DOT-approved transport casks capable of holding the FFTF RH-SCs are currently available, as indicated in Chapter 2, Section 2.5.1.2, FFTF Decommissioning Alternatives, and no transport of these components would occur until such a cask is available.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

The site would not be restored and available for Tribal Treaty or conservation purposes under USDOE's preferred alternative. Washington State requires energy facilities to be decommissioned with site restoration – as Oregon also did with the Trojan Nuclear Reactor site on the Columbia River. However, the draft TCWMEIS fails to discuss Washington's energy site restoration requirements pursuant to RCW Chapter 80.50 and WAC 463-72-040. (this is another failure in regard to adoption of the TCWMEIS for state SEPA purposes). *499-84*

The draft TCWMEIS also fails to compare and justify the proposal to leave the reactor significantly in place despite USDOE's Records of Decision to fully remove the nine reactors lining the Columbia River. *499-85*

HOANW'S RECOMMENDATION for REVISING THE PREFERRED ALTERNATIVE: The Washington State standard for decommissioning nuclear reactors requires removal and site restoration. Oregon did this for the Trojan reactor. Do not put more radioactive waste on the road unnecessarily – treat the waste at Hanford. *499-86*

17. Significant Public Involvement Flaws Marked the Comment Period on the Draft TCWMEIS. A New Comment Period is Necessary on a Revised Draft TCWMEIS Which Cures the Major Flaws, Inaccuracies and Inadequacies of the Current Draft:

Public review and comment on the draft TCWMEIS got off to a rocky start. Recognizing the importance of the TCWMEIS for both decision making and public knowledge and input regarding the impacts of the major decisions for how to cleanup the most contaminated area in the western hemisphere, Assistant Secretary Triay and Office of River Protection Manager Olinger committed in the spring of 2009 to a very extensive comment period. This comment period, it was understood, would allow for the detailed public and advisory board review necessary to offer comments on a 6,000 page environmental impact statement governing decisions as diverse as High-Level Nuclear Waste tank closure to decommissioning of the FFTF Reactor and use of landfills for on-site and off-site waste. An extended comment period was crucial to allow for review of the draft, followed by preparation of Citizens' Guides and materials for public hearings and workshops. *499-87*

Despite years of delay and time to plan, USDOE's EIS management did not respond to requests for a collaborative effort to plan for public hearings and workshops until two months of the comment period had elapsed, and we had complained (shortly after Christmas) to USDOE Headquarters about the failure to collaboratively plan with stakeholders for when and where hearings and other public involvement efforts would occur.

The first hearing was held with far less than 30 days of notice to regional stakeholders and the public – preventing us from preparing and mailing Citizens' Guides and conducting other information outreach to encourage attendance and comment. USDOE's own mailed notice for the hearing was nothing short of awful, and criticized by all regional stakeholders involved in review in collaboration with the Hanford Advisory Board's Public Involvement Committee.

499-84 In response to the commentor's statement regarding the regulations or requirements that apply to FFTF decommissioning, Chapter 8 of this *TC & WM EIS* provides both a listing and a short description of the laws, regulations, and requirements that may apply to the proposed actions, including FFTF decommissioning.

499-85 The RODs referred to by the commentor did not address or determine the end state for FFTF. This *TC & WM EIS* addresses proposed actions to retrieve, treat, and dispose of Hanford tank waste; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate environmental cleanup activities at Hanford and other DOE sites.

499-86 Chapter 8 of this *TC & WM EIS* provides both a listing and short description of the laws, regulations, and requirements that may apply to the proposed actions, including decommissioning of FFTF.

499-87 DOE's public involvement process for this EIS was based on CEQ and DOE regulations for implementing NEPA; DOE Order 451.1B requirements; and applicable DOE NEPA guidance (available at http://energy.gov/nepa). While DOE is not bound by the terms of the TPA public involvement plan in conducting NEPA processes at Hanford, DOE is well aware of those procedures and factored them into the *TC & WM EIS* public involvement plan, which was prepared in collaboration with Ecology, a cooperating agency.

In response to the commentor's request for more-extensive collaboration in the *TC & WM EIS* public hearing planning process, as well as DOE's desire to communicate with and involve the public in this process, DOE stakeholder teleconferences were held on December 30, 2009, and January 5 and 6, 2010. Public hearing dates and locations were identified and discussed, and it was agreed that additional public hearings would be held in Spokane, Washington, and La Grande and Eugene, Oregon. Prehearing workshops were also discussed. In addition, DOE held a 1-hour open house prior to each public hearing to allow the public to meet informally with members of the *TC & WM EIS* team, ask questions, and learn more about this EIS. Informative posters and factsheets were provided at these open houses. It was further agreed during the DOE stakeholder teleconferences that no workshops other than the HAB workshop held on December 15, 2009, would be held. A suggestion was made during one of the teleconferences to move the planned January 26, 2010, public hearing in Richland, Washington, to meet the 30- to 45-day notification goal under the TPA

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- USDOE should commit to advance review of draft notice mailings (email and USPO) by the Hanford Advisory Board Public Involvement Committee and other stakeholders 30 days in advance of the start of a major comment period. USDOE should not claim that NEPA documents are not subject to TPA Community Relations Plan and other state and federal public involvement and notice requirements, deadlines and processes when the proposed actions will require TPA adoption, or adoption via permits, etc… **499-87 cont'd**

In contrast to the poor collaboration for the first two months of the comment period, USDOE's ORP then committed to hold seven hearings across Washington and Oregon – which was a major public education and involvement success.

Over 600 members of the general public attended seven hearings in Oregon and Washington. Through Heart of America Northwest's holding pre-hearing workshops in adjoining rooms with USDOE support, more than half the attendees were able to have the information needed to testify and have their questions answered. (USDOE and State officials attended and participated in a number of those pre-hearing workshops).

Evaluations and surveys of attendees show that USDOE's notices failed to provide meaningful notice of the impacts of the proposed actions and failed to inform and encourage attendance. Indeed, few people attending the hearings came because of USDOE's mailed or emailed notices, and fewer than ten percent even reported seeing USDOE's notices.

- Notices for impact statements, like notices for TPA actions, must include a clear description of impacts and how the proposed actions may affect public values and concerns, and be designed to communicate that at first glance in order to encourage the public to read the notice and attend hearings. USDOE's notices, even after revision, failed to provide any indication to the public of the impacts from USDOE's proposed actions. Environmental Impact Statements are supposed to provide the public with that critical information – and, to meet State SEPA requirements, the Summary must provide that information as well as notice. **499-88**

The evaluations and surveys of attendees showed that over 75% of the public attending the hearings did so because of the notice received from Heart of America Northwest and Heart of America Northwest Research Center via Citizens' Guides and fact sheets mailed and emailed; phone banks; presentations in communities or on campuses. These results show the importance of collaboration with citizen groups.

- USDOE failed to provide access to the comments presented at the Portland hearing and to the presentations and answers to public questions despite repeated requests from citizen groups. This failure to provide timely access to information critical for preparation of our comments and those of other citizens and citizen groups has undermined our ability to comment and violated both NEPA rules, and ultimately violated the Freedom of Information Act. **499-89**
  - Members of Heart of America Northwest and the Rosemere Neighborhood Association requested a copy of the Portland hearing transcript and a record of the

community relations plan (the January/February timeframe for public hearings was announced at the December 15, 2009, HAB meeting). During the call, the Hanford communities indicated their support for the January 26 public hearing date and their opposition to changing it. In response to a request that the Seattle public hearing not be scheduled for a week when schools were out, the hearing date was moved to March 8, 2010. DOE also held hearings in locations that encouraged university student attendance and participation, such as Eastern Oregon University.

The commentor suggests that the hearing notices could have been improved and should have been reviewed by stakeholders in advance of their mailing. The purpose of the mailers was not to educate the public on the draft EIS and its content, but to provide information to interested parties regarding the scheduled meetings (date, time, location); the *TC & WM EIS* mailers served that purpose. DOE provided, and continues to provide, other opportunities for public education related to this *TC & WM EIS*. As noted above, DOE's public hearing format included a 1-hour open house prior to each hearing to assist the public in learning more about this EIS and its preliminary findings, and informative posters and factsheets were provided at each open house. *TC & WM EIS* project information is also available to the public on Hanford's website (http://www.hanford.gov).

499-88 Notice of the comment period and hearings was published in the *Federal Register*; mailings were sent to interested parties; and notices were placed in local newspapers. Please see response to comment 499-87 regarding the purpose of the mailers and format of the public hearings.

Consistent with "Adoption — Procedures" (WAC 197-11-630), Ecology conducted its own independent review of the *Draft TC & WM EIS* for the purpose of adopting this EIS, wholly or in part, to satisfy SEPA requirements and support future permitting actions. However, SEPA procedural requirements for preparation of environmental documents (e.g., circulation, commenting, hearing requirements) are not required to be met before Ecology can adopt this EIS.

499-89 All comments on the *Draft TC & WM EIS* that were made during the public comment period, whether given orally at hearings or sent via mail or email, and their approved responses are included in this CRD, a separate volume of this *Final TC & WM EIS*. DOE has posted this final EIS, including this CRD, on the Hanford website (http://www.hanford.gov) and the DOE NEPA website (http://energy.gov/nepa), and a Notice of Availability will be published in the *Federal Register*.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

answers to public questions given by USDOE and Washington state officials at the hearings. These requests were denied.
Access to the transcript and to be able to review both comments by the public and state officials; and, to review the responses given by USDOE and Washington's representatives to questions was essential for preparation of our comments. A Freedom of Information Act Request was filed with a request for expedited response and a waiver of fees (since the information would be used in workshops, webinars, fact sheets and Guides to assist the public in commenting before the end of the comment period, a fee waiver was entirely justified). USDOE formally denied both the waiver of fees and expedited response --- leaving the public without the information and records which we believe were important for our preparation of comments. *499-89 cont'd*

- Failure to provide timely access to records which the public believes are essential to preparing informed comments warrants extension of the comment period and penalties against USDOE officials for failing to provide information.
  - A significant cause of the failures to provide essential information appears to be USDOE's contractual reliance on SAIC, its contractor for the EIS. If transcripts are completed for USDOE and delivered to SAIC, they are subject to FOIA.
  - It is inappropriate to ask the public to send comments on a federal agency environmental impact statement to a private contractor, instead of directly to the federal agency. In this case, it was wrong to require people to submit comments electronically to an address "@SAIC" instead of directly to USDOE.
  - SAIC officials revealed incredible biases bringing into doubt their qualification to prepare this EIS and certainly precluding their ability to fairly receive and evaluate comments. A senior manager of SAIC wrote a rude email to our organization revealing that he equated advocacy for cleanup with anti-nuclear views and failing to recognize facts vetted by Ecology and USDOE. USDOE officials apologized for this, but SAIC has never apologized, nor shown that it will evaluate comments in an unbiased manner. *499-90*

Submitted by Heart of America Northwest and Heart of America Northwest Research Center
1314 NE 56th St. #100 Seattle, WA 98105 office@hoanw.org ; or, contact Gerry Pollet, J.D., Executive Director gerry@hoanw.org (206)382-1014 Resources for citizens reviewing the EIS or seeking to comment on other Hanford Clean-Up issues are available at www.hoanw.org

Both the open house and question-and-answer period preceding each *TC & WM EIS* hearing were provided by DOE as a mechanism to educate the public on this EIS. They were not meant to be mechanisms for collecting or generating comments. Any requests for information submitted to DOE under the Freedom of Information Act were handled through the established DOE administrative process in accordance with Freedom of Information Act requirements (5 U.S.C. 552 et seq.). The transcripts of all the public hearings were posted on ORP's website when they were available.

499-90 DOE acknowledged the public's need for more time to review the *Draft TC & WM EIS* by extending the public comment period 45 days, for a total comment period of 185 days. All references supporting this EIS were made available to the public in official DOE reading rooms. Per DOE Order 451.1B, although contractors may assist in DOE's NEPA implementation, the legal obligation to comply with NEPA belongs to DOE. Further, per DOE NEPA regulations (10 CFR 1021.310), DOE shall include a disclosure statement executed by any contractor (or subcontractor) under contract with DOE to prepare the EIS document, in accordance with 40 CFR 1506.5(c). While Science Applications International Corporation conducted the analyses and preparation of this EIS, its work was performed under DOE's direct guidance and close scrutiny, and both the *Draft* and *Final TC & WM EIS* were reviewed and approved by DOE.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

Selected Inventory Data from Appendix D, TC&WM EIS

Parameter	SST Tank Equipment	SST Ancillary	Past SST Leaks Appx D only	Cribs/Trenches	Totals Appx D Only
Pu curies	66,900	590	72	594	68,156
Tc99 Ci	15,500	93	312	142	16,047
Total U Ci	875	9.9	19.7	6.21	910.8
U – Kg *	542,000	5,160	25,400	3,990	576,500
Ratio of U Ci to Kg	619:1	521:1	1,289:1	642:1	633:1

In comparison the following totals are from Appendix S:

Pu	= 76,626	ci
Tc99	= 691.8	ci
Total U	= 3,073	ci
U (chem.)	= 213,752	Kg

Appendix S ratio of U ci to Kg = 70:1

- the EIS failed to indicate the specific type of uranium – it could be just soluble salt or a total including insoluble compounds as well? Perhaps this is explained somewhere in the text, but it should be clarified on the separate tables.

There are some numbers that just don't add up - such as the uranium chemical inventory compared to the curies. Why do we have a higher curie count in appendix S when the total uranium Kg numbers are lower compared to Appendix D?

499-58 cont'd

Response side of this page intentionally left blank.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

Columbia Riverkeeper • Heart of America Northwest • Sierra Club Cascade Chapter • Oregon Chapter of the Sierra Club • Washington Physicians for Social Responsibility • Oregon Physicians for Social Responsibility • Spokane Riverkeeper • Republicans for Environmental Protection, Washington Chapter • Northwest Environmental Defense Center • Friends of the Columbia Gorge • The Lands Council • Center for Environmental Law & Policy • Oregon Toxics Alliance • Rosemere Neighborhood Association • Eastern Washington Voters • Hanford Challenge • Alliance for Democracy, Portland Chapter • Hanford Watch • Hells Canyon Preservation Council • Olympic Environmental Council • Silver Valley Community Resource Center

April 29, 2010

The Honorable Steven Chu
Secretary of Energy,
U.S. Department of Energy
1000 Independence Ave., SW
Washington D.C. 20585

The Honorable Inés Triay
Assistant Secretary for Environmental Management
U.S. Department of Energy
1000 Independence Ave., SW
Washington D.C. 20585

RE: End Waste Import/Storage Mission at Hanford

Dear Secretary Chu and Assistant Secretary Triay:

On behalf of the undersigned organizations, we are writing to request that the U.S. Department of Energy (DOE) withdraw its 2000 and 2004 Records of Decision selecting Hanford as a disposal site for large volumes of radioactive low-level waste (LLW) and mixed low-level waste (MLLW) from across the Nation. The Department's own draft *Tank Closure and Waste Management Environmental Impact Statement* (TC&WM EIS) clearly demonstrates that importing and burying off-site waste at Hanford poses serious human health and environmental impacts. ***499-91***

We join the State of Oregon Department of Energy's formal request, submitted to the Department on March 23, 2010. Oregon's letter discusses both the impacts and the flawed process relied upon by DOE in issuing a Record of Decision before analyzing the impacts at Hanford from importing and disposing of off-site waste.

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Page 1 of 4
April 29, 2010

499-91 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE prepared an SA to evaluate information previously presented in the *Draft TC & WM EIS* that has been updated, modified, or expanded to determine whether a supplement to the draft EIS is warranted. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* was not required. See Chapter 1, Section 1.8.2, for more information.

Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

Against this backdrop, we urge DOE to:

a) withdraw its prior decisions selecting Hanford to dispose of off-site waste;
b) issue a new formal decision that DOE will not add more waste to Hanford;
c) commit that DOE will conduct a new environmental impact statement if DOE revisits this decision after 2022; and
c) commit to issuing a new, revised draft of the TC&WM EIS for public comment which does not propose adding off-site waste and cures the numerous defects in the current draft, as the Department was advised by its Hanford Advisory Board (March 4, 2010).

The Department's claims that it prioritizes cleanup of Hanford and will honor a voluntary moratorium on disposing of off-site waste at Hanford until the vitrification plant is operational (estimated for 2022) have no credibility so long as the Department continues to insist that the TC&WM EIS include disposal at Hanford for 3 million cubic feet of off-site waste. The promised moratorium on adding off-site waste until 2022 does nothing to diminish the severe impacts to groundwater, the Columbia River, and human health projected by DOE itself in the draft TC&WM EIS. The Department's insistence that it will implement its decision made in 2000 to add that waste – prior to any site specific impact analysis – does, however, greatly diminish the Department of Energy's credibility.

Thousands of citizens have sent in comments on the TC&WM EIS objecting to the Department's insistence that it will use Hanford to dispose of off-site waste, and hundreds turned out at the public hearings held in Washington and Oregon. The people of the Northwest, including many of the members of our organizations, responded to the analysis put forth by the Department in the TC&WM EIS with unified objections to disposing of off-site waste at Hanford.

499-91 cont'd

The latest information, disclosed to the public in the TC&WM EIS, confirms that the assumptions underlying DOE's 2000 decision have not withstood the test of time. As the Oregon Department of Energy stated in its letter:

> Potential site-specific impacts [of importing LLW and MLLW] were finally assessed and documented with the release late last year of the draft Hanford Tank Closure Waste Management Environmental Impact Statement (TC&WM EIS). This document clearly shows that the adverse impacts of disposing of additional off-site waste at Hanford, especially if it contains certain mobile and long-lived radionuclides, would be significant. The analysis in the draft TC&WM EIS shows that no mater where at Hanford DOE proposes to dispose of off-site waste, the impacts exceed standards and are unacceptable. Moreover, the impacts from Hanford-origin wastes in these same areas already exceed standards under the most aggressive cleanup considered, leaving no room for any additional impact from off-site wastes.

The Hanford Advisory Board also issued formal consensus advice to the Department urging DOE to issue a formal Record of Decision that DOE will not add off-site waste to Hanford, stating, in part:

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Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

> Importation of this waste is projected in the draft TC&WMEIS to increase the contamination levels in groundwater by as much as tenfold above the impacts projected for key contaminants of concern for on-site waste. It could reach a cancer risk level for groundwater in excess of one hundred times Washington State's cleanup risk level for cleanups and landfills.
>
> The draft TC & WM EIS does not include a reasonable alternative to adding more waste to Hanford . . . The draft document clearly shows both alternatives (for where DOE would dispose of off-site waste) analyzed by DOE have contaminants above legal standards due to quantities and composition of the projected wastes disposed. DOE should have and did not consider an alternative that did not import waste for disposal at Hanford.[1]

The Department's draft TC&WM EIS fails to consider and disclose the route specific impacts from trucking 3 million cubic feet of waste to be disposed at Hanford, and fails to meet the legal requirement under the National Environmental Policy Act to disclose to the public that the Department has a pending related proposal to import and dispose of highly radioactive "GTCC" wastes at Hanford – which would greatly increase the cumulative environmental and health impacts. The Department's failure to disclose these plans in TC&WM EIS and in materials discussing the EIS has greatly harmed the Department's credibility, and increased public resolve to oppose the Department's plans to import and dispose of more waste at Hanford.

499-91 cont'd

As evidenced by the overwhelming public outcry at the TC&WM EIS hearings, citizens of the Pacific Northwest will not tolerate off-site waste exacerbating Hanford's existing threats to the Columbia River and people of the Northwest. The Department faces certain litigation if it does not withdraw its decision to use Hanford as a national radioactive waste dump.

In light of these serious issues, we urge the Department to remove consideration of off-site waste in the draft TC&WM EIS and to issue a Record of Decision that off-site waste will *not* be added to Hanford.

Sincerely,

Brett VandenHeuvel
Executive Director
Columbia Riverkeeper

Gerry Pollet
Executive Director
Heart of America Northwest

Sierra Club Cascade Chapter

Oregon Sierra Club

[1] Hanford Advisory Board (HAB) Advice 229, March 4, 2010, Page 11 (parenthetical added).

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April 29, 2010

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Commentor No. 499 (cont'd): Gerry Pollet, Executive Director, Heart of America Northwest

Spokane Riverkeeper

Republicans for Environmental Protection, Washington Chapter

Northwest Environmental Defense Center

Friends of the Columbia Gorge

The Lands Council

Center for Environmental Law & Policy

Oregon Toxics Alliance

Rosemere Neighborhood Association

Eastern Washington Voters

Hanford Challenge

Alliance for Democracy, Portland Chapter

Hanford Watch

Hells Canyon Preservation Council

Washington Physicians for Social Responsibility

Oregon Physicians for Social Responsibility

Olympic Environmental Council

Silver Valley Community Resource Center

CC: Governor Chris Gregoire
Governor Ted Kulongoski
Senator Patty Murray
Senator Maria Cantwell
Senator Ron Wyden
Senator Jeff Merkley

Page 4 of 4
April 29, 2010

Response side of this page intentionally left blank.

Commentor No. 500: Judith Werner

Judith Werner
JW Interiors
4266 Woodside Circle
Lake Oswego, OR 97074
(▬) ▬-▬

Mary Beth Burandt
U.S. Dept. of Energy
Office of River Protection
P.O. Box 1178
Richland, Wash 99352

I can't believe I even have to tell you this (Office of River Protection???).

You need to stop the plans to import off-site nuclear waste to Hanford! Don't we have enough of our own??

500-1

And, why will you not have a comprehensive cleanup of the leaking tanks and contaminated soil? Why would you want to contaminate our groundwater?? It is your JOB to protect the Columbia River and its environs. Just thought I'd let you know.

500-2

Faxed 5/3
cc Col. Swiskeeper

500-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

500-2 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the SSTs, treat and dispose of this waste, and close the SST farms via landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Commentor No. 501: Sam Adams, Mayor, City of Portland, Oregon

From: Adams, Sam [Sam.Adams@portlandoregon.gov]
Sent: Monday, May 03, 2010 5:33 PM
To: 'TC&WMEIS@saic.com'
Subject: DOE Draft TC&WM EIS Comments
Attachments: Mayor Adams Comments on Hanford TCWMEIS.pdf

Dear Ms. Burandt,

Thank you for the opportunity to comment on the Hanford Tank Farm Closure and Waste Management Environmental Impact Statement. Please see my comments attached.

Sincerely,

Mayor Sam Adams
City of Portland

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Commentor No. 501 (cont'd): Sam Adams, Mayor, City of Portland, Oregon

Office of Mayor Sam Adams
City of Portland

Mary Beth Burandt
DOE Draft TC&WM EIS Comments
TC&WMEIS@saic.com

May 3, 2010

Dear Ms. Burandt,

Thank you for the opportunity to comment on the Hanford Tank Farm Closure and Waste Management Environmental Impact Statement (EIS). Hanford is the world's largest and most complex environmental cleanup project, so I appreciate the complexity of the task ahead of the USDOE in proposing actions to clean up this facility.

It has come to my attention that a number of the recommended alternatives in this draft EIS pose serious threats to regional human and environmental health. While the City of Portland is not qualified to comment on the selection of one particular alternative over another in the draft EIS, we ultimately support the alternative that is most protective over the long term of the Columbia River. Portland sits at the confluence of the Columbia and Willamette Rivers, the health of which are vital to the success of this city. I am troubled that the USDOE's preferred alternatives do not reflect this perspective. ***501-1***

In addition to the downstream impacts of the quality of on-site mitigation and clean-up activity at Hanford, I am significantly dismayed by Section 2.3, Waste Management Alternatives of the EIS and the USDOE's preferred Waste Management Alternative of Alternative 2, which allows the retrieval of off-site waste for storage at Hanford. ***501-2***

Receipt of off-site waste at Hanford, especially if it contains (as would be expected) mobile long-lived radioactive materials, such as technetium 99 or iodine 129, is projected to have significant adverse long-term impacts on the groundwater, which ultimately impacts the Columbia River. Moreover, the transfer of nuclear waste through Oregon on its way to Hanford poses an unacceptable risk to the health of Portland citizens. ***501-3***

Assuming no accidents, the USDOE itself estimated 816 cancer deaths to residents along the route, and to people in traffic near the trucks, from a similar proposal in 2008. That estimate is based on radiation doses for an adult male and does not account for the possibility of traffic accidents, leakages, or acts of terror along the transfer route. ***501-4***

The City of Portland adamantly opposes the USDOE's selection of Alternative 2 of the Waste Management Alternatives as the preferred alternative in this EIS. Given that there are already ***501-5***

1221 SW Fourth Avenue, Suite 340 ♦ Portland, Oregon 97204-1995
(503) 823-4120 ♦ FAX (503) 823-3588 ♦ TDD (503) 823-6868 ♦ www.portlandonline.com/mayor/

501-1 While DOE's Preferred Alternatives for tank closure, FFTF decommissioning, and waste management in this *TC & WM EIS* may not necessarily represent the most environmentally preferred alternatives, the ROD issued by DOE will identify any additional mitigation and monitoring commitments adopted by DOE and specify other factors considered by DOE in reaching its decision. Please see Section S.5.5 of the Summary and Section 2.10 of Chapter 2 of this *TC & WM EIS* for more information on key environmental findings.

501-2 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

501-3 See response to comment 501-2 for a discussion on the transport and disposal of offsite waste.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

501-4 As shown in Appendix H, Figure H–4, solid radioactive waste transports would originate from DOE sites to the east and southeast of Hanford; for this reason, Interstate 5 would not be used for transports analyzed in this EIS. The value of 816 LCFs is from the results provided in the *GNEP PEIS* (DOE 2008b). This value represents the maximum impacts associated with 50 years of transportation activities supporting the operations of all existing U.S. commercial light-water reactors if they all were replaced with high-temperature, gas-cooled reactors. The *GNEP PEIS* was canceled by DOE on June 29, 2009 (74 FR 31017). The transportation of radioactive materials and waste, both coming to and leaving Hanford, must comply with DOT and NRC regulations that promote the protection of human health and the environment. This includes requiring the use of certified packaging that minimizes the radiation dose rate outside the transportation package. As shown in the Summary of this EIS, Section S.5.3;

Commentor No. 501 (cont'd): Sam Adams, Mayor, City of Portland, Oregon

Page 2

many barriers to quickly and adequately cleaning up the existing nuclear waste at Hanford, it is plainly unacceptable to consider importing additional nuclear waste, even temporarily, from outside of the Hanford site. Furthermore, the actual transportation of that waste by river, rail, or road through Portland would be an unacceptable risk to the City. **501-5 cont'd** **501-6**

We recognize that the treatment of nuclear waste is a regional and national issue that requires the collaboration of all levels of government to develop practical and safe solutions. In objecting to the transport of nuclear waste through this region, I offer this city's support in developing a plan for the on-site treatment of nuclear waste to either mitigate the health risks of the waste in transport or to eliminate the need for transport altogether. Treating nuclear waste on-site is the best opportunity for our communities to avoid further health and environmental impacts from waste produced from regional, decommissioned nuclear facilities. **501-7**

The City of Portland, in solidarity with the City of Spokane, Washington, urges the USDOE to follow through on the agency's fourth strategic theme: ***Environmental Responsibility:*** *Protecting the environment by providing a responsible resolution to the environmental legacy of nuclear weapons production.* **501-8**

The Portland City Council opposes the transportation of massive amounts of nuclear waste through our region and supports the alternatives in the Hanford Tank Farm Closure and Waste Management Environmental Impact Statement which are most protective of the long-term health of the Columbia River. **501-9**

Sincerely,

Sam Adams, Mayor
City of Portland

1221 SW Fourth Avenue, Suite 340 ♦ Portland, Oregon 97204-1995
(503) 823-4120 ♦ FAX (503) 823-3588 ♦ TDD (503) 823-6868 ♦ www.portlandonlinc.com/mayor/

Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs during either incident-free transportation or postulated transportation accidents.

501-5 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

501-6 Because the radioactive waste analyzed in this *TC & WM EIS* would originate from DOE sites to the east and southeast of Hanford, no waste shipments are expected to pass through or near Portland, Oregon.

501-7 DOE has a national strategy for disposing of radioactive waste that requires transportation between DOE sites. This strategy was analyzed in the *WM PEIS* (DOE 1997). As part of this strategy, radioactive waste could be transported to Hanford for disposal and transported from Hanford for treatment and disposal at other DOE sites. Because radioactive waste analyzed in this *TC & WM EIS* would originate from DOE sites to the east and southeast of Hanford, no waste shipments are expected to pass through or near Portland, Oregon. DOE minimizes the generation of radioactive waste as much as practical and treats waste streams to make them acceptable for disposal. DOE is constantly reviewing new treatment technologies and looking for opportunities to cost-effectively minimize the need for transporting radioactive waste.

501-8 DOE's current mission at Hanford is the environmental cleanup of the facilities and areas where DOE previously engaged in activities in support for America's defense program. DOE's efforts are aggressively focused on deactivating, decommissioning, decontaminating, and managing resulting waste in an environmentally responsible manner. ORP's mission is to retrieve and treat

Hanford's tank waste and to close the tank farms to protect the Columbia River. Additional information on Hanford's mission is available at http://www.hanford.gov.

One of the purposes of this *TC & WM EIS* is to address the environmental impacts of retrieval, treatment, and disposal of tank waste and final (i.e., permanent) closure of the SST system. This EIS also evaluates the impacts of FFTF decommissioning, including management of waste generated by the decommissioning process. Finally, this *TC & WM EIS* evaluates the potential environmental impacts of ongoing solid-waste management operations at Hanford, as well as the proposed disposal of Hanford LLW and MLLW and a limited volume of offsite LLW and MLLW.

501-9 DOE is supportive of approaches that would best protect human health and the environment while also meeting its legal obligations.

Commentor No. 502: Stuart Harris, Director, Confederated Tribes of the Umatilla Indian Reservation, Department of Science and Engineering

Confederated Tribes *of the*
Umatilla Indian Reservation
Department of Science & Engineering

46411 Timine Way • Pendleton, OR 97801
(541) 429-7040 • fax (541) 429-7040
info@ctuir.com • www.umatilla.nsn.us

March 19, 2010

Ms. Shirley Olinger
Office of River Protection
US Department of Energy
PO Box 550
Richland, WA 99352

Subject: CTUIR Comments on the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site

Dear Ms. Olinger,

The CTUIR appreciates the opportunity to provide comments on the subject document. A tremendous amount of work has gone into this document, and the analyses contain information that is very important to understanding the future conditions at Hanford. We appreciate the amount of effort that DOE clearly made to explain everything clearly and cross-reference information. Nevertheless, the CTUIR has only been able to scratch the surface and is providing high-level comments. There are many aspects that we were unable to evaluate in depth; any topic on which we remain silent is due to lack of review time, not lack of interest. We also expect that many comments could be answered if DOE had held workshops on each major topic (as the WMA-C process is doing), or if we had hundreds of hours to search through the EIS and the many supporting documents that were prepared over the last several years.

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) have a vital interest in the current and future condition of Hanford, the Hanford Reach, and Hanford-affected lands and resources. The USDOE's Hanford site was developed on land ceded by the CTUIR under the 1855 Treaty with the United States. The CTUIR reserved rights to this land and retained and reserved the perpetual rights to hunt, fish, gather, pasture livestock and pursue other activities throughout the region, including the area in and around Hanford. The Hanford site contains critical and unique shrub steppe habitat, and the Hanford Reach is the last free-flowing segment of the Columbia River and is home of the last remaining naturally spawning fall Chinook.

Through nuclear weapons production activities, it has taken less than one lifetime to contaminate and thereby affect the ability of CTUIR to safely use all the Hanford Nuclear Reservation Area and its resources. CTUIR developed a Hanford Policy that reflects our responsibility to protect, preserve, and enhance Hanford natural resources including the air, water, and ground, and all that grows and lives there. The goals of the CTUIR Hanford Policy are to ensure that Hanford-generated pollution is not allowed to further contaminate on- and off-site natural resources, to protect the health of Tribal members when on Hanford or Hanford-affected lands, to evaluate the effectiveness of clean-up and restoration actions at Hanford, and to contribute advice and the

502-1

502-1 The first Waste Management Area C workshop was held in May 2009 and the *Draft TC & WM EIS* was published in October 2009; the workshop formats used for the draft EIS and Waste Management Area C were for different purposes and therefore were slightly different. DOE held numerous workshops on this *TC & WM EIS* on specific topics identified by interested parties, including the CTUIR. The specific workshops on groundwater modeling, known as Technical Review Group meetings, are identified in Appendix C, Section C.3, and summarized in Table C–1. DOE also held a full-day workshop in December 15, 2009, specifically related to helping stakeholders such as the CTUIR understand the information in the published *Draft TC & WM EIS*. Tables C–2 and C–3 summarize DOE's communication and consultation efforts related to the CTUIR. In addition, the CTUIR also has representation on the HAB. Section C.4 identifies the communication and briefings provided through that additional forum. As a result, DOE believes a reasonable effort was made to educate the CTUIR on this EIS.

Commentor No. 502 (cont'd): Stuart Harris, Director, Confederated Tribes of the Umatilla Indian Reservation, Department of Science and Engineering

scientific underpinnings to DOE to help DOE make the best, most stable, and protective cleanup decisions it can make.

Except for Alternative 6B, the alternatives contained in the draft EIS are not compliant by several orders of magnitude. Further, they are clearly not the actual alternatives, but rather artificial constructs used for analytical purposes. Although there are some significant technical problems with the EIS, the CTUIR believes that there is probably enough information buried in the EIS to craft some practical and compliant alternatives. **The CTUIR believes that another EIS document is needed with real alternatives that are compliant with requirements to protect human health and the environment.** If this additional document is not written, then DOE will be choosing an alternative that has not been evaluated, whose impacts are not known, and that might perpetuate groundwater conditions that are lethal for thousands of years. *502-2*

We recognize that DOE has offered to discuss the EIS and its implications with us. We will be calling to set up a meeting with our staff and the Science and Technology Committee.

Sincerely,

Stuart Harris, Director
CTUIR Department of Science and Engineering

2 Attachments:
Technical comments
Environmental Justice

Cc:
Dave Brockman, DOE/RL
Jane Hedges, WA Ecology
Dennis Faulk, EPA
Gabe Bohnee, NPT ERWM
Russell Jim, YN ER/WM
Ken Niles, ODOE
file

502-2 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

DOE has satisfied NEPA requirements by responding to public comments in the CRD and by making changes to the draft EIS where appropriate and necessary. Subsequent to the issuance of the *Draft TC & WM EIS*, DOE prepared an SA to analyze 14 topics it identified where it is unclear whether updated, modified, or expanded information warrants preparation of a supplemental or new draft EIS. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* is not required. See Chapter 1, Section 1.8.2, for more information.

Commentor No. 502 (cont'd): Stuart Harris, Director, Confederated Tribes of the Umatilla Indian Reservation, Department of Science and Engineering

ATTACHMENT 1 – Technical comments

Over-Arching Comments:

Since DOE has repeatedly stated that it will not repackage the parts of the alternatives, we have to evaluate the alternatives as currently presented.

1. DOE selected and packaged the alternatives for analytical reasons, not to develop alternatives to meet specific regulatory requirements. There is nothing wrong with this, but the analytical packages are being presented as if they are real NEPA alternatives.
   a. When presenting alternatives for actual use, DOE should have started with a list of health and risk criteria it must meet. The NEPA analysis must use CERCLA and MTCA criteria if DOE wants to reach a stable decision.
   b. Which alternatives meet criteria for protecting human health and the environment? Only 6A and 6B, possibly.
   c. Which alternatives are compliant with CERCLA and ARARs and TPA milestones? Unknown.
   d. Which alternatives are congruent with actual plans? For example, what was the rationale for an alternative that replaces the WTP twice when that is clearly not going to happen, or uses a different WTP design than the one being built? Unknown.

502-3

2. The DOE preferred alternatives are not in compliance.
   a. How can DOE choose a remedial alternative that does not meet state health and risk standards? How can WA Ecology assure the citizens of Washington State will be protected if MTCA is not an ARAR and state risk targets will not be met?
   b. How can DOE try to make a decision that drastically affects the TPA milestones and endstates? Is this even legal?
   c. Just because DOE has NEPA 'coverage' does not mean that CERCLA or RCRA requirements will be met, or that CERCLA and RCRA closure decisions will follow the NEPA decision if the primary CERCLA criteria would not be met.

502-4

3. Now that some analysis has been performed, a document that evaluates actual alternatives is needed. This time, compliance should be the overall criterion. The different components should be packaged and repackaged until a set of alternatives, *all of which are in compliance,* are found.
   a. It appears that compliance can only be reached if no more waste is imported unless it is all vitrified, more Hanford-generated waste is immobilized and disposed in an offsite deep geologic repository, more deep vadose remediation occurs, the LAW fraction is treated as GTCC and disposed in a deep geologic repository, 99.9% of tank waste is retrieved, and the maximum amount of clean closure is achieved. Contamination under the tanks is extensive and landfill closure is not protective or compliant.
   b. These may not be the optimum determinations, but this is the conversation that needs to happen.

502-5

502-3 See response to comment 502-2 for a discussion of the range of alternatives analyzed and their role in the eventual ROD.

DOE intends to make decisions based on its analysis of the proposed actions and the range of reasonable alternatives evaluated in this *TC & WM EIS*. This *TC & WM EIS* addresses the potential laws and requirements that would apply to the proposed actions, depending on the alternative. Issues concerning the ability to meet legal standards or requirements are also discussed, along with the potential mitigation measures that may be needed and that are feasible for DOE to implement. Additional mitigation measures could also be required in future permits issued by the State of Washington, or be addressed under the scope of the TPA as part of future remedial actions that are subject to CERCLA. ARARs analyses, including the MTCA, are conducted under CERCLA to determine cleanup levels for ongoing environmental remediation being conducted under the TPA. Regarding the rationale for analyzing an alternative that replaces the WTP twice, the assumption of replacing WTP twice in selected alternative(s) was made to estimate the potential impacts over the timeframe associated with implementing the proposed actions. This may represent an overly conservative assumption (that is, it may not be necessary to replace WTP twice) that would tend to overestimate the impacts.

502-4 This EIS is not being prepared under CERCLA; therefore, the ARARs process does not apply. However, some of the ongoing Hanford site activities that are considered in the cumulative impacts analysis are currently undergoing remediation under the TPA, which is the legally binding process used at Hanford to implement CERCLA and RCRA (hazardous waste) requirements. All environmental restoration actions conducted at Hanford under CERCLA must evaluate the "legally applicable, relevant and appropriate requirements of Federal and State laws and regulations" to establish the appropriate cleanup level that must be achieved at an individual cleanup site.

However, the scope of the proposed actions evaluated in this *TC & WM EIS* does not include CERCLA remedial actions. Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives and identify where standards may be exceeded. This is not the same as an "ARARs analysis" under CERCLA, and it serves a different purpose. The identification of legal requirements in a NEPA document assists an agency in its planning, funding, and decisionmaking process. It also provides full disclosure to members of the public, stakeholders, and other agencies regarding

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4. The role of Ecology and the TPA in developing the EIS is unclear.
   a. It is not clear whether Ecology endorses DOE's preferred alternative, the groundwater model, the assumptions, and so on. **502-6**
   b. Why did Ecology agree that 1E-4 lifetime cancer risk is acceptable when the MTCA standard is 1E-5 (cumulative) and 1E-6 (individual)? How can Ecology assure citizens that state standards will be met if they have already agreed to something less? It is not protective to hedge this by saying that MTCA applies only to chemicals, and radiological risks are allowed to add another order of magnitude. **502-7**
   c. DOE can issue a NEPA ROD and try to do final planning *outside* the TPA process with an emphasis on capping, but EPA and Ecology still make the decisions *within* the TPA process. What was Ecology's rationale for going along with a non-TPA product that seems to conflict with the TPA? **502-8**
   d. How will WA Ecology develop mitigation measures (a SEPA requirement) to balance the tremendous impacts to the vadose zone, groundwater, human health, and the ecology? **502-9**
   e. Are DOE's preferred alternative and its tremendous environmental consequences allowed in the Sitewide RCRA Permit? Can a site that causes many millennia of natural resources that are lethal to biota and people ever be legally closed? CTUIR does not think so. **502-10**

5. The assumptions, uncertainties, and decision instabilities need further discussion.
   a. If the model is still not calibrated and the document is based on a single deterministic set of model parameters (and only on the tritium model run), then it is impossible to determine the level of uncertainty. **502-11**
   b. Other parameters such as exposure parameters may be equally problematic. For example, DOE made up a "native american" exposure scenario that is totally incorrect, but that nevertheless has enough information to show that risks are at least 10-fold higher, and possibly 100-fold higher, than presented. **502-12**
   c. Actual RCRA closure is not clearly described. What additional modeling will be required for the CRCA-CERCLA actions and performance assessments? **502-13**
   d. NRD liability has not been accounted for. The consequences of failing to clean up adequately will last tens of thousands of years. Clean closure (6B) costs only twice as much as landfill closure, within the middle range of costs, whereas the NRD liability f any other alternative is chosen could be much higher both in actual dollars and in health and ecological consequences. **502-14**
   e. Even if clean closure takes 100 years to achieve, this would still be preferable to 10,000 years of lethal groundwater and destruction of the river (as shown by the cumulative analysis and the northwest groundwater flow). **502-15**
   f. DOE assumes the river channel will remain in the same place for 10,000 years. Has there been any change in the last 10,000 years? Similarly, the likelihood of a Blackrock reservoir is fairly high given the issues surrounding Yakima Valley irrigation. **502-16**

the potential scope of an agency's effort to implement a proposed action (or an alternative) in terms of the subsequent permitting, other approvals, consultations, and coordination requirements, all of which would include additional public involvement opportunities in the future.

See response to comment 502-2 for a discussion of potentially applicable laws and regulations, as well as potential mitigation measures.

502-5 See response to comment 502-2 for a discussion of the range of alternatives analyzed and their role in the eventual ROD.

502-6 Ecology has been a cooperating agency since 2003, and one of Ecology's primary responsibilities as identified in the MOU is to help ensure that the contents and analyses in this *TC & WM EIS* are sufficient to satisfy SEPA requirements. See Appendix C for the MOU and Ecology's foreword to this EIS for more information.

502-7 The "benchmark standards" used in this *TC & WM EIS* represent dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL if an MCL is available. For example, the benchmark for iodine-129 is 1 picocurie per liter; for technetium-99, it is 900 picocuries per liter. These benchmark standards for groundwater impacts analysis were agreed upon by both DOE and Ecology as the basis for comparing the alternatives and representing the potential groundwater impacts. In addition, this approach is consistent with the MTCA standards Method A, which is used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs listed in Table 720-1 of the MTCA.

502-8 See response to comment 502-6 regarding Ecology's role in this *TC & WM EIS*.

502-9 Chapter 7, Section 7.1, of this *TC & WM EIS* discusses mitigation measures that could be used to avoid or reduce potential impacts on all resource areas. Many of the mitigation measures discussed would apply across all alternatives because of the similar nature of some of the activities analyzed in this EIS (e.g., construction of facilities). However, the resource subsections of Section 7.1 do acknowledge specific alternatives where only certain mitigation measures would apply or where additional mitigation consideration may be warranted for a specific alternative. Washington State RCRA/Hazardous Waste Management Act permit decisions will be undertaken to ensure that the necessary environmental investigations, evaluations, and mitigation measures are implemented. The

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Topical Comments

Inventories

1. There may be differential removal of radionuclides during sluicing. Sluicing preferentially removed soluble forms (3H, Tc, Cs), but leaves less soluble radionuclides (Pu, U) in the tank heel. *502-17*
2. CTUIR is not sure that the chemical inventories are adequate? For example, does the US Ecology inventory show 95% of the U on site? No; the US Ecology inventory is 0 which gives another reason why risks could actually be much higher than presented. *502-18*
3. The CTUIR does not think that uncertainty is adequately discussed. Similarly, a good sensitivity analysis is needed, and that may not be adequate either. *502-19*
4. The EIS contains some very good information, such as discussion of what inventories are not known.
5. A discussion of which radionuclides and chemicals are and are not included, and why, is needed. What is the definition of "risk driver"? *502-20*
6. There are many 'what ifs' that may not be adequately discussed. What if waste must remain at the CSB indefinitely? What if the spent fuel at the ENW has to remain there for an extended time? What if landfills are closed and buildings demolished without full characterization (as is currently planned)? Much uncertainty exists regarding what is in tanks, how much is in tanks, and what form it is in. *502-21*
7. The inventories at the various landfills, for the cumulative analysis, need further discussion as we were unable to locate all the information we were looking for in the relatively short review window. *502-22*

Waste Treatment

1. DOE has said for years that bulk vitrification is not a proven technology (page S-37) and will not be considered. Why is it being evaluated? *502-23*
2. Steam reforming consists of diluting waste with water, converting water to steam, and as a by-product, getting radioactive waste as minerals again that have to be disposed of. Unless the waste is in a form that is as stable as glass, then it can enter the environment over time. So this seems like a waste of energy and time. (Page S-37) *502-24*
3. What is the longevity of "cast stone"? It is still cement. Is it different from grout? Page S-37. *502-25*
4. It appears that removal of Technetium-99 is necessary, yet apparently this has not been decided yet because the alternatives treat it as an open question. The CTUIR was under the impression that Tc removal was clearly recognized as required and that the Vit Plant is designed to do so. Why isn't TC-99 removal considered under any of the other alternatives except 2B and 3B? Could Alternative 6B include it? *502-26*

Modeling Method

1. A central tendency or best guess set of parameters, run multiple times, only provides information about the variability caused by different combinations of single unvarying parameters. Apparently there is no variation in the individual parameters themselves (such as using a range of infiltration rates). This means that a true upper bound and true amount of uncertainty is impossible to determine. *502-27*

permitting process will consider the measures provided in this *TC & WM EIS* and may include other measures that the State of Washington determines are necessary for protection of human health and the environment. Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

502-10 See response to comment 502-6 regarding Ecology's role in this *TC & WM EIS*. Also, see Chapter 7, Section 7.1, on the permit process and how decisions through this EIS will follow that process.

502-11 DOE disagrees with the commentor's premise that the model is not calibrated, that the document is based on a single set of deterministic model parameters, or that the tritium model run is the sole basis for the calibration. Appendices L, N, and O of the *Draft TC & WM EIS* include discussions of the calibration of the groundwater flow model (more than 10,000 parameter sets were evaluated), the calibration of the vadose zone flow and transport model (more than 8,000 parameter sets were evaluated), and the calibration of the groundwater transport model (more than 200 parameter sets were evaluated). In evaluation of these parameter sets, comparisons between model results and field data were made for the site as a whole (water table elevations), individual source areas (BY Cribs, TY Cribs, and the 216-B-26 Crib), and groups of sources that combine to create region-scale plumes (the REDOX and PUREX plumes). As stated in the Summary; Chapters 2 and 5; and Appendices O, Q, and U, DOE's view is that differences between the alternatives that are greater than a factor of 10 (one order of magnitude) are significant discriminators with respect to uncertainties within the modeling chain.

502-12 Regarding the exposure parameters used in the American Indian scenarios, the intent of those scenarios was to collectively reflect American Indian lifestyles for the purpose of comparison. Both the activities and parameters used in those scenarios are based on existing reports and compilations. It was never the intent to analyze all possible American Indian scenarios. However, exposure data provided by the tribes are used in Appendix W, Section W.3, to estimate peak impacts on a CTUIR hunter-gatherer (and on a Yakama hunter-gatherer) for a representative alternative combination, Alternative Combination 2. Those analyses suggest that the exposure pathways and parameters used for the EIS

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2. A side-by-side comparison of actual plumes from the annual groundwater report and EIS-modeled plumes should be included for calibration. The calibration doesn't appear to be that good. This needs a broader discussion. *"The best overall fit with the groundwater monitoring data was based on tritium concentrations values reported at the Core Zone and Columbia River. As a result of these calibration tests, the values from Runs P10 and R10 were selected as the best fit parameter set."* (Page O-8) How did the other plumes fit their calibration tests? Why did they not fit as well as the Tritium plume? **502-28**
3. "The sitewide natural recharge rate should be 3.5 millimeters (0.14 inches) per year". (Page L-3). Can localized recharge be more? The model does not account for localized impacts. Further, infiltration occurs in pulses, not in a smooth annual average. **502-29**
4. "*The lowest top of the basalt elevation in Gable Gap (i.e., the "cutoff" elevation) determines the water level at which flow through the gap is possible."* (Page L-9) *"The results of the groundwater transport analysis presented in this appendix were calculated using the Base Case flow field. The results from the Alternate Case flow field were compared to those from the Base Case flow field as part of a sensitivity analysis for both the operational and postoperational time periods. The data from these sensitivity analyses are presented in Section O.6."* (Page O-4). **502-30**
   - The Alternative Case may be more representative, but both cases show substantial northwest flow.
   - Along with localized recharge rate, the TOB is such a critical factor that a broader discussion with the Hanford communities is needed.
5. "*the basalt layer beneath the unconfined aquifer is assumed to be a no-flow boundary, i.e., no water enters the unconfined aquifer from the underlying basalt*." (Page L-11). **502-31**
   - This is not a good assumption. Basalts will typically be flow boundaries. The rates may not be as high as the Hanford formation; but for the area of the entire Hanford site, the amount flowing from the basalt aquifer can be significant. This has been seen in areas such as Gable Mountain Pond where the ground water chemistry shows discharge from the basalt aquifer. Several authors have also theorized a "window" in the basalt where parts of the Elephant Mountain formation is missing and the lower basalt interbed is in direct contact with the younger Ringold formation. The only basalt cells that they allowed to be "active" or to allow flow through are a few cells in Gable Gap (Page L-13). These were allowed to be active to prevent model instability. (Page L-26).
6. For calibration, "no more than one observation well could be assigned to any given MODFLOW cell." (Page L-28). This equates to roughly 270 wells used for calibration. Other well data sets were used as independent calibrations. For a 200x200 meter size cell, this seems to be small. "*The RMS error (calculated versus observed) should be less than 5 meters (16.4 feet), approximately 10 percent of the gradient in the water table elevation*." (Page L-29). How does this large difference relate to areas such as Gable Gap with a relatively flat ground water table? The sensitivity of the model to this was shown later in the EIS document on page L-37 "*The flow model requires a highly conductive zone of Hanford gravel across the center of the model through the Gable Gap area to satisfy the extremely flat water table conditions measured across this region over a large variation in operational recharge."* **502-32**
7. *"…each particle-tracking simulation must be preceded by a vadose zone simulation. An interface was developed to transfer the contaminant flux from the STOMP simulations to* **502-33**

hunter-gatherer is sufficiently representative for use in the EIS alternatives analyses.

502-13 To address the commentor's remarks regarding clarity of presentation in the *Draft TC & WM EIS*, particularly with respect to closure and end states of the cumulative impacts sources, DOE has added an analysis of the impact of mitigation measures that would reduce the flux to the aquifer. This analysis can be found in Chapter 7, Section 7.5, of this *Final TC & WM EIS*. As part of the closure and permitting processes, additional subregional-scale site characterization data would be developed to support smaller-scale, more-detailed modeling assessments.

502-14 Chapter 2, Section 2.11, of this *TC & WM EIS* summarizes and compares the relative consolidated costs of continued operation of existing facilities; construction, operation, and deactivation of new or modified facilities; and associated activities in support of the proposed actions, including administrative controls, institutional controls, and postclosure care. Cost estimates associated with natural resource damage liability are considered beyond the scope of this EIS. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

502-15 See response to comment 502-14 regarding factors influencing future DOE decisions.

502-16 As clarified in Chapter 1, Section 1.10, of this *TC & WM EIS*, the U.S. Bureau of Reclamation issued its *Final Planning Report/Environmental Impact Statement, Yakima River Basin Water Storage Feasibility Study, Yakima Project, Washington* (BOR 2008) in December 2008, with Ecology as a cooperating agency. The Bureau identified the No Action Alternative, which includes activities currently planned or under construction, as the Preferred Alternative. The Bureau informed Ecology that a formal ROD is not required and will not be prepared.

DOE retained Appendix V of the *Draft TC & WM EIS* in this final EIS to provide an analysis of scenarios that could potentially result in an increase in groundwater elevation at Hanford and increased Columbia River elevation at Hanford (model recharge sensitivity analyses). There is no evidence that would support

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the particle-tracking model." (Page O-5). If the particle tracking from the vadose zone is not representative, as discussed above, then the particles calculated as going into the ground water would not be truly representative. **502-33 cont'd**

8. *"Dispersivity is a measure of the degree of spreading of a contaminant plume. In the standard implementation of the particle-tracking method, the dispersivity is a constant and does not depend on distance from the source (scale). This TC & WM EIS uses a regional-scale model, which was considered important to describe the scale dependence of dispersivity…. At distances greater than this threshold, the dispersivity remains constant at its maximum value."* (Page O-6). Would this be a good representative approach in light of preferential flow pathways and differences in hydraulic conductivity? Under fast flow conditions, a contaminate plume may remain more concentrated before it has time to disperse. **502-34**
9. Table M-3 (Page M-15). Are the leak loss estimates accurate? Too low? Is DOE using biased estimates? In addition, what about leak estimates from the removal of the ancillary equipment such as the pipelines? All the retrieval leaks are estimated to occur in only one year – 2018. When would they actually be retrieving these tanks? How does the retrieval method and estimation account for HLW that is entrained BETWEEN the metal tank liner and the concrete bottom and sides of the tanks? **502-35**
10. Page N-90 and N-91 discuss very long travel times of 4,270 years for locations with recharge rates of 0.9 millimeters per year. This rate was only calculated for the undisturbed IDF-East site in a portion of the 200-East Area. This is significantly less than the background conditions calculated over the balance of the 200-East and 200-West Areas of 3.5 millimeters per year and much less than for disturbed areas. This long travel time is much longer than the lifespan of any caps placed over the sites. If these caps break down, then the travel times would also be significantly affected as the infiltration rates would be affected. **502-36**
11. Why doesn't the IDF barrier, after its post-design life period of time, have an infiltration rate equal to that of pre-Hanford background levels and the post-design life of the sitewide barrier? (Table M-2, page M-14). Their models show that the IDF barrier will never degrade? **502-37**
12. Since past leaks at a tank farm, range from 4 cubic meters (1,057 gallons) to 400 cubic meters (105,700 gallons) (page N-91) their modeled recharge conditions has an increase from 3.5 millimeters per year to 100 millimeters per year for a period of 1 year. This increases the recharge to an immediate area to 10,570 gallons per year. First of all, this amount seems low compared to the amount that has potentially be leaked in the past. In addition, this amount is spread out through an entire year's period. This is unrealistic and doesn't represent a true pulse of water. **502-38**
13. Why was a test of the influence of a silt layer use an infiltration rate of 50 millimeters per year rather than the 100 millimeters per year used previously? (Page N-92). Is DOE assuming the silt will only allow for half the amount of infiltration? This isn't explained. **502-39**
14. When DOE looked at the influence of tilt angle on the migration of contaminants, the area of discharge was only 5 meter by 5 meter in size. This seems small. (page N-92). Also, the interface that is tilted is between an upper layer of Hanford Gravel and an underlying Hanford Sand. Their results did not show much horizontal migration. What would be the effects if the tilted layer was a composed of a finer silt layer? **502-40**

a significant change in the Columbia River location or elevation in the last 10,000 years. Further, there are no reasonably foreseeable changes in the position and/or elevation of the Columbia River (manmade or geologic) in the next 10,000 years. As such, this EIS cannot evaluate these highly uncertain potential river position impacts (or biases) on the NEPA alternatives.

502-17 With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks and residual waste, requires preparation of detailed performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

502-18 DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication. None of the reviewed documents included a total uranium inventory estimate for this disposal site. However, DOE again reviewed the data and revised US Ecology inventory to include a calculated total uranium inventory. This inventory was included in this final EIS and analyzed appropriately.

502-19 DOE disagrees with the assertion that uncertainty and sensitivity are not adequately addressed in this *TC & WM EIS*. DOE's view is that NEPA requires a comparison of the impacts of the various alternatives in the context of the cumulative impacts; that the comparison be technically sound and traceable to reliable sources of data; and that important sources of uncertainty in the analyses be identified and their potential implications for decisions and alternatives impacts discussed. In light of technical review and other comments, DOE is of the view that the discussion of the nature and role of uncertainty in the groundwater modeling can be expanded and clarified, and has revised this *Final TC & WM EIS* accordingly.

502-20 The screening process that DOE used in this EIS to select the set of COPCs is described in Appendix Q, Section Q.2. The results of this screening provided the COPCs (radionuclides and chemicals) that were used in the analysis of the tank

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15. This discussion on page N-94 shows that dikes have a strong influence on plume migration to the ground water. This need to be incorporated in the models since they are so prevalent across Hanford. **502-41**

Modeling results – groundwater

1. A side-by-side comparison of the EIS and from the DOE 2005 Annual Ground Water Monitoring Report shows that the tritium plumes don't appear to match. Is this the best fit? At least for the Iodine and Nitrate, the DOE model does not appear to match the actual plumes. **502-42**
2. Both the base case and the alternative case clearly show that contamination from the 200 E area moves to the southeast, while contamination from the 200 W area moves to the northwest. Although this confirms our worst fears, it is refreshing to finally have a sitewide official groundwater model that we can rely on and cite. **502-43**
3. Does the Uranium analysis presented in section O.6.4 account for the rapid movement of Uranium currently seen coming from the B-BX-BY tank farms? **502-44**

Secondary waste

1. Secondary waste must be immobilized. **502-45**
2. The CTUIR believe that secondary waste is a very important aspect that needs much more review and discussion.

Retrieval

1. 99.9% retrieval is the only option that results in compliance, even if the regulatory requirement is only 99% **502-46**
2. DOE must consider Tc for both vitrification and containerization. **502-47**
3. The soil under every tank needs to be characterized, either to confirm no leaks, or to estimate what has leaked. **502-48**

Waste Importation

1. Off-site importation results in a significant impact if the waste is not immobilized. Page S-100 shows that acceptance of off-site waste that contains radionuclides like iodine-129 and technetium-99 could have an adverse and major impact on the environment. **502-49**
2. The ROD that allows waste importation must be rescinded since this analysis shows that risks are unacceptable if waste is imported. **502-50**
   a. There is no alternative which does not add off-site waste. This needs to be corrected when the real alternatives are developed. **502-51**
   b. Alternatives for mitigation conditions that will achieve standards are needed since the only way to meet health and environmental protection standards. If DOE imports waste and does not immobilize it, other areas must be made cleaner in order to keep the long-term risks within acceptable limits, or other waste must be removed from Hanford Site to a geological site. **502-52**
3. Reasonable alternatives which USDOE did not examine in the TCWMEIS include:
   a. disposal options at regulated disposal facilities for the 3 million cubic feet of off-site waste which USDOE proposes to dispose at Hanford, where the addition of these wastes will not be projected to result in groundwater contamination in excess of standards; **502-53**

waste and the cumulative impacts. "Risk driver" was not defined in the draft EIS, but has been added to Chapter 9, "Glossary," in this final EIS.

502-21 Although the comment is not clear, DOE believes the commentor is referring to uncertainty of HLW being stored at Canister Storage Building-type facilities. This EIS evaluates the necessary storage capacity needed to store all the HLW canisters for each of the alternatives for up to 145 years.

502-22 The estimated inventories (radionuclide and chemical) for the burial grounds can be found in Appendix S, Tables S-35a through S–86b.

502-23 DOE has conducted a number of supplemental technology reviews and technology selection processes, as discussed in Appendix E, Section E.1.2.3.5.1. As discussed in this section, in April 2002, DOE evaluated over 50 potential supplemental technology options. From this list, the Hanford Cleanup Challenge and Constraints Team Mission Acceleration Initiative working subgroup performed the final evaluation to select appropriate technologies for further development. The six goals of this working subgroup are included in Section E.1.2.3.5.1, along with the conclusion that bulk vitrification, cast stone, and steam reforming should be further evaluated.

502-24 As discussed in Appendix E, Section E.1.2.3.8.5, bench-scale and recent pilot-scale testing leading to full-scale implementation of steam reforming to treat sodium-bearing tank waste at INL have continued to produce favorable results. However, the remaining technology development needs for steam reforming include engineering-scale tests using actual Hanford tank waste and continued assessment of waste product performance.

502-25 The long-term performance of the cast stone waste form is discussed in Appendix E, Section E.1.2.3.7.5, Waste Form Performance. Retention of waste constituents within the cast stone waste is enhanced by adding fly ash and slag to the grout formulation. The rate of release of hazardous constituents depends strongly on the nature of the waste form used to immobilize the constituents. The nature of the waste forms, analysis of long-term performance assessment, and the methods used to estimate the release rates and values of parameters characterizing release rates from cast stone are presented in Appendix M. A description of the grout mixture assumed in the EIS analysis is presented in Appendix E, Section E.1.2.3.7.2.

502-26 As discussed in Appendix E, Section E.1.2.3.1.1, the Pretreatment Facility (of the WTP) was originally designed to remove technetium-99. Based on reviews of technetium-99 in ILAW glass, DOE and Ecology agreed in 2008 to eliminate

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b. exhuming and disposing offsite from Hanford significant quantities of long-lived radioactive wastes (e.g., pre-1970 buried TRU, for which exhumation and offsite disposal in a geologic repository is needed; and,
c. an alternative under which all tank wastes are vitrified in a reasonable time period and tank farms are cleaned up with characterization and removal of wastes to the extent practicable based on risk analyses. **502-53 cont'd**

Closure with capping

1. The EIS shows that tank leaks cause unacceptable risks, and also that capping does not work. Therefore, there is no doubt that more contamination in soil needs to be removed. **502-54**
2. Appendix R relies on the Fluor document that presumed capping, as did the CP Strategy. This is contrary to the CTUIR Policy, HAB advice, and various public statements from the Tri-Parties. **502-55**
3. The clean closure assumptions are not clear. Does it mean that only a few feet of soil (from the ground surface or below the tank) will be excavated, or that excavation to groundwater will occur (as stated repeatedly by Mary Beth Burandt in presentations)? **502-56**
4. DOE has repeatedly stated that clean closure includes excavation all the way to groundwater. Since a careful 2-volume cost evaluation was prepared, we take this as indication that full excavation is not only possible, but it is cost-effective. Since DOE has now demonstrated that contamination can be completely removed and the tanks clean-closed, there is no reason to settle for anything less. Regardless whether the tanks themselves are HLW or something else, DOE has now demonstrated that clean closure is possible and within the central range of costs. **502-57**
5. The results prove that caps do not work in the long run. The CTUIR agrees.
6. The results prove that TRU must be excavated. The CTUIR agrees.
7. Filling the tanks with gravel would not prevent water intrusion and possible mobilization of contaminants from residue. Likewise, filling the tanks with grout will not prevent mobilization of residual tank waste. The waste will not evenly mix with the grout. Instead, it will be in more concentrated zones at the bottom of the tank. When water leaks in the tank, it will travel along the edges of the tank and flow down to the bottom to pool around this waste and eventually out to the ground. **502-58**
8. Does DOE assume an equal mixing of grout and residuals in tanks and ancillary equipment under Alternatives 2B, 3A, 3B, 3C, 4, 5, and 6C? (Page M-16). Even though DOE states that the inventory is assumed to reside in the bottom meter of the tank (Page M-16), it is likely that the remaining waste that is grouted will not mix evenly within the tanks when grout is added. Any waste that is between the liner and the concrete tank will not be able to mix with the added grout. **502-59**
9. CTUIR disagrees disagree with the statement on page S-96 that states "*clean closure would provide little, if any, reduction in long-term impacts to the groundwater before the calendar year 6000, due to the early release from past leaks and cribs and trenches contiguous to the SST farms.*" If DOE removes the contaminated soil via excavation, then long-term benefits would be observed immediately. **502-60**

technetium removal from the WTP permit. Construction of the Pretreatment Facility to date has eliminated the capability to remove technetium from the LAW stream. This *TC & WM EIS*, however, assumed for analysis purposes that technetium-99 removal could be completed in the existing Pretreatment Facility; however, design and construction modifications would be necessary to add technetium removal capability, if required. To facilitate evaluation of the relative efficiency of retention of this radionuclide in the LAW forms, separation of technetium-99 from the 200-East Area liquid stream and immobilization into IHLW glass was considered under Tank Closure Alternatives 2B and 3B. Analysis of technetium-99 removal for these two alternatives was sufficient to discern long-term waste-form performance on site and show the impact of the decision to eliminate the technetium-99 capability from pretreatment. Therefore, DOE determined it was not necessary to evaluate this pretreatment capability as a part of every alternative, including Tank Closure Alternative 6B. Based on the analyses of Tank Closure Alternatives 2B and 3B in this EIS, DOE could reach a decision concerning technetium-99 removal that would be documented and explained in a ROD for this final EIS.

502-27 DOE assumes the comment is referring to the Monte Carlo optimization and uncertainty analysis in Appendix L, Section L.9, of the *Draft TC & WM EIS*. The Monte Carlo analysis evaluated the sensitivity of the model to changes in hydraulic conductivity values for the 13 different material zones within the model. This resulted in over 6,000 Base Case model runs, with each model run having a different set (within a reasonable range) of hydraulic conductivity values for each of the 13 material zones. This approach is similar to the example, "such as using a range of infiltration rates," given in the comment of an acceptable approach to analyzing uncertainty. Please see Section L.9, specifically Section L.9.1, of the draft EIS for additional details regarding the method used to analyze uncertainty in the flow model.

502-28 As discussed in Appendix L of the *Draft TC & WM EIS*, the primary calibration of the flow model was accomplished by matching model results to observed heads. Appendix L, Section L.9, discusses the hydraulic conductivity distributions and their influences on calculated heads. This method of calibration is preferred because of the long record of observed heads during the operational period. Following calculation of the calibrated flow field, the calculation in Appendix O referenced by the commentor was made to vary transport parameters. This was done to obtain the most appropriate values for representing the regional-scale behavior of the aquifer to facilitate comparison

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Landfills

1. Under WA state law, new landfills must have no impact on groundwater at all. This means treating everything before new disposal. The long half-lives of imported waste would be so long that only vitrification would be acceptable. **502-61**
2. CTUIR does not support landfill closure, even of tanks that are non-leakers.
3. Even ERDF would release hazardous substances if (when) leachate collection stops.
4. The new IDF with grouting would not meet the requirement for no impact. So why is Ecology agreeing with the EIS? **502-62**

Human Risk Scenarios and methods

1. Methods are opaque; this section was clearly not written by a risk assessor, because the information that a risk assessor needs to review is largely absent.
2. It seems strange that the clean closure (alt. 6B, Base Case) appears to show a greater radiological risk than only a partial clean closure risk (alt. 4) Page S-101.
3. It is unfathomable why DOE totally ignored the CTUIR exposure scenario after years of consultation and promises made by DOE. Instead, DOE made up its own scenario, and as a consequence get every single exposure factor wrong. The "scenario" that DOE labeled Native American is little more than part of a scenario for a Richland gardener with a sauna. We asked on several occasions to meet with the SAIC risk assessor to make sure this did not happen, but DOE refused. As far as we can tell, the Native American risks are at least 10-fold higher than stated. **502-63**

Human Risk results

1. As CTUIR has stated on many occasions, DOE's concept of how to treat reasonably foreseeable land use is problematic, particularly if DOE intends to maintain site land use controls for 10,000 years. **502-64**
2. The Core Zone boundary and the river are not the only locations where risks need ot be presented. Given the underlying analysis, it should be possible to show risk isopleths across the site (as the TWRS EIS did). **502-65**
3. Short-term risks cannot be compared to long-term risks. **502-66**
4. 1E-4 is the maximum allowed under CERCLA, and 1E-5 is the maximum excess lifetime cancer risk allowed under MTCA. This is equivalent to 15 mrem. Yet DOE assumes that 100 mrem is acceptable. This is incorrect – it is the offsite public dose limit for operating facilities. For closed facillities it is 25 mrem/yr (NRC) or 15 mrem/yr (CERCLA). **502-67**
5. It is unclear whether the dose to risk conversion factor includes fatal and non-fatal cancer and heritable mutations? **502-68**
6. DOE lists the benchmark standard for Chromium (Cr) as 100 micrograms per liter. This may be the drinking water standard, however the aquatic standard is more strict at 10 micrograms per liter. The benchmarks that should be adopted would be the stricter and more protective ones. **502-69**

Ecological risk methods and Ecological risk results

Not evaluated; no determination as to quality, consequences, or uncertainty.

of the alternatives. The tritium plume was selected for this calculation because of its regional scale and relatively well-characterized sources. In Appendix U, the calculated plumes are compared with observed plumes on a regional scale to help understand uncertainties on the overall modeling system and their influence on the comparison of the alternatives. Appendix U concludes that, with the exception of uranium-238, total uranium, and carbon tetrachloride, the modeling system is capable of reproducing observed plume shapes and concentration to within an order of magnitude. This was the design objective for the modeling system, and provides the reader with a sense of the degree of discrimination that should be considered significant when comparing the alternatives.

502-29 Due to the 10,000-year analysis period of the *Draft TC & WM EIS*, the temporal resolution of data detail encoded into the model is annualized. This simplifies the model from an encoding and numerical analysis perspective, but also limits the model's ability to simulate infiltration events, which occur more frequently than is reflected by the smooth annual averages encoded into the model. This model simplification, although it smoothes out the annual recharge pulses that actually occur in any given year, reasonably represents the overall recharge impacts of the sum of the estimated pulse events minus the sum of the estimated evapotranspiration that is estimated to occur annually across the model domain. As additional information, *TC & WM EIS* guidance for use of the sitewide natural recharge rate of 3.5 millimeters per year is provided in the *Technical Guidance Document* (DOE 2005), dated March 25, 2005. The *Technical Guidance Document* was developed and agreed upon by DOE and Ecology.

502-30 In an effort to incorporate the opinions and ideas available from developers and users of groundwater models for Hanford, the *TC & WM EIS* groundwater model development process included periodic meetings with Hanford's Local Users' Group. The top-of-basalt surface, recharge rates, and numerous other modeling parameters and assumptions were communicated to the Local Users' Group; comments from the group were collected and addressed; and the model development process was updated based on the comments received. A summary of this interactive process is included in the November 2007 document, *MODFLOW Flow-Field Development: Technical Review Group Process and Results Report*, available on the Hanford Site website at http://www.hanford.gov/files.cfm/Modflow%20Report.pdf.

502-31 A simplifying assumption was made that there is no hydraulic connectivity between the unconfined aquifer and any existing confined aquifers. It is likely that some interaction between unconfined and confined aquifers exists. However,

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Air Quality

Not evaluated; no determination as to quality, consequences, or uncertainty.

Cumulative risks and impacts

1. The cumulative impacts of DOE's preferred alternative show that groundwater will remain so contaminated for over 10,000 years, that it would be lethal to use for more than a short time. Since DOE assumed that current closure plans would be carried out, the CTUIR interprets the cumulative impacts to reflect DOE's current best guess at sitewide risks posed by the current set of planned and proposed sitewide closure configurations. *502-70*

Short-term and Long-term impacts

1. Long-term impacts are inadequately described
2. It is improper to compare short-term worker risks with long-term impacts. Workers will not be excessively exposed – it would be illegal to do so. DOE has used short-term doses to bias the results toward capping. *502-71*
3. Institutional controls fail quickly. DOE contradicts itself about perpetual federal control. This is a high-risk assumption. DOE must choose UU/UE remedial alternatives.

Environmental Justice

1. While the EJ analysis follows conventional methodology, it is completely irrelevant for Native Americans. The CTUIR requests that DOE work with the DOSE to prepare a more useful analysis. CTUIR's draft language is included in Attachment 2. *502-72*
2. Common sense says that Tribes have a closer relationship to the natural resources, and that Tribes bear a higher risk burden, and therefore they obviously have a disproportionately high share of the impacts and consequences. *502-73*
3. It is odd that visual resources are titled Native American interests. Visual resources belong to everyone, but the general public and the Tribes may place different value on different aspects of visual resources. Similarly, Native Americans have many more interests than simply visual resources. *502-74*

NRDA

1. NRDA liability is not considered and NRD costs are not discussed. Some of the impacts (acreage) are presented, but this is an area that needs more discussion. *502-75*
2. DOE should not use I&I language instead of remediation even for borrow areas. *502-76*
3. The intent of separating 'unavoidable' from 'irreversible' impacts is not clear. Does DOE intend them to have different treatment under NRDA? *502-77*

the availability of data that describe the locations, sizes, and water flux amounts between the aquifers is not sufficient to encode these features into the model. This simplifying assumption should not bias the EIS analysis, and is, therefore, believed to be reasonable in light of the uncertainty related to this feature.

502-32 There is a high frequency of observation wells in areas where waste sites are located due to site interests over time. This frequency provides a high number of available observations in some areas and fewer to zero observations in other areas. To mitigate the model calibration statistics being biased toward particular regions of the model where greater numbers of observations have been taken over time, the decision was made to constrain the assignment of observation wells so that only one observation well could be assigned to any model cell location. This procedural approach to observation well assignments limited the number of wells that could be assigned in the model. Appendix L, Figures L–33 and L–34, provide the *Final TC & WM EIS* base case model's calibration statistics for the 200-East and 200-West Areas, respectively. One of the primary calibration statistics calculated in these figures, the root mean square error, ranges between 1.572 meters (5.158 feet) in the 200-East Area and 2.22 meters (7.284 feet) in the 200-West Area. This is an indication that the model's head predictions more closely match field observations in areas where the gradient of the water table is less steep.

502-33 This comment is predicated on the assumptions that STOMP is a particle tracking-like analysis, and that needing an interface between STOMP (vadose zone analysis) and particle tracking (groundwater analysis) indicates that there is a problem with the STOMP analysis results. These assumptions are inaccurate. The purpose of the STOMP-to-particle-tracking interface is to translate the STOMP model output into an efficient format that is useable as input by the particle tracking model. Using this type of interface code is not uncommon when off-the-shelf separate models (in this case, STOMP and particle tracking) are used together and there is a desire to make the interface more efficient. This interface does not change the behavior of either the STOMP or the particle tracking models. Thus, the need for this interface does not indicate a problem with either of the models.

502-34 DOE agrees that the representation of dispersion in heterogeneous systems is important to predicting outcomes. DOE also agrees with the well-established hydrologic concept that dispersion in heterogeneous groundwater systems contains two components. The first is macrodispersivity, which represents heterogeneity on a scale larger than the finest material zonation that can be

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ATTACHMENT 2 – Environmental Justice

A Method for Tribal Environmental Justice Analysis under NEPA

Barbara Harper[1] and Stuart Harris[2]

1) Manager, Environmental Health Program, Department of Science and Engineering, Confederated Tribes of the Umatilla Indian Reservation, P.O. Box 638, Pendleton, OR 97801. bharper@amerion.com; 541-966-2400
2) Director, Department of Science and Engineering, same as above. Stuartharris@ctuir.com.

ABSTRACT

The goal of environmental justice (EJ) is for all peoples to receive or achieve the same degree of protection from environmental and health hazards. However, methods for EJ analysis under NEPA have never been suitable for Native American tribes, particularly in the western US. The Confederated Tribes of the Umatilla Indian Reservation have developed a method for evaluating and quantifying disproportionate impacts under NEPA. Because many traditional tribal communities are inseparable from their environment, we recommend identifying whose resources are affected as the first step, rather than simply counting the numbers people in various ethnic groups within a predefined zone of analysis. The second step is to describe the eco-traditional system that pertains to the tribe and its resource interests. The features, attributes, goods, and services provided by the baseline conditions of the ethno-habitat and its resources are described, and quantifiable measures to evaluate interruptions in service flow and risks to traditional lifeways over multiple generations are applied. A subsistence exposure scenario and risk assessment based on traditional lifeways is included in this step. Finally, we look at cumulative impacts to the eco-traditional system and to the subsistence economic systems that are crucial for tribal health and well-being. To evaluate cumulative disproportionality or risk disparities for the entire tribe, we evaluate what proportion of the community is affected and the pre-existing co-risk factors that make the community more vulnerable, and compare the results to other population segments or communities.

encoded (i.e., heterogeneities on the scale of several MODFLOW cells or larger). This component of dispersivity is addressed through the encoding of different material properties into the model, with the geologic boring records as the basis. This is the scale on which the preferential pathways (e.g., the highly conductive Hanford formation) are included in the flow model. The second component of dispersion, hydrodynamic dispersion, represents processes operating on a finer scale (i.e., scales smaller than a MODFLOW cell). This component of dispersion is introduced into the model through the concept of the dispersion coefficient. The behavior of a particle in a preferential pathway is governed mostly by advection, with the particle path tending to follow the flow field, which tends to be aligned with the preferential pathway. The relatively smaller (hydrodynamic dispersion) jumps are not as important, and the evolution of the plume is dominated by the presence and shape and connectivity of the heterogeneities. The behavior of a particle inside a relatively homogeneous portion of the flow field is influenced more strongly by the hydrodynamic dispersivity.

502-35 DOE conducted a detailed review of the tank past leaks inventory evaluated in the draft EIS and determined that the inventory for a number of unplanned releases needed to be revised. This inventory is relatively minor, but the inventory estimates in Appendix D and the groundwater human health dose and risk analysis in Appendix Q were updated for this *Final TC & WM EIS*. However, as noted by the commentor and discussed in Appendix D of the draft EIS, due to lack of supporting data, there is uncertainty regarding the volume of tank waste leaked. To provide additional insight, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

Appendix D, Section D.1.2, Tank Ancillary Equipment Waste, provides a discussion of the estimated inventories of waste that could remain in the tank ancillary equipment, including waste transfer piping. DOE conservatively assumed that all of the tank retrieval leaks occurred in a single year, 2018. Assuming a release earlier than the time when waste retrieval is currently scheduled supports a bounding analysis of the impacts of retrieval losses. Finally, the inventory of tank waste that may have leaked from the tanks and would be contained below the steel tank liner is included in the volumes of past leak waste shown in Tables D–26 and D–27, as well as Appendix M, Table M–4.

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A. INTRODUCTION

Environmental Justice has been defined by EPA's Office of Environmental Justice[1] as:

> *"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."*

We believe that the goal of this "fair treatment" is not to distribute risks evenly among populations, but to identify potential disproportionately high and adverse impacts in different populations and reduce the inequities. Although inequities can exist in any setting, impacts of federal actions are most often evaluated through an environmental impact statement prepared under the National Environmental Policy Act (NEPA). All federal agencies are encouraged to consider environmental justice in their NEPA analysis, evaluate disproportionate impacts, and identify alternative proposals that may mitigate these impacts. The fundamental policy of NEPA is to "encourage productive and enjoyable harmony between man and his environment," so that the United States may:

> *(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;*
> *(2) assure for all Americans safe, healthful, productive, and aesthetically and traditionally pleasing surroundings;*
> *(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;*
> *(4) preserve important historic, traditional, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;*
> *(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and*
> *(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.*

In considering how to evaluate progress in reaching these aspirational goals, the Council on Environmental Quality (CEQ) defined effects or impacts to include "ecological...aesthetic, historic, traditional, economic, social or health impacts, whether direct, indirect or cumulative."[2] Recognizing that these types of impacts might disproportionately affect different communities or groups of people, President Clinton issued Executive Order12898 in1994[3], directing each federal agency to, among other things,

[1] http://www.epa.gov/compliance/resources/policies/ej/ej_guidance_nepa_epa0498.pdf
[2] http://ceq.hss.doe.gov/nepa/regs/ej/justice.pdf
[3] President Clinton, WJ: "Federal actions to address environmental justice in minority populations and low-income populations," 59 FR 32: 7629-7633 (Executive Order 12898; February 11, 1994).

Remediation of these waste tank farm past leaks and associated contamination in the vadose zone tank farm past leaks and associated contamination in the vadose zone is being evaluated under the RCRA Facility Investigation/Corrective Measures Study process. As such, the vadose zone contamination associated with tank farm past leaks is considered an RCRA operable unit rather than a CERCLA operable unit and is assessed in this *TC & WM EIS*.

502-36 The value of 0.9 millimeters per year for that site was identified in the *Technical Guidance Document* (DOE 2005), signed by DOE and Ecology. The discussion on the rate of release for an IDF-East barrier (i.e., design life recharge rate of 0.5 millimeters per year, less than the background for this location) is discussed in Appendix N, Section N.3.6, of the *Draft TC & WM EIS*. DOE did an additional analysis of IDF-East performance that involved looking at a range of infiltration rates. This analysis has been added to Appendix N, Section N.5, and is discussed in Chapter 7, Section 7.5.2.9, of this *Final TC & WM EIS*.

502-37 As discussed in Appendix M, Section M.3, the rates of infiltration adopted for use in this EIS are those recommended in the *Technical Guidance Document* (DOE 2005), signed by DOE and Ecology. The infiltration rates in the area of IDF-East are as follows: pre-Hanford background rate, 0.9 millimeters per year; rate for the IDF barrier design life, 0.5 millimeters per year (the modified RCRA Subtitle C barrier is assumed to perform for 500 years; the Hanford barrier, for 1,000 years); and rate for the IDF barrier post–design life, 0.9 millimeters per year.

502-38 The values of 10,570 gallons and 105,700 gallons are within the range of documentation on past leaks, as presented in Appendix M, Table M–4, of this *Final TC & WM EIS*. Due to the period covered in the draft's analysis (10,000 years), the data encoded into the model are annualized. This simplifies the model from an encoding and numerical analysis perspective but also limits the model's ability to simulate infiltration events, which occur more frequently than is reflected by the smooth annual averages encoded into the model. Although this simplification tends to smooth out the recharge pulses that occur in any given year, it reasonably represents the overall recharge impacts calculated as the sum of the estimated annual pulse events minus the estimated annual evapotranspiration across the model domain.

502-39 The sensitivity analysis for the tilt of geologic layers represented a discharge to a small crib; therefore, the appropriate infiltration rate is 50 millimeters per year, as listed in Appendix M, Table M–3. That rate was obtained from the *Technical Guidance Document* (DOE 2005), signed by DOE and Ecology.

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- *"Make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations,"*
- *"Identify differential patterns of consumption of natural resources among minority populations and low-income populations,"*
- *Evaluate differential consumption patterns by identifying "populations with differential patterns of subsistence consumption of fish and wildlife," and*
- *"Collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence."*

The CEQ's Guidance for Environmental Justice under the National Environmental Protection Act[4] recognized that tribes might bear disproportionate burdens (emphasis added):

- Agencies should consider the composition of the affected area, to determine whether minority populations, low-income populations, or Indian tribes are present *in the area* affected by the proposed action, and if so whether there may be disproportionately high and adverse human health or environmental effects on minority populations, low-income populations, or Indian tribes.
- Agencies should consider the potential for multiple or cumulative exposure to human health or environmental hazards in the affected population and historical patterns of *exposure* to environmental hazards; Agencies should consider these multiple, or *cumulative effects*, even if certain effects are not within the control or subject to the discretion of the agency proposing the action.
- Agencies should recognize the *interrelated* traditional, social, occupational, historical, or economic factors that may *amplify* the natural and physical environmental effects of the proposed agency action. These factors should include the physical sensitivity of the community or population to particular impacts; the effect of any disruption on the *community structure* associated with the proposed action; and the nature and degree of impact on the physical and social structure of the community.
- Agencies should be aware of the diverse constituencies within any particular community Agencies should seek tribal representation in the process in a manner that is consistent with the government-to-government relationship between the United States and tribal governments, the federal government's *trust responsibility* to federally-recognized tribes, *and any treaty rights*.

Methods for identifying and evaluating disproportionate environment burdens still lag far behind these goals[5], particularly for Native Americans. We believe this is due to the language in EPA

[4] http://ceq.hss.doe.gov/nepa/regs/ej/justice.pdf
[5] Bowen, W. (2002). An analytical review of environmental justice research: what do we really know? Environ. Management, 29(1):3-15.
Brulle, RJ and Pellow, DN (2006). Environmental Justice: Human Health and Environmental Inequalities. Ann. Rev. Public Health. 27:103-124.
Boone, CG. (2009) Environmental Justice as Process and New Avenues for Research Environmental Justice 1(3):149-154
Northridge, ME, Stover, GN, Joyce E. Rosenthal, JE, and Sherard, D. (2003) Environmental Equity and Health: Understanding Complexity and Moving Forward. Am. J. Pub. Health 93: 209-214.

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502-40 The sensitivity analysis referenced by the commentor was designed to look at a high-discharge source, which is the most common type of source at Hanford. An inner release area of 5 meters by 5 meters is typical for the majority of cribs that make up this class of source. As discussed in Appendix N, Section N.5.4, the degree of horizontal migration is determined by the hydraulic contrast between the tilting layers and the discharge of the source. Greater hydraulic contrast tends to lead to greater lateral migration, and higher discharge tends to favor vertical migration. In response to this comment and others, further explanation and description have been provided in Appendix N of this *Final TC & WM EIS*.

502-41 The STOMP model is entirely capable of simulating clastic dikes when adequate characterization data are available to encode them in the model. However, the availability of data on the locations and sizes of clastic dikes at Hanford is limited. Such dikes were included in the STOMP model to the extent that they were represented in the boring logs and other information used to develop the geology. A sensitivity analysis of the effect of a clastic dike was included in Appendix N, Section N.5.5, to allow the reader to assess the impact of any such feature on the outcomes of the analysis. DOE does not believe that clastic dikes have a strong influence on plume migration, as asserted by the commentor.

502-42 The discussion of the agreement between the modeled and measured tritium plumes is in Appendix L of the *Draft TC & WM EIS*. Comparisons involving the locations of peak concentrations and their values between 1980 and 2005, the first arrival of the plume at the Columbia River, and the general shapes and extents of the plumes show agreement to first order. The discussion of the agreement between modeled and measured iodine-129 and nitrate plumes is in Appendix U, and again, the comparisons show agreement to first order. The major areas of disagreement between model results and field measurements are with plumes involving uranium and carbon tetrachloride. The discussion of the sources of the disagreement and the implications for comparison of the alternatives has been revised in this *Final TC & WM EIS* in response to similar comments.

502-43 DOE shares the view that such a model is an important component of a NEPA analysis.

502-44 The SX tank farm was selected as the uranium-238 source for the long-term analysis discussed in Appendix O, Section O.6.4, of the *Draft TC & WM EIS*. This analysis would not apply to uranium-238 flux originating from the B/BX/BY tank farms or other sources if the peak concentration of uranium-238 occurred during the standard analysis period of 10,000 years.

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guidance directing agencies to "collect, maintain and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding facilities or sites expected to have substantial environmental, human health, or economic effect on the surrounding populations," which led to developing guidance and data based solely on spatial analysis of demographic data[6]. Compounding this is the conventional threshold criterion that 20% of a local community must be of a single ethnic group or below a certain income level in order to be recognized as an environmental justice community[7].

Identifying an EJ community by geospatial ethnicity is not the same as identifying a disadvantaged layer coexisting within a community[8]. Distinct populations may live differently and separately, and if federal actions or pollution sources are unevenly spaced, then exposures and impacts may be unequal[9]. Multi-variate analysis may be required to determine whether race plays an explanatory role in risk distribution even after controlling for other economic, land-use, and population factors[10].

Using this combined threshold determination (does a particular ethnic group comprise >20% of the population within a certain distance of the site?), disproportionate impacts to Native Americans are often overlooked. Further, reliance on conventional methods for economic and cumulative analysis as well as lack of consideration of the federal Trust obligations (and Treaties, where they exist) makes most EJ analysis under NEPA almost completely irrelevant to American Indians.

Strife, S. (2009) Childhood Development and Access to Nature: A New Direction for Environmental Inequality. Research Organization & Environment, 22: 99-122.
[6] http://www.epa.gov/compliance/resources/policies/ej/ej_guidance_nepa_epa0498.pdf;
Mohai, P. and Saha, R. (2006) Reassessing Racial and Socioeconomic Disparities in Environmental Justice Research. Demography, 43: 383-399.
[7] Buhrmann, J. (2002). A Framework to Assess Environmental Justice Concerns for Proposed Federal Projects. In: Muntz et al. (eds). Justice and Natural Resources: Concepts, Strategies and Applications. Washington, D.C.: Island Press.
[8] Robert W. Williams (1999). The contested terrain of environmental justice research: community as unit of analysis. Social Sci. J., 36:313-328.
M Taquino, D Parisi, DA Gill (2002). Units of analysis and the environmental justice hypothesis: the case of industrial hog farms. Social Sci. Quarterly, 83:298-316.
[9] Waller LA, Louis TA, Carlin BP. (1999) Environmental Justice and statistical summaries of differences in exposure distributions. J Expo Anal Environ Epidemiol. 9(1): 56-65.
Corburn, J (2002), Environmental Justice, local knowledge, and risk:he discourse of a community-based cumulative exposure assessment. Env. Mgmt. 29:451-466.
Satterfield, TA., Mertz, CK., and Slovic, P. (2004) Discrimination, Vulnerability, and Justice in the Face of Risk. Risk Analysis: 24: 115-129.
Shapiro, MD. (2005). Equity and information:
[10] Morello-Frosch, R., Pastor, M., and Sadd, J (2001). Environmental Justice and Southern California's "Riskscape:" The Distribution of Air Toxics Exposures and Health Risks among Diverse Communities. Urban Affairs Rev. 36: 551-578.

502-45 Both DOE and Ecology believe there is sufficient information regarding secondary waste presented in this *TC & WM EIS* to support future DOE decisions.

502-46 The decision to leave 0.1 percent, 1 percent, or more of the waste in the SSTs is one of the decisions supported by this *TC & WM EIS* (see Section S.1.3.1 of the Summary and Chapter 1, Section 1.4.1). Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks, residual waste, and surrounding waste in the soil, requires preparation of detailed performance assessments and a closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

502-47 Comment noted.

502-48 TPA Milestone M-45-00 requires, as part of the closure process, characterization of every tank farm and the soils surrounding the tank farms, detailed examinations of the tanks, and evaluations of actual tank residual waste following retrieval. Using this information, site-specific radiological performance assessments and a closure plan will be prepared. These documents will provide the information and analysis necessary for DOE and the regulators (i.e., Ecology) to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks. Waste Management Area C is the first waste management unit that is currently undergoing this process. The State of Oregon is participating in this process as well.

502-49 The impacts of the offsite waste in terms of radiological risk are presented in the *TC & WM EIS* Summary, Section S.5.5, and Chapter 2, Section 2.10, Key Environmental Findings. This section discusses the differences in the radiological risks between including and excluding offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling

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The Trust relationship between Native Sovereign Nations and the Federal Government

"The Federal Government has enacted numerous statutes and promulgated numerous regulations that establish and define a trust relationship with Indian tribes. The United States continues to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, tribal trust resources, and Indian tribal treaty and other rights"[11]. The Supreme Court, in defining the trust responsibility, has held that:

> [The federal government] has charged itself with moral obligations of the highest responsibility and trust. Its conduct, as disclosed in the acts of those who represent it in dealing with the Indians, should therefore be judged by the most exacting fiduciary standards. *Seminole Nation v. United States*, 316 U.S. 286, 296-97 (1941).

Both CERCLA and OPA define "natural resources" broadly to include "land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources..." Both statutes limit "natural resources" to those resources held in trust for the public. While there are slight variations in their definitions, both CERCLA and OPA state that a "natural resource" is a resource "belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by" the United States, any State, an Indian Tribe, a local government, or a foreign government [CERCLA §101(16); OPA §1001(20)].[12] Thus, for American Indian Tribes the evaluation of disproportionate impacts is more often a question of natural resource use rather than demographics.

B. Framework for EJ Analysis

A framework for Tribal EJ analysis is presented here, including natural resource usage patterns, tribal health risk assessment that considers traditional uses of natural resources, and cumulative analysis that considers preexisting stressors that may cluster in tribal communities. [13]

[11] Executive Order 13175, 65 Fed. Reg. 67249 (November 6, 2000); Presidential Memorandum of November 5, 2009, 74 Fed. Reg. 215: 57881 (published on November 11, 2009

[12] http://www.epa.gov/superfund/programs/nrd/primer.htm

[13] Harper,B.L. (1995). *The Earth and Myself Are of One Mind: Achieving Equity in Risk Based Decision Making and Land Use Planning.* EPA's State and Tribal Risk Forum, Albuquerque, NM.
Harris, S. & Harper, B. (1998). Using eco-traditional risk in risk-based decision making. *American Nuclear Society Environmental Sciences Topical meeting, Richland WA.*
Harris, S. & Harper, B. (1998). Traditional risk and traditional toxicity. *Testimony to EPA's Science Advisory Board Executive Board. October 31, 2000.*
Harris, S. & Harper, B. (1998). Characterizing risks: Can DOE achieve intersite equity by 2006? *DOE's Waste Management Conference (Waste Management '98, Albuquerque, NM).*
Harris, S. (1999). Environmental justice and permitting in Indian country. *Presentation to the National Environmental Justice Advisory Council, Arlington, Virginia.*
Harris, S. (1999). Native American perspectives on environmental justice and environmental permitting. *Keynote Speaker, Native American Heritage Month, sponsored by Argonne National Laboratory, the Department of Energy's Center for Risk Excellence. Chicago.*
Harper, B.L. & Harris, S.G. (1999). Measuring Risks to Community Health and Quality of Life. *9th ASTM Symposium on Environmental Toxicology and Risk Assessment, (Paper #6034, Committee E47), published in "Environmental Toxicology and Risk Assessment" (F. Price, K Brix and N Lane, eds.), 2000, pages 195-211.* Harris,

secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

502-50 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

502-51 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

502-52 Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives, in this case waste importation. As discussed in Chapter 5 of this *TC & WM EIS*, DOE acknowledges that "benchmark standards" could be exceeded in groundwater at the Core Zone Boundary and/or at the Columbia River nearshore at various dates. The term "benchmark standards" as used in this *TC & WM EIS* represents dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL, provided an MCL is available.

In response to comments received on the *Draft TC & WM EIS*, additional sensitivity analyses were performed and are included in this final EIS. The additional analyses evaluate potential impacts if certain remediation activities are conducted at some of the more prominent waste sites on the Central Plateau and

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Step 1. *Resource and Community Identification.*

The Resource Identification regarding a site or area is defined as the probability of a natural or traditional resource of tribal importance being present and potentially impacted. Particularly in the western United States, asking the following questions may reveal unrecognized potential for disparate impacts:

- What potential EJ populations use the resources from the impacted zone?
- How is the area or resource used; how important are those resources or places to the EJ population; what attributes of the resource or system does the community value?
- Is the affected area linked ecologically, traditionally, visually, or hydrologically to other tribal resources or areas? Is the affected area within a tribal historic area (usual and accustomed area, ceded area), a traditional traditional property, a viewshed, or a tribally important landscape?
- Is a tribe a Natural Resource Trustee of the affected resource or lands?
- Does the affected area include sacred sites, historical/ archaeological sites, burial sites, and sites containing important traditional traditional materials or with associated traditional uses or history?

Step 2. *Damage Potential.*

This step describes the baseline and existing conditions and potential for damage due to physical disturbance, contamination, desecration or aesthetic degradation.

- Describe the affected resources and eco-traditional systems, and the uses that different population segments make of the area and its resources.
- Describe the features and attributes of the ecosystem or eco-traditional system that people value.
- Describe the goods and services flowing from the system under baseline conditions. For convenience, these may be grouped in various ways, such as (a) ecological, traditional, recreational and general impact categories[14], (b) health, ecological, socio-traditional, and socio-economic endpoints[15], or (c) natural, human, built, and economic systems[16].
- Estimate the time until, and duration of, adverse impact (a measure of threat imminence or urgency as well as recovery time).

Harris, S. & Harper, B. (1999). Environmental justice in Indian country: using equity assessments to evaluate impacts to trust resources, watersheds, and eco-traditional landscapes. Proceedings of "*Environmental Justice: Strengthening the Bridge Between Tribal Governments and Indigenous Communities, Economic Development and Sustainable Communities*" (posted at http://www.iiirm.org/publications/EnvJust/papero~1.pdf)
S.G. (2000). Environmental Justice and Native Perspectives. *Invited presentation at the meeting "How Should Environmental Justice be Addressed in Indian Country?" Sponsored by the Federal Interagency Working Group, Albuquerque.*
Harris, S.G. (2000). Risk analysis: changes needed from a Native American perspective. *Human and Ecological Risk Assessment 6, 529-535.*
Harper, B. & Harris, S. (2001). Equity Assessment and tribal eco-traditional risk. *Alaska Forum on the Environment.*
Harper, B. & Harris, S. (2001). *An Integrated Framework for Characterizing Cumulative Risks To Tribal Health And Well-Being And Subsistence Lifeways.* IIIRM, Denver CO (www.iiirm.org), and Report to EPA/OSWER.
[14] C. Ridolfi, personal communication, 2009.
[15] Harper and Harris, ibid.
[16] http://climlead.uoregon.edu/sites/climlead.uoregon.edu/files/reports/ROGUE%20WS_FINAL.pdf

along the river corridor. Furthermore, the sensitivity analyses evaluate scenarios that could restrict or reduce certain waste types from being imported to Hanford. The discussion found in Section 7.5 was added to summarize these results.

502-53 See response to comment 502-51 regarding the development the alternatives in this EIS.

See response to comment 502-50 for a discussion on the transport and disposal of offsite waste.

Since 2004, DOE has buried all LLW in lined trenches. DOE continues to have strict limits for the amount of waste Hanford can accept, and ensures that disposal activities are protective of the environment and meet regulatory requirements. Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies.

The Tank Closure alternatives analyzed in this *TC & WM EIS* were developed to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone. The EIS analysis shows that the level of waste retrieved is important in long-term impacts. Once the tank waste in a waste management area has been retrieved, then the actual residuals would be evaluated during the tank closure process for that waste management area. Activities would include detailed examinations of the tanks and residual waste and preparation of a performance assessment and a closure plan. These documents would provide the information and analysis necessary for DOE and

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- Describe the existing stressors and resiliency of the affected systems, both ecological and human (a measure of vulnerability).
- Describe the socio-economic system; subsistence economy if applicable.

Step 3. *Consequence Potential.*

This step evaluates the interruptions of service flows, the cumulative impacts (health risk, impacts to the subsistence or socio-economic system, cumulative health risks and impacts, and socio-traditional impacts), and the disparity between the tribe's impacts and those of the general population.

- Measure injury or impact to individual and combined resources and reductions in service flows, at local, eco-system, and regional scales.
- If the potential for any amount of contamination exists, evaluate multi-pathway, multi-contaminant health risks using exposure scenarios for each population segment (traditional subsistence scenario for tribal uses).
- Evaluate cumulative health impacts considering existing community circumstances and tribal definitions of health and well-being.
- Measure socio-traditional and socio-economic impacts using tribally-relevant parameters.
- Describe of disparities between populations across all consequences.

Table 1 presents an example of the systematic consideration of affected resources and the information needed for the equity analysis and cumulative impact analysis in an Environmental Impact Statement. This format is followed in the Hanford example that follows.

Table 1. Example of table for each resource

Affected Resource	Features and Attributes of the baseline resource	Goods and Services provided under baseline conditions	Measurement Endpoints (parameters, direction of improvement or decrement)
Landscape	Sacred geography	Religious experience Linguistic landmarks Traditional mnemonics	Degrees of vision with undisturbed viewshed
Groundwater	Undegraded GW	Drinking water Domestic uses Agriculture-Pasture Sweatlodge use	Gal-yrs > dw std Gal-yrs > cum risk Acre-ft-yrs > Ag std Gal-yrs > d.l.
Salmon	Wholesome food, eco-traditional resource, indicator of ecosystem health	First Food, income and barter services, oral tradition, language, education, behavioral role model, ecological services	Detectable Hanford-related contaminants; Degree of health risk at tribal consumption rates (modeled and measured).

the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

502-54 As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or are suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.97 million liters (750,000 to 1,050,000 gallons).

See response to comment 502-53 regarding groundwater contamination and remediation.

502-55 DOE is implementing an extensive cleanup program at Hanford as required under RCRA; CERCLA; and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates. Appendix R describes other actions considered in the cumulative impacts analysis, including activities and future end states at 403 waste sites across the Hanford Site. Appendix R and the cumulative impact analyses reflect the plans for closure of these waste sites that were in effect at the time the *Draft TC & WM EIS* was prepared.

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

502-56 This *TC & WM EIS* has evaluated large-scale soil excavation/removal strategy. This approach is considered in Tank Closure Alternatives 6A and 6B. Under these alternatives, all 12 SST farms in the 200-East and 200-West Areas would be clean-closed following deactivation. As discussed in Chapter 1, Section 1.9.1.6, clean closure of the tank farms would involve removing all SSTs, associated ancillary equipment, and contaminated soil to a depth of 3 meters (10 feet) below the tank base, all of which would be managed as HLW. Where necessary, deep soil excavation would be conducted to remove contamination plumes

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C. Hanford Site NEPA Analysis

This section is an example of language from the perspective of the Confederated Tribes of the Umatilla Indian Reservation that could be included in Hanford Environmental Impact Statements.

C.1 Environmental Setting and Worldview

People have inhabited the Columbia Basin from the Younger Dryas era (13,000 to 10,000 years ago) at the end of the Pleistocene era and throughout the Holocene era to the present. Throughout this time climate changed, vegetation changed, and water tables fell, rose, and fell again.[17] The human ethnohistory in the Columbia Basin is divided into traditional periods that parallel the climatic periods and represent traditional adaptations to changing environmental conditions. Throughout this entire period the oral history continually added information needed for survival and resiliency as the climate fluctuated. These teachings were built over thousands of years, and still teach each generation how to live and behave to sustain themselves and the community. The oral tradition provides accounts and descriptions of the region's flora, fauna, and geology. Some stories and oral histories contain factual information and accurate explanations of environmental processes such as ancient floods, lava flows, the meaning of fossils, identification of extinct plants and animals and their habitats, or ecological principles and relationships such as the role of salmon carcasses in the riverine nutritional cycle. Other oral teachings are expressed in symbolic terms and contain social principles and traditional values (e.g., a coyote fable associated with a physiographic feature used to teach a moral lesson or serve as a mnemonic for practical behavioral instructions). Oral histories impart basic beliefs, teach moral values and the land ethic, and help explain the creation of the world, the origin of rituals and customs, the location of food, and the meaning of natural phenomena. Cameron (2008)[18] examined archaeological, ethnographic, paleo-environmental, and oral historical studies from the Interior Plateau of British Columbia, Canada, from the Late Holocene period, and found correlations among all four sources of information.

The Columbia River flows through what was a traditional and economic center for the Plateau communities. The land and its many entities and attributes provided for all their needs: hunting and fishing, food gathering, and endless acres of grass on which to graze their horses, commerce and economy, art, education, health care, and social systems. All of these services flowed among the natural resources, including humans, in continuous interlocking cycles. Adverse impacts to any resource ripple through the entire web and through interconnected biological and human communities. Therefore, if the link between a person and his/her environment is severed through the introduction of contamination or physical or administrative disruption, natural resource

[17] http://www.oregon-archaeology.com/archaeology/oregon/; http://www.wac6.org/livesite/precirculated/1803_precirculated.pdf; Mehringer, P.J. (1996) "Columbia River Basin EcosystemsL Late Quaternary. http://www.icbemp.gov/science/mehringe.pdf.

[18] Cameron, I (2008) "Late Holocene environmental change on the Interior Plateau of Western Canada as seen through the archaeological and oral historical records." World Archaeological Congress 6, Dublin, Ireland.

within the soil column. DOE would like to point out to the commentor that the initial removal of the 3 meters (10 feet) of soil below the bottom of the tanks is the assumption used to determine the extent to which the soils would be managed as HLW and therefore, removed and managed as HLW. The remaining contaminated soil beneath this depth would be removed and treated; however, it would not be managed as HLW and would be disposed of on site in the proposed RPPDF after appropriate treatment. This is further explained in Appendix E, Section E.1.2.5.3.2, and clarified in the *TC & WM EIS* Summary, Section S.2.1.

502-57 Tank Closure Alternatives 6A and 6B evaluate clean closure of the SST system. See response to comment 502-14 regarding factors influencing future DOE decisions.

As discussed in Section S.5.2.1.5 of the Summary, and Appendix E, Section E.1.2.5, of this *TC & WM EIS*, there are technical uncertainties associated with tank removal and deep soil remediation beneath the tanks that would have to be weighed against the order(s)-of-magnitude increase in short-term impacts on resource areas that would result from implementing these alternatives. In addition, the key environmental findings discussed in the *TC & WM EIS* Summary, Section S.5.5, and Chapter 2, Section 2.10, describe in more detail the potential short-term impacts and other concerns or issues DOE has identified related to clean closure of the SST system, which leads DOE to believe that clean closure is not preferred.

Under "Cost-Benefit Analysis" (40 CFR 1502.23), a Federal agency may prepare a cost-benefit analysis; however, one is not required. Chapter 2, Section 2.11, of this *TC & WM EIS* summarizes and compares the relative consolidated costs for continued operation of existing facilities; construction, operation, and deactivation of new or modified facilities; and associated activities to support the proposed actions.

502-58 The only Tank Closure alternative that analyzes filling the tanks with gravel is Alternative 1, No Action Alternative. As stated in Chapter 2, Section 2.5.2.1, "SSTs showing signs of deterioration that would threaten the structural integrity of the tanks would be filled with grout or gravel as a corrective action or emergency response. Waste contained in DSTs showing similar signs of deterioration would be removed from the tanks and consolidated in existing DSTs to the extent possible. The deteriorated DSTs would then be filled with grout or gravel as a corrective action or emergency response." No credit for stopping water intrusion and possible mobilization of contaminants was taken for gravel-

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service flows may be interrupted, the person's health suffers, and the well being of the entire community is affected[19].

These relationships form the basis for the unwritten laws or *Tamanwit* that were taught by those who came before, and are passed on through generations by oral tradition in order to protect those yet to arrive. The ancient responsibility to respect and uphold these teachings is directly connected to the culture, the religion, and the landscape along the Columbia Plateau. Individual and collective well-being is derived from membership in a healthy community that has access to, and utilization of, ancestral lands and traditional resources, so that each person may fulfill his or her part of the natural cycles and the responsibility to uphold the natural law. The traditional identity, survival, and sovereignty of the native nations along the Columbia River and its tributaries are maintained by adhering to, respecting, and obeying these ancient unwritten laws.

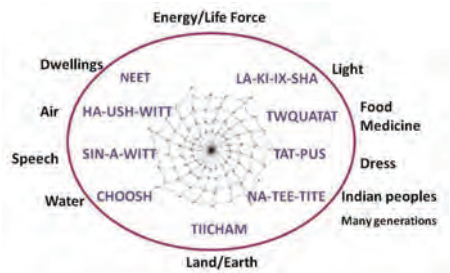

Figure 1. Depiction of CTUIR Tamanwit, the Natural Law.

[19] S Harris. "Traditional Legacies: Challenge to the Risk Community." Plenary Address, Society for Risk Analysis Annual Meeting, Phoenix, AZ, December 7, 1998;
Cajete, G (1999). A People's Ecology. Clear Light Publishers, Santa Fe, New Mexico.

filled tanks under Tank Closure Alternative 1. With regard to immobilizing the tank residual waste with grout, as discussed in Appendix E, Section E.1.2.5.1.1, under "Residual Waste Stabilization," this EIS assumes that physical stabilization of the residual waste would be achieved through introduction of dry powders, dry granular material, and grout. The goal of such physical stabilization would be to reduce the residual waste constituent's mobility by physically isolating the residual waste from the environment and/or chemically treating the waste to reduce its mobility. Thus, while complete immobilization of the residual waste may never be achieved, DOE is trying to achieve this goal and this effort was considered appropriate for this EIS. However, as explained in Appendix M, releases to the environment from this grouted waste form were assumed and analyzed in this EIS.

502-59 The grout fill is discussed in Appendix E, Section E.1.2.5.1.1, of the *Draft TC & WM EIS*. As stated in this section, "the grout hardens in the tanks to stabilize the residual waste and provide structural stability for landfill closure of the tank farms." Further discussion in this appendix includes the following: "a volume of residual waste would remain in the tanks for closure. Physical stabilization of the residual waste would be the preferred approach for treatment. Grout has physical as well as chemical waste stabilization properties that would make it an effective technology for stabilization of residual waste. However, chemical stabilization using sequestering agents may also be considered if needed to further immobilize specific contaminants."

502-60 To address the commentor's position regarding the potential impacts on groundwater that may result from soil excavation in the tank farms, DOE has provided clarifying text on the descriptions, as well as discussions of the key environmental findings in the Summary, Section S.5.5, and Chapter 2, Section 2.10, of this *Final TC & WM EIS*.

502-61 DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; Section 1.2.7 discusses the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE order requirements that must be met for DOE to implement the Tank Closure alternatives.

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C.2 Affected Resources

In a NEPA analysis, impacts of proposed federal actions on a range of environmental attributes are evaluated, as well as potential impacts to a variety of health, economic, and other endpoints. The term "impact" implies an adverse effect, but of course a federal action may also result in improvements, so the metrics used for the evaluation need to be amenable to both decrements and benefits.

C.2.1 Aesthetic and Physiographic Resources

It is well known that environmental attributes or qualities such as wilderness, solitude, peace, calm, quiet, and darkness are important to individual species that need large undisturbed habitat as well as to humans who value those experiential qualities[20]. Quiet is an important resource. Noise can affect living organisms in the ecosystem through interruption of reproductive cycles and migration patterns, and driving away species that are sensitive to human presence. Non-natural noise can be offensive while traditional ceremonies are being held. Light at night affects nocturnal animals such as bats, owls, night crawlers and other species. Night light also has known affects on diurnal creatures and plants by interrupting their natural patterns. Light can affect reproduction, migration, feeding and other aspects of a living organism's survival. Light at night also disrupts the quality of human experience, including star gazing and traditional activities.[21]

Viewscapes tend to be panoramic and are traditional and sacred landscapes when they contain prominent topography or vantage points from which to view a panorama composed of multiple songscapes and storyscapes. Traditional landscapes have been defined by the World Heritage Committee as distinct geographical areas or properties uniquely representing the combined work of nature and of man. They identified and adopted three categories of landscape: the purely natural landscape, the human-created landscape, and an associative traditional landscape which may be valued because of the religious, artistic or traditional associations of the natural and/or human elements. Traditional landscapes may be invisible unless they are disclosed by the peoples to whom they are important. Tribal values lie embedded within the rich traditional landscape and are conveyed to the next generation through oral tradition by the depth of the Indian languages. Numerous landmarks are mnemonics to the events, stories, and traditional practices of native peoples. Within this landscape are songs and fables associated with specific places; when access is denied a song or fable may be lost.

Within a broad sacred landscape there may be numerous individual traditional sites and resources. They can be mountains, rivers, lakes, caves, forest groves, coastal waters, and entire islands. The reasons for their sacredness are diverse. They may be perceived as abodes of deities and ancestral spirits; as sources of healing water and plants; places of contact with the spiritual, or communication with the 'beyond-human' reality; and sites of revelation and transformation. As a result of access restrictions, many sacred places are now important reservoirs of biological

[20] http://findarticles.com/p/articles/mi_m1145/is_n8_v29/ai_15769900/; http://findarticles.com/p/articles/mi_m1145/is_n8_v29/ai_15769900/
[21] http://www.miller-mccune.com/science_environment/blinded-by-the-light-1501

The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter.

As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies. Any offsite waste destined for disposal at Hanford must be treated to land-disposal-restriction treatment standards at the site of origin prior to shipment to Hanford.

502-62 The scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and closure of the SST system, including the tank system and the vadose zone impacted by the tank farms (i.e., past leaks). The *TC & WM EIS* closure alternatives for the tank farms include no action, landfill closure, selective clean closure, and clean closure (which would involve actions to remove the source of contamination). The State of Washington has agreed that the alternative descriptions identify the information needs necessary to meet SEPA requirements. Ecology expects that the analysis provided in this *Final TC & WM EIS* will provide enough information to adequately inform its permitting requirements. When Ecology provides approval of DOE's proposed actions by issuing a permit, the applicable WAC regulations will be applied and enforced. The state closure standards for the owners and operators of all dangerous waste facilities are defined (WAC 173-303-610(2)); references to the tank systems (WAC 173-303-640) and corrective action requirements (WAC 173-303-645) are included. The regulations describe specific requirements for closure of the tank system (WAC 173-303-640(8)(a) and (b)), including a requirement for DOE to "remove or decontaminate all wastes residues, contaminated soils, and structures and equipment contaminated with waste" from the tank system. If DOE "demonstrates that no contaminated soils can be practically removed or decontaminated," then the corrective action regulations (WAC 173-303-645) will apply.

diversity. Sacred natural sites such as forest groves, mountains and rivers, are often visible in the landscape as vegetation-rich ecosystems, contrasting dramatically from adjoining, non-sacred, degraded environments.[22]

Aesthetic and Physiographic Resources			
Affected Resource	**Features and Attributes of the baseline resource**	**Goods and Services provided under baseline conditions**	**Measurement Endpoints (parameters, direction of improvement or decrement)**
Landscape(s) and viewshed	Intact scape for places, names, songs, calendar, other services. Undisturbed physiographic profile. Sacred geography; Vista for general public	Religious experience Linguistic landmarks Traditional mnemonics Quality of recreational experience	Impact on physiographic profile; Loss or recovery of native scapes. Degrees of vision with undisturbed viewshed; Degradation or improvement in viewshed; changes in physiographic profile over time (lifecycle); Significance of direction or features of interruption (line of sight); Duration of impacts; Quality of recovery plan after operation is over.
Wilderness	Solitude, 'nature'	Quality of religious or recreational experience; safety from intrusion	Distance to nearest disturbance; Preservation of or recovery of baseline or target conditions (uncontaminated, biodiverse)
Quiet			Detectable noise night and day
Darkness			Degrees of vision with and without lights

C.2.2 Water, Soil, and Air.

Water sustains all life. As with all resources, there is both a practical and a spiritual aspect to water. Water is sacred to the Indian people, and without it nothing would live. When having a feast, a sip of water is taken either first or after a bite of salmon, then a bite of salmon, then small bites of the four legged animals, then bites of roots and berries, and then all the other foods.

[22] Oviedo, G. (2002). member of the Task Force of Non-Material Values of Protected Areas of the World Commission on Protected Areas (WCPA), at the Panel on Religion, Spirituality and the Environment of the World Civil Society Forum, Geneva, 17 July 2002.
Stoffle, R.W., Halmo, D.B., Austin, D.E. (1998). Traditional Landscapes and Traditional Traditional Properties: a Southern Paiute View of the Grand Canyon and Colorado River. American Indian Quarterly, Vol. 21: 229-250.
Walker, D.E., 1991. "Protection of American Indian Sacred Geography," in: *Handbook of American Indian Religious Freedom,* Vecsey, C., Ed., Crossroad, New York, NY, pp. 100-115.
Greaves, T., 1996. "Tribal Rights," *Valuing Local Knowledge,* Brush, S.B. and Stabinsky, D., eds., Island Press, Washington, D.C., pp. 25-40.

502-63 Current standard practices by U.S. agencies were followed to calculate human health impacts. References are provided in Appendix Q of this EIS. The apparent discrepancy in the alternative comparison noted by the commentor is addressed in the text. As indicated in the paragraph above Figure S–23 in the Summary of this *Final TC & WM EIS*, the higher lifetime radiological risk under Tank Closure Alternative 6B, Base Case, is due to the disposal of large amounts of vadose zone sediments excavated from all SST farms. In comparison, the estimates under Tank Closure Alternative 4 are due to disposal of vadose zone sediments from only two SST farms (BX and SX).

Early stakeholder participation in the EIS planning and development process is important to DOE, and DOE has provided numerous opportunities for such interaction. Hanford-area tribes have had the opportunity to provide, and have provided, extensive input to the *TC & WM EIS* preparation process and analysis. Chapter 8, Section 8.3, and Appendix C, Section C.3, of this *TC & WM EIS* identify the process for tribal interaction and the primary occasions for DOE's interactions with the tribes on the subject of the *TC & WM EIS* preparation process. In addition, Section 8.3 of this *Final TC & WM EIS* includes a description of the outcomes of the meetings with the tribes, and a new appendix (Appendix W) describes the tribal perspective as provided by the Hanford-area tribes. The intent of the American Indian scenarios was to collectively reflect American Indian lifestyles for the purpose of comparison. Both the activities and parameters used in those scenarios are based on existing reports and compilations. It was never the intent to analyze all possible American Indian scenarios. However, in Appendix W, Section W.3, exposure data provided by the tribes are used to estimate peak impacts on a CTUIR hunter-gatherer and on a Yakama hunter-gatherer for a representative alternative combination, Alternative Combination 2. The comparison of those analyses to those for the EIS hunter-gatherer suggest that both of the exposure pathways modeled and the parameter values used for the EIS hunter-gatherer are representative for use in the EIS analyses. In addition, one or two exposure pathways account for essentially all of the peak impacts (and variability) across the hunter-gatherer scenarios. Notable also is the strong similarity between the EIS hunter-gatherer and the CTUIR hunter-gatherer—from the perspective of both exposure factors and predicted impacts.

502-64 This *TC & WM EIS* assumes several different types of end-state management, as described in Chapter 2, the Glossary, and the Summary. These include administrative controls, institutional controls, and postclosure care, as

Commentor No. 502 (cont'd): Stuart Harris, Director, Confederated Tribes of the Umatilla Indian Reservation, Department of Science and Engineering

The concept of sacred water or holy water is global, and often connects people, places, and religion; religions that are not land-connected may lose this concept.[23] The quality of purity is very important for ceremonial use of water. For example, making a sweat lodge and sweating is a process of cleansing and purification, and the water used for sweat-bathing should be uncontaminated. From a ceremonial perspective, the most important drop of contamination is not the drop that causes a body of water to exceed a numerical standard, but the drop that changes the quality of the water from pure to impure. Additionally, concepts related to the flow of services from groundwater and the valuation of groundwater are receiving increased attention.[24]

Air, Water, Soil			
Affected Resource	**Features and Attributes of the baseline resource**	**Goods and Services provided under baseline conditions**	**Measurement Endpoints (parameters, direction of improvement or decrement)**
Surface water	Ecological	Habitat and provisions for plants, fish and wildlife; ground water recharge	Ecological measures include water quality standards, and other measures not listed here.
	Traditional	Habitat for sacred plants, fish, and wildlife; subsistence use; ceremonial drinking; support for traditional lifeways	Gal-yrs > tribal risk-based std Gal-yrs > cum risk target level Gal-yrs > d.l. Multiplier for traditional importance; Any institutional control needed to protect human (including tribal) health
	Recreational	Sport fishing; hunting; boating; swimming; wildlife observations	Gal-yrs > general dw std
	General	Commercial fishing; transportation; irrigation; drinking; pasture	Acre-ft-yrs > Ag std
Groundwater	Ecological	Surface water recharge; wetland recharge, river upwelling	See other sections
	Traditional	Ceremonial and spiritual use and drinking	Gal-yrs > d.l. Gal-yrs > cum risk
	Recreational	Drinking water	Gal-yrs > dw std
	General	Commercial, municipal, industrial, and domestic use; irrigation; pasture; public drinking	Gal-yrs > dw std Acre-ft-yrs > Ag std Any institutional control needed to protect human (including tribal) health
Air		Human health	Sitewide emissions profile over lifespan of activity; Standards: NAAQS, NESHAPS, PM, diesel, ozone, other standards. Dust resuspension

[23] Altman, N. (2002) Sacred Water: the Spiritual Source of Life. Mahwah, NJ: Hidden Spring Publ.;
Marks, W.E. (2001) The Holy Order of Water. Vancouver BC: Steiner Books Inc.;
Burmil, S., Daniel, T.C., and Hetherington, J.D. (1999). Human values and perceptions of water in arid landscapes. *Landscape and Urban Planning,* 44: 99-109;
Mazumdar, S. and Mazumdar, S. (2004). Religion and place attachment: A study of sacred places. Journal of Environmental Psychology, 24: 385-397.

[24] National Research Council (1997) Valuing Ground Water: Economic Concepts and Approaches. Washington D.C.: National Academy Press.

appropriate. Each of these end-state management options would take place at the completion of an action and is assumed to occur for 100 years following the end of the action (e.g., active institutional controls would be maintained for 100 years following final placement of waste in a storage facility). The 10,000-year time period described in this *TC & WM EIS* represents the period of analysis used for the long-term impact analyses for groundwater, human health, and ecological risk; it does not represent the assumed period of institutional controls. For clarity, the definition of "10,000-year period of analysis" is included in this final EIS in Chapter 2, the Glossary, and the Summary, as appropriate.

502-65 Appendix Q of this EIS presents radiological and chemical risk for 12 onsite locations, the 10 barriers, the Core Zone Boundary, and the Columbia River nearshore.

502-66 This *TC & WM EIS* presents both short-term (operational period) and long-term human health impacts of the proposed actions. The reported results reflect the different receptors and different exposure pathways associated with short- and long-term impacts. During the operational phase of the proposed actions, airborne radionuclides would be the principal concern. Thus, the analysis considers an MEI at an offsite location and the population within 50 miles that might be exposed to airborne radionuclides. The analysis also includes the potential dose to a person who practices a subsistence-type lifestyle. The short-term impacts are presented in terms of dose and LCFs. As discussed in Appendix K, Section K.1.1.6, a risk factor of 0.0006 is used in calculating the fatal cancer risk; however, a factor of 0.0008 could be used to estimate cancer morbidity.

Over the long-term, the movement of radionuclides to the human environment from buried sources is of concern. The pathways can be through migration to the groundwater and the Columbia River, or by intrusion into the buried materials. A number of individuals are considered, as discussed in Chapter 5 and Appendix Q: a well-driller, a resident farmer, an American Indian resident farmer, and an American Indian hunter-gatherer. This EIS also presents estimated human health impacts on the downstream population based on the exposure scenarios described for the resident farmer. The radiological impacts are presented as dose and cancer risk.

502-67 See response to comment 502-4 regarding NEPA requirements and the ARARs concept under CERCLA.

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		Visibility	Airborne doses Haze rule; Indirect impacts from energy production, ozone emissions, diesel use. Contribution or benefit to PSD area or attainment status. Greenhouse gas emissions.
Soil and sediment	Clean soil	Matrix for life support	Total vadose zone inventory of contaminants; Undisturbed soil profile;
		Human health	Soil pathways with tribal soil ingestion rate; Soil pathways as part of cumulative multimedia exposure Exceedance of sediment standards (biota) and dose to people (as above) Any institutional control needed to protect human (including tribal) health Exceedance of human or biotic standard
		Tribal uses (pigments, clays, etc.), pottery	Degree of Tribal access to special materials
		Biotic health; Habitat for sacred plants, fish, and wildlife;	Microbial quality (crust, nutrient cycling, etc.)
		Fill material	Volume, area, and diversity of clean fill area; Quality of mitigation actions; Minimization of disturbance and linked resource impacts

C.3 Terrestrial and Aquatic Biological Resources

Ecosystem Scale.

An ethnoecological approach to describing terrestrial resources will complement the purely ecological descriptions that conventionally are included in sections about affected resources in an EIS. These sections begin with descriptions of the potential natural vegetation within the Columbia Basin ecozones (e.g., using EPA Ecoregion Level 1-4 maps and vegetation descriptions), and then describe the natural resource usage patterns of the Plateau Area.[25]

Biological resources are integral to many traditional practices and celebrations throughout the year, many of which honor the traditional foods or First Foods. Based on the importance and many uses of the natural resources, an exposure scenario reflecting the underlying ethnohabitat or eco-traditional system was developed for use in dose and risk assessments at Hanford (Harper and Harris 1997; Harris and Harper 2000; CTUIR 2004)[26]. Ethno-habitats or eco-traditional

[25] http://www.fs.fed.us/land/pubs/ecoregions/ch48.html#342I
[26] Harris, S.G. and Harper, B.L. "A Native American Exposure Scenario." Risk Analysis, 17(6): 789-795, 1997;

This *TC & WM EIS* considers requirements from a number of sources. These include Federal and state requirements, as well as DOE requirements for protection of the public (100 millirem from all exposure modes from all DOE activities) (DOE Order 458.1). Also, this EIS considers the requirements under the Washington State MTCA. For example, the "benchmark standards" used in this EIS represent dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL if an MCL is available. These benchmark standards for groundwater impacts analysis were agreed upon by DOE and Ecology as the basis for comparing the alternatives and representing potential groundwater impacts. This approach is consistent with the MTCA standards Method A used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs as listed in Table 720-1 of the MTCA.

502-68 Appendix K, Section K.1.1.6, discusses the scientific evidence relating radiation exposure to the incidence of cancers, fatal and nonfatal. This discussion indicates that use of the fatal cancer risk factor of 0.0006 is conservative, but also provides the reader with the information from which the incidence of nonfatal cancers can be estimated. The EIS tables that reflect health impacts of normal operations and hypothesized facility accidents present both the doses and the resulting risk to an exposed individual or the number of LCFs in an exposed population. Appendix Q, Section Q.2.4.2, explains that nuclide-specific risk coefficients, developed using techniques that account for gender and age, were used for the long-term human health impacts analysis.

502-69 DOE disagrees with the commentor's assertion that aquatic standards are an appropriate benchmark or reference for evaluating or referencing groundwater concentrations. The groundwater results in Chapters 5 and 6 are applicable only to the subsurface groundwater system; the ecological risk portions of Chapters 5 and 6 deal with surface water systems and use an entirely different reference system.

502-70 This *TC & WM EIS* does not consider groundwater remediation; its scope includes non-groundwater remediation activities for tank closure and FFTF decommissioning. Other Hanford remediation activities as required under RCRA, CERCLA, and/or the TPA are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. Cleanup decisions regarding the non-tank-farm contamination sites will be made in consultation with Federal and state agencies. The other Hanford remediation

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systems can be defined as the set of traditional, religious, nutritional, educational, psychological, and other goods and services provided by intact, functioning ecosystems and landscapes. A healthy ethno-habitat or eco-traditional system is one that supports its natural plant and animal communities and also sustains the biophysical and spiritual health of its native peoples. Ethno-habitats are places clearly defined and well understood by groups of people within the context of their culture. These are living systems that serve to help sustain modern Native American peoples' way of life, traditional integrity, social cohesion, and socio-economic well-being. The lands, which embody these systems, encompass traditional Native American homelands, places, ecological habitats, resources, ancestral remains, traditional landmarks, and traditional heritage. Larger ethno-habitats can include multiple interconnected watersheds, discrete geographies, seasonal use areas, and access corridors.[27] A depiction of the eco-traditional system for the CTUIR is shown as a seasonal round that includes both terrestrial and aquatic resources.

The Columbia River, which cuts through the Hanford site, is the life blood of the region, with rich diverse fisheries delicately balanced on thriving aquatic ecosystems. The Hanford Reach is the last free-flowing segment of the Columbia River and is home of the last remaining naturally spawning fall Chinook. Ancestral CTUIR fisheries sites are located throughout the Hanford

S Harris and B Harper. "Using Eco-Traditional Dependency Webs in Risk Assessment and Characterization." Environmental Science and Pollution Research, 7(Special 2): 91-100, 2000;
Harper, B.L., Harding, A.D., Waterhous, T. & Harris, S.G. (2008). *Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual* US Environmental Protection Agency EPA-STAR-J1-R831-46; posted at http://www.hhs.oregonstate.edu/ph/tribal-grant-main-page.
[27] Modified from the East-Side EIS of the Interior Columbia Environmental Management Plan (ICBEMP).

activities are considered in the *TC & WM EIS* cumulative impacts analysis, although this EIS is not able to fully reflect the effectiveness of remediation activities, and does not consider groundwater remediation.

There are significant uncertainties in estimating the degree of cleanup to be achieved by the remediation activities. Among these are (1) the inventories of contaminants released to the ground at many of the sites; (2) for liquid release sites, the portion of the originally disposed contaminants remaining in the vadose zone and the portion that has migrated into the groundwater; (3) the selection of specific cleanup/containment methods for some sites; and (4) the effectiveness of the cleanup/containment methods. Therefore, the cumulative impacts analysis for this *TC & WM EIS* is conservative in that it does not account for cleanup/containment of waste and contaminated soil at liquid release sites, or cleanup/containment of current or future groundwater contamination.

In recognition of concerns about the effects of remedial actions, DOE has added sensitivity analyses to Appendix U of this *Final TC & WM EIS* to provide information on the potential effects of reasonably foreseeable remedial actions on the concentrations of contaminants in groundwater. The results of these sensitivity analyses are discussed in Chapter 7, Section 7.5.

502-71 This *TC & WM EIS* provides information on the potential short- and long-term impacts for each of the alternatives analyzed, but does not compare these two types of impacts. To fully understand the impact of an alternative, it is necessary to consider both the short- and long-term impacts, which are discussed in the Summary, Sections S.5.3 and S.5.4, respectively, and Chapter 2, Sections 2.8 and 2.9, respectively, of this EIS.

This *TC & WM EIS* assumes several different types of end-state management, as described in Chapter 2, the Glossary, and the Summary. These include administrative controls, institutional controls, and postclosure care, as appropriate. Each of these end-state management options would take place at the completion of an action and is assumed to occur for 100 years following the end of the action (e.g., active institutional controls would be maintained for 100 years following final placement of waste in a storage facility). The 10,000-year time period described in this *TC & WM EIS* represents the period of analysis used for the long-term impact analyses for groundwater, human health, and ecological risk; it does not represent the assumed period of institutional controls. For clarity, the definition of "10,000-year period of analysis" is included in this final EIS in Chapter 2, the Glossary, and the Summary, as appropriate.

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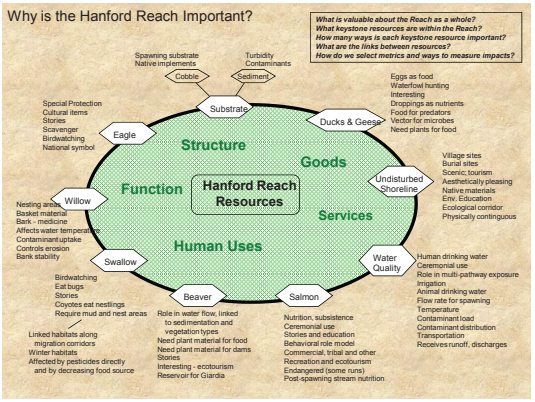
Reach. The health of the Hanford Reach is the keystone essential to the survival of Columbia Basin fisheries and CTUIR Treaty rights and resources.

Aquatic resources in the Hanford Reach (the area of the river flowing through the Hanford site) include many species, including people[28]. An illustration of resource interconnections and services is shown in the following figure.



Traditional and ecological keystone species

All natural resources are significant to tribal culture as part of functioning ecosystems, and many are individually important as useful for food, medicines, materials, or other uses. As both the seasonal round and the Hanford Reach web show, some species have more prominent roles than others for a variety of reasons. Identifying the keystone species important to different groups of people provides information about the disproportionate impacts to those groups of people.

[28] Harris, S.G. & Harper, B.L. (2000). Using eco-traditional dependency webs in risk assessment and characterization of risks to tribal health and cultures. *Environmental Scence and Pollution. Research* 2, 91-100.

DOE agrees with the commentor that DOE would not intentionally expose a worker to excess radiation. The analysis assumes that most of the clean closure activities (including removal of tanks from the ground) would be done remotely, using shielded equipment and other techniques to reduce worker exposure to ALARA.

502-72 DOE recognizes that the tribes feel a strong connection and association with their surrounding environment. For example, DOE appreciates receiving the CTUIR's narrative, which provides its perspectives. DOE included this narrative in this *Final TC & WM EIS* as a new appendix (Appendix W), with references to this appendix added in the main volume of this EIS. Also, this EIS includes a number of analyses of the potential impacts of the various alternatives on the local American Indian population over the short term (see Appendix J) and long term (see Appendix Q). In addition, sensitivity analyses using the specific American Indian parameters provided by the Yakama Nation and the Umatilla Tribes were completed for Alternative Combination 2; the results are included in Appendix W of this *TC & WM EIS*.

502-73 DOE recognizes that the tribes feel a strong connection and association with their surrounding environment. In Appendix J, Sections J.5.7.1.1 through J.5.7.1.3, this *Final TC & WM EIS* compares estimated radiation doses to the American Indian population and an average individual in that group, to the radiation dose to the remainder of the population and an average individual within the remainder of the population. As shown in Tables J–16, J–20, J–27, J–31, J–37, and J–41, the estimated dose to the average member of the American Indian population, under every alternative in which there is an estimated dose to the public, is lower than the estimated dose to an average member of the total population. This EIS also analyzed the impacts on an MEI residing at the border of the Yakama Reservation and compared those results to an MEI residing at the Hanford boundary. As shown in Tables J–24, J–35, and J–45, the dose to an MEI residing at the Yakama Reservation boundary over the life of the project is very low, and the probability that an individual at this location would develop an LCF from this exposure is essentially zero. These estimated doses are a fraction of those estimated for an MEI residing at the Hanford boundary. Also, impacts were estimated for an MEI living at or near the Hanford boundary who subsists predominantly on the consumption of homegrown produce, animal products from a family farm, and foodstuffs harvested from the wild (e.g., fruits, vegetables, fish, and game). This scenario could represent a member of a minority group who practices a subsistence lifestyle, such as members of the American Indian community.

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D. EJ Analysis

EJ analysis is basically a comparison of the degree of impacts among different human communities. This can entail comparing Town A to Town B, comparing impacts on migrant workers to the general population, comparing impacts on children and elders to healthy adults, or comparing impacts on resources and services important to different population segments. The summary step should provide a thoughtful comparison of impacts and benefits; for example, development might provide a few jobs for the general population at the expense of losing a ceremonial spring that affects an entire tribe. A strict economic analysis might portray the project as a net benefit to a county, while not recognizing the negative impacts that accrue to a tribe. If reduced to simply a dollar valuation, tribal impacts are inevitably undervalued. Therefore, part of the EJ analysis must find another way to bring tribal interests into parity. One way to do this is by examining the proportion of the EJ population that is adversely affected rather than absolute numbers.

Some of the aspects that are most relevant to many tribal situations include (but are not limited to):

1. Disparities in the significance of natural resource impacts across various human populations (e.g., tribal, general population, recreational community);
2. Disparities in contamination-based human health risk based on exposure scenarios relevant to different populations;
3. Disparities in socio-traditional impacts (interruptions of socio-traditional services);
4. Disparities in economic impacts;
5. Disparities in cumulative risk (risk to health, culture, economy, homeland security, etc) based on the tribal definition of health and well-being; identification of vulnerabilities and co-risk factors.
6. Overall equity summary; proportion of EJ population affected.

D.1 Natural Resource Impacts

Parameters for evaluating harm to natural resources have been suggested above, so they are not further discussed here.

D.2 Health Risk Analysis

> "The Superfund law requires cleanup of the site to levels which are protective of human health and the environment, which will serve to minimize any disproportionately high and adverse environmental burdens impacting the EJ community"[29].

When tribal resources and services are impacted by contamination, a tribal exposure scenario may be warranted. Traditional or subsistence scenarios are similar in format to existing residential, recreational, or occupational exposure scenarios, but reflect and are inclusive of tribal traditional and lifestyle activities[30]. They are comprised of:

[29] http://www.epa.gov/region02/community/ej/superfund.htm
[30] Harris, S.G. & Harper, B.L. (1997). A Native American exposure scenario. *Risk Anaysis*. 17, 789-795.

Table J–25 presents the comparative food consumption rates for the subsistence consumer and the general population MEI.

Section J.5.7.3 summarizes the estimated impacts on long-term human health for three receptors: a resident farmer, an American Indian resident farmer, and an American Indian hunter-gatherer (see also Appendix Q, Section Q.3). The analysis shows that under the alternatives analyzed in this EIS, the impacts on a member of the general public would be similar to those on an American Indian living in the region. Under some alternatives, the American Indian resident farmer or American Indian hunter-gatherer may be exposed to higher doses or Hazard Indices greater than 1, but under these alternatives, the typical resident farmer would be exposed to similarly elevated risks. The alternatives with the highest risks are those in which onsite receptors could be affected far into the future. As discussed in Section J.5.7.3, these onsite exposure scenarios do not currently exist and have never existed during Hanford operations. It is unlikely that any of the Tank Closure alternatives would pose a disproportionately high and adverse health risk to the offsite American Indian population.

502-74 Visual resources in general are described in Chapter 3, Sections 3.2.1.2 and 3.3.1.2. American Indian visual resources, as well as other American Indian interests, are described in Sections 3.2.8.3 and 3.3.8.3.

502-75 It is DOE policy to integrate natural resource and restoration concerns through the CERCLA cleanup process. This process is being conducted at Hanford under the TPA and provides multiple opportunities for tribal governments and other interested parties to participate in cleanup-related decisionmaking. DOE also appreciates the CTUIR's participation in the ongoing natural resource injury assessment process, which is separate from and outside the scope of this *TC & WM EIS*.

502-76 As discussed in Chapter 7, Section 7.3, construction of new facilities, emplacement of engineered surface barriers, and/or selective or complete clean closure of the SST system would require relatively large volumes of geologic materials from Borrow Area C for backfilling of excavations. While the land itself underlying Borrow Area C would not be irreversibly or irretrievably lost or committed as a result of using geologic materials, the area would be physically altered in an irreversible manner. More-detailed discussion of these impacts on Borrow Area C can be found in Section 7.2.1. Sections 7.1.1 and 7.1.5 discuss the potential mitigation actions that could be used to minimize visual and aesthetic impacts and restore Borrow Area C, such as regrading, contouring the landscape, and planting native vegetation to match the natural landscape.

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1. standard exposure pathways and exposure factors (such as inhalation rates or soil ingestion rates but with increased environmental contact rates),
2. traditional diets composed of native plants and animals, and
3. unique pathways such as the sweatlodge, gathering and use of basket materials, etc.

Tribal exposure scenarios pose a unique problem in that much of the specific traditional information about the uses of plants and animals for food, medicine, ceremonial, and religious purposes is proprietary. However, the basic activities (e.g., fishing, hunting, gathering) as well as significant traditional activities (e.g., basketmaking, pottery, firewood gathering, sweating) are shorthand labels that identify some of the most visible activities within this personally self-sufficient or subsistence economy. Major activities in the generally-recognized activity categories can be described in enough detail to understand the basic frequency, duration, and intensity of environmental contact within each category and habitat. This allows the identification of exposure pathways and estimation of exposure factors.

Table 1. Major Activity Categories

Activity Type	*General Description*
Hunting	Hunting includes a variety of preparation activities of low to moderate intensity. Hunting occurs in terrain ranging from flat and open to very steep and rugged. It may also include setting traplines, waiting in blinds, digging, climbing, etc. After the capture or kill, field dressing, packing or hauling, and other very strenuous activities occur, depending on the species. Subsequent activities include cutting, storing (e.g., smoking or drying), etc.
Fishing	Fishing includes building weirs and platforms, hauling in lines and nets, gaffing or gigging, wading (for shellfish), followed by cleaning the fish and carrying them to the place of use. Activities associated with smoking and constructing drying racks may be involved.
Gathering	A variety of activities is involved in gathering, such as hiking, bending, stooping, wading (marsh and water plants), digging, and carrying.
Sweatlodge Use	Sweatlodge building and repairing is intermittent, but collecting firewood is a constant activity.
Materials and Food Use	Many activities of varying intensity are involved in preparing materials for use or food storage. Some are quite vigorous such as pounding or grinding seeds and nuts into flour, preparing meat, and tanning hides. Many others are semi-active, such as basket making, flintknapping, construction of storage containers, cleaning village sites, sanitation activities, home repairs, and so on.

Together, this information is then used to calculate the direct and indirect exposure factors. This process follows the general sequence:

1. Environmental setting – identify what resources are available (or would be available if uncontaminated and undegraded);
2. Lifestyle description – activities and their frequency, duration and intensity, and uses of natural resources;

Harris S.G. & Harper B.L. (2004). *Exposure Scenario for CTUIR Traditional Subsistence Lifeways.* Pendleton, OR: Confederated Tribes of the Umatilla Indian Reservation

502-77 NEPA requires that an EIS include consideration of "any adverse environmental effects which cannot be avoided should the proposal be implemented" and "any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented" (42 U.S.C. 4332 (2)(C)). The CEQ's regulations, which govern how NEPA should be implemented, require that this discussion be included with the environmental consequences of the proposed action and alternatives (40 CFR 1502.16). Chapter 7, Section 7.2, of this *TC & WM EIS* defines and discusses unavoidable adverse environmental impacts. Section 7.3 defines and discusses the irreversible and irretrievable commitments of resources that may be involved if the proposed actions are implemented.

Commentor No. 502 (cont'd): Stuart Harris, Director, Confederated Tribes of the Umatilla Indian Reservation, Department of Science and Engineering

3. Diet (indirect exposure factors);
4. Pathways and media;
5. Exposure factors - Crosswalk between pathways and direct exposure factors; cumulative soil, water and air exposures.

The basic components of the exposure scenario are given below. Details are posted at www.phs.oregonstate.edu/ph/tribal-grant-main-page.

- Soil ingestion = 400 mg/d for all age groups
- Inhalation rate = 25 m^3/d for adults, with children scaled from the adult value
- Drinking water = 3L/d for adults, with children scaled from the adult value; an additional 1L is ingested during each use of the sweat lodge.
- Based on the ecological resources and on the anthropological literature, the CTUIR developed two relevant diets, one for the Columbia River regions where salmon forms a large percentage of the protein source, and one for upland and mountain areas with resident fish and spawning areas for anadromous species.

D.3 Socio-traditional Impacts

Examples of socio-traditional activities that are generally tied to the land and that might be disproportionally affected by federal actions are listed below. For individual sites, tribes should be consulted to develop site-specific measures.

- Impact on societal structure and cohesion (e.g., hours per year unavailable for social interaction through loss or reduced value of the resource or area)
- Educational opportunity (e.g., lost study areas associated with traditional stories or place names or family history or traditional practices; lost R&D opportunity)
- Integrity of traditional resources: number of sites with any disturbance or contamination, weighted by type and years of history associated with the site.
- Access to traditional lands: degree of restricted access (e.g., full restriction to any area or resource evidenced by institutional controls or barriers or reduced visits), fraction of ceremonial resources available relative to original quantity and quality
- Traditional landscape quality: proxy scale with elicited judgment based on original condition; total remaining landscape size without encroachments
- Degree of compliance with Treaty rights (e.g., proxy scale based on access, safety, natural and traditional resource integrity and quality, freedom from encroachments, hassle-free exercise of rights)
- Degree of Compliance with Trusteeship obligations with evaluation of tribal services.
- Preservation of future land use and remedial options (e.g., acres of permanent losses including plumes, number of uses no longer viable, number of curies x half-life in irretrievable waste forms)
- Degree of sustainability of the resource, its degree of permanent administrative protection, and associated exercise of Treaty rights of access and use.

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D.4 Economic Impacts

The eco-traditional system described in other sections includes human, biological, and physical components, and supports the flow of nutritional, religious, spiritual, educational, sociological, and economic services. In the general population these service flows are quantified in the symbolic form of dollars or other trusted and agreed-on exchange systems.

Indigenous economies provide the same types of services as any other economy, including employment (i.e., the roles of individuals in maintaining the functional community and ensuring its survival), shelter (house sites, construction materials), education (intergenerational knowledge required to ensure sustainable survival through time and maintain personal and community identity), commerce (barter items and stability of extended trade networks), hospitality, energy (fuel), transportation (land and water travel, waystops, navigational guides), recreation (scenic visitation areas), and economic support for specialized roles such as religious leaders and teachers.

As in dollar-based economies, indigenous subsistence communities use exchange systems composed of networks of materials with labor-based value (how long does it take to acquire or make the item, what skill is required, what effort is expended, what importance does the item have, what status does the item confer). Indigenous communities ensure the flow of goods and services with interlinked networks of reciprocity, obligation, and trust. Together these networks determine how materials, services, and information flow within the community and between the environment and the community. Wealth and security include the accumulation of knowledge, skills, and obligations as well as, or more than, the accumulation of material items including 'money.' In economic terms, this system is called a subsistence economy. An explanation of "subsistence" developed by the EPA Tribal Science Council is as follows.[31]

> "Subsistence is about relationships between people and their surrounding environment, a way of living. Subsistence involves an intrinsic spiritual connection to the earth, and includes an understanding that the earth's resources will provide everything necessary for human survival. People who subsist from the earth's basic resources remain connected to those resources, living within the circle of life. Subsistence is about living in a way that will ensure the integrity of the earth's resources for the beneficial uses of generations to come."

A subsistence economy includes people with a wide range of 'jobs' such as food procurement, processing, and distribution; transportation (pasturing and veterinary); botany/apothecary services; administration and coordination (chiefs); education (elders, linguists); governance (citizenship activities, conclaves); finance (trade, accumulation and discharge of obligations); spiritual health care; social gathering organization; and so on. The categories of 'fish, hunt, and gather' each include a full cross section of these activities. This is why 'hunting' is not just the act of shooting and eating an animal, but includes a full cross-section of all the activities that a hunter-specialist does within their community.

[31] Tribal Science Council (2002). "Subsistence: A Scientific Collaboration between Tribal Governments and the USEPA." Provided by John Persell (jpersell@lldrm.org).

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Many contemporary tribal families include members engaged in both monetary and subsistent activities as wage-laborers, part-time workers, professional business people, traditional craft makers, seasonal workers, hunters, fishers, artisans, and so on. Tribal governments engage in the western dollar-based economies but also use traditional and modern technologies for harvesting and preserving foods as well as for distributing goods and services through communal networks of sharing and caring.

NEPA analysis should include subsistence economics, and not simply dollar economics.

D.5 Cumulative Risk

There is a growing recognition that conventional risk assessment methods do not address all of the things that are "at risk" in communities facing the prospect of contaminated waste sites, permitted chemical or radioactive releases, or other environmentally harmful situations. Conventional risk assessments do not provide enough information to "tell the story" or answer the questions that people ask about risks to their community, health, resource base, and way of life. As a result, cumulative risks, as defined by the community, are often not described, and therefore the remedial decisions may not be accepted. The full span of risks and impacts needs to be evaluated within the risk assessment framework in order for cumulative risks to be adequately characterized[32] (National Research Council, 1994, 1996; President's Commission, 1997).

Health, Security, and Quality of Life

Because many communities need more information than simply risk and dose results, the Environmental Protection Agency developed a Comparative Risk method over a decade ago for adding a community welfare or quality of life component[33]. The Comparative Risk field has been developing methods for community Quality of Life (QOL) that combine traditional, social, and economic measures along with aesthetics and any other factor the community identifies as important[34]. We have modified this concept to reflect traditional tribal traditional values as well

[32] National Research Council, 1994. *Building Consensus: Risk Assessment and Management in the Department of Energy's Environmental Remediation Program*. National Academy Press, Washington, D.C.
National Research Council, 1996. *Understanding Risk: Informing Decisions in a Democratic Society*. National Academy of Science, Washington, D.C.
Presidential/Congressional Commission of Risk Assessment and Risk Management, President's Commission: *Framework for Environmental Health Risk Management (Final Report, Volume 1* (1529 14th Street, NW, Suite 420, Washington, D.C., 1997) and (http://www.riskworld.com).
[33] U.S. Environmental Protection Agency, 1993. "A Guidebook to Comparing Risks and Setting Environmental Priorities." EPA-230-B-93-003.
[34] L Lindholm, M Rosen and M Emmelin How many lives is equity worth? A proposal for equity adjusted years of life saved. *Journal of Epidemiology and Community Health* 1998;52:808-811;
Ponce, RA., Bartell, SA., Wong, EY, LaFlamme, D., Carrington, C., Lee, RC., Patrick, DL., Faustman, EM., and Bolger, M. (2002) Use of Quality-Adjusted Life Year Weights with Dose-Response Models for Public Health Decisions: A Case Study of the Risks and Benefits of Fish Consumption. Risk Anal. 20: 529-542.

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as secular or social community aspects that apply to suburban as well as to tribal communities[35] (Harper et al., 1995; Harper and Harris, 2000).

John M. Last defines individual human health as "a state characterized by anatomic integrity, ability to perform personal, family, work, and community roles; ability to deal with physical, biological, and social stress; a feeling of well-being; and freedom from the risk of disease and untimely death" [36]. This definition is broader than the regulatory approach which tends to equate good health with lack of excessive exposure. Definitions of health and functionality from the public health literature include a variety of medical and functional measures, but may not specifically call out the fact that the survival and well-being of every individual and culture depends on a healthy environment. This broader approach used with risk assessments is adaptable to indigenous communities that, unlike westernized communities, turn to the local ecology for food, medicine, education, religion, occupation, income, and all aspects of a good life.[37]

Homeland Security. A secure homeland means the same for tribal sovereign nations as it does for any other level of government. Impacts to homeland security of native sovereign nations may be a relevant part of EJ analysis.

- Land Base – a secure land base with jurisdiction and ownership, free from encroachment or legal threat to sovereignty or self-government or jurisdiction.
- Governance – stable, balanced government with self-determination of the tribal nation.
- Resources – natural, traditional, legal, technical, organizational, and human resources adequate to define and meet threats to stability, self-determination, resources, culture, mental and physical health, religion, economy and security. Technical and legal staff. Health and human services adequately funded.
- Capital Resources – infrastructure, cyber, and domestic resources designed to respond to threats and protect tribal values and resources with strength and understanding in a traditional manner. Adequate housing, etc.
- Security – confidence in natural resource adequacy and quality, confidence in a leadership that looks out for the members and the resources, confidence in adequate economic well-being; confidence that the culture, language, values, and people will survive; freedom from legal battles brought by the federal and other governments.
- Culture – appreciation of individuals, creativity, support of the needy, devotion to the people, justice, and the shared history and blood ties to the land and to each other, according teachings of our elders.

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[35] Harper, B.L., Bilyard, G.R., Broh, E.H., Castleton, K.J., Dukelow, J.S., Hesser, W.A., Hostick, C.J., Jarvis, T.T., Konkel, R.S., Probasco, K.M., Staven, L.H., Strenge, D.L., Thiede, M.E., and Traynham, J.C., 1995. "Hanford Risk Management Program and Integrated Risk Assessment Program: Cost/Risk/Benefit Analyses: A K-Basin Example." Pacific Northwest National Laboratory, Richland, WA., May 1995.
[36] John Last, 1998. *Public Health and Human Ecology, 2nd ed.* Stamford, CT: Appleton & Lange.
[37] Harris and Harper, ibid and loc. Cit.
Donatuto, J. and Harper, B. (2008). Issues in Evaluating Fish Consumption Rates for Native American Tribes. Risk Analysis 26(6): 1497-1506;
Donatuto, J. (2008). When Seafood Feeds the Spirit yet Poisons the Body: Developing Health Indicators for Risk Assessment in a Naitve American Fishing Community. Dissertation. University of British Columbia.

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- Religion – freedom to choose and practice any religion.
- Economy – adequate food, clothing, shelter for individual and tribal needs, both in dollars and barter, but also including riches of the landscape, heritage, and knowledge.

Vulnerability

EPA is required to identify populations who are more highly exposed; for example, subsistence populations and subsistence consumption of natural resources (Executive Order 12898[38]). EPA is also required to protect sensitive populations.[39] Some of the factors known to increase biological sensitivity include developmental stage, age (very young and very old), gender, genetics, and health status[40], and this is part of EPA's human health research strategy.[41]

In addition, disadvantaged groups may also experience a wide range of stressors or co-risk factors[42], such as poverty, disproportionate job hazards, existing health disparities and co-morbidities, limited access to health care, later diagnosis and less access to advanced care, pervasive discrimination, overburdened or aged infrastructure, dependence on subsistence resources with increasing legal threats to hunters and fishers, loss of access to fishing, hunting, and gathering grounds, contamination of subsistence resources (fish toxics in particular), rural dumps, lower quality of utilities and communication capabilities, poorer schools, increased domestic violence, loss of religion, loss of language, increased mental health issues, greater jail time than non-natives, higher smoking and substance abuse rates, poorer housing (mold, lead, asbestos, crowded, not handicap-accessible), lack of homeowner loans and higher interest rates, and lack of money to get technical and legal expertise needed for equal participation to decision processes,

Because these factors tend to cluster in tribal communities, the overall psychological impact is the assumption that tribal lives are less important, and tribal perspectives are not important, and that tribes do not deserve the same level of protection. Consistent federal actions and attitudes over the centuries have taught many tribal members that they are not deserving of the same level of assistance from the federal government and should not expect equal treatment, becoming a self-fulfilling prophecy that tribal governments are struggling to overcome.

[38] White House, 1994. Federal Actions To Address Environmental Justice In Minority Populations And Low income Populations: Feb. 11, 1994; 59 FR 7629, Feb. 16, 1994.
[39] *Superfund Exposure Assessment Manual*. EPA/540/1-88/001 OSWER directive 9285.5-1. U.S. Environmental Protection Agency Office of Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. 1988.
[40] http://www.epa.gov/nheerl/research/childrens_health.html
[41] EPA/600/R-02/050, September 2003 (posted at http://www.epa.gov/nheerl/publications/).
[42] Flaskerud, JH. and Winslow, B. (1998). Conceptualizing Vulnerable Populations. Nursing Research, 47:69-78.

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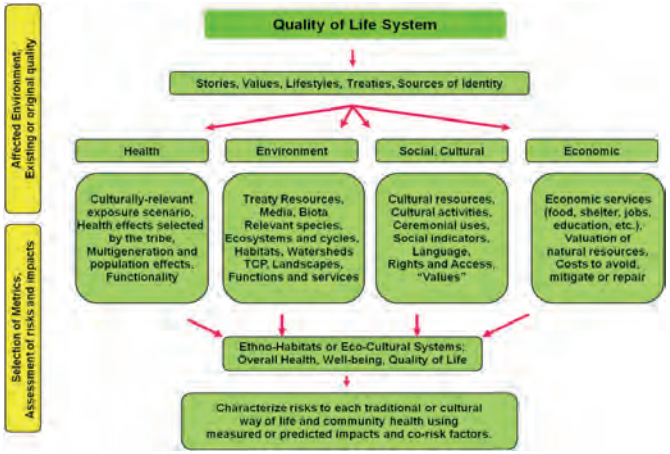
Commentor No. 502 (cont'd): Stuart Harris, Director, Confederated Tribes of the Umatilla Indian Reservation, Department of Science and Engineering



D.6 Equity analysis.

Evaluating disproportionate impacts to Native Americans involves the following:

- Are the exposures different when the tribal subsistence scenario is used as compared to the rural residential or other non-native scenario? Whose risks are highest?
- Are the natural resources of tribal interest more impacted than those identified by the general population? How important are those resources or places? How many ways are those resources or places important? How large is the impacted area from a tribal perspective?
- Do disparities in impact accumulate over many generations, and do they accumulate at a higher rate in the EJ communities? Have the next seven or more generations been taken into consideration?[43]

[43] Harper, B. and Harris, S. (2001) An Integrated Framework for Characterizing Cumulative Tribal Risks. Posted at www.iiirm.org.; Harper, B.L. and Harris, S.G., **"Measuring Risks to Tribal Community Health and Culture,"** *Environmental Toxicology and Risk Assessment: Recent Achievements in Environmental Fate and Transport, Ninth Volume, ASTM STP 1381*, F. T. Price, K. V. Brix, and N. K. Lane, Eds., American Society for Testing and Materials, West Conshohocken, PA, 1999.

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Commentor No. 502 (cont'd): Stuart Harris, Director, Confederated Tribes of the Umatilla Indian Reservation, Department of Science and Engineering

- Is the tribe already vulnerable (at risk) due to existing health disparities, economic disadvantages, higher exposure to other toxics, or existence of several dozen co-risk factors (e.g., poor housing, high unemployment, etc – contact authors for more details)?
- What proportion of tribal members is affected (rather than absolute numbers of people)?
- Is the federal fiduciary Trust obligation being met?
- Is traditional awareness and respect shown equitably to the affected tribes as to the local civic entities?[44]

Example of Summary Impacts (complete for each population segment).

Resource or Topic	Features, Attributes, Functions, Goods, Services	Measures of loss or benefit (positive or negative movement; degree of movement)
Sitewide Integrity	*(See above tables)*	
Landscape		
Light, Noise, other aesthetic attributes.		
Viewshed		
Air quality, dust		
Soil,		
Minerals, gravel, fill, barrier material		
Sediments		
Water		
Terrestrial Ecosystems		
Terrestrial habitats and species		
Aquatic Ecosystems		
Aquatic habitats and species, shorelines		
Transportation	Features and events related to safety and vulnerability of adjacent areas.	General transportation risks; Routes through tribal lands; Routes near critical habitats, rivers.
Hazardous substances; safety aspects	Baseline (target) is lack of contamination; -current condition is tremendous contamination.	Amount of hazardous material imported, generated, stored, or disposed. Amount of hazardous material already on site, both permitted and contaminated.
Human Health	Target is both lack of excessive exposure and active multi-dimensional health promotion.	Individual and community doses and risks using Tribal scenarios, Multigenerational exposures and risk, Consideration of broader health context.
Env Justice	Tribally-appropriate EJ analysis needed to understand disproportionate impacts.	Compliance with Treaty and Trust; Presence of disadvantaged or disproportionally affected groups-Tribes;

[44] From: American Indian and Alaskan Native Environmental Justice Roundtable. Albuquerque, New Mexico August 3-4, 2000; Final Report, January 31, 2001. Edited by the Environmental Biosciences Program, Medical University of South Carolina Press.

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Commentor No. 502 (cont'd): Stuart Harris, Director, Confederated Tribes of the Umatilla Indian Reservation, Department of Science and Engineering

		Eco-spatial basis for tribal EJ analysis.
Economic	Recognition of subsistence economy methods.	Convention analysis for general pop; Impacts to subsistence for tribes.
Traditional Resources	Need evaluation of likelihood of adverse or beneficial impacts to sites, zones, districts.	Amount of activity in TCP, archaeological zone, sacred sites, and NHPA sites.
Energy and Infrastructure	Need lifecycle energy and infrastructure evaluation, including adequacy of closure plans.	Energy requirement Infrastructure footprint Replacement-mitigation of resources Road needs, water and sewer needs. Intensity of security needs
Climate-Energy Values	Targets of energy efficiency, net zero, sustainability, planning for climate change.	Net-zero operations Carbon footprint
Cumulative	Lifeways support	Impacts to health, ecology, traditional, socio-economic, other analyses. Space-time mapping of impacts. Lifecycle impacts and costs. Sitewide totals of hazardous materials, footprints; impact on the ability to reach a fully restored endstate.
Homeland Security		

Making the Decision

In the case that disproportionate impacts occur, what would cause (or allow) a regulator to make a decision that reduces the disparities in impacts, especially if it costs money? Often the community at disproportionate risk is expected to take responsibility for reducing their risk by changing their heritage, religious, or ceremonial activities, rather than removing the underlying cause of the inequity. [45] In reality, this magnifies the disproportionate impacts rather than reducing them. One of the most visible examples of this is the expectation that native sovereign nations reduce their fish consumption due to contamination, in effect requiring the Tribe to choose between health and religion.

A methodology for evaluating disproportionate impacts is presented here. The real challenge is to the federal government to reduce the inequity by making more protective decisions.

[45] O'Neill, C.A. (2003). Risk avoidance, traditional discrimination, and environmental justice for indigenous peoples. *Ecology Law Quarterly* 30, 1-57.

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Commentor No. 503: Rosemary Sikes

From: Rosemary Sikes [rosemarysikes@olympus.net]
Sent: Monday, May 03, 2010 5:50 PM
To: tc&wmeis@saic.com
Subject: EIS public comment from Dept. of Energy

I am writing to comment on the Environment impact statement (EIS) that was required to be written by the Department of Energy (DOE) concerning treating and managing waste at Hanford Nuclear Reservation. I am a life long resident of Washington state, born and raised in eastern Washington, now living in Port Townsend, WA. I am outraged the EIS proposes adding millions more cubic feet of radioactive waste at the 560-square mile Hanford Nuclear Reservation near the Columbia River before cleaning up the vast mess already there. Hanford already ranks as the most contaminated site in North America. The Washington State Department of Ecology says that more than a million gallons of highly toxic waste already has leaked from Hanford's 177 underground storage tanks, which contain 53 million gallons of high-level radioactive material. The Hanford situation poses serious threats to human communities and ecosystems, particularly the Columbia River. The notion that the federal government would allow Washington's burden of radioactive waste to escalate is unfathomable, especially considering the treatment facility to convert a portion of the existing waste to a more stable glass form for underground burial is now delayed for operations until at least 2019. Washington state has already taken way more than our share of the nations nuclear waste. NO MORE!!!! Let each state store the radioactive waste it produces. I believe this strategy will also reduce the amount of radioactive waste produced.

503-1

503-2

503-1 cont'd

Sincerely,

Rosemary Sikes
1709 Gise Street
Port Townsend, WA 98368
rosemarysikes@olympus.net

503-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

503-2 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities and the ecosystems around Hanford. One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms by landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Commentor No. 504: Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

From: Tom Carpenter [tomc@hanfordchallenge.org]
Sent: Monday, May 03, 2010 6:09 PM
To: tc&wmeis@saic.com
Cc: 'Fettus, Geoffrey'; kaltofen@aol.com; 'John Brodeur'; David Brockman; 'Olinger, Shirley J'
Subject: Comments of Hanford Challenge and NRDC
Attachments: 2010 05.03 HC NRDC Comments on the Draft Tank Closure and Waste Management.pdf

May 3, 2010

Mary Beth Burandt, NEPA Document Manager
U.S. Department of Energy, Office of River Protection
P.O. Box 1178
Richland, W A 99352
TC&WMEIS@saic.com

Re: Draft Tank Closure and Waste Management Environmental Impact Statement
Comments by Hanford Challenge and NRDC

Dear Ms. Burandt,

Attached please find the written joint comments submitted by Hanford Challenge and the Natural Resources Defense Council (NRDC) regarding the Department's Tank Closure and Waste Management Draft Environmental Impact Statement.

Thank you for the opportunity to provide these comments.

Sincerely yours,

Tom Carpenter, Executive Director
Hanford Challenge
219 First Avenue, S., Suite 120
Seattle, WA 98104
(xxx) xxx-xxxx, ex xx
tomc@hanfordchallenge.org

Geoff Fettus, Senior Project Attorney
Natural Resources Defense Council
1200 New York Avenue, NW
Suite 400
Washington, D.C. 20005
(xxx) xxx-xxxx
gfettus@nrdc.org

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Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

May 3, 2010

Mary Beth Burandt, NEPA Document Manager
U.S. Department of Energy, Office of River Protection
P.O. Box 1178
Richland, W A 99352
TC&WMEIS@saic.com

Re: Draft Tank Closure and Waste Management Environmental Impact Statement Comments

Dear Ms. Burandt,

Hanford Challenge and the Natural Resources Defense Council (NRDC) hereby submit our joint comments regarding the Department's Tank Closure and Waste Management Draft Environmental Impact Statement.

Hanford Challenge is a membership-based, regional public interest organization based in Washington State. Our mission is to help create a future for Hanford that secures human health and safety, advances accountability, and promotes a sustainable environmental and economic legacy for Northwest communities.

NRDC is a national non-profit membership environmental organization with offices in Washington, D.C., New York City, San Francisco, Chicago, Los Angeles and Beijing. NRDC has a nationwide membership of over one million combined members and activists. NRDC's activities include maintaining and enhancing environmental quality and monitoring federal agency actions to ensure that federal statutes enacted to protect human health and the environment are fully and properly implemented. Since its inception in 1970, NRDC has sought to improve the environmental, health, and safety conditions at the nuclear facilities

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Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

operated by DOE and the civil nuclear facilities licensed by the NRC and their predecessor agencies.

Our vision for the Hanford Site is that the environs around it are safe and accessible for all potential uses, without restriction. In particular, any environmental remediation project at Hanford should:

- Protect the Columbia River over the long term, which means effectively addressing groundwater and soil contamination
- Not rely on institutional barriers or take any credit for human control beyond 100 years after the completion of the cleanup
- Protect human health and the environment, including workers, future residents, consumers of agricultural products, recreational and commercial river users, and tribal peoples
- Honor tribal rights and treaties
- Retrieve, treat and secure any contamination that poses significant risks to the ecology and current and future generations.

These comments were prepared by Tom Carpenter, Executive Director of Hanford Challenge, Geoffrey Fettus, Senior Project Attorney at NRDC, and expert technical comments were provided by two reviewers:

1. Marco Kaltofen, PE, (Civil, Mass.)
   Boston Chemical Data Corp.
   Natick, MA (Attachment 1)

2. John Brodeur, PE, LEG
   Energy Sciences & Engineering
   Kennewick, WA (Attachment 2)

Executive Summary of Comments

Generally:

1) The DOE should revise and reissue the draft EIS and not move forward with a final EIS until such time as a complete site characterization is conducted and after valid risk assessment models are developed. *504-1*

2) The Draft EIS must conform to existing federal law and it must conform to lawfully rendered agreements. Metrics which do not meet the lawfulness test or do not carry the force of regulations fail to meet NEPA *504-2*

504-1 In response to previous comments regarding the adequacy of site characterization, DOE and Ecology have reviewed the data and associated uncertainties and concluded that there are sufficient site characterization data to support this EIS, and that risk assessment models used are valid. Under CEQ NEPA regulations, agencies must "apply NEPA early in the process" and "integrate the NEPA process with other planning at the earliest time possible" (40 CFR 1501.2). There must be a balanced judgment concerning an agency's decision to start the NEPA process early enough to inform its decisions, while recognizing that all of the necessary information may not be available. CEQ regulations have long recognized this tension and provided appropriate ways to proceed with an EIS (40 CFR 1502.22). Valid risk assessment models were used in the draft EIS impact analyses. DOE and Ecology have determined the data and analyses are adequate to ensure a credible evaluation of the reasonably foreseeable impacts of the alternatives. Uncertainties in the analyses are discussed as required under CEQ regulations (40 CFR 1502.22). The methodology used to analyze the impacts of the alternatives is described in Appendix F; the methodology used to analyze the cumulative impacts is described in Appendix R.

504-2 DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; Section 1.2.7 discusses the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE order requirements that must be met for DOE to implement the Tank Closure alternatives. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter.

Additionally, NEPA regulations do not require alternatives to be fully compliant with laws or regulations (40 CFR 1502.2(d)), as explained in NEPA guidance (NEPA's Forty Most Asked Questions [46 FR 18026]), which states that "An alternative that is outside the legal jurisdiction of the lead agency must still be analyzed in the EIS if it is reasonable. A potential conflict with local or federal

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

standards. One such example is the use of future areal extent of groundwater above standards, as opposed to a metric which does carry the force of law, such as future human health risk to individuals or populations. Metrics for the NEPA alternatives selection must meet all established and lawful standards such as cancer and non-cancer risks to individual resource users, environmental risks, species level risks, and adverse impacts to Native American Indian cultural resources. **504-2 cont'd**

3) The existing failures to meet completeness standards for significant portions of the draft proposed EIS nevertheless are likely to legally preclude final approval of a comprehensive EIS. The failure to address groundwater in the saturated zone is an obvious weakness of the draft proposed EIS. This level of omission has not survived scrutiny in other formerly used defense facilities which have completed their respective EIS processes. Likewise, the failure to identify or even screen for preferential underground pathways for groundwater transport is another glaring omission, which has a significant bearing on the risk numbers generated by this drafting process. **504-3**

These omissions are so significant that severability of the various milestones on the road to creating a complete, comprehensive, and lawful EIS is essential.

4) Rather than use single scalar averages to represent all portions of the entire site uniformly, the Draft EIS should use of ranges of values or at least statistically significant values matched to actual site conditions. The current Draft EIS assumes that no preferential pathways exist in the subsurface, and that the site is perfectly homogeneous and well-characterized. Such conditions barely exist in the simple laboratory simulations, and never exist in any real-world systems. There can be no confidence in risk estimates that are based upon average values that imply homogeneity throughout the site. The use of such values fails to meet the standard of engineering practice demanded by the regulations upon which the EIS process is based. **504-4**

5) The Draft EIS should conform to CERCLA and for Washington State's Model Toxic Control Act[1] requirements for protecting human health. Lifetime cancer risks, under those laws should not exceed 1×10^{-5}, applicable under MTCA when multiple carcinogens are considered. **504-5**

[1] Washington Administrative Code (WAC) 173-340-200)

law does not necessarily render an alternative unreasonable, although such conflicts must be considered."

Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives, as well as the permits and approvals DOE must obtain from Federal, state, and local agencies. In Sections 8.1.7 and 8.3, DOE identifies the consultations and coordination that DOE has undertaken with American Indian tribes and would need to continue for the purpose of implementing the proposed actions and alternatives.

Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that may be needed and are feasible for DOE to implement to offset the potential impacts that might result from implementing an alternative. While DOE's Preferred Alternatives for tank closure, FFTF decommissioning, and waste management in this *TC & WM EIS* may not necessarily represent the most environmentally preferred alternatives, the ROD issued by DOE will identify any additional mitigation and monitoring commitments adopted by DOE and specify other factors considered by DOE in reaching its decision, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. In announcing its decision in the ROD based on the EIS analyses, DOE will be obligated to carry out the decision consistent with the requirements identified in this EIS. These requirements will be interpreted and applied by Federal, state, and local regulatory agencies through their independent authorities. These agencies may also impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA, which would include additional opportunities for public comment.

504-3 DOE disagrees with the commentor's supposition that this *TC & WM EIS* fails to address groundwater in the saturated zone. Both groundwater flow and transport in the saturated zone are discussed in Chapters 5 and 6 and Appendices L and O of the *Draft TC & WM EIS*. DOE also does not agree with the supposition that this *TC & WM EIS* fails to identify or screen for preferential underground pathways. The discussions in Appendix L regarding the zonation and parameterization of the flow model explicitly mention that a high-conductivity channel in the unconfined aquifer is necessary to achieve a good calibration and is a necessary feature of the model framework. DOE agrees with the commentor's view that heterogeneities in the hydraulic conductivity zonation can influence projections of risk through the groundwater pathway.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

Offsite Wastes

6) Alternatives in the Draft EIS which include off site waste acceptance should be severed from this EIS process in order to maintain consistency with existing federal regulations. The acceptance of offsite wastes is neither required to proceed with any of the remaining Alternatives described in the EIS, nor does it further any of the NEPA required actions at the Hanford Facility, such as limitation of adverse environmental affects, prevention of negative alterations of short or long term land-uses, or the prevention of adverse outcomes from the irretrievable commitments of cleanup resources. **504-6**

The DOE is poised to spend tens of billions of tax dollars on one of the most complex and challenging remediation campaigns ever undertaken. Importing and disposing of offsite waste that will in fact add new contamination to the groundwater and violate drinking water standards for thousands of years is indefensible, and defeats the purpose of the remediation effort.

High-Level Waste Tanks

7) Hanford Challenge and NRDC support Oregon's Proposed Alternative 7 identified in its preliminary comments to the Department of Energy in a letter dated January 5, 2010. However, we believe that all the tank waste should be removed from the tanks, adequate characterization be performed to determine whether certain tanks need to be removed, and leaked waste that has leaked from the tanks into surrounding soils be retrieved and treated. **504-7**

8) Per the above comments, additional clarity is needed in the Draft EIS on the long term environmental and public health impacts of leaving at least 1 percent of the HLW in place in the heel of the tanks. **504-8**

9) Also, we write to clarify some areas of altered statutory requirements. Specifically, DOE should be aware that neither *NRDC v. Abraham*, 271 F.Supp. 2d 1260 (D.Idaho 2003) nor *NRDC v. Abraham*, 388 F.3d 701 (9th Cir. 2004) collectively, the "HLW Decisions," bar DOE from removing high-level radioactive waste (HLW) from the tanks and **504-9**

504-4 DOE disagrees with the premise of the comment, specifically with the assertion that single-scalar averages were used to represent the entire site uniformly. Spatial heterogeneity was explicitly considered in the groundwater flow analysis (Appendix L), vadose zone flow and transport analysis (Appendix N), and groundwater transport analysis (Appendix O). Appendix L documents the finding that a zone of high hydraulic conductivity is required to match field observations across the central portion of the site (Section L.4.3.2.2). DOE believes that inclusion of spatial heterogeneity (at a scale sufficient to support the analyses of contaminant transport from the sources that contribute to long-term impact) is a requirement of an unbiased comparison of the impacts under the alternatives.

504-5 This EIS is not being prepared under CERCLA; therefore, the ARARs process does not apply. However, some of the ongoing Hanford site activities that are considered in the cumulative impacts analysis are currently undergoing remediation under the TPA, which is the legally binding process used at Hanford to implement CERCLA and RCRA (hazardous waste) requirements. All environmental restoration actions conducted at Hanford under CERCLA must evaluate the "legally applicable, relevant and appropriate requirements of Federal and State laws and regulations" to establish the appropriate cleanup level that must be achieved at an individual cleanup site.

However, the scope of the proposed actions evaluated in this *TC & WM EIS* does not include CERCLA remedial actions. Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives and identify where standards may be exceeded. This is not the same as an "ARARs analysis" under CERCLA, and it serves a different purpose. The identification of legal requirements in a NEPA document assists an agency in its planning, funding, and decisionmaking process. It also provides full disclosure to members of the public, stakeholders, and other agencies regarding the potential scope of an agency's effort to implement a proposed action (or an alternative) in terms of the subsequent permitting, other approvals, consultations, and coordination requirements, all of which would include additional public involvement opportunities in the future.

The "benchmark standards" used in this *TC & WM EIS* represent dose or concentration levels that correspond to known or established human health effects. For groundwater, the benchmark is the MCL if an MCL is available. For example, the benchmark for iodine-129 is 1 picocurie per liter; for technetium-99, it is 900 picocuries per liter. These benchmark standards for groundwater

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

treating that waste for disposal. Nor do the HLW decisions bar DOE from separating some portion of that waste into a stream that meets low-level radioactive waste (LLW) standards and disposing of that waste outside of a geologic repository in a properly licensed disposal site. Section 3116 of the 2005 National Defense Authorization Act, DOE's response to the original Idaho Federal District Court HLW Decision was a significant change to the entire structure and purpose of the Nuclear Waste Policy Act (NWPA), not a "clarification." That law has application in South Carolina and Idaho. Section 3116 does not have application in Washington or Oregon. See, Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Pub. L. No. 108-375, § 3116, 118 Stat. 1811, 2162-64 (2004). *504-9 cont'd*

10) The "waste incidental to reprocessing" concept codified in Section 3116 does not set cleanup standards of "99 percent," "most of the radioactivity," or an "inch and half of waste at the bottom of the tank." In fact, it sets no cleanup standard whatsoever and leaves the matter of how much radioactive waste to leave behind entirely up to the DOE. DOE should ensure that this concept is left out of its consideration of final and preferred alternatives for the Hanford Draft EIS.

11) Under the current NWPA, the Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC) regulate the geologic disposal of HLW – and decide what is (and what is not) HLW. At the Hanford Reservation, DOE may not unilaterally decide that HLW has been transformed into "waste incidental to reprocessing." If the concepts embodied in Section 3116 are in any way adopted or used in the Hanford Draft EIS, then EPA, NRC and the states will not have meaningful oversight over the amount of radioactive waste DOE decides to leave in the tanks. *504-10*

12) NRDC and literally dozens of environmental and public interest groups stood with Washington, Oregon, New York, and New Mexico and objected to the concepts embodied in Section 3116. Only the states of South Carolina and Idaho – who sided with the other states as recently as March 2004 in objecting to DOE's assertion of "waste incidental to reprocessing" authority –submitted to DOE's cleanup budget-threatening tactics and supported the legislative change. Via Section 3116, DOE obtained an exemption from the NWPA and the ability to reclassify HLW as "incidental waste" without any *504-11*

impacts analysis were agreed upon by both DOE and Ecology as the basis for comparing the alternatives and representing the potential groundwater impacts. In addition, this approach is consistent with the MTCA standards Method A, which is used to establish cleanup levels under the separate CERCLA and RCRA processes established by the TPA. Method A draws from current Federal and state standards, including the MCLs listed in Table 720-1 of the MTCA.

504-6 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

504-7 Chapter 2, Section 2.6.4, of this *Final TC & WM EIS* has been revised to include a discussion of the Oregon Department of Energy's proposal and how DOE has addressed the range of reasonable alternatives for tank waste storage, retrieval, and treatment and remediation of the existing tank farms in its original alternatives. DOE has carefully considered the Oregon proposal and, as explained in Section 2.6.4, has determined that it is not reasonable.

The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. For both Tank Closure Alternatives 6A and 6B, Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that the removal of the contaminants from the vadose zone does not capture the contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and infiltration from contiguous cribs and trenches [ditches]).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

congressional or state oversight. No such similar path forward exists at the Hanford site. **504-11 cont'd**

13) Clean closure of the tanks is the preferred alternative. The Draft EIS should be revised to include alternatives for Double Shell Tank closure. The Draft EIS does not consider and evaluate a true clean closure scenario that includes cleanup of the groundwater, deep vadose zone contamination and groundwater contamination from past practice facilities. Instead, all of the Alternatives fail to meet regulatory compliance standards for groundwater contamination at some point. If alternatives are presented and analyzed in the Draft EIS that fail to meet regulatory standards, that should be identified, discussed and explained in the Draft EIS. All Alternatives should be compared to a true clean closure alternative. Alternative 6(b) is the closest acceptable alternative presented. **504-12**

14) DOE should adopt an interim policy that the farms will be clean-closed. Tank farm closure decisions can be revisited and made final after completing a more comprehensive characterization of the groundwater and vadose zone in order to understand the basic characteristics of the contamination migration processes. **504-13**

15) No action should be undertaken by DOE that would serve to preclude clean closure of the tanks, including grouting of tanks. **504-14**

16) All tank waste should be immobilized through vitrification. None of this waste should be disposed of on the Hanford Site, however. Adequate provision for temporary storage should be made at Hanford until a deep geological repository becomes available for use. Hanford Challenge opposes bulk vitrification and stone-casting. We support Option 2B for two high-level waste and six low activity waste melters. **504-15**

17) Safety and worker protection should be paramount considerations in the tank farm closure and vitrification processes. **504-16**

Groundwater and Vadose Zone

18) The Draft EIS also does not include or consider decisions about groundwater remediation at the tank farms. Instead, all of the Alternatives create groundwater sacrifice zones by default because all **504-17**

504-8 The decision to leave 0.1 percent, 1 percent, or more of the waste in the SSTs is one of the decisions supported by this *TC & WM EIS* (see Section S.1.3.1 of the *TC & WM EIS* Summary and Chapter 1, Section 1.4.1). The environmental and human health impacts of leaving 1 percent of the tank waste prior to closure is presented in several part of this EIS, including the Summary and Chapters 2 and 5. With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed on only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks and residual waste, requires preparation of a performance assessment and a closure plan. These required documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

504-9 As described in Chapter 8, Section 8.1.5, of this *TC & WM EIS*, DOE Order 435.1 and its associated manual and guidance establish responsibilities and requirements for management of DOE HLW, TRU waste, LLW, and the radioactive component of mixed waste. These detailed radioactive waste management requirements include requirements for management of waste incidental to reprocessing determinations; waste characterization and certification; waste storage, treatment, and disposal; and radioactive waste facility design and closure. The terms "incidental waste" and "waste incidental to reprocessing" refer to a process for identifying waste streams that are incidental to SNF reprocessing; such waste is subsequently managed as LLW or TRU waste if the "waste incidental to reprocessing" requirements contained in DOE Manual 435.1–1 are met. Thus, through this process, DOE is able to make a determination that, for example, waste residues remaining in tanks, equipment, or transfer lines can be managed as LLW or TRU waste if the requirements in Section II.B of DOE Manual 435.1–1 have been or will be met. These requirements are divided into two processes, the "citation" process and the "evaluation" process. Waste resulting from processing SNF that is determined to be incidental to reprocessing is not HLW and would be managed under DOE's regulatory authority in accordance with the requirements for LLW or TRU waste, as appropriate. When determining whether SNF processing plant waste is another waste type or HLW, either the citation or evaluation process in DOE Order 435.1 can be used.

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Alternatives fail to meet regulatory compliance standards for groundwater. Long-term groundwater impacts would result in extensive regions of contamination along the Columbia River shoreline making the area uninhabitable. Yet the Draft EIS states that groundwater decisions are not a part of this Draft EIS. The DOE cannot say that they are going to clean up the tank farms by sacrificing the groundwater, and then claim that decisions about groundwater cleanup are not part of the Draft EIS. Clearly the Draft EIS must include consideration of groundwater cleanup decisions. ***504-17 cont'd***

19) There should be no grouting and "closure" of the tanks with amounts of HLW in place, as DOE would be unable to remove any additional waste from the tanks or further maintain the integrity of the tanks. While DOE can be expected to environmentally monitor the tank fields as long as DOE has custodial responsibility over the sites, it is not contemplated that the tanks would be monitored for any specified period of time beyond that and passive institutional controls will need to be in place. Currently, we are unaware of any requirement for markers to alert future generations to the hazards posed by the waste similar to the requirements for passive institutional controls at geologic disposal site(s) for high-level radioactive waste. Such a situation would be the equivalent of abandoning waste in place. The prevailing attitude of the scientific community also uses the term "abandon." The National Academies had this to say on the performance of grout in binding radioactive waste: ***504-18***

> Predicting performance in resisting water infiltration can be difficult because of uncertainties that include the degree to which the first layers of grout take up the residue, the water pathway effects of the cold joints between successive pours of grout, and the effects of preferential corrosion of the tank metal and penetrating structures (thereby offering a partial bypass path). Moreover, waste tank residue is likely to be highly radioactive and not taken up in the grout, so there is substantial uncertainty associated with the volumetric classification and average concentration of the waste

In July 2003, parts of DOE Order 435.1 dealing with the procedures for determining waste incidental to reprocessing were declared invalid by the U.S. District Court for the District of Idaho in *Natural Resources Defense Council v. Abraham*, 271 F. Supp.2d 1260 (D. Id. 2003). On November 5, 2004, the court's decision was reversed on appeal by the U.S. Court of Appeals for the Ninth Circuit and remanded to the District Court with instructions to dismiss the case (*Natural Resources Defense Council v. Abraham*, 388 F.3d 701 [9th Cir. 2004]). On March 6, 2006, the District Court dismissed the case.

Some alternatives analyzed in this *TC & WM EIS* evaluate SST system closure, as well as disposal at Hanford of ILAW, ancillary equipment, WTP melters, and other supplemental-waste streams that meet the *Hanford Site Solid Waste Acceptance Criteria*, Revision 12 (Fluor Hanford 2005). DOE would proceed with SST system closure and disposal of these wastes only if closure and disposal activities complied with applicable laws. (For a more comprehensive discussion on the compliance with regulatory requirements, see Section 2.7 of this CRD) LLW and MLLW disposal facilities that would be sited, constructed, and operated under the alternatives analyzed in this EIS would be subject to the appropriate DOE Manual 435.1–1 requirements. Closure of HLW facilities, including the tank farms, also would be subject to DOE Manual 435.1–1 requirements.

504-10 The analytical approach and evaluation methods utilized in this *TC & WM EIS* are consistent with NEPA requirements and applicable law. Section 3116 of the 2005 National Defense Authorization Act is not currently applicable to the State of Washington, and only applies to the States of Idaho and South Carolina. At Hanford, the requirements for management of DOE HLW, TRU and LLW, and the radioactive component of mixed waste are provided in DOE Order 435.1 and its associated manual and guidance and are described in Chapter 8, Section 8.1.5, of this *TC & WM EIS*. Furthermore, as discussed in the *TC & WM EIS* Summary, Section S.5.2.1.4, and Chapter 2, Section 2.7.4, the final waste classifications of certain waste streams have not yet been determined. Nevertheless, to ensure consideration of the full range of alternatives, the EIS analyzes two alternatives, Tank Closure Alternatives 6A and 6B, both of which assume that the tank waste is all managed as HLW either because (a) the waste has been determined to be HLW, or (b) the historical processing data for the waste streams do not support management of the waste as non-HLW. It is also important to note that DOE is not making decisions based on this *TC & WM EIS* on the ultimate disposition of waste streams that are currently managed as HLW at Hanford, and will make

and prediction of the isolation performance of the system.[2] 504-18 cont'd

20) A comprehensive workplan for achieving the legally mandated levels of groundwater restoration must be included among the alternatives in the draft final EIS. In effect, this draft EIS contains only a "No Action Alternative" for contaminated groundwater at Hanford. 504-19

21) The invalidity of the vadose zone model is demonstrated by the fact that there is a complete misunderstanding of the source of the contamination plume that was used in the attempt to calibrate the vadose zone model. Vadose zone modeling is not properly calibrated and is inappropriate for assessing risk from contaminant migration through the vadose zone. 504-20

22) There is inadequate characterization of the nature and extent of the vadose zone contamination. None of the larger vadose zone contamination plumes at the tank farms have been adequately characterized to the extent that they can be used to perform the type of model validation that is needed for the risk assessments. 504-21

23) When some of the massive past releases occurred, soils were at near-saturation conditions, causing downward flow along preferential drainage pathways to the groundwater. This type of contaminant migration is common at most of the Hanford tank farms as indicated by patterns of contamination distribution and as is found in the similar geologic conditions in the lower Columbia Basin. With these conditions, it is inappropriate to use the type of vadose zone contamination migration model that was used in the Draft EIS. 504-22

24) The first step to completing a valid risk assessment is to characterize the nature and extent of contamination in the soil around the tank farms. This means tracing the contamination from the source through the unsaturated zone soil and into groundwater at most of the contamination plumes. Currently active sources of groundwater contamination are not included in the risk models. Active sources of 504-23

[2] National Research Council, Commission on Geosciences, Environment, and Resources. Board on Radioactive Waste Management, Committee on the Remediation of Buried and Tank Wastes, Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites. Washington, DC: National Academy Press. 2000, p. 40.

those decisions in accordance with applicable law.

504-11 Comment noted regarding the Section 3116 "waste incidental to reprocessing" process.

504-12 Potential conflicts with laws and regulatory compliance standards do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. This *TC & WM EIS* addresses the potential laws and requirements that would apply to the proposed actions, depending on the alternative (see Chapter 8). Issues concerning the ability to meet legal standards or requirements are also discussed, along with the potential mitigation measures that may be needed and that are feasible for DOE to implement. Additional mitigation measures could be required in future permits issued by the State of Washington, or be addressed under the scope of the TPA as part of future remedial actions that are subject to CERCLA. In the ROD, DOE will identify and discuss the factors considered in reaching its decisions, such as economic, technical, and national policy considerations, along with mitigation and monitoring measures that DOE will implement. With respect to the DSTs, as noted in the *TC & WM EIS* Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, a closure configuration for the original 28 DSTs was evaluated in this EIS for engineering reasons related to the closure barrier placement. However, a decision on closure of DSTs is not part of the proposed actions because the DSTs are active components needed to complete waste treatment. Closure of the DSTs would need to be addressed at a later date subject to appropriate NEPA review.

504-13 As outlined in DOE's Preferred Alternative for tank closure, DOE prefers landfill closure, which could include implementation of corrective/mitigation actions, as described in Chapter 7 of this EIS, that may require soil removal or treatment of the vadose zone. Decisions on the extent of soil removal or treatment, if needed, will be made on a tank farm- or waste management area-basis through the RCRA closure permitting process. DOE does not prefer alternatives with clean closure components because DOE believes that removal of the tank structures is technically infeasible and, due to both the depth of the contamination and the technical issues associated with removal of the tank structures, that it presents significant uncertainty in terms of worker exposure risk and waste generation volume.

504-14 Comment noted.

504-15 DOE believes the commentor actually supports Tank Closure Alternative 6B,

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

vadose zone contamination are also not included in the risk models. It is premature to make tank closure decisions and create groundwater sacrifice zones until the subsurface conditions are understood and vadose zone plumes are adequately characterized. **504-23 cont'd**

25) The Draft EIS should also evaluate a large scale soil excavation/removal strategy for deep contamination removal. **504-24**

26) The DOE uses full clean closure costs but only partial clean closure benefits in its cost benefit analysis. **504-25**

27) Technitium-99 contamination related to the BY Cribs (Figure N-5 in the Draft EIS) shows an increasing trend from about 500 pCi/L to 20,000 pCi/L and rising from about 1983 to the present. This trend indicates a dynamic groundwater contamination condition, not a steady state flow as modeled, and it indicates that an active vadose zone plume is just now entering the groundwater in the immediate vicinity of the well. **504-26**

28) DOE should not plan to undertake any remediation that requires institutional controls beyond 10 years after closure. The Draft EIS appears to assume that the DOE, or another agency of the US government, will control the Hanford Site for 10,000 years (vol 2., p. Q-31). This is an extremely unlikely scenario, and defies common sense. **504-27**

Detailed comments from Marco Kaltofen, PE, (Civil, Mass.), Boston Chemical Data Corporation, and John Brodeur, PE, LEG, are attached to this letter and should be incorporated in full as part of these comments.

In addition to the attached expert comments, we also offer the following detailed comments:

29) The Draft EIS alternatives should be amended to identify mitigation to protect the soil, groundwater, environment and future generations. **504-28**

30) Please identify how Quality Assurance/Quality Control (QA/QC) procedures and protocols were used in the performance of the draft TC&WM EIS analysis. **504-29**

31) p. 24, Vol. 1, 1.7.1: Retrieval should be governed by more than the 99 percent volumetric goal. After the 99 percent volumetric retrieval, if **504-30**

which would use a 2 HLW melter by 6 LAW melter configuration, because Alternative 2B assumes onsite disposal of ILAW glass. However, even Alternative 6B assumes secondary waste generated during treatment operations would be disposed of on site in an IDF.

504-16 Many of the technologies that DOE anticipates using allow work to be accomplished with low exposure of workers. For example, as described in Appendix E, the various tank waste retrieval technologies would use remotely controlled and robotic equipment to mobilize and remove waste from the tanks, and many of the waste treatment operations at the WTP also would be performed remotely.

As discussed in Appendix K, Section K.2.1.2.1, DOE and its contractors would implement controls to limit the exposure of individual workers for all activities in accordance with applicable regulations and guidance (10 CFR 835; DOE Standard 1098-2008). Site procedures and job control plans would incorporate ALARA techniques such as reducing time of exposure, increasing the number of workers and/or shielding, and using remote operations. DOE does use robotics when practical as a means of limiting worker exposure. As individual projects proceeded, DOE and its contractors would continue to look for ways to reduce worker doses.

504-17 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

504-18 The decision to leave 0.1 percent, 1 percent, or more of the waste in the SSTs is one of the decisions supported by this *TC & WM EIS* (see Section S.1.3.1 of the *TC & WM EIS* Summary and Chapter 1, Section 1.4.1), in addition to clean closure of the SSTs. The tank closure process, which includes detailed examinations of the tanks and residual waste, requires preparation of a performance assessment and a closure plan. These required documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

504-19 A comprehensive work plan for achieving the legally mandated levels of groundwater restoration is clearly not a requirement of this *TC & WM EIS*, and DOE strongly disagrees with the assertion that this EIS needs to validate the

specific radionuclides remain that pose unacceptable health or environmental hazards, then they should be targeted and more retrieval should be required until their health and environmental hazards are at or below acceptable level. **504-30 cont'd**

32) p. 24, Vol 1,: "Using currently available liquid-based waste retrieval and leak detection systems, waste would be retrieved" may be problematic. No retrieval method should unduly increase the amount of contaminants that leak into the surrounding soil. Sluicing tanks that are known to be leakers is not an acceptable option, unless it can be clearly demonstrated that future leaks will not occur. The leak detection systems must be accurate and the retrieval process must be highly regulated to ensure that the retrieval process will be stopped before any significant leaks can occur. **504-31**

33) p. 24, Vol1: "For analysis purposes, it was assumed that the WTP would need to be replaced after 60 years" means that DOE must guarantee that the replacement will occur, else the analysis is meaningless. **504-32**

34) p. 24, Vol1: "filled with grout to immobilize the residual waste" is inaccurate. The grout may serve to reduce the mobility of the residual waste contaminants, but it will not completely "immobilize" them. **504-33**

35) p.27, Vol1: "closed as an RCRA hazardous waste landfill unit under WAC 173-303, "Dangerous Waste Regulations," and DOE Order 435.1, as applicable," Remove "as applicable" because both requirements do apply. **504-34**

36) p.27, Vol1: "The BX and SX tank farms would be clean-closed by removing the tanks, ancillary equipment, and soils to a depth of 3 meters (10 feet) below the tank base." The selection of 10 feet must be addressed here (based on contaminant concentrations and costs) and must be justified elsewhere. "Where necessary, deep soil excavation would also be conducted to remove contamination plumes within the soil column." "Where necessary" needs to be replaced by specific requirements or at least a reference to a section where the specific requirements are located. **504-35**

entire Hanford cleanup strategy. The purpose of this document is to compare the relative environmental impacts of alternatives associated with tank waste disposition, offsite waste disposal, and FFTF disposition. The cumulative impacts analysis presented in Chapter 6 of this EIS attempts to portray impacts against a background of current contamination levels. DOE is committed to cleaning up the site to agreed-to regulatory levels through its ongoing CERCLA / RCRA programs, and the burden of showing their ultimate effectiveness remains with those programs.

504-20 The STOMP models in this *TC & WM EIS* were calibrated to groundwater conditions attributable to three reasonably well characterized sources: the BY Cribs, the BC Cribs, and the 216-T-26 Crib. Comparisons between model results and field data were made for the site as a whole (water table elevations), individual source areas (BY Cribs, TY Cribs, and the 216-B-26 Crib), and for groups of sources that combined to create regional-scale plumes (the REDOX and PUREX plumes). As stated in the Summary; Chapters 2 and 5; and Appendices O, Q, and U, DOE's view is that the differences between the alternatives that are greater than a factor of 10 (one order of magnitude) are significant discriminators among the uncertainties within the modeling chain.

504-21 DOE disagrees with the commentor's assertion that characterization data are inadequate for an understanding of the nature and extent of vadose zone contamination. The STOMP models in this *TC & WM EIS* were calibrated to groundwater conditions attributable to three reasonably well characterized sources: the BY Cribs, the BC Cribs, and the 216-T-26 Crib.

504-22 The STOMP model used for the vadose zone flow and transport analysis in this *TC & WM EIS* does account for the large discharges that occurred at Hanford. One of the features of the STOMP model, as explained in Appendix N, Section N.2, is a three-dimensional representation of geology, hydraulic properties, and grid geometry. Selected to incorporate spatial heterogeneity of geologic and recharge conditions, this representation explicitly simulates the complexity of travel time behavior due to the lateral spreading and preferential flow that reflect local conditions.

504-23 DOE disagrees with the commentor's premise that current sources of groundwater and vadose zone contamination are not included in the risk models. For both the alternative and cumulative impact assessments, past, current, and future releases are modeled and their impacts evaluated for the entire 10,000-year period of analysis. As indicated in Appendix N, Section N.3.4, of this

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37) p.27, Vol1: "The MLLW would be disposed of on site." The proposed location for future disposal must be identified and analyzed, else DOE may only be transferring a problem from one location to another. **504-36**

38) p.27, Vol1: "Using currently available liquid-based retrieval and leak detection systems, waste would be retrieved to a volume corresponding to 90 percent retrieval, less than the TPA Milestone M-45-00 minimum goal of 99 percent." DOE agreed to the TPA Milestones, thus there is no need to analyze or present an alternative that would violate DOE's legally-binding commitments. **504-37**

39) p.29,Vol. 1: "The HLW debris from clean closure would be managed as HLW and stored on site." Debris needs to be defined. Hanford Challenge supports the DOE's proposal to characterize the melters as HLW, and disposed of according to the requirements in the Nuclear Waste Policy Act. **504-38**

40) p.29,Vol. 1, Tank Closure Alternative 6C: While the soil cleanup is to a deeper level than for other alternatives, cleanup may be needed at even greater depths. Also, for this alternative and all others, plans for cleanup of soil that is not directly under tanks must be included. **504-39**

41) Vol. 2, p541, D.1.1 (D-2): "All radionuclides are decayed to January 1, 2001 (DOE 2003a)." It is unclear whether ingrowth of progeny is properly considered, which can be of vital importance. If ingrowth was not considered, please do so and make the appropriate corrections. **504-40**

42) Vol. 2, p542, D.1.1 (D-3): "For the groundwater release screening scenario, only drinking water consumption was considered." If screening is not performed for all groundwater pathways, key contaminants may be screened out that should not be. Either provide evidence that the limited screening is bounding or extend the screening to all groundwater pathways that are analyzed. **504-41**

43) Vol. 2, p542: "Radionuclides contributing less than 1 percent of impacts" is unclear. Was the total contribution from the screened out contaminants less than 1 percent or was the contribution from each individual radionuclide less than 1 percent? If the latter case is true, then it is possible that slightly less than 36 percent of the impacts were ignored. Please clarify the statement and ensure that the former case is what was adopted. Please provide details on how the screening analyses **504-42**

Final TC & WM EIS, field-sampling data from approximately 150 vadose zone boreholes were used to calibrate the vadose zone model as well as regional-scale groundwater plume measurements for the BY Cribs, BC Cribs, 216-T-26 Crib, and the REDOX and PUREX waste sites. Furthermore, in Appendix U, modeled results of contaminant plumes are compared against field measurements for the COPCs. DOE's view is that the overall level of characterization data for Hanford supports differentiation among the alternatives, which is a key feature of a NEPA analysis.

504-24 This *TC & WM EIS* has evaluated large-scale soil excavation/removal strategy. This approach is considered in Tank Closure Alternatives 4, 6A, and 6B, which involve selective or complete clean closure of the SST system and are representative of excavation actions that result in removal of the source of contamination from the vadose zone (i.e., contaminated soils between the tank farms and the groundwater). Clean closure of the tank farms would involve removing all SSTs, associated ancillary equipment, and contaminated soil to a depth of 3 meters (10 feet) below the tank base, all of which would be managed as HLW. Where necessary, deep soil excavation would then be conducted to remove contamination plumes within the soil column.

504-25 Chapter 2, Section 2.11 of this *TC & WM EIS* summarizes and compares the relative consolidated costs of continued operation of existing facilities; construction, operation, and deactivation of new or modified facilities; and associated activities in support of the proposed actions, including administrative controls, institutional controls, and postclosure care. For analysis purposes, these cost estimates were calculated using constant 2008 dollars and, where applicable, existing cost information. Where cost information was not directly applicable, relevant data were scaled to estimate costs, or, where appropriate, scoping-level cost estimates were developed.

See response to comment 504-6 regarding factors influencing future DOE decisions.

504-26 Appendix N, Figure N–5, of the *Draft TC & WM EIS*, depicts the gross beta and technetium-99 concentrations at monitoring well 299-E33-7 near the BY Cribs. The graph is a reflection primarily of the operational history of the BY Cribs, with an early (ca. 1956) peak groundwater concentration of approximately 1,000,000 picocuries per liter. The subsequent groundwater concentrations (after ca. 1970) result from residual vadose zone contamination from the BY Cribs and potentially other neighboring sources. DOE disagrees with the assertion that

were performed, whether the same computer programs and models were used as in the final analysis or if surrogates were utilized.

- Also, it is unclear whether daughter ingrowth was considered in the screening analyses. Please state exactly what was analyzed. If progeny ingrowth was not considered, then the screening analyses must be corrected.
- Please state how uncertainty was included in the screening analysis. If uncertainty was ignored, then the screening could easily miss important contaminants. If uncertainty was not included, then the analysis needs to be corrected. **504-42 cont'd**
- Please provide a complete list of the expected inventories for all contaminants before the screening process was performed and what their impacts were.
- Inventories of all organics that could complex with contaminants and affect their mobility are required.

44) Vol. 2, p2231, Q.2.4.2 (Q-25): "Physical characteristics of soil were based on site-specific measurements, description of the soil as silty clay loam (Mann et al. 2001)" Please provide a complete set of soil physical properties, rather than relying on a single description. Hundreds of soil measurements have been performed over decades and clay has almost always only been detected in very minute quantities. Much better support is required before such an important analysis can rely on a single statement from an author that is not a geologist. Any covers have conceptually been considered to be impregnated silt overlying sand, gravel and basalt. **504-43**

a. If impregnated silt is considered, then rock corrections are needed for porosities and other physical properties.

45) Table Q–7. No evidence of rock corrections is evident. Please make the appropriate corrections here and throughout all the physical property data and analyses. **504-44**

46) Tables Q-7 to Q-8. Properties such as the hydraulic gradient, dry bulk density and vadose zone thickness will vary across the site. Also the use of a single strata would cause any bona fide geologist to go into **504-45**

an active vadose zone plume is just now entering groundwater in the immediate vicinity of the well. The operational history, characterization data, and vadose zone physics all suggest an early impact from this site approximately two orders of magnitude greater than currently observed.

504-27 This *TC & WM EIS* provides information on the potential short- and long-term impacts for each of the alternatives analyzed, but does not compare these two types of impacts. To fully understand the impact of an alternative, it is necessary to consider both the short- and long-term impacts, which are discussed in the Summary and Chapter 2 of this EIS.

This *TC & WM EIS* assumes several different types of end-state management, as described in Chapter 2, the Glossary, and the Summary. These include administrative controls, institutional controls, and postclosure care, as appropriate. Each of these end-state management options would take place at the completion of an action and is assumed to occur for 100 years following the end of the action (e.g., active institutional controls would be maintained for 100 years following final placement of waste in a storage facility). DOE chose this time period for institutional controls based on current regulations. For disposal facilities licensed by NRC for the disposal of Class A and Class B low-level waste without special provisions for intrusion protection, institutional control of access to the site is required for up to 100 years. For hazardous waste management disposal units, RCRA and Ecology hazardous waste regulations require a 30-year postclosure care period; however, due to the types of waste planned for disposal, it is assumed that this period would be extended to 100 years. The 10,000-year time period described in this *TC & WM EIS* represents the period of analysis used for the long-term impact analyses for groundwater, human health, and ecological risk; it does not represent the assumed period of institutional controls. For clarity, the definition of "10,000-year period of analysis" is included in this final EIS in Chapter 2, the Glossary, and the Summary, as appropriate.

504-28 Chapter 7, Sections 7.1 and 7.5, of this *TC & WM EIS* discusses mitigation measures that could be used to avoid or reduce potential impacts on all resource areas. Many of the mitigation measures discussed would apply across all alternatives because of the similar nature of some of the activities analyzed in this EIS (e.g., construction of facilities). However, the resource subsections of Section 7.1 do acknowledge specific alternatives where only certain mitigation measures would apply or where additional mitigation consideration may be warranted.

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shock. Unless it can be demonstrated that the current analysis is bounding, individual analyses for each tank farm is needed. *504-45 cont'd*

47) Table Q-12 contains the following contaminants:

Hydrogen-3 (tritium)
Carbon-14
Potassium-40
Strontium-90
Zirconium-93
Technetium-99
Iodine-129
Cesium-137
Gadolinium-152
Thorium-232
Uranium-238
Neptunium-237
Plutonium-239
Americium-241

Table D-2 contains the following radionuclide: *504-46*

Hydrogen-3 (tritium)
Carbon-14
Strontium-90
Technetium-99
Iodine-129
Cesium-137
Uranium isotopes
Neptunium-237
Plutonium isotopes
Americium-241a

504-29 DOE applies quality management systems to its NEPA document preparation process and is committed to developing NEPA documents of the highest quality and technical accuracy. This *TC & WM EIS* was prepared in compliance with the requirements of DOE Order 414.1D, *Quality Assurance*, as well as project-specific quality management plans and procedures that govern data management, calculations and analyses, and analytical software development and use. As a result of the 2006 Settlement Agreement between DOE and Washington State ending litigation concerning the *HSW EIS* (DOE 2004a), Ecology conducted its own quality assurance reviews of the *Draft TC & WM EIS* to ensure that quality assurance processes were in place and being followed.

504-30 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. DOE's preferred retrieval option (i.e., to retrieve at least 99 percent of the tank waste) is consistent with the TPA goal of residual waste not exceeding 10.2 cubic meters (360 cubic feet) for 100-series tanks or 0.85 cubic meters (30 cubic feet) for the smaller 200-series tanks, corresponding to 99 percent retrieval. The EIS analysis shows that the level of waste retrieved is important in long-term impacts. Once the tank waste in a waste management area is retrieved, the actual residuals will be evaluated during the closure process for that waste management area. Activities include detailed examinations of the tanks and residual waste and preparation of a performance assessment and closure plan. These documents will provide the information and analysis necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks. DOE has already begun the process of retrieving waste from the tanks, such as tanks located in Waste Management Area C.

See response to comment 504-6 regarding factors influencing future DOE decisions.

504-31 Because of concerns regarding the use of sluicing methods to retrieve waste from leaking or suspect leaking tanks and agrees with that concern, as described in Appendix E, Section E.1.2.2., this EIS assumes that the modified sluicing retrieval method would not be used to retrieve waste from leaking or suspected leaking tanks. Instead, a vacuum-driven MRS was assumed to be used for these tanks. Leak detection and monitoring is described in Section E.1.2.2, which

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It is clear that there is a disconnect between these tables. Also, it appears that ingrowth of progeny has not been considered which invalidates the analyses. **504-46 cont'd**

48) E.1.2.2.5 Leak Detection and Monitoring – Acceptable leak volumes need to be defined. Those definitions need to be developed based on contaminant concentrations and distributions from past leaks and spills and residual concentrations. Modeling should be able to predict risks from potential future leaks and those risks must be within acceptable levels. **504-47**

49) p. 710, Vol. 2, E.1.2.2.53 (E-29): "However, given the limited sensitivity of some SST leak detection systems, larger leak volumes could occur." Maximum allowable leak volumes must be defined and leak detection systems must be demonstrated that will ensure that leaks greater than the maximum allowable cannot occur. **504-48**

50) p. 1734, Vol. 2, L.1.3 (L-3) - "The Technical Guidance Document specifies five key requirements for development of the TC & WM EIS groundwater flow field, as follows:

a. The flow field should be transient (i.e., change with time).
b. The factor driving the transient behavior should be operational recharge to the aquifer rather than time-changing boundary conditions.
c. The sitewide natural recharge rate should be 3.5 millimeters (0.14 inches) per year.
d. Both a Base Case and a Sensitivity (Alternate) Case should be investigated; the difference between the two cases should take into account the uncertainty in the top of basalt (TOB) elevation in the Gable Mountain–Gable Butte Gap (Gable Gap). The intent of the TC & WM EIS is to illustrate any potential differential effects this uncertainty might have on simulated alternative impacts. This approach was preferred (as opposed to presentation of results for all alternatives for each flow field) for brevity and clarity of presentation. **504-49**
e. Flow field development should be consistent with the frameworks for vadose zone and contaminant transport modeling.

states that safe retrieval of tank waste would involve the use of procedures, technologies, and systems for detecting environmental releases.

504-32 The assumptions made in this *TC & WM EIS* are for analytical purposes only. DOE's goal is to consider the best-available information to inform the agency's decisionmaking process about the potential impacts that may result from a particular course of action. Predicting the exact timing of replacement for a new technology facility is not feasible at this time. Therefore, conservative analyses and assumptions tending toward overestimating the impact, were provided in this EIS. CEQ regulations (40 CFR 1502.9(c)) require an agency to consider whether there are substantial changes in the proposed action that are relevant to environmental concerns or significant new information or circumstances that have developed over time. DOE will ensure appropriate NEPA review is conducted consistent with CEQ requirements as facility upgrades or replacements are needed.

504-33 Regarding this EIS's use of the word "immobilize," as discussed in Appendix E, Section E.1.2.5.1.1, under "Residual Waste Stabilization," this EIS assumed that physical stabilization of the residual waste would be achieved through the introduction of dry powders, dry granular material, and grout. The goal of such stabilization would be to reduce the residual waste constituent's mobility by physically isolating the residual waste from the environment and/or treating the waste chemically to reduce its mobility. Thus, while complete immobilization of the residual waste may never be achieved, DOE is seeking to achieve this goal and it is considered appropriate for consideration in this EIS.

504-34 DOE's intent in using the phrase "as applicable" is to clarify that the two requirements will need to be integrated during the closure process and as part of decisions made by the regulator, including agreements made under the TPA, a legal agreement between DOE, Ecology, and EPA.

504-35 DOE understands the comment to refer to the draft EIS Chapter 1, Section 1.7.1.4, statement, "The BX and SX tank farms would be clean-closed by removing the tanks, ancillary equipment, and soils to a depth of 3 meters (10 feet) below the tank base." As further discussed in Appendix E of the draft and final EISs, Section E.1.2.5.3.2, under Tank Closure Alternative 4, the tank slab, footing, and 3 meters (10 feet) of soil under the tank slab were assumed to be highly contaminated and, thus, were required to be decontaminated in the Preprocessing Facility. The depth of 3 meters (10 feet) below the tank slab is an average depth assumption that was made for analysis purposes in the draft and

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f. Even if DOE provides an edict on the natural recharge rate, scientific justification is still required to use that value, else the analysis is useless. **504-49 cont'd**

51) p. 1742, Vol. 2, L-11, L.4.2: "The only time-varying fluxes of water across the model boundary are anthropogenic are recharges." The above statement is known to misrepresent field conditions. A detailed discussion of the misrepresentations is needed including an analysis of their effects. Examples of misrepresentations are that the river elevations change over time, leakage occurs through the basalt, and areas modified by man do not receive the natural recharge (e.g., buildings, roads, etc.). **504-50**

52) p.1745, Vol.2, L.4.2 (L-11): "tank farms receive 100 millimeters (4 inches) per year." Because all cell footprints are 200 m X 200 m, a discussion of boundary conditions over cells only partially containing tank farm or other unnatural entities is needed. **504-51**

53) "p.1745, Vol.2, L.4.2.4 (L-14): Values for over 200 sources (or sinks) of water were taken from the Cumulative Impacts Inventory Database (SAIC 2006) and encoded into the model." Information on which sources were selected and any rejections is needed to help check the model. Also comments from the LUG and experts are needed with the accepted resolutions. **504-52**

54) p.1757, Vol 2, L.5.1.1 (L-26): "To mitigate the rewetting problem in the Gable Gap area within the model, inactive cells that represented the TOB were made active and assigned hydraulic conductivity values that are more than 500 times smaller than that of Hanford and Ringold Muds (0.001 meters [0.00328 feet] per day). Making the inactive cell active and using a low hydraulic conductivity value allowed the active water table cells above the TOB to rewet from below but also maintained the TOB as an impermeable boundary." **504-53**

a. The DOE's claim to have an impermeable boundary of active cells with a non-zero conductivity is not possible. Also, a computer program that does not allow rewetting from any adjacent cell cannot represent physical reality, thus any analyses using such a computer program for Hanford sediments cannot duplicate certain physical processes and its results are suspect. Results

final EISs. The actual depth and volume of soil would be evaluated on a tank-by-tank basis after the contaminant levels within the soil were determined. This level of discussion was considered inappropriate for inclusion in Chapter 1 of this EIS, but was described in detail in Appendix E. Similarly, a description of deep soil removal activity under Alternative 4 was included in Section E.1.2.5.3.2. As explained in this section, there is considerable uncertainty regarding the size and concentration of the contaminants within the past tank leak plumes. Therefore, for analysis purposes, conservative estimates were made concerning these past tank leak plumes so that their impacts could be analyzed. The extent of the soil-cleaning efforts required to meet the waste acceptance criteria for onsite disposal of the decontaminated debris and soil at the RPPDF was unknown, as were the details of the Preprocessing Facility flowsheet. Therefore, assumptions were made concerning the "acid wash" soil-washing treatment system that would be employed in the Preprocessing Facility and the throughput of the facility. Details of these assumptions are included in Section E.1.2.5.3.2.

504-36 The discussion to which the commentor refers is a summary of the closure actions addressed under Tank Closure Alternative 4. As detailed in Chapter 2, Section 2.5.2.4, this MLLW would be disposed of on site in the RPPDF, a proposed new facility that would be built between the 200-East and 200-West Areas. The impacts of constructing and operating this facility are addressed within the scope of this *TC & WM EIS*.

504-37 One *TC & WM EIS* alternative addresses a retrieval goal of 90 percent, less than the TPA Milestone M-45-00 minimum goal of 99 percent. Retrieval to 90 percent represents a range, depicting the potential programmatic risk analysis process for the tank farms as defined by Appendix H of the TPA, Single Shell Tank Waste Retrieval Criteria Procedure. This alternative evaluates the potential impacts that could occur from implementing that process. To date, Ecology and DOE have initiated the Appendix H process for one tank, 241-C-106.

504-38 As used in this *TC & WM EIS*, the term "debris" is defined as waste that results from the cleanup and closure of the tank farms. This waste would include contaminated construction rubble and any metals and plastics used during the actual cleanup such as clothing, equipment, or pipes. Its use in this EIS was not intended to meet the EPA definition of debris as codified in "Land Disposal Restrictions" (40 CFR 268).

504-39 DOE would like to clarify that Tank Closure Alternative 6C involves landfill closure and is discussed on page 1–30 in Chapter 1, Section 1.7.1.6, of the *Draft*

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from representative test cases must be benchmarked against computer program that can duplicate those physical processes to estimate the amount of error that is introduced by applying the computer program with known errors. **504-53 cont'd**

55) p. 1758, Vol 2, L.5.4 (L-27): "Pre-Hanford head observation data are not available." The TC & WM EIS groundwater flow model was assigned an initial arbitrarily high water table and run in transient mode for 500 years to simulate pre Hanford (1940–1943) conditions with only natural recharges applied per the Technical Guidance Document (DOE 2005). This initial 500-year model run approached long-term steady state conditions, which is assumed to represent pre-Hanford conditions." Residents lived at the Hanford location, probably farming. Their effect on the environment must be included when establishing initial conditions. **504-54**

56) p. 1758, Vol 2, L.6.1 (L-27): "Closer than 600 meters (1,969 feet) to the Columbia River, to remove the periodic fluctuations in the river stage from the head observation data" The periodic fluctuations in the river stage may be one of the most important factors affecting the transport of contaminants into the Columbia River, yet it is being rejected. At a minimum, separate analysis is needed to determine its importance and how to include that importance. **504-55**

57) N.1.2; "Boundary conditions for the upper surface at each site are a specified recharge determined by technical guidance (DOE 2005)" For the saturated zone model, the recharge was altered annually based on human activities. The same rule applies to the vadose zone analysis, although the timing should be more refined. **504-56**

58) N1.2; "More than 400 subarea models are required" for the vadose zone analyses. The edges of the subarea models were extended to the point where the side contaminant fluxes were set to zero. This approach requires that there is no interaction between the subarea models. **504-57**

a. Please provide a single figure showing the footprints of all subarea models and state that there is no interaction between any subarea models.
b. Other: The tank T106 leak (and possibly others) was so great that it altered the vadose zone. A typical release to the vadose zone **504-58**

TC & WM EIS. Tank Closure Alternatives 6A and 6B involve clean closure of the tank farms, which includes the removal of all tanks, associated ancillary equipment, and contaminated soil to a depth of 3 meters (10 feet) directly beneath the tank base and, where necessary, deep soil excavation to remove contaminated plumes within the soil column. Under Alternatives 6A and 6B, Option Case, in addition to clean closure of the tank farm sources, clean closure of the contiguous cribs and trenches (ditches) would also occur, which involves removal of contaminated plumes within the soil column as a result of the operation of these cribs and trenches (ditches).

504-40 DOE agrees with the commentor's observation that the concentration of daughter products can increase with time, and that, given enough time, a closed system will attain a state of secular equilibrium. This was considered in developing the screening process used in determining the COPCs for this *TC & WM EIS*. It turns out that the rate of production of the daughter products is low for the conditions relevant to a 10,000-year groundwater analysis. A discussion of this issue has been included in this *Final TC & WM EIS*.

504-41 Appendix Q featured consideration of both groundwater release and direct intrusion scenarios and their long-term human health impacts. For the groundwater release scenario, only drinking water consumption was considered; for the direct intrusion scenario, only inadvertent soil ingestion and inhalation pathways. It has been found that direct consumption of contaminated drinking water entails potential exposure to all of the radionuclides and chemicals identified in the cumulative impacts and alternative impacts waste inventories.

504-42 The radionuclides and chemical constituents used in the *Draft TC & WM EIS* analysis are the product of the extensive database compilations, reviews, and drinking water–based preliminary human risk assessment described in detail in Appendix S. The preliminary risk assessment determined that many of the radionuclides and chemical constituents in the initial compilations would not contribute significantly to either the alternative or cumulative impacts described in this *Final TC & WM EIS*. Thus, radionuclides contributing less than 1 percent of the impacts under well scenarios were eliminated from the detailed analyses, as were chemicals present in the inventories at levels at or below health-based limits. The screening resulted in reduction of the original inventory to the final analytical set of 14 radionuclides and 26 chemical constituents.

The response to the commentor's specific question regarding daughter ingrowth is yes; ingrowth was considered in developing the screening process

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model is not applicable and is not acceptable for such leaks. One example of the vadose zone alteration is that Cesium traveled so far, because so much Sodium (Na) flooded the vadose zone that it tended to occupy the sorption sites where the Cs typically would occupy.

504-58 cont'd

59) p. 1933, Vol. 2, N.1.2 (N-3): "In summary, the process for the selection of hydraulic parameter values involved the matching of predicted to measured borehole moisture content profiles for all 16 soil types followed by the matching of randomly generated soil types to observed unconfined aquifer conditions for 3 primary soil types. It also provided for consistency with values of saturated hydraulic conductivity" Quantification of the random generation process is needed and numerical values for determining consistency are required, because as stated the values may not even be realistic, but could match what is stated.

504-59

a. Other: Using 200 m X 200 m cells throughout the model domain will result in excessive smearing and likely numerical dispersion for contaminant transport analyses. What was done to address these concerns?

504-60

60) p.1937, Vol. 2, N.1.2 (N-7): "The early peak of the predicted technetium-99 profile occurs at the same time as the early peak of the measured total beta profile (see Figure N–5) but is lower because of the presence of radionuclides other than technetium-99 among beta emitters. The concentration level measured and predicted for technetium-99 for the current time period are in general agreement. Thus, the predicted concentration profile for technetium-99 shows qualitative agreement with the reported concentration of gross-beta activity."

a. The above interpretation is highly suspect. First, information for Figures N-5 and N-6 are plotted separately making any interpretation difficult. Second, the time axes are entirely different, making any interpretation even more difficult. While the early peak Tc-99 concentration (~1E6) may be lower than the total beta peak concentration (~1E9), it is 3 orders of magnitude lower, while at later times, the measured values for Tc-99 actually exceed the measured value for total beta. Additionally, the latest measured values for both Tc-99 and total beta are trending upwards, while the

504-61

for determining the COPCs used in this EIS, and it turns out that the rate of production of the daughter products is low for the conditions relevant to a 10,000-year groundwater analysis. A discussion of this issue has been added to this EIS, along with more detail on how the screening process was completed.

504-43 In Appendix Q of this *TC & WM EIS*, the term "soil" refers to topsoil in which plants consumed by both humans and livestock (or game) are growing. As such, it is altered by natural processes at the ground's surface and, in the case of agricultural scenarios, by human activities. Soils are distinctly different from those subsurface materials for which "hundred of measurements" have been made and will vary across the site. Hence, the analysis in this EIS uses statistically derived parameters that are conditioned on qualitative descriptions of materials found at the site. Site-specific properties, such as those used in the unsaturated zone modeling of the subsurface materials, are discussed in Appendix N of this EIS.

504-44 DOE does not believe that rock corrections to Appendix Q, Table Q–7, are needed. As indicated in the text, the properties addressed in that table are the saturated-zone input for the RESRAD [RESidual RADioactivity] code. Written as a systems performance assessment code, RESRAD handles the indirect water use pathways (e.g., gardening) adequately, but is unable to sufficiently account both for the variable releases of contaminants over space and time and for the complex hydrogeology found at the site. Thus, the approach taken to assessing long-term doses and risks for the radionuclides employs a combination of RESRAD calculations for the non–water exposure pathways and postprocessed STOMP and MODFLOW/RAN3D numerical flow and transport calculations for those pathways involving use of groundwater. As a practical matter, this means that the groundwater pathway results from RESRAD, based on the parameter values indicated in Tables Q–7 and Q–8, are not used in the analyses.

Still, it is necessary for RESRAD to have parameters in order to run. While RESRAD offers default values, the inputs either are taken to be broadly representative of conditions found at the site or are used to actively suppress/control the unused groundwater component in the RESRAD runs; for example, the well pumping rate is 0.0. Hence, even these parameters are reported in Table Q–7. The soil and sediment hydraulic properties referred to elsewhere in this *TC & WM EIS* are those used in the numerical models. The parameterization of these properties, discussed in Appendix N, Section N.3, has been based on matching observations at a field scale, not a laboratory scale. Hence, once again corrections are not required.

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predicted value are essentially constant. There is no general agreement here. Because the Tc-99 measurements are greater than the total beta measurements, some measurements are clearly in error. The measurement errors need to be addressed. **504-61 cont'd**

61) p.1938, Vol. 2, N.1.2 (N-8): "Estimates of isopleths of concentration of technetium-99 near the BY Cribs based on measurements reported for 2007 are presented in Figure N–7. These data were used to provide additional testing of the proposed set of values of vadose zone hydraulic parameters. The approach used TC & WM EIS source data for the BY Cribs, the STOMP vadose zone model, the MODFLOW-predicted transient flow field, and a particle tracking transport model to predict spatial distribution of technetium-99 in the unconfined aquifer for calendar year 2005. The results of this analysis are presented in Figure N–8." There is no reason why model results could not be presented for year 2007 to allow direct comparison with measured results. **504-62**

a. The color scheme and inclusion of the mesh in Figure N-8 makes even trying to read the figure almost impossible. The two figures should be combined using simple contours, but different colors for measured vs. predicted values, with a zoom-in figure if needed. **504-63**

b. Other: No mention of Courant numbers or Peclet numbers, common modeling metrics, could be found in Vol 2, calling into question the accuracy of any and all results. **504-64**

62) p.1938, Vol. 2, N.1.2 (N-8): "The predicted concentrations show both qualitative and quantitative agreement with measured concentrations, with high levels near the sources and decreasing levels in the northwest direction. The predicted concentrations also show movement to the southeast due to transient flow in that direction under the influence of high aqueous discharges from past Hanford operations." **504-65**

a. The "quantitative agreement" is questionable. Even 1D models would show higher levels near the sources. For quantitative agreement, a metric must first be established, such as an root-mean-square approach (as was used for the saturated zone well heads) where differences between predicted concentrations at well locations are compared to measured concentrations at the same wells. Next, an acceptable level for differences must be

Note that RESRAD, as described in Section Q.2.3, is also used for intruder scenarios. These scenarios involve exposures to waste brought to the surface or excavated; they do not entail any groundwater exposure pathways.

504-45 The approach taken in assessing long-term doses and risks for the radionuclides employs a combination of postprocessed STOMP and MODFLOW/RAN3D numerical flow and transport calculations for those pathways involving use of groundwater and RESRAD calculations for the non–water exposure pathways. In regard to the former, there are 16 soil types, each with distinct hydraulic properties, employed in the numerical models for groundwater flow and transport calculations. A qualitative and quantitative hydraulic characterization of each material type at field scale has been developed, and each material is associated with a known stratigraphic unit. Further, that material can and does appear in a discontinuous manner at several locations within a stratigraphic unit, resulting in a hydrological characterization at a scale finer than that of the major geological strata found at the site. Details are provided in Appendix N.

The particular hydraulic properties given in Tables Q–7 and Q–8 are the saturated and unsaturated zone input for the RESRAD code, a multipathway systems performance assessment code. RESRAD handles the indirect water use pathways (e.g., gardening) adequately, but is unable to sufficiently account for both the variable releases of contaminants over space and over time and the complex hydrogeology found at the site. As a practical matter, this means that the groundwater pathway results from RESRAD, based on the parameter values indicated in Tables Q–7 and Q–8, are not used in the analyses, and the parameter values in those tables do not matter.

Still, it is necessary for RESRAD to have parameters in order to run. While RESRAD offers default values, the inputs in the tables either are taken to be broadly representative of conditions found at the site or are used to actively suppress/control the unused groundwater component in the RESRAD runs. Tank farms are individually analyzed, for long-term as well as intruder scenarios.

504-46 Appendix D, Table D–2, of the *Draft TC & WM EIS* provides a listing of the final set of constituents used in the analysis of the tank waste, which set was screened from the original BBI of the underground waste storage tanks at Hanford. It is also noted in Section D.1.1 that a screening of the cumulative impacts analysis data resulted in the addition of other COPCs that are not included in Table D–2 but are included in Appendix Q, Tables Q–1 and Q–12 (noted in the comment).

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established. Differences must be calculated for all the times when measurements were recorded for each subarea model. In that manner quantitative measures can be established for each subarea and can be compared against a pre-specified standard. **504-65 cont'd**

b. Merely providing graphical results for a very small sample of subarea models is of limited value. It does not allow anybody to draw any meaningful conclusions, if for no other reason than the sample may not be representative. The preponderance of the evidence should demonstrate the accuracy and usefulness of the models.

c. Some more meaningful examples would be: **504-66**
   i. compare model predictions with actual contaminant discharges to the Columbia River for a total system evaluation
   ii. compare model predictions with actual contaminant movement from the T-106 tank leak for a near-field release that has been well studied and documented
   iii. compare with pump-and-treat operations that combines the effects of large scale and long term contaminant migrations with the efficacy of human intervention with its implications on the various proposed alternatives

63) p.1941, Vol. 2, N.1.2 (N-11): "On the basis of this quantitative agreement of a factor of less than five quantitative agreements..." This makes no sense. Presentation of results over an extended period of time would be much more valuable and would provide much more information than a single snapshot in time **504-67**

64) Figure N-9: please explain "Tritium picocuries per cubic liter" **504-68**

65) Figure N-12: It appears that a considerable amount of numerical dispersion has infected the model, producing more widespread pollution than is real and lowering peak concentrations. A simple contour plot (without contour flooding) overlaying wells with zero or < 100 pCi/L of H-3 is needed to address this issue and help evaluate the accuracy of the modeling predictions. **504-69**

66) Table N-1: "Plio-Pleistocene Cement" needs explanation. It does not appear that any rock (gravel) corrections have been included in this table. Please explain why not and provide justification. **504-70**

Therefore, DOE disagrees with the commentor's statement that there is a disconnect between these tables.

504-47 DOE has developed and implemented a very advanced system for detecting and monitoring leaks and spills from the waste tanks. As discussed in Appendix D, Section D.1.6, Tank Waste Retrieval Leaks, this EIS conservatively assumes a leak of 15,000 liters (4,000 gallons) of tank waste from each of the SSTs. This waste volume is considered conservative because of the advanced leak-detection-and-monitoring systems DOE now has in place at the tank farms.

504-48 Both the maximum allowable leak volumes and what DOE considers to be conservative leak volumes for the SSTs are included in the EIS analysis, as described in Appendix D, Section D.1.6, Tank Waste Retrieval Leaks. This EIS conservatively assumed a leak of 15,000 liters (4,000 gallons) of tank waste from each of the SSTs. This volume is considered conservative because DOE now has advanced leak-detection-and-monitoring systems in place at the tank farms.

504-49 Regarding "scientific justification" of parameters and inputs to the groundwater modeling, the authors of the *Technical Guidance Document* (DOE 2005) were of the view that a value of 3.5 millimeters per year is within the scientifically agreed-upon range of estimates for background infiltration and that there is certainly some spatial and temporal variation in the real world, but that, given the relative insensitivity of a groundwater flow model to this parameter and given the comparative nature of a NEPA analysis, the estimate contained in the *Technical Guidance Document* was reasonable for the purposes of a NEPA analysis. DOE, Ecology, the Technical Review Group, and the technical contributors to the development of this *TC & WM EIS* are in agreement with this view.

504-50 DOE does not misrepresent field conditions, but may make simplifying assumptions for analysis purposes. Appendix L, Section L.2.2, of this *Final TC & WM EIS* has been revised to expand the boundary condition discussion, including more detail about the potential effects when model-encoded boundary conditions are simplified for analysis. This discussion also includes more detail about the data limitations and uncertainties in areas where simplifying assumptions are applied.

504-51 Appendix L of this *Final TC & WM EIS* has been revised to include a discussion of boundary conditions over cells containing tank farms or other unnatural entities that do not fully cover the 200-by-200-meter MODFLOW cell.

504-52 A detailed description of the methodology for evaluating all of the sources included in the Cumulative Impacts Inventory Database is included in

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

67) Table N-1: No mention of horizontal hydraulic conductivity or anisotropy is provided. Please provide the missing information and its justification. **504-71**

68) Table N-1: Please explain why the Hanford gravel has a hydraulic conductivity (0.0125 cm/s) that is less than that for Hanford sand (0.0202 cm/s). Those values do not agree with the basic material definitions and can lead to extremely erroneous model predictions. **504-72**

69) Please identify how Quality Assurance/Quality Control (QA/QC) procedures and protocols were used in the performance of the draft TC&WM EIS analysis. **504-73**

70) As noted by the Hanford Advisory Board's independent contractor's analysis, there are a number of unit conversion or data errors that raise serious doubts about the quality of the analysis. **504-74**

Appendix S of the *Draft TC & WM EIS*. This appendix includes details about contaminant inventories and liquid volume releases. The MODFLOW Technical Review Group process (which included Local Users' Group input), including a summary of the meetings conducted, is included at http://www.hanford.gov/files.cfm/Modflow%20Report.pdf.

504-53 DOE agrees that active cells with non-zero hydraulic conductivity values do not provide an impermeable boundary. Appendix L of this *Final TC & WM EIS* has been revised to remove the implication that the active top-of-basalt cells in the Gable Gap area are an impermeable boundary. In a transient model of an unconfined aquifer, cells can become saturated or unsaturated as a function of time, depending on the boundary conditions. Given this, the problem of rewetting must still be resolved. The rewetting problem is a numerical problem and not one that attempts to mimic any real-world condition. If the model solution meets the model's convergence criteria, then that solution is an acceptable solution, whether or not the model settings allow rewetting of cells from adjacent cells. DOE disagrees that only model solutions that allow rewetting from adjacent cells are acceptable model solutions.

504-54 There is uncertainty regarding what the water table elevations were across Hanford prior to the beginning of the operational period. Without any data with which to compare and calibrate the pre-Hanford water table, it was decided that the background recharge assumptions would be used to determine the initial heads for the model simulation. This included the base background recharge of 3.5 millimeters per year across most of the site, but also included a city of Richland recharge rate of 50 millimeters per year in the southernmost model region, which accounts for some human land use prior to Hanford operations. It is understood and agreed that these assumptions simplify and may not represent actual pre Hanford recharge conditions. However, given no available date to calibrate the model to during this timeframe, these assumptions seem reasonable.

504-55 The regional nature of the flow model required that data encoding resolution (e.g., river stage) be represented at a level no finer than one value for each year. It is known that river stage elevations vary during the course of a day at times, even more so over a week or a month timeframe. Given that only a single value (per calendar year) could be encoded to represent the river stage at any given location, and given that the river stage boundary condition strongly affects simulated model heads nearby, combined with the fact that fluctuations in the river occur much more frequently than once per year, it was determined that it would not be helpful for the head observation data set to include these

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

Conclusion

We request that you withdraw this draft TC&WM EIS, and revise it to provide legally-compliant alternatives. We look forward to the DOE's response to our comments. *504-75*

Sincerely yours,

Tom Carpenter, Executive Director
Hanford Challenge
219 First Avenue S., Suite 120
Seattle, WA 98104
(206) 292-2850
tomc@hanfordchallenge.org

Geoffrey H. Fettus, Senior Project Attorney
Natural Resources Defense Council
1200 New York Avenue, NW
Suite 400
Washington, D.C. 20005
(202) 289-2371
gfettus@nrdc.org

cc: Shirley Olinger, Manager, Office of River Protection, ORP
David A. Brockman, Manager, Richland Operations Office

detailed river fluctuations when the model encoding for the river stage does not. Therefore, it was decided to remove from the head calibration data set those head observation wells located within 600 meters of the river, as these wells are the ones most likely affected by river stage fluctuations.

504-56 In response to this comment and others, further explanation and description have been provided in Appendix N of this *Final TC & WM EIS*.

504-57 In response to this comment, a discussion of the interaction among sites, with specific reference to anthropogenic discharge, has been added to Appendix N of this *Final TC & WM EIS*.

504-58 The STOMP model used for the vadose zone flow and transport analysis in this *TC & WM EIS* does account for the large discharges that occurred at Hanford. One of the features of the STOMP model, as explained in Appendix N, Section N.2, is a three-dimensional representation of geology, hydraulic properties, and grid geometry. Selected to incorporate spatial heterogeneity of geologic and recharge conditions, this representation explicitly simulates the complexity of travel time behavior due to the lateral spreading and preferential flow that reflects local conditions.

DOE agrees with the comment that the groundwater model must simulate the interactions between COPCs within the vadose zone. The *Draft TC & WM EIS* groundwater modeling process achieves this objective by encoding into the model the various subsurface material types ascertained from well boring data collected across Hanford, and, consistent with the encoded material types and their respective hydraulic properties, simulating flux along preferential flow pathways.

504-59 In response to this comment and others, further explanation and description have been provided in Appendix N of this *Final TC & WM EIS*.

504-60 Appendix L, Section L.4.12, of this *Final TC & WM EIS* has been revised to expand the groundwater flow model gridding discussion to include factors that were considered as part of selecting model cell size. It should be noted that, for groundwater transport analysis purposes, source areas are modeled at their actual locations and at their actual sizes. The *TC & WM EIS* groundwater modeling methodology retains the utility to model sources at their actual locations and sizes, although the flow model models flow conditions (heads and velocities) only to a resolution of 200 meters by 200 meters in the horizontal plane.

504-61 DOE has combined the two curves referenced by the commentor into a single graph to facilitate data presentation, and that revision is included in

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

Comments on the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, WA, USDOE, Oct. 2009

Prepared for
Hanford Challenge
By Marco Kaltofen, PE, (Civil, Mass.)
Boston Chemical Data Corp.
May 3, 2010

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Appendix N, Figure N–12, of this *Final TC & WM EIS*. As to the commentor's concern regarding general agreement of the calibration, DOE disagrees with the commentor's observations. It should be noted that the gross beta data reported in the 1950s during the first peak are not specific measurements of technetium-99; those data include beta activity from a variety of short-lived radionuclides. DOE's view is that these measurements, taken as a whole, suggest peak concentrations of technetium-99 of about 1 million picocuries per liter, with an uncertainty of about two orders of magnitude. The later (i.e., 1990 to 2000) plateau suggests technetium-99 concentrations of about 10,000 picocuries per liter, with an uncertainty of about one order of magnitude. The model result is in general agreement with these suggestions. The reader is strongly cautioned in Appendix N not to overinterpret the gross beta measurements. In response to this comment and others, further explanation and description have been provided in this *Final TC & WM EIS*.

504-62 DOE agrees with the commentor and has updated the comparison data to 2010.

504-63 In response to this and other comments, the data presentation in Appendix N, Figures N–7 and N–8, in the draft EIS has been revised for Appendix N, in Figures N–13 and N–14, of this *Final TC & WM EIS* to facilitate interpretation.

504-64 As noted in the comment, the text of Volume 2 of the *Draft TC & WM EIS* does not make explicit reference to values of Courant or Peclet numbers for vadose zone flow and transport analysis. The text of Appendix N in Volume 2 (page N–3 and Figure N–1 of the draft EIS), does make reference to actions taken to control grid size, but does not mention time step control or the need for each of these actions. As an initial step in the approach to vadose zone analysis, an extensive set of sensitivity analyses were completed to investigate requirements for time and space step control for the range of recharge and aqueous volumetric injection conditions reported for past and expected for future activities. The results of the analyses were that time and space step control as may be summarized in the Courant and Peclet numbers is required to provide reproducible calculations of vadose zone conditions and adequate closure of mass balances. The approach adopted for this *TC & WM EIS* was use of the STOMP feature of Courant number control coupled with site-specific determination of horizontal and vertical space step sizes required for the recharge and injection conditions specified for the site. Thus, time step, grid sizes, and model extent were selected to provide accurate simulations of associated recharge and injection conditions. In addition, each simulation completed for the EIS analysis was subject to a postprocessing mass balance check to identify cases with computation challenges. Such cases were

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Prepared by Marco Kaltofen, PE, (Kaltofen@wpi.edu), May 3, 2010

Executive Summary

1) The EIS must conform with existing federal law and it must conform with lawfully rendered agreements. These laws and agreements include:

- The Hanford Federal Facility Agreement and Consent Order, also called the Tri Party Agreement.
- The Nuclear Waste Policy Act, which requires the permanent isolation of specific waste streams at the Hanford Site.
- The Native American Graves Protection and Repatriation Act of 1990, 43 CFR 10.
- NEPA, the National Environmental Policy Act. By this statute, (Section 102(2)(C) NEPA), the actions proposed in an EIS should be protective of the environment and human health. The EIS must address the environmental impact of the proposed action, adverse environmental effects under an implemented proposal, alternatives to the proposed action, the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.
- Washington State, Model Toxics Control Act Statute and Regulation - Chapter 70.105D RCW, Uniform Environmental Covenants Act Chapter 64.70 RCW, and MTCA Cleanup Regulation Chapter 173-340 WAC
- Resource Conservation and Recovery Act
- Comprehensive Environmental Response, Compensation, and Liability Act, (CERCLA or more commonly, Superfund)

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subject to reanalysis. The text of Appendix N, Section N.3, has been revised to provide clarification of the procedure followed in vadose zone analysis.

504-65 As discussed in Appendix N, the uncertainties in the input data, the noise in the field data, and the nonlinear response of the simulation to changes in parameters all combine to render the exercise a qualitative search for a parameter set that reproduces general features of three different types of sites.

504-66 The goal of the analysis, presented in Appendix N, Section N.3, is to derive material property parameters for the vadose zone that permit an unbiased comparison of the long term impacts of the combination of sources for each alternative. The approach discussed in Section N.3.6 of this *Final TC & WM EIS* is predicated on the observation that there are a limited number of sites at which conditions are attributable to a single source with a well-known inventory. Further, such sites must be close to a groundwater monitoring well with a long observational history. After the material properties of the vadose zone were derived, a systems-level test of the groundwater modeling machinery was conducted (Appendix O). For this test, the PUREX and REDOX plumes were modeled and compared with the regional-scale tritium plume. DOE's view is that calibrations at well-characterized, small-scale sites must be supplemented with regional-scale simulations to build a model that facilitates the comparison of alternatives.

504-67 In response to this comment and others, further explanation and description have been provided in Appendix N of this *Final TC & WM EIS*.

504-68 The words "tritium picocuries per cubic liter" are a typographical error from the legend of the original figure that was not corrected before the figure was incorporated into the *Draft TC & WM EIS*. The legend has been revised for this *Final TC & WM EIS*.

504-69 DOE disagrees with the commentor's assertion that a considerable amount of numerical dispersion has infected the model. The text of Appendix N, Section N.1.2, of the draft EIS does make reference to actions taken to control grid size, but does not mention time step control or the need for each of these actions. As an initial step in the approach to vadose zone analysis, an extensive set of sensitivity analyses were completed to investigate requirements for time and space step control for the range of recharge and aqueous volumetric injection conditions reported for past and expected for future activities. The results of the analyses were that time and space step control as may be summarized in the Courant and Peclet numbers is required to provide reproducible calculations of

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

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Prepared by Marco Kaltofen, PE, (Kaltofen@wpi.edu), May 3, 2010

2) The major decisions to be made, as described in this EIS, (storage of tank waste, percent retrieval of tank waste, tank waste treatment, treated tank waste disposal, SST closure, creation of facilities to accept and treat offsite waste, and FFTF decommissioning), should be treated as severable matters. Waste Treatment Plant (WTP) closure, DST closure, groundwater remediation, CERCLA past practice units, and FFTF deactivation have already been severed from this EIS. Likewise, portions of the EIS found to meet applicable laws and agreements should go forward, even if an independent and individual major decision outlined above can not meet the standard of lawfulness.

The existing failures to meet completeness and lawfulness standards for significant portions of the draft proposed EIS nevertheless are highly likely to legally preclude final approval of a comprehensive EIS. The failure to address groundwater in the saturated zone is an obvious weakness of the draft proposed EIS. This level of omission has not survived scrutiny in other formerly used defense facilities which have completed their respective EIS processes. Likewise, the failure to identify or even screen for preferential underground pathways for groundwater transport is another glaring omission, which has a significant bearing on the risk numbers generated by this drafting process. *504-77*

These omissions are so significant that severability of the various milestones on the road to creating a complete, comprehensive, and lawful EIS is essential. Without this, the redrafting/reapproval process will become so drawn out that it will become impossible to meet the existing agreements between the many agencies which are responsible for the Hanford cleanup.

3) A comprehensive workplan for achieving the legally mandated levels of groundwater restoration must be included among the alternatives in the draft *504-78*

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vadose zone conditions and adequate closure of mass balances. The approach adopted for this *TC & WM EIS* was use of the STOMP feature of Courant number control coupled with site-specific determination of horizontal and vertical space step sizes required for the recharge and injection conditions specified for the site. Thus, time step, grid sizes, and model extent were selected to provide accurate simulations of associated recharge and injection conditions. In addition, each simulation completed for the EIS analysis was subject to a postprocessing mass balance check to identify cases with computation challenges. Such cases were subject to reanalysis. The text of Appendix N has been revised to provide clarification of the procedure followed in vadose zone analysis.

504-70 In response to this comment and others, further explanation and description have been provided in Appendices L and N of this *Final TC & WM EIS*. In particular, the nomenclature on material type adopted for this EIS and its relationship to other nomenclatures in use at the site have been addressed.

504-71 An anisotropy ratio of 10:1 (horizontal to vertical) was used in the vadose zone and groundwater models of this *TC & WM EIS*. This is standard industry practice in the absence of specific information to the contrary. In response to this comment and others, further explanation and description have been provided in Appendix N of this EIS.

504-72 Terms such as "sand," "gravel," and "loam" are classifications based on textual properties such as particle size distribution, and while suggesting hydraulic characteristics, such terms do not dictate them. The hydraulic conductivity of a material depends on particle size distribution in a complicated manner related to the nature of particle packing and the contiguous pore space in the material. It is not uncommon to find a "sand" that has a higher hydraulic conductivity in the field and/or laboratory than a "gravel" from the same site. Such deviations from what might be expected from a texture classification alone can even be found in some previous characterizations of Hanford materials.

504-73 DOE applies quality management systems to its NEPA document preparation process and is committed to developing NEPA documents of the highest quality and technical accuracy. This *TC & WM EIS* was prepared following the requirements of DOE Order 414.1D, *Quality Assurance*, as well as project-specific quality management plans and procedures that govern data management, calculations and analyses, and analytical software development and use. As a result of the 2006 Settlement Agreement between DOE and Washington State ending litigation concerning the *HSW EIS* (DOE 2004a), Ecology conducted

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final EIS. In effect, this draft EIS contains only a "*No Action Alternative*" for contaminated groundwater at Hanford. *504-78 cont'd*

4) The State of Oregon and the State of Washington have produced official statements regarding the acceptance of specific alternatives in the EIS. These important stakeholders support minimum 99 percent tank waste removal, off site storage of high levels wastes in a deep geological repository, pretreatment of tank or low activity wastes, and avoidance of "supplemental" treatment technologies. Hanford Challenge generally supports these two State-sponsored proposals, and is opposed to alternatives in the EIS which do not meet the requirements of the States of Washington and Oregon and the Tri Party Agreement.

Hanford Challenge supports Oregon's Proposed Alternative 7 identified in its preliminary comments to the Department of Energy in a letter dated January 5, 2010. Hanford Challenge, however, believes that all the tank waste should be removed from the tanks, and adequate characterization be performed to determine whether tanks be removed and leaked tank waste retrieved and treated from beneath the tanks. Hanford Challenge does not support categorically treating all soil overburden as high level waste, as this may draw resources away from important cleanup requirements. Overburden should be treated according to relevant and applicable environmental laws, legal agreements, and regulations. *504-79*

5) Acceptance of offsite wastes is not related to any of the required activities described by the EIS. The acceptance of offsite wastes is a fully separate regulatory process permitted under 10 CFR 61, NUREG 1300, 40 CFR 270.11, 270.13, 270.14, and 40 CFR 264.18, 264.95, 264.97 and others. Alternatives in the EIS which include off site waste acceptance should be severed from this EIS process in order to maintain congruence with existing federal regulations. The *504-80*

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its own quality assurance reviews of the *Draft* and this *Final TC & WM EIS* to ensure that quality assurance processes were in place and being followed.

504-74 In response to this comment, DOE reviewed the draft EIS and identified some errors where data were incorrectly input into the text of the document. These errors have been corrected.

504-75 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

504-76 DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; Section 1.2.7 discusses the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE order requirements that must be met for DOE to implement Tank Closure alternatives. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each Chapter and are listed in the references at the end of each chapter.

Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives, as well as the permits and approvals DOE must obtain from Federal, state, and local agencies.

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acceptance of offsite wastes is neither required to proceed with any of the remaining alternatives described in the EIS, nor does it further any of the NEPA required actions at the Hanford Facility, such as limitation of adverse environmental affects, prevention of negative alterations of short or long term land-uses, or the prevention of adverse outcomes from the irretrievable commitments of cleanup resources. ***504-80 cont'd***

6) Hanford Challenge supports decontamination of the FFTF via removal and closure. The actions required to clean close this facility, while substantial, are far less daunting than upcoming tasks at Hanford, such as groundwater remediation and closure of former cribs and trenches. ***504-81***

7) Alternatives selected as a result of this EIS must not create a legal or technical condition which prevents or adversely affects closure of the WTP, DST closure, groundwater remediation, and closure of CERCLA past practice units. ***504-82***

8) Alternatives selected through this EIS process must meet all lawful and applicable regulations and standards. Metrics which do not meet the lawfulness test or do not carry the force of regulations fail to meet the NEPA standard. One such example is the use of future areal extent of groundwater above standards, as opposed to a metric which does carry the force of law, such as future human health risk to individuals or populations. Metrics for alternatives selection must meet all normal and lawful standards such cancer and noncancer risks to individual resource users, environmental risks, species level risks, and adverse impacts to Native American Indian cultural resources. ***504-83***

9) Alternatives were compared and site conditions modeled using a limited set of environmental constants and receptor values. Individual scalar values were ***504-84***

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In Sections 8.1.7 and 8.3, DOE identifies the consultations and coordination that DOE has undertaken with American Indian tribes and would need to continue for the purpose of implementing the proposed actions and alternatives. In addition, Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that may be needed and are feasible for DOE to implement to offset the potential impacts that might result from implementing an alternative. While DOE's Preferred Alternatives for tank closure, FFTF decommissioning, and waste management in this *TC & WM EIS* may not necessarily represent the most environmentally preferred alternatives, the ROD issued by DOE will identify any additional mitigation and monitoring commitments adopted by DOE and specify other factors considered by DOE in reaching its decision, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. In announcing its decision in the ROD based on the EIS analyses, DOE will be obligated to carry out the decision consistent with the requirements identified in this EIS. These requirements will be interpreted and applied by Federal, state, and local regulatory agencies through their independent authorities. These agencies may also impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA, which include additional opportunities for public comment.

504-77 See response to comment 504-17 regarding groundwater remediation at Hanford.

504-78 A comprehensive work plan for achieving the legally mandated levels of groundwater restoration is clearly not a requirement of this *TC & WM EIS*, and DOE strongly disagrees with the assertion that this EIS needs to validate the entire Hanford cleanup strategy. The purpose of this document is to compare the relative environmental impacts of alternatives associated with tank waste disposition, offsite waste disposal, and FFTF disposition, and their relative environmental impacts. The cumulative impacts analysis presented in Chapter 6 of this EIS attempts to portray impacts against a background of current contamination levels. DOE is committed to cleaning up the site to agreed-to regulatory levels through its ongoing CERCLA / RCRA programs, and the burden of showing their ultimate effectiveness remains with those programs.

504-79 Chapter 2, Section 2.6.4, of this *Final TC & WM EIS* has been revised to include a discussion of the Oregon Department of Energy's proposal and how DOE has addressed the range of reasonable alternatives for tank waste storage, retrieval, and treatment and remediation of the existing tank farms in its original alternatives. DOE has carefully considered the Oregon proposal and,

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

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used for critical modeling constants such as soil bulk densities, soil porosities, hydraulic conductivities, particulate concentrations in air and so on. Rather than use single scalar averages to represent all portions of the entire site uniformly, the EIS should use of ranges of values or at least statistically significant values matched to actual site conditions. The current EIS assumes that no preferential pathways exist in the subsurface, and that the site is perfectly homogeneous and well-characterized. Such conditions barely exist in the simple laboratory simulations, and never exist in any real-world systems. There can be no confidence in risk estimates that are based upon average values that imply homogeneity throughout the site. The use of such values fails to meet the standard of engineering practice demanded by the regulations upon which the EIS process is based.

504-84 cont'd

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as explained in Section 2.6.4, has determined that it is not reasonable. It should be noted, however, that Ecology did not offer its own alternatives, but, rather, is a cooperating agency on this EIS. Ecology's participation as a cooperating agency has enabled the agency to help formulate the alternatives presented in this *TC & WM EIS*, and its views on the proposed actions and alternatives analyses are presented in the foreword to the draft and final EISs.

The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. For both Tank Closure Alternatives 6A and 6B, Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that the removal of the contaminants from the vadose zone does not capture the contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

504-80 See response to comment 504-6 for a discussion on the transport and disposal of offsite waste.

504-81 DOE's Preferred Alternative is FFTF Decommissioning Alternative 2: Entombment (see Section 2.12.2). See response to comment 504-6 regarding factors influencing future DOE decisions.

504-82 Chapter 1, Section 1.4.2, addresses decisions not to be made in this *TC & WM EIS*. As noted in that section, decisions on closure of the WTP, closure of the DSTs, groundwater remediation, and closure of CERCLA past-practice units are not within the scope of the proposed actions. Groundwater remediation and closure of these facilities would be addressed at a later date, subject to appropriate reviews. DOE does not believe that decisions made based on this *TC & WM EIS* will have any adverse effect on future actions or decisions.

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Review of Tank Farm Alternatives

Tank Farm Alternative 1 – No Action - The no action alternative is not considered, nor is it acceptable or lawful. Hanford Challenge does not support Tank Farm Alternative 1. *504-85*

Tank Farm Alternative 2A – Existing WTP Vitrification; No Closure
This alternative does not comply with the existing Tri-Party Agreement, based upon this alternative's prolonged schedule, failure to pretreat 99Tc waste streams, and failure to dispose of high level wastes offsite in a geological repository as required under the Nuclear Waste Policy Act, (NWPA). Hanford Challenge does not support Tank Farm Alternative 2A. *504-86*

Tank Farm Alternative 2B – Expanded WTP Vitrification; Landfill Closure.
This alternative does not comply with the existing Tri-Party Agreement, based upon this alternative's failure to prevent existing contamination in the vadose zone, which is currently greater than 15 feet below ground surface, from ultimately reaching the Columbia River. This alternative requires the construction of a second vitrification plant. With this investment, the expanded vitrification for low activity waste reduces overall risks compared to alternative 2A. This alternative fails, as does alternative 2A, because of its reliance on landfill closure, which does not meet the requirements of the Tri-Party Agreement or the Nuclear Waste Policy Act. Hanford Challenge does not support Tank Farm Alternative 2B. *504-87*

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504-83 See response to comment 504-75 for a discussion on the development of the alternatives in this EIS.

The scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and closure of the SST system, including the tank system and the vadose zone impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this EIS, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas within the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process.

The *TC & WM EIS* closure alternatives for the tank farms include no action, landfill closure, selective clean closure, and clean closure (which would involve actions to remove the source of contamination). This EIS does not include proposed actions to address potential groundwater impacts resulting from the tank farms (i.e., past leaks), as such actions will be addressed as part of CERCLA remedial action for the non-tank-farm areas of the 200 Areas. All CERCLA remedial actions must meet the applicable, relevant, and/or appropriate requirements of Federal and state laws and regulations governing such actions or can be waived by EPA.

504-84 DOE disagrees with the premise of the comment, specifically with the assertion that single-scalar averages were used to represent the entire site uniformly. Spatial heterogeneity was explicitly considered in the groundwater flow analysis (Appendix L), vadose zone flow and transport analysis (Appendix N), and groundwater transport analysis (Appendix O). Appendix L documents the finding that a zone of high hydraulic conductivity is required to match field observations across the central portion of the site (Section L.4.3.2.2). DOE is of the view that inclusion of spatial heterogeneity (at a scale consistent with the comparative nature of the NEPA analysis) is required for an unbiased comparison of impacts of the alternatives.

504-85 The No Action Alternative is included in the analysis as required by CEQ regulations (40 CFR 1502.14[d]). The regulations require the analysis of the No Action Alternative even if the agency is under a court order or legislative command to act. This analysis provides a baseline, enabling decisionmakers to compare the magnitude of potential environmental effects of the action alternatives.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

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Tank Farm Alternative 3A, 3B, and 3C – Existing WTP Vitrification with Supplemental Treatment (3A - Bulk Vitrification, 3B – Cast Stone, and 3C – Steam Reforming); Landfill Closure. These alternatives fail to remove wastes from the tank farm, substituting inferior bulk stabilization methods for more appropriate treatment via the Vitrification plant(s). Engineering scale studies have found these measures to be less effective than removal and treatment options. These closure options are not permanent measures and thus they fail to meet the criteria of the Tri-Party Agreement and they fail to dispose of high level wastes offsite in a geological repository as required under the Nuclear Waste Policy Act, (NWPA). Leaving these wastes stored in situ at Hanford indefinitely is not a legal option. These alternatives are not supported by Hanford Challenge. *504-88*

Tank Farm Alternative 4 – Existing WTP Vitrification with Supplemental Treatment Technologies; Selective Clean Closure/Landfill Closure. This alternative is not supported by the State of Oregon, which correctly notes that this alternative does not meet Tri-Party Agreement requirements for the quality of the final waste form. This alternative is not supported by Hanford Challenge. This alternative does not comply with the NWPA which requires permanent isolation of the Tank Farm wastes and any accompanying remedial wastes. Leaving these wastes stored at Hanford indefinitely is not a legal option. *504-89*

Tank Farm Alternative 5 – Expanded WTP Vitrification with Supplemental Treatment Technologies; Landfill Closure. This alternative does not retrieve 99 percent or more of the tank waste. The State of Oregon correctly notes that this alternative does not meet Tri-Party Agreement requirements for the quality of the final waste form. This alternative is not supported by Hanford Challenge. This alternative does not comply with the NWPA which requires permanent isolation *504-90*

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504-86 See response to comment 504-75 for a discussion on the development of the alternatives in this EIS.

504-87 See response to comment 504-75 for a discussion on the development of the alternatives in this EIS.

504-88 DOE conducted a number of supplemental technology reviews and technology selection processes as discussed in Appendix E, Section E.1.2.3.5.1. As discussed in this section, in April 2002, DOE evaluated over 50 options for potential supplemental technologies. From this list, the Hanford Cleanup Challenge and Constraints Team Mission Acceleration Initiative working group performed the final evaluation to select the appropriate technologies for further development. The six goals of this working group are included in this section of Appendix E with the conclusion that bulk vitrification be further evaluated along with cast stone and steam reforming.

Regarding the commentor's concern about the disposition of HLW, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

504-89 See response to comment 504-88 for a discussion of Yucca Mountain and the Blue Ribbon Commission.

See response to comment 504-75 for a discussion on the development of the alternatives in this EIS.

504-90 The removal of 99 percent or more of the tank waste is also DOE's preference as discussed in Chapter 2, Section 2.12.1. This level of waste removal would be achieved under all Tank Closure alternatives, with the exception of Alternative 1 (No Action) and Alternative 5. As discussed in Chapter 2, Section 2.2.2.1.1.5, DOE has developed a tiered strategy for maximizing tank waste retrieval while minimizing the potential for causing leakage. Appendix D of this EIS discusses uncertainties regarding the residual waste inventories. Retrieval has been completed on only a small number of SSTs and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks and residual waste, requires the preparation of a performance assessment and a closure plan. These documents would provide the information and analysis

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of the Tank Farm wastes and any accompanying remedial wastes. Leaving these wastes stored at Hanford indefinitely is not a legal option. *504-90 cont'd*

Tank Farm Alternative 6A – All Vitrification/No Separations; Clean Closure. This alternative does not meet existing scheduling requirements, primarily due to the lack of pretreatment separations. It is in other respects the same alternative as 6B. This alternative is not supported by Hanford Challenge because of its extended timetable. This option fails to meet legal requirements. *504-91*

Tank Farm Alternative 6B – All Vitrification with Separations; Clean Closure. This alternative has one distinct advantage over all of the other proposed alternatives. This alternative does not commit the US DOE to any irreversible actions or irretrievable commitments of resources to actions which violate NEPA, CERCLA, RCRA, and other legislation which enables the Hanford clean up. Other stakeholders have made detailed comments regarding additions to alternative 6B and the draft EIS generally which would enable this specific alternative to meet legal as well as State, Community, and Tribal requirements. As a single illustrative example, multiple stakeholders, (Oregon DOE, Nez Perce Tribe ERWM Program analysis, Hanford Challenge, and others), request that technecium-99 removal be included for this option. *504-92*

(For explicit details on these see, Alternative 7 – the Oregon Proposal, dated January 4, 2010 by the Oregon DOE, and the Affiliated Tribes of Northwest Indians Resolution 10-02 on 99.9% removal of single-shell tank wastes).

Tank Farm Alternative 6C – All Vitrification with Separations; Landfill Closure. This alternative fails to meet legal requirements due to the inclusion of landfill closure as the final disposal option for the single shell tank farms. This *504-93*

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necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

504-91 See response to comment 504-75 for a discussion on the development of the alternatives in this EIS.

504-92 Chapter 2, Section 2.6.4, of this *Final TC & WM EIS* has been revised to include a discussion of the Oregon Department of Energy's proposal and how DOE has addressed the range of reasonable alternatives for tank waste storage, retrieval, and treatment and remediation of the existing tank farms in its original Tank Closure alternatives. DOE has carefully considered the Oregon proposal and, as explained in Section 2.6.4, has determined that it is not reasonable.

504-93 See response to comment 504-75 for a discussion on the development of the alternatives in this EIS.

DOE does provide geologic repository disposal for Hanford's (and other DOE sites') TRU waste at WIPP in New Mexico. The current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

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alternative thus fails for the same reasons described for alternatives 2B, 3, 4, and 5, namely the failure to meet the standards of legal agreements and regulations. These failures are, once again, failure to be protective of the Columbia River and failure to provide for disposal in an offsite repository. This alternative is not supported by Hanford Challenge. *504-93 cont'd*

Review of FFTF Decommissioning Alternatives

FFTF Decommissioning Alternative 1 – No Action

The no action alternative is not considered, nor is it environmentally acceptable nor is it lawful. This alternative is also the most expensive. Keeping the FFTF in surveillance and maintenance status comes at a significant cost economically, and increases short term environmental impacts. This alternative is not supported by Hanford Challenge. *504-94*

FFTF Decommissioning Alternative 2, Entombment & Alternative 3, Removal

The treatment of the RH-SCs and the disposition of bulk sodium is the same for alternatives 2 and 3. Costs are similar between alternatives 2 and 3. Hanford Challenge supports alternative 3, removal, as having the lowest long term risk. *504-95*

Review of Waste Management Alternatives

Waste Management Alternative 1 – No Action. The no action alternative is not acceptable or lawful for the disposition of onsite-generated wastes in that it contradicts existing federal and state laws. No action is the preferred alternative *504-96*

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504-94 FFTF Decommissioning Alternative 1: No Action is included in the analysis as required by CEQ regulations (40 CFR 1502.14[d]). The regulations require the analysis of the No Action Alternative even if the agency is under a court order or legislative command to act. This analysis provides a baseline, enabling decisionmakers to compare the magnitude of environmental effects of the action alternatives. This *TC & WM EIS* presents a discussion of ongoing surveillance and maintenance actions (see Chapter 2, Section 2.5.3.1) and short-term impacts (see Chapter 4, Section 4.2) associated with FFTF Decommissioning Alternative 1: No Action.

504-95 See response to comment 504-6 regarding factors influencing future DOE decisions.

504-96 Waste Management Alternative 1: No Action is included in the analysis as required by CEQ regulations (40 CFR 1502.14[d]). The regulations require the analysis of the No Action Alternative even if the agency is under a court order or legislative command to act. This analysis provides a baseline, enabling decisionmakers to compare the magnitude of environmental effects of the action alternatives. As noted in Chapter 2, Section 2.5.4.1, under the No Action Alternative, limited amounts of offsite waste would continue to be sent to Hanford, consistent with the enforceable January 6, 2006, Settlement Agreement with the State of Washington (as amended on June 5, 2008) regarding *State of Washington v. Bodman* (Civil No. 2:03-cv-05018-AAM), signed by DOE, Ecology, the Washington State Attorney General's Office, and DOJ.

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to the acceptance of offsite-generated wastes, given that it is not possible to accept such offsite-generated wastes and yet remain within the boundaries of existing federal regulations. *504-96 cont'd*

Component 1: All onsite-generated LLW and MLLW would be treated and disposed of in the existing, lined 218-W-5 LLBG trenches. Component 1 of Alternative 1 is contrary to existing laws and legal agreements, including, the Hanford Federal Facility Agreement and Consent Order, also called the Tri Party Agreement, the Nuclear Waste Policy Act, which requires the permanent isolation of specific waste streams at the Hanford Site, NEPA, the National Environmental Policy Act, Washington State's Model Toxic Waste Act, the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act, (CERCLA or more commonly, Superfund). Hanford Challenge does not support Component 1 of Alternative 1. *504-97*

Component 2: No offsite-generated waste would be accepted. There is no environmental benefit which accrues to the Hanford facility for this option, nor is any other alternative in the EIS dependent on completion of this component, thus the lowest risk option is no action for this component of Waste Management Alternative 1. Hanford Challenge supports component 2 of Alternative 1 for waste management. *504-98*

Waste Management Alternative 2

Component 1: Would continue treatment of onsite-generated LLW and MLLW in expanded, existing facilities and dispose of onsite-generated LLW and MLLW in a single IDF (IDF-East). *504-99*

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504-97 See response to comment 504-75 for a discussion on the development of the alternatives in this EIS.

504-98 Comment noted.

504-99 Comment noted.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

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Component 2: Extends this alternative to include previously treated offsite-generated wastes. Component 1 of alternative 2 does not provide the mandated level of risk reduction, nor does it comply with existing state and federal regulations. Component 2 of Alternative 2 is contrary to existing laws and legal agreements, including, the Hanford Federal Facility Agreement and Consent Order, also called the Tri Party Agreement, the Nuclear Waste Policy Act, which requires the permanent isolation of specific waste streams at the Hanford Site, NEPA, the National Environmental Policy Act, Washington State's Model Toxic Waste Act, the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act, (CERCLA or more commonly, Superfund). Hanford Challenge does not support Components 1 and 2 of Alternative 2. ***504-99 cont'd***

Waste Management Alternative 3

Component 1: Would continue treatment of onsite-generated LLW and MLLW in expanded, existing facilities and dispose of onsite-generated in a single IDF (IDF-East); and would continue treatment of onsite-generated LLW and MLLW in expanded, existing facilities, but would dispose of onsite-generated LLW and MLLW in two IDFs (IDF-East and IDF-West). This component provides the maximum total risk reduction for receptors, and comes closest to meeting the requirements of existing state and federal regulations. Hanford Challenge supports Component 1 of Alternative 3. ***504-100***

Component 2: Extends this alternative to include previously treated offsite-generated LLW and MLLW. Component 2 of Alternative 3 is contrary to existing laws and legal agreements, including, the Hanford Federal Facility Agreement and Consent Order, also called the Tri Party Agreement, the Nuclear Waste Policy

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504-100 DOE notes the commentor's preference for the treatment component of Waste Management Alternative 1 and the storage component of Alternative 3, with the understanding that all applicable and relevant regulations are presented in this final EIS. Throughout this EIS, DOE identifies the legal requirements that DOE would need to comply with for the specific activities that are part of the proposed action and alternatives. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate, what results they are expected to achieve, what end- or by-products might be produced, and how this measures up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter. Also, Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed action and alternatives and the permits and approvals DOE would need to obtain from Federal, state, and local agencies.

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Act, which requires the permanent isolation of specific waste streams at the Hanford Site, NEPA, the National Environmental Policy Act, Washington State's Model Toxic Waste Act, the Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act, (CERCLA or more commonly, Superfund). Hanford Challenge does not support Component 2 of Alternative 3.

504-100 cont'd

The preferred waste management alternatives are Component 2 of Alternative 1 and Component 1 of Alternative 3, so long as component 1 of Alternative 3 meets all applicable and relevant state and federal regulations as presented in a final EIS.

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General comments

Standing – The comments presented are offered in matters of law only, and are not meant to represent or replace a technical commentary.

Legality – A final EIS must meet all applicable and relevant state and federal regulations, and meet the requirements of legal agreements.

Any portion of a final EIS which is contrary to any laws, regulations, standards, or lawful agreements has no legal viability in any judicial authority, whether state, federal, or other United States jurisdiction. *504-101*

Severability - If a portion of a final EIS is determined to be lawful and is agreed to by the signatories of existing relevant lawfully-made agreements, then this portion of the final EIS should proceed into force, without regard to nonrelevant portions of the final EIS which do not achieve this same standard of lawfulness. *504-102*

Standards - The use of a, "Maximum area to exceed criteria or standards" benchmark is an unacceptable criterion for measuring remedial success. The minimizing of human health and safety and environmental risks is the more accepted precedent. All standards and criteria used in the final EIS must meet state and federal regulatory requirements for applicability and enforceability. The use of benchmarks which do not have a basis in law, precedent or regulation is not an acceptable means of proving that an alternative presents the lowest practical environmental or public health risk level. *504-103*

Failure to meet standards – The presumed failure to meet river water quality, groundwater quality, (based on radionuclide concentrations), and air quality *504-104*

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504-101 This EIS is not being prepared under CERCLA; therefore, the ARARs process does not apply. However, some of the ongoing Hanford site activities that are considered in the cumulative impacts analysis are currently undergoing remediation under the TPA, which is the legally binding process used at Hanford to implement CERCLA and RCRA (hazardous waste) requirements. All environmental restoration actions conducted at Hanford under CERCLA must evaluate the "legally applicable, relevant and appropriate requirements of Federal and State laws and regulations" to establish the appropriate cleanup level that must be achieved at an individual cleanup site.

However, the scope of the proposed actions evaluated in this *TC & WM EIS* does not include CERCLA remedial actions. Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives and identify where standards may be exceeded. This is not the same as an "ARARs analysis" under CERCLA, and it serves a different purpose. The identification of legal requirements in a NEPA document assists an agency in its planning, funding, and decisionmaking process. It also provides full disclosure to members of the public, stakeholders, and other agencies regarding the potential scope of an agency's effort to implement a proposed action (or an alternative) in terms of the subsequent permitting, other approvals, consultations, and coordination requirements, all of which would include additional public involvement opportunities in the future.

504-102 See response to comment 504-6 regarding factors influencing future DOE decisions.

504-103 See response to comment 504-5 regarding benchmark standards used in this EIS.

504-104 Chapter 7, Sections 7.1 and 7.5, of this *TC & WM EIS* discuss mitigation measures that could be used to avoid or reduce potential impacts on all resource areas. Many of the mitigation measures discussed would apply across all alternatives because of the similar nature of some of the activities analyzed in this EIS (e.g., construction of facilities).

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standards, (based on particulate matter, carbon monoxide, and sulfur and nitrogen oxides), is not an acceptable foundation for a final EIS. Final approval of remedial alternatives must include a timetable and roadmap for meeting these legal obligations. In particular, the failure to meet air quality standards for particulate matter is problematic in that radionuclide transport is facilitated by particulate matter. This represents a direct pathway for increased human exposure to radioactive material. ***504-104 cont'd***

Cultural and Paleontological Resources, (Native American Indian Interests), are described in the draft EIS as sensitive to impact from ground disturbance as well as sensitive to visual disturbances which may impact sites of cultural and religious significance. In addition the impacts on the Columbia River system and its fisheries should receive consideration in the selection of preferred alternatives. Alternatives which fail with respect to Columbia River protection also fail to respect issues of Native American Indian cultural and paleontological resource protection. ***504-105***

Offsite wastes – Acceptance of offsite wastes does not provide an environmental benefit to the mandated Tank Farm closure and FFTF Decommissioning programs, nor is it a requirement to complete these mandated programs. The acceptance of offsite wastes comes at the cost of increased risks to the environment and the safety and health of the public at the Hanford site. For example, from the EIS Tank Farm Summary document, p. S-109, the applicant notes that, "receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically iodine-129 and technetium-99, could have an adverse impact on the environment." Alternatives which include the acceptance of offsite wastes should be excluded categorically from the final EIS. ***504-106***

Completeness – No comprehensive evaluation of current groundwater ***504-107***

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504-105 As described in Chapter 4 of the *Draft TC & WM EIS*, there would be no short-term impacts on the Columbia River under any of the *TC & WM EIS* alternatives. The analysis of long-term impacts on Columbia River ecological resources included the impacts of both radioactive and chemical constituents on a number of species. Species or groups of species (i.e., receptors) selected to represent Columbia River aquatic and riparian ecological resources include benthic invertebrates, muskrat, spotted sandpiper, raccoon, bald eagle, least weasel, and aquatic biota, including salmonids. The results (see Appendix P, Section P.3.2, of this *Final TC & WM EIS*) indicate that exposure to radioactive COPCs from groundwater discharge under all alternatives would be below the 0.1-rad per-day benchmark for wildlife receptors and the 1-rad-per-day benchmark for benthic invertebrates and aquatic biota, including salmonids. Thus, no adverse effects are expected. With respect to chemical COPCs, the analysis results indicate that chromium is the only COPC that could have a potential toxic effect, as it would exceed 1 for salmonids under all Tank Closure alternatives (including the No Action Alternative) and some Waste Management alternatives. However, based on the conservative nature of the exposure assumptions and the fact that the chromium is likely from a source other than the tank farms, no adverse impacts are expected as a result of actions taken under the alternatives (see Chapter 6, Section 6.4.3.2, and Appendix P, Section P.3.2.2, of this *Final TC & WM EIS*).

504-106 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

Comments on the Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, WA, USDOE, Oct. 2009
Prepared by Marco Kaltofen, PE, (Kaltofen@wpi.edu), May 3, 2010

conditions, baseline risks, or potential remedial/restoration measures is included in the draft EIS. This omission by itself threatens the integrity of the entire EIS process and the accompanying restoration schedule. *504-107 cont'd*

Insufficient risk/exposure model verification and calibration - Alternatives were compared using a very limited set of environmental constants and receptor values. Individual set values were used for critical modeling constants such as soil bulk densities, soil porosities, hydraulic conductivities, particulate concentrations in air and so on. (See EIS-0391 V2 p. Q-26)

Individual values appear to be selected to minimize apparent exposure risks, such as the use of 4.5 microgram per cubic meter PM10 as the only reference value for exposure to dusts. This value is 1/5th the value for US urban sites, and less than 1/15th the values for high dust events in the Pacific Northwest. (M. S. Wolff et al, EHP, 2005;113(6):739-748, and Center for Air Pollution Impact and Trend Analysis, R. B. Husar et al, 1998 respectively). The prevalence of high dust events in the region is well documented. A handful of days at the elevated dust storm levels would raise the Time Weighted Annual Ambient Average PM10 levels to concentrations far above the 4.5 EE-6 g/cubic meter used to evaluate risk in the EIS. *504-108*

The use of these values also implies a level of environmental homogeneity which does not exist in the real world. For subsurface pathways, for example, preferential pathways are known to exist at various parts of the site. These preferential pathways may cause ground water hydraulic conductivities to increase by orders of magnitude compared to surrounding strata. Likewise, these preferential pathways can cause breakthrough times for radioactive wastes to reach the Columbia River to drop by orders of magnitude.

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increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

504-107 Chapter 3, Sections 3.2.6.2 and 3.2.6.3, of this EIS summarize existing vadose zone and groundwater conditions, respectively, including sources of environmental contamination and its extent across Hanford. Where appropriate, contaminant concentrations are compared with DOE derived concentration guides (DOE Order 458.1) and/or Federal and state drinking water standards, as appropriate, in part to establish the environmental "baseline" for assessing long-term groundwater and human health impacts, as presented in Chapter 5 of this EIS. More-detailed hydrogeologic information and data used to prepare the groundwater flow model in support of the long-term impact analyses are included in Appendix L. Additional hydrogeologic data specific to the evaluation of long-term impacts on the vadose zone are presented in Appendices M and N, and data and interpretation specific to the groundwater transport analysis are included in Appendix O. Groundwater beneath Hanford is described in Section 3.2.6.3, including the fact that groundwater quality beneath large portions of Hanford has been affected by past liquid waste discharges. The commentor is also referred to the latest groundwater monitoring report (which may be accessed through http://www.hanford.gov/page.cfm/SoilGroundwaterAnnualReports) and/or the current Hanford Site environmental report (Poston, Duncan, and Dirkes 2011) for more-detailed information on groundwater conditions; these references are cited throughout Chapter 3 and are listed in Section 3.4.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

504-108 Estimation of human health impacts for this *TC & WM EIS* involves modeling of releases to the vadose zone from hundreds of sources at Hanford, transport of water and solutes through both the vadose zone and the unconfined aquifer, and estimation of human health impacts based on contact with and use of contaminated groundwater and direct contact with waste material. As discussed in Appendix M, estimates of rate of release are based on site- and source-specific conditions, including physical dimensions, waste inventories, and physical and chemical characteristics of waste forms. Analysis of transport through both the vadose zone and unconfined aquifer is based on a three-dimensional, spatially heterogeneous, site-specific description of soil types and characteristics. These

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

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End note

The nuclear engineering profession has understood from the outset that the Columbia River and the Pacific Ocean itself must be protected from radioactive contamination. Actions at Hanford are sometimes evaluated through the false perspective that its original operators were unaware of the potential damage that radiation does in the environment.

A prominent 1954 text on reactor design notes that, "The danger that is always present is that sea plants and animals that utilize minerals from water will concentrate the active material in their bodies, and the radioactivity may ultimately reappear in sea food consumed by human beings." (From, Introduction to Nuclear Engineering, Raymond L. Murray, 1954, Ch. 15 Radioactive Waste Disposal, p. 300, Prentice Hall Publishers). This author was a student of Robert Oppenheimer and was a research assistant to Ernest Lawrence. Fifty six years later, protection of the Columbia remains the underlying principle of the laws that regulate nuclear wastes at Hanford.

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analyses reflect the variability observed in the environment and in the different types of facilities located at Hanford and reflect preferential flow to the extent that the pathways are present in the underlying geologic data. With respect to individual values incorporated into the human health exposure scenarios, the objective was to construct a reasonably conservative rather than worst case analysis. As an example, the value adopted for airborne mass loading (4.5 micrograms per cubic meter) is a time-weighted average incorporating exposure at low values indoors and high values encountered outdoors, as in gardening.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

ATTACHMENT 2

Review of Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington.

Prepared for Hanford Challenge
May 3, 2010

Review comments by:
John Brodeur, PE, LEG
Energy Sciences & Engineering
Kennewick, WA

A discussion of Clean Closure and groundwater sacrifice
My first concern with the EIS is that it does not consider and evaluate a true clean closure alternative. By "clean closure" I refer to the concept of removing the tank waste, tank structures and ancillary equipment and excavation/removal of the vadose zone contamination plus the cleanup of the groundwater contamination resulting from past leaks, spills, and intentional discharges from the tanks and adjacent cribs and trenches.

Alternatives 6 A & B with the option of clean closure of the adjacent cribs best represent a clean closure alternative. However, Alternatives 6A&B do not include cleanup of the groundwater. Section S.1.3.2 indicates that groundwater remediation decisions are not made or included in the proposed actions in the EIS. The EIS does not adequately explain exactly what that means or how key groundwater decisions impacting the risk assessments are represented in the risk assessments for each alternative. *504-109*

In my review of the EIS I attempted to determine if there was an alternative that resulted in removal or treatment of all forms of contamination, from the tank farms to the vadose zone and groundwater. I was not successful due to the difficulty in determining just what contamination sources went into what portions of the models of each alternative.

In the Summary section of the EIS, key figures are the calculated radiological risk from drinking groundwater at the core boundary for three radiological sources including: 1)the tank farms cribs and trenches (Figure S-16), 2) the past leaks at the SSTs (Figure S-17) and 3)tank closure residuals, ancillary equipment and retrieval leaks (Figure S-18).

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504-109 The scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and on closure of the SST system. This closure includes the tank system and the vadose zone impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this EIS, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas within the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) and TPA processes. The *TC & WM EIS* Tank Closure alternatives considered for the tank farms include no action, landfill closure, selective clean closure, and clean closure (which would involve actions to remove the source of contamination). This EIS does not include proposed actions to address potential groundwater impacts resulting from the tank farms (i.e., past leaks), as such actions will be addressed as part of CERCLA remedial action for the non-tank-farm areas of the 200 Areas. All CERCLA remedial actions must meet the ARARs of Federal and state laws and regulations governing such actions or can be waived by EPA.

The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

The Summary, which the commentor is referring to, provides an upper level presentation of the results of the *Draft TC & WM EIS*. Chapter 5 and Appendix Q of the *Draft TC & WM EIS* and again in this *Final TC & WM EIS* presents the human health impacts related to tank farm operations, retrieval and closure. The first type of release presented is the past practice of direct discharge of liquid to cribs and trenches (ditches). The second type of release presented is due to past activity at the tank farms and includes past leaks from damaged tanks. The third type of release presented is due to future activities and includes leaks during retrieval of waste from the tanks, and long-term leaching of waste material in tanks and ancillary equipment and the results are presented beginning

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

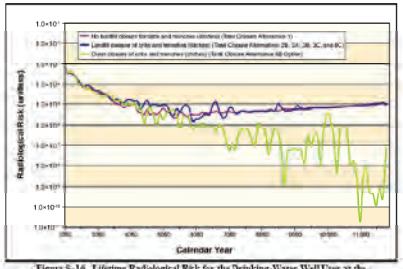

Figure S-16. Lifetime Radiological Risk for the Drinking-Water Well User at the Core Zone Boundary due to Releases from the Six Sets of Cribs and Trenches (Ditches)

Figure S-16 shows long-term radiological risk from releases from cribs and trenches. Clean closure of cribs (Alternative 6B, light green trace in the figure) includes removal of the contamination sources in the vadose zone. The long-term radiological risk shown on the plot, reflects conditions resulting from an absence of groundwater cleanup. This supports the contention on page S-92 that "Cribs and trenches are major contributors to potential long-term groundwater impacts for all Tank Closure alternatives due to early discharges …" That is exceptionally true if the groundwater is not cleaned up under the clean close scenario and one drags this groundwater contamination into the risk model that is used to represent a clean closure scenario.

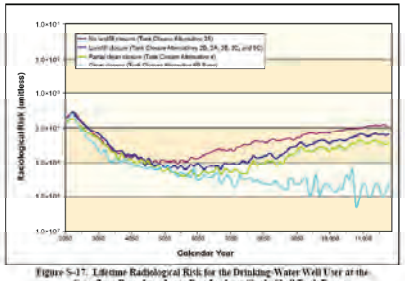

Figure S-17. Lifetime Radiological Risk for the Drinking-Water Well User at the Core Zone Boundary due to Past Leaks at Single-Shell Tank Farms

504-109 cont'd

in the calendar year 2050. This presentation of the analyses allows the reader to specifically compare the alternatives using information on past and future potential impacts.

DOE does not agree with the commentor's statement that "DOE is arguing that the groundwater is already contaminated and we will only be making it a little worse by adding add a little more contamination that will exceed groundwater standards." There are potential compliance issues identified today with the tanks as well as the associated CERCLA cribs and trenches (ditches) adjacent to them. This *TC & WM EIS* indicates that, over the long term, removal of the waste from the SSTs and closure of the tanks has long term benefits over not closing the SSTs. Following completion of the mitigation action plan and before implementing closure actions DOE will develop a tank farm system closure plan that will be implemented for each of the waste management areas. The first waste management area to be addressed is Waste Management Area C. The TPA has a milestone for the completion of a soil investigation for Waste Management Area C (M-045-61), submittal of a closure plan (M-045-82), and for the completion of Waste Management Area C closure (M-045-83). DOE will complete the soil investigation to determine the nature and extent of the contamination. To inform the decision process for closure, DOE will complete a Waste Management Area C Performance Assessment and risk assessment. Following completion of the tank retrievals, data collection activities for residuals in the pipelines, ancillary equipment, and soil, the performance assessment will be revised to include all data. This revised performance assessment and closure plan will be presented for public review and comment, and the Waste Management Area C closure plan will be modified and incorporated into the Hanford site wide permit.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

Figure S-17 shows the long-term radiological risk from past leaks at the tank farms. On page S-93 it indicates that clean closure of the SST Farms means that contamination from past leaks would be removed at all SST Farms. However, groundwater contamination remains and it is left to the reader to figure out that the blue trace in Figure S-17 results from the absence of groundwater cleanup. On page S-93 it states "Past leaks are major contributors to potential long-term groundwater impacts".

On page S-96 it states that Figures S-16 and S-17 show that clean closure would provide little reduction in long-term impacts to groundwater before CY6000 due to past leaks and cribs and trenches. This is only true because their clean closure scenario is not a clean closure. Under Alt 6A&B with option, the groundwater contamination from past leaks is not remediated and is included in the clean close alternative risk calculation creating substantial risk. As a result, when you compare the relative risks, there is little reduction in long-term impacts to groundwater resulting in the false conclusion of the true benefit of an actual clean closure scenario.

Figure S-18 shows the tank farm closure risk from drinking groundwater at the core zone. Specifically absent from that graph is a plot for Tank Closure Alternative 6B because "there are no long-term human health impacts…" because the "groundwater sources … are completely removed under this alternative" *pg S-95*. In other words, when you remove the contamination, the long-term risk is gone. That concept of clean close as applied to Tank Closure also needs to be applied to the closure concept for the crib and trench sources and for the past leak sources.

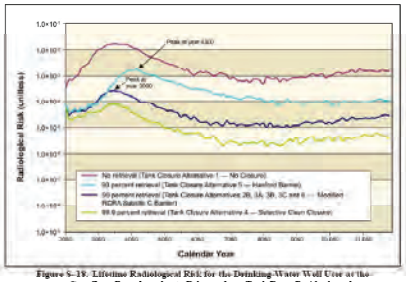

Figure S-19. Lifetime Radiological Risk for the Drinking Water Well User at the Core Zone Boundary due to Releases from Tank Farm Residuals and Ancillary Equipment and to Retrieval Leaks

On page S-96 the DOE proffered alternative of landfill closure of the tank farms and associated cribs versus clean closure of the same, is based on the excessive cost of clean

504-109 cont'd

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Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

closure and on the conclusion that clean closure would only provide an incremental decrease in radiological risk. That argument is apparently based on the preceding Figures S-16 and S-17 which in effect, compares the relative long-term radiological risks only for alternatives where the groundwater is not cleaned up and does not compare risks to a true clean-closure alternative.

Figures S-16 and S-17 are terribly misleading without a clear explanation of what contamination is and is not represented in the radiological risk determination. DOE's argument of only incremental decrease in radiological risk with clean closure is not a valid argument when comparing it against the risk from an alternative that includes cleanup of the groundwater during and following the retrieval period.

It appears that the DOE is prematurely assuming a cleanup path where the groundwater at the tank farms will not be remediated. This approach biases the risk assessment by producing significant long-term impacts to groundwater that may not necessarily be present. Since DOE's alternative preference is based on a comparison of relative alternative risks, at least one of the alternatives must include groundwater cleanup for a proper risk comparison. In effect, the DOE is arguing that the groundwater is already contaminated and we will only be making it a little worse by adding add a little more contamination that will exceed groundwater standards.

This argument amounts to making the determination in the EIS that the groundwater beneath the tank farms is irretrievably contaminated and now, since it is already contaminated we might as well contaminate it some more and really make it irretrievable and save some money on cleanup. This is all done in light of the fact that the EIS is not intended to make decisions on cleanup of the groundwater.

Including past groundwater contamination in all Alternatives creates a groundwater sacrifice zone by default yet the EIS provides no mention or discussion of this. In fact, it was very difficult to determine how the existing groundwater was included in the risk calculations.

504-109 cont'd

Vadose zone flow and transport model validation
On pages N-6 and N-7 the EIS discusses the selection of van Genuchten parameters for the vadose zone model using a process described in Figure N-1 where they match parameters with actual conditions. In effect, this is an empirical calibration of their vadose zone model where they change some of the variables of the basic equation to make the model a better match to actual conditions.

Three data sets are used to represent contamination migration conditions resulting from a single vadose zone source. One of the data sets is discussed and explained in Appendix N.

504-110

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504-110 There appears to be some confusion. The *Draft TC & WM EIS* Appendix N, Figure N–1, reference is to three soil types and not three data sets. In the *Draft TC & WM EIS* these three soils, Hanford gravel, Hanford sand, and Ringold gravel, are the three dominantly occurring soil/sediment types found in the vadose zone, and in our simulations flow in the vadose zone is most sensitive to characteristics. Other materials such as silts and mud are important features in some locations, but by and large flow and transport are through the three soil types.

DOE recognizes that it is difficult to compare the historical data presented in Figure N–5 to model results in Figure N–6 of the draft EIS. This has been revised in this *Final TC & WM EIS* by presenting both on the same graph, Figure N–12. DOE would like to clarify that the comparison of these two data sets is a "qualitative agreement." DOE believes this qualitative agreement is evident in that the observed data show gross beta and the predicted technetium-99 peak in the mid-1950s, with concentrations falling off rapidly thereafter and ending in the 1970s. Given the log scale, the size of the initial peak, and approximate agreement even over long periods, qualitative agreement is a reasonable characterization. There indeed may be trend as a result of flows from a distant source to the well, but that trending value is still of the same order of magnitude. Thus, there are two points to be made in this regard: first, there is qualitative agreement; and second, the structure evident in the field data is not explained solely by the BY Crib model. Note in Figure N–5 of the draft EIS that the technetium-99 activity exceeds the gross beta. Explanations for this range from measurement uncertainties to multiple and distant sources. Appendix N has been revised in this final EIS to provide this additional explanation.

DOE would like to clarify that neither the flow nor the transport model is a steady-state model.

DOE believes that the commentor's conclusion regarding the active vadose zone plume is too restrictive. All that is suggested by the observations in well 299-E33-7 is that a new pulse or band of technetium-99 contamination is arriving in the vicinity of the well. This could be by way of the vadose zone or the saturated zone. The commentor's argument that the technetium-99 arriving at the vadose zone is from a distant source via lateral movement through a perched water table is examined in detail in the following paragraphs.

DOE disagrees with the commentor's interpretation of the Sobczyk (2004) document. Sobczyk indicates the movement of uranium in the vadose zone,

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

Figure N-5 shows the historical gross beta activity and Tc-99 concentration measured in the groundwater beneath the BY cribs (well 299-E33-7). The source of this groundwater contamination is reported to be from the BY cribs.

Figure N-6 shows the modeled or predicted Tc-99 concentration, although I do not understand why they did not plot the data on Figures N-5 and N-6 on a common graph.

On page N-7, the EIS indicates that the measured and predicted Tc-99 concentrations are in general agreement and the predicted Tc-99 concentration profile shows qualitative agreement with the gross beta profile. I am not certain what this means relative to the model and I would normally request that a sensitivity analysis be done to provide an estimation of the error of the model, but this is all moot point as I will explain.

I will mention first that the predicted Tc-99 curve reaches a steady state concentration of near 20,000 pCi/L after 50 years. On the other hand, measured Tc-99 concentration shows an increasing trend from about 500 pCi/L to 20,000 pCi/L and rising. In my opinion, this does not appear to be a qualitative match nor does it appear to represent a condition of general agreement.

On review of the Tc-99 groundwater data shown in Figure N-5, I conclude that a clear rising trend in groundwater contamination is occurring at this location from about 1983 to the present. This trend indicates a dynamic groundwater contamination condition, not a steady state flow as modeled, and it indicates that an active vadose zone plume is just now entering the groundwater in the immediate vicinity of the well.

Unfortunately, the Tc-99 contamination shown by Figure N-5 originated from the BY Farms or from the large leaks from tank BX-102. It did not originate from the BY cribs as indicated and it certainly is not from a single vadose zone source. This has all been documented by the Nez Perce and Sobczyk (et al., 2003, 2004), and DOE 2004.

Tc-99 and Uranium have relatively high migration rates. Uranium can be tracked through the vadose zone with passive spectral gamma ray logging, but Tc-99 cannot because it requires actual sampling to determine soil concentration. What Sobczyk and the DOE Grand Junction Office did was to follow the uranium from the BX-102 through the vadose zone on a northward preferential pathway to a place below the BY cribs where it is entering groundwater. This vadose zone data is all correlated with groundwater data including trends in Tc-99, Uranium and Nitrates. This combination of vadose zone uranium plume tracking and correlation with multiple groundwater contaminants makes Sobczyk's conclusions quite solid. These references on the BX-102 contamination plume are all available and the information provided by Sobczyk is summarized in the annual Hanford Site Groundwater Monitoring Report so it is inexplicable why the data would be so totally misused for such a critical thing as calibrating the model forming the basis of the entire risk assessment.

This contamination migration pathway through the vadose zone soil and into groundwater at the B-BX-BY complex as mapped out by Sobczyk, probably represents a

504-110 cont'd

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once reaching the perched system, was to the northeast in the vicinity of well 299-E33-18, where it is implicated as the origin of the saturated zone plume observed moving to the northwest. That plume extends to the BY Cribs and beyond (Sobczyk 2004:Figure 6).

An additional complication is the likelihood of changes in the direction of the groundwater flow in this area over the years.

DOE disagrees with the commentor's assertions regarding DOE's calibration of the model. As stated in Section N.1.2 of the draft EIS, concentration data at several locations were used in the final step of the calibration of the vadose zone parameter. This included unconfined-aquifer data considered, by virtue of location and history, to be attributable to single-site sources, and data attributable to grouped sources (e.g., tritium plume data). Three sets of gross beta concentration data were used for single-source sites, including the concentrations at well 299-E33-7 immediately downgradient from the BY Cribs. (The other locations were the BC Cribs [gross beta] and the vicinity of the 216-T-26 Crib [iodine-129].) The BY Cribs are judged to be suitable as a calibration site because of (1) the location of the well relative to the cribs, (2) the fairly well quantified release with respect to both flow and inventory, resulting in a simple response in the aquifer below, (3) the availability of a significant quantity of geologic data for the area, and (4) the adequate density of concentration data available at the time when the release was expected to have impacted the well.

In regard to the near-saturated soil conditions, the release from the cribs involved larger volumes of water than did leakage from the tanks. During operation of the BY Cribs, conditions in the vadose zone were at or near saturation for a short time—a couple of years—and this is precisely what was modeled—with an emphasis on agreement with the peak occurring in the mid-1950s immediately after operation of the cribs.

DOE disagrees with the commentor's assertion that the models used—implemented using the STOMP code—were inappropriate. The STOMP code can be used, and in fact in our models was used, to simulate the variety of hydrogeological conditions—varying in time and ranging from arid conditions to saturation—associated with the multiple types of releases that have occurred at the site.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

local drainage that drained to the north toward a paleo-channel that ran from west to east between the west area and Gable Mountain. This migration pathway most likely resulted from contamination moving through the soil at or near saturated soil conditions. The near saturated soil conditions resulted from the characteristically large volumes of effluent or tank liquid that was released in the B complex. It is also likely that all of the large volume releases from the area went down the same migration pathway. Because of the near-saturated soil conditions that most likely occurred at the B complex, it is inappropriate to use the BY groundwater data for the empirical calibration process describe in Figure N-1. I believe this shows that the type of vadose zone contaminant migration model used in the EIS is entirely inappropriate for the types of conditions that existed at many of the tank farms.

504-110 cont'd

The vadose zone model should consider and appropriately model the expected saturation of the soil during a large leak or release event as well as the increased soil moisture resulting from placement of gravel covers over the tank farms and the water releases from water line leaks and the massive effluent releases from nearby cribs.

I concur with Sobczyk's interpretation that the rising Tc-99 in the groundwater beneath the BY cribs most likely originated from the BX-102 leak which, along with uranium, is just now reaching groundwater in this area. Current conditions along the migration pathway are probably close to some form of steady state conditions but for the increased infiltration at the tank farms and other recent water releases in the area.

In the above discussion, I used words like "likely" and "most likely" demonstrating an educated but limited understanding of actual site conditions as a result of inadequate characterization of the vadose zone contamination at Hanford. They simply don't have the site characterization data to confirm or reject any theories on subsurface conditions. Likewise, there is obviously also not enough data to do the type of model calibration that was attempted. I believe that the site that is used for the empirical calibration of the vadose zone model must be extraordinarily well characterized both spatially and temporally because the model accuracy is critical for developing and demonstrating accurate risk assessments.

504-111

I believe it is entirely premature to make the closure decisions proposed in the EIS before the site characterization is completed and we at least have an understanding of how the contamination migrates through the vadose zone soil. The current vadose zone model using unsaturated flow is inappropriate and the calibration of the model is simply wrong because the contamination actually originated from a different source.

Groundwater Transport Model
The groundwater contaminant transport analysis is described in Appendix O and groundwater transport results for tank closure alternatives are presented in a series of tables from Table O-6 to O-32. Groundwater concentration plots and groundwater plume model results are shown and discussed in Chapter 5.

504-111 The analyses of the *Draft TC & WM EIS* rely on various modeling approaches to predict the future consequences of RPP mission activities that DOE may undertake. Appendix L, Section L.4.3, reveals that field-sampling data from over 5,000 boring logs were used to support lithologic encoding of the regional-scale flow model; Section L.6.1, that field-sampling data from approximately 1,800 groundwater wells were used to calculate the regional-scale flow model; and Appendix N, Section N.1.2, that field-sampling data from approximately 140 vadose zone boreholes were used to calibrate the vadose zone model as well as regional-scale groundwater plume measurements for the BY Cribs, BC Cribs, 216-T-26 Crib, and the REDOX and PUREX waste sites. In Appendix U, modeled results of contaminant plumes are compared against field measurements for the COPCs. DOE's view is that the overall level of characterization data for Hanford supports differentiation among the alternatives, which is a key feature of a NEPA analysis. As part of the closure and permitting processes, additional subregional-scale site characterization data may be developed to support smaller-scale, more-detailed modeling assessments.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

My first comment about the model is that a description of the physical model that the model represents could not be found. I was looking for areas in the model with high permeability representing old drainage channels and other ties to the actual geology and hydrogeology of the site. Even a basic cross section showing model resolution and the different Ringold layer parameters would have been useful. Questions remain about how well the model represents actual subsurface conditions. **504-112**

The calibration of the groundwater transport model was accomplished using two tritium plumes but not with any lower mobility contaminant plumes or a plume containing multiple contaminants. The tritium plume calibration model runs appear to represent historical conditions at Hanford.

It is also difficult understand groundwater impacts of each Alternative with no way to compare the groundwater conditions between Alternatives. I cannot determine exactly what contamination went into each model and specifically what were the differences between the sources. **504-113**

Figure 5-240 shows Alternative 6A base case groundwater total uranium concentration for 2005. This model result apparently does not include existing uranium groundwater contamination and has not been compared to existing conditions. The uranium plume on the north side of the B complex where the uranium concentration exceeds the MCL is not shown (see Missing Groundwater Contamination below) **504-114**

Relative to the end risk associated with each alternative and the Alternative impact on groundwater it is clear that the no action Alternative 1 will result in widespread groundwater contamination of the Hanford site and rivershore areas. It was difficult to compare groundwater impacts from the rest of the Alternatives because the impacts were similar and there were no comparison plots or discussion of the differences. In addition, the absence of a clean groundwater alternative makes it a game of comparing bad groundwater impacts to slightly worse impacts with no concept of what could be. My interest at least is in assessing the possibility of clean groundwater. **504-115**

I-129 distribution coefficient sensitivity modeling reported on page O-91, used a soil bulk density of 2.6 g/cm^3, corresponding to a soil density of 162 lb/ft^3. An actual in-situ soil density, considering a soil porosity of 25% by volume would be about 110 lb/ft^3 or 1.7 g/cm^3. This unrepresentative soil density results in inaccurate migration rates in the sensitivity analysis.

The sensitivity of the model to contaminant inventory variations (O.6.5) uses the vadose zone model output for Tc-99 from the "BY cribs" in the calculations. On page O-107 it indicates that the BY crib sensitivity analysis shows "variations of source strength on the order of 50% would result in large variations in the near field … with resulting variations in (groundwater) concentrations of over an order of magnitude". This leads to groundwater concentration predictions at the three output points with error ranging from 50% to 100%. In other words, the model shows the groundwater concentration is very sensitive to variations in vadose zone source strength. **504-116**

Page 7

504-112 This *Final TC & WM EIS* has been updated to add a site conceptual hydrogeologic model to Appendix L, Section L.2. The conceptual model is depicted at a general/summary level. Additional details regarding data selection, qualification, and justification are included in appropriate sections within this EIS, and/or included in EIS calculation and analysis packages.

504-113 The calibration method (tritium plume matching) included in Appendix O was based on a compilation and interpretation of observed tritium plume data provided in the *Hanford Site Groundwater Monitoring for Fiscal Year 2003* (Hartman, Morasch, and Webber 2004). For this *Final TC & WM EIS*, this interpretation was supplemented with information up to and including the *Hanford Site Groundwater Monitoring and Performance Report for 2009* (DOE 2010). The purpose of the calibration was to determine transport parameters for the groundwater transport model; in DOE's view, this is best accomplished by comparing results for conservative tracers. The first reason for this choice is that conservative tracers (from high discharge sites, like the PUREX and REDOX sources) are least likely to have confounding influences from vadose zone transport processes. The second reason for this choice is that conservative tracers sample more of the area and volume of the aquifer, and thus provide a more robust test for developing parameters. The third reason is that conservative tracers are the most likely to have well-developed, regional-scale plumes that are amenable to field sampling and analysis. The working hypothesis underlying this process is that, when parameters are chosen that match model results and field measurements for conservative tracers, these same parameters are applicable to retarded tracers. This is a well-established, standard hydrogeologic approach. DOE disagrees with the commentor's observation that plumes containing multiple contaminants were not used in this process. The plumes used in all of the contaminant transport calibrations contain multiple constituents. A comparison of the COPCs by alternative is included in Chapter 5. The analysis performed in Chapter 5 includes lower mobility contaminants such as uranium-238 and a detailed description of the contaminant sources. The inventory data for each alternative by source are provided in Appendix D and the cumulative impacts analysis inventories by source are provided in Appendix S.

504-114 Chapter 5, Figure 5–240, of the *Draft TC & WM EIS* represents a model result for sources related to Tank Closure Alternative 6A. Figures in Chapter 5 are not intended to represent current conditions. The comparison of model predictions to current measurements is presented in Appendix U.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

This sensitivity to source strength is probably correct, at least for the environmental conditions that are modeled. Unfortunately, the sensitivity test empirical model was based on the BY Crib groundwater plume data and the Tc-99 did not originate from the cribs but from a tank source. As a result there are differences in the vadose zone release to groundwater that are not considered in the sensitivity model. For model quality validation concerns the sensitivity to source strength modeling is totally invalid but the underlying trend conclusion is probably correct, at least for the conditions that were modeled.

It is clear that additional site characterization must be completed before any reliable groundwater contaminant transport calculations or model sensitivity analyses can be completed.

The validity of the other inventory sensitivity calculation in this section (TY cribs) was not assessed due to an inability to review the T complex site characterization data because most of the data and reports were not available either on the web or in the WSU public reading room. However, considering the sensitivity of the BY groundwater model to the inventory and to the uncertainty of the model source term, it can be concluded that the groundwater transport calculation errors are too large to support the risk assessments in the EIS.

504-116 cont'd

Missing Groundwater Contamination
Results of the vadose zone and groundwater modeling as shown in Figures 5-205 to 5-206 are not accurate. All of the figures show very low initial uranium concentrations in the groundwater at this time when we know this is not the case.

I again pick on the work of Dr. Sobczyk and DOE GJO characterization of the B complex as an example where uranium from the BX-102 tank has made its way through the vadose zone soil and entered groundwater where it currently exceeds the drinking water standard benchmark. So current uranium concentrations in the groundwater exceeds anything predicted in the modeling.

My concern is that the EIS apparently missed this groundwater contamination and did not properly assess the resulting long-term risks. I also have concerns that there is no way to determine what specific contamination plumes at Hanford are represented by the models. It is apparent that the BX-102 contamination is not represented.

Somewhere from the source characteristic data of leak volume and composition to the release model, to the vadose zone transport model, the uranium did not make it into the groundwater and is not accounted for in the risk assessment.

504-117

"Possibly" some Short-term environmental consequences
Some short-term environmental consequences/impacts do not appear to have been reviewed, evaluated, assessed or recognized in the EIS. I refer to the short-term environmental impacts resulting with existing groundwater contamination as well as the

504-118

504-115 See response to comment 504-107 regarding groundwater contamination and remediation.

504-116 In response to this and similar comments, Appendix O of this *Final TC & WM EIS* has been revised and includes an update to the iodine-129 distribution coefficient sensitivity analysis found in Section O.6.3.

The comment regarding the model's sensitivity to contaminant inventory values implies that the analysis of the model's sensitivity to contaminant inventory variations is invalid because "the Tc-99 did not originate from the [BY] cribs but from a tank source." DOE disagrees with the comment that no technetium-99 was discharged from the BY Cribs. As described in Appendix D, Table D–30, 128 curies of technetium-99 were discharged from the BY Cribs. Although this is an important correction to the comment, more importantly, the Appendix O sensitivity to contaminant inventory variations would be valid regardless of whether there was technetium-99 inventory released from BY Cribs. This Appendix O sensitivity analysis compares 100 model runs to one another—not to an absolute or known result. The purpose of this sensitivity analysis is to show how differently a groundwater plume may behave if the inventory of its contaminant source varies by plus or minus 50 percent. This Appendix O analysis reasonably meets this objective. DOE notes that there is no comment on the TY Cribs portion of this Appendix O contaminant inventory variation sensitivity analysis. DOE disagrees with the commentor's conclusion that groundwater transport calculation errors are too large to support the risk assessment in this EIS.

504-117 All of the figures and tables in Chapter 5 represent model results for sources related only to specific Tank Closure, FFTF Decommissioning, and Waste Management alternatives. In particular, Figures 5–205 and 5–206 of the *Draft TC & WM EIS* present model results for only the sources involved in Tank Closure Alternative 6A. Figures in Chapter 5 are not intended to represent current conditions. The comparison of model predictions to current measurements is presented in Appendix U.

504-118 Short-term impacts analysis, as described in the Summary and other places within this EIS, covers impacts associated with the active project phase during which construction, operations, deactivation, and closure activities would take place, and extending through the applicable 100-year administrative control, institutional control, or postclosure care period. Short-term impacts are summarized primarily in Chapter 4 of this EIS. Long-term impacts are presented

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

deep vadose zone contamination that is currently entering groundwater. Page 4-66 mentions that direct short-term impacts of tank closure activities are "mainly" limited to retrieval induced leaks but it does not mention anything about impacts from past leaks or cribs and trenches.
Even under the no action Alternative 1 the EIS indicates (pg 4-67) "no short term impacts would occur because no tank waste retrieval would be performed", implying that only retrieval leaks are considered as short term impacts.

Under the clean closure Alternative on page 4-62, it mentions historical tank leaks and the fact that contamination has migrated deep into the vadose zone "and possibly to the water table" (underline added). This is about as close to an admission that we will get that contamination from tank leaks has reached groundwater. In reality this is a statement of the uncertainty associated with the contamination distribution in the vadose zone and the extent of migration. It supports a conclusion that we don't have adequate site characterization information to properly evaluate or assess short-term impacts. The uncertainty is so great at this point that there still appears to be some confusion over whether or not the contamination may "possibly" have reached groundwater. It seems to me that this should possibly be resolved before trying to assess environmental impacts.

It is all very confusing trying to figure out where and how the EIS modeling considers and includes the existing deep vadose zone contamination and groundwater contamination.

Short-term environmental impacts to groundwater resulting under Alternatives 1 and 2A (no Closure), should be compared to the short-term environmental impacts from landfill closure and clean closure in order to properly evaluate and quantify the true benefit of removing the contaminated vadose zone soil and cleaning up the groundwater.

At Hanford we find several tank farms where the vadose zone contamination is now entering the groundwater, including the B farm complex, C farm, SX farm and T farm. At other farms this conclusion of groundwater contamination is not as certain due to a lack of site characterization data.

These short term impacts should be identified and evaluated in the EIS so that they may be prioritized in the overall scheme of the closure process to perhaps address some of the short-term impacts on a priority basis and thereby prevent some of the potential long-term impacts.

The BX-102 contamination plume comes to mind as a specific example where impacts to groundwater are occurring and will increase in the short-term. In this case, a small pump and treat effort may be advisable to minimize the extent of the new groundwater plume until clean closure can occur and the groundwater plume can be remediated.

Another example is the SX Farm where very high concentrations of Tc-99 contamination have been identified in the groundwater. Over the short-term remediation and institutional control period these plumes could increase and spread to cause very

504-118 cont'd

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primarily in Chapter 5 of this EIS and include potential impacts on groundwater and human health, as well as ecological risks during the 10,000-year period of analysis. Long-term impacts analysis during this time period, which starts in the year 1940 and extends out to 11,940, captures the impacts associated with past tank leaks, retrieval leaks, and past practices involving contiguous cribs and trenches (ditches).

See response to comment 504-107 regarding groundwater contamination and remediation.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

significant long-term impacts on the groundwater. Right now, they are short term impacts that need to be recognized, addressed and resolved in the EIS. Perhaps proper consideration will lead to cleanup of a small groundwater plume rather than expansion of the problem until an irrecoverable condition exists.

Discussing short-term impacts to groundwater is moot point however if the EIS does not address groundwater remediation or at least adopt a clean-groundwater interim management goal. *504-118 cont'd*

As discussed above, the DOE preference for the landfill closure Alternative versus the clean-closure alternative is based on the incremental difference in risk that results with a less-than-clean closure. I believe that if the short-term impacts to groundwater were properly considered, that preference would have to be reconsidered.

Assumed Sound Source Uncertainties
If we accept the basic conclusions of the groundwater sensitivity analysis presented in Appendix O and discussed earlier in this review, we understand that the groundwater contaminant concentrations are sensitive to source term strength and that a 50% change in source strength could result in a 10 fold increase in groundwater concentration. Source strength refers to the output of the vadose zone portion of the model.

Under the EIS clean closure Alternative 6 A&B, the resulting groundwater contamination from past leaks and adjacent cribs and trenches has a large impact on the long term groundwater contamination levels and associated risk. The existing contamination migrating through the vadose zone and into groundwater is the principal source of groundwater contamination that occurs with the clean close Alternative.

This leads to Appendix M and a review of the releases to the vadose zone. Table M-3 provides tank leak volume estimates which create the principal clean-close contamination input to the vadose zone model and has the greatest impact on future groundwater contamination, except for the in-tank waste that would be released under the no action Alternative. My concern is that, except for a few cases, the tank leak volume estimate data provided in Hanlon and shown on Table M-3 are often nothing more than biased guesses. *504-119*

None of the tank leaks have been adequately characterized to determine the nature and extent of the contamination and allow a correlation of liquid loss data to the existing contamination distribution. Even vadose zone contamination from the large leak from T-106 has not been properly characterized for we do not know the extent of the deep contamination and the extent of groundwater contamination from that leak. In the early 1990's a characterization effort was undertaken in an attempt to resolve concerns by the GAO. That characterization effort started with a plan for about 10 borings but was quickly reduced and turned into a site characterization effort that included only one new borehole. *504-120*

504-119 DOE notes that NEPA analysis is a comparison of the alternatives under consideration; that assumptions used in the analysis must be clearly identified and the uncertainties discussed; and that the assumptions underlying the analyses should not bias one or more alternatives relative to the others. In Appendix D of this *TC & WM EIS*, the derivation of the inventory in the SSTs is discussed. In Appendix M, modeling assumptions are discussed, including those related to the portrayal of tank farm past leaks. It should be noted that the same modeling assumptions were used to derive environmental consequences for all alternatives. DOE disagrees that uncertainties related to modeled inventories preclude an unbiased comparison of alternatives.

504-120 See response to comment 504-119 regarding the assumptions used in the analysis of the alternatives.

Where data are available, estimates of the volume of past leaks are based on measurement of changes in height of material in the tanks or on measurement of radioactivity measured in soil adjacent to the tank. This information represents the best available information and provides an adequate basis for decisionmaking on remediation and closure of the tanks.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

Tank leak volume estimates used in the vadose zone modeling to determine groundwater impacts are severely biased toward the low-volume extreme and selectively ignore significant leak data. For example, tank SX-109 experienced several leak episodes and various leak volume estimates were produced over the years using different types of analyses. In 1987 Lewis (1987) prepared a leak volume estimate that determined as much as 56,000 gal of waste could have leaked from the tank. This included an estimate of 33,000 gal that leaked from the tank between 1965 and 1973 when contamination was detected in the laterals below the tank and they recorded a 4-inch drop in liquid.

In 1992, it was determined that the 56,000 leak volume estimate was too high so the leak volume estimate was reassessed by an "independent" contractor (DOE, 1992). The new estimate was completed by mere amateurs who had little knowledge of the subsurface contamination migration at Hanford (nor did anyone at that time). The new estimate was based on a phony calculation of the contamination distribution in the soil, which was largely uncharacterized at that time, and postulated that most of the vadose zone contamination originated from tank SX-108. From this postulation, the leakage estimate was reduced to 10,000 gal. This report was not subjected to a qualified peer review and the analysis completely ignored the previous estimate (Lewis, 1987) which was based on in-tank liquid level drop combined with plume detection in the laterals. The new leakage estimate was included in Hanlon (Table M-3) where it remains as the official estimate. ***504-121***

In 1995 a rigorous analysis of historical process data was completed by Agnew (et al.,1995 and Agnew and Corbin, 1998) indicating much larger leak volumes for most of the SX Farm tanks. That information appears to not have been included in Table M-3.

I believe that to determine environmental impacts from previous tank leaks, the DOE should perform an unbiased analysis of tank leaks and the leak volume estimates should be correlated and verified with vadose zone characterization data. Unfortunately correlation of the tank leak data with the vadose zone data is not possible at this time because the nature, extent and distribution of contamination in the vadose zone soil has not been determined. Considering the sensitivity of the contaminant migration model, until the tank leak estimates are properly determined with the application of a valid scientific method, I do not believe there is adequate precision in the tank leak volume data to reliably calculate groundwater impacts.

Regarding the statement that "Sixty seven of the SST's are known or suspected to have leaked liquid waste to the vadose zone between the 1950's and the present, although it is likely that some of the tanks have not actually leaked"; This statement indicates a level of uncertainty associated with determining whether or not a tank has leaked and it demonstrates the bias in regards to tank leak status designations. This of course, leads to questions and concerns about the source term and source term bounding conditions used for the vadose zone modeling and groundwater impacts assessments. ***504-122***

First, I must object to performing an analysis of environmental impacts when they still haven't figured out which tanks leaked. This historical argument over tank leak designation and the associated source term uncertainty would not exist be it not for an

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504-121 The conclusion that the Hanlon estimate was most appropriate for the analyses in this *TC & WM EIS* was documented in the *Technical Guidance Document* (DOE 2005). Appendix D, Section D.1.1.4, discusses the use and uncertainties associated with the Hanlon estimates.

504-122 See response to comment 504-119 regarding the assumptions used in the analysis of the alternatives.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

inadequate characterization of the vadose zone contamination around the tank farms (see comments above).

To move forward with vadose zone modeling in light of characterization inadequacies would require an extensive investigation and analysis of the uncertainty associated with the tank leak source term. Such an assessment must be prepared in a scientific and unbiased manner. Once the source term uncertainties are determined, upper and lower bounds for the source term would need to be established and modeling of the bounding source term conditions would need to be accomplished.

504-122 cont'd

Even with the known uncertainty associated with tank leak volume estimates, the draft EIS provides no bounding assessment or even a sensitivity analysis of the effect of varying tank leak source volumes. The only such sensitivity analysis in the EIS was that completed for the groundwater model as discussed above.

The statement shown above "that some of the tanks have not actually leaked" clearly indicates a bias in the tank leak designation. This is a very well developed historical bias that has always been present at Hanford and clearly continues. The truth is that there are some tanks that are listed as sound but are actually leakers. Tanks at Hanford are categorized as "sound" or "assumed leakers" instead of calling them "assumed sound" and "leakers" as would be appropriate.

In 1998, an assessment of the vadose zone contamination (US DOE, 1998) concluded that contamination plumes at the base of tank TY-102 "most likely resulted from leakage from tank TY-102". This contamination was located right at the base of the tank on the side of the tank were no other tanks are nearby that could have contributed to the plume. This condition was about as clear of a conclusion for tank leak that can be found by assessing the soil contamination distribution.

As a result of the vadose zone findings, a committee was collected to reassess the tank leak designation. That group quickly divided into two respectively intractable groups and the issue could not be resolved. As a result, a consultant was called in to establish a decision making process for tank leak designations. The consultant developed a tank analysis process (Epple, et al., 1998) based on a Bayesian logic framework and tank TY-102 was used in an example of the implementation of that process. The result of the test run was a 95% probability determination that the tank had leaked versus a posterior probability of no leak of 45%.

In 1999, the use of the newly developed tank leak designation was discontinued and tank TY-102 remains listed as a "sound" tank.

The bias described here relative to the tank leak designations is clear and it is also clear that Table M-3 is missing contamination release estimates from tanks TY-102, BY-111 and BX-106. Data indicates that all three tanks have leaked.

504-123

504-123 See response to comment 504-119 regarding the assumptions used in the analysis of the alternatives.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

As long as the very basic question about whether or not a tank (or 149) has leaked remains uncertain, I do not believe the estimate of the vadose zone source term is adequate for assessing risk. If, in spite of this source term uncertainty, we were to move forward with the environmental assessment, bounding conditions on the source term would have to be established and the model would have to be run with the high and low extreme conditions.

The uncertainty of a tank's leak status would all but disappear if the vadose zone soil contamination is properly characterized and the bias is removed from tank leak status decisions.

504-123 cont'd

Summary of critical concerns
My review was focused on the tank farms and associated contamination in the tanks, vadose zone soil and groundwater. I followed the contamination through the model to see how the different contamination sources are dealt with (or not) in each component of the risk assessment model.

The most important concern is that the EIS does not consider and evaluate a true clean closure scenario that includes cleanup of the groundwater, deep vadose zone contamination and groundwater contamination from past practices facilities. Instead, all of the Alternatives fail to meet regulatory compliance standards for groundwater contamination at some point. If alternatives are presented and analyzed in the EIS that fail to meet regulatory standards, that should be identified, discussed and explained in the EIS. All Alternatives should be compared to a true clean closure alternative.

504-124

The EIS also does not include or consider decisions about groundwater remediation at the tank farms. Instead, all of the Alternatives create groundwater sacrifice zones by default because all Alternatives fail to meet regulatory compliance standards for groundwater. Long-term groundwater impacts would result in extensive regions of contamination along the Columbia River shoreline making the area uninhabitable. Yet the EIS states that groundwater decisions are not a part of this EIS. The DOE cannot say that they are going to clean up the tank farms by sacrificing the groundwater, and then claim that decisions about groundwater cleanup are not part of the EIS. Clearly the EIS must include consideration of groundwater cleanup decisions.

504-125

I believe the invalidity of the vadose zone model is demonstrated by the fact that there is a complete misunderstanding of the source of the contamination plume that was used in the attempt to calibrate the vadose zone model. Vadose zone modeling is not properly calibrated and is inappropriate for assessing risk from contaminant migration through the vadose zone.

This complete misunderstanding of the source of that contamination is caused by inadequate characterization of the nature and extent of the vadose zone contamination. None of the larger vadose zone contamination plumes at the tank farms have adequately been characterized to the extent that they can be used to perform the type of model validation that is needed for the risk assessments.

504-126

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504-124 In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. Rather, the scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and the closure of the SST system. This closure includes the tank system along with the vadose zone as impacted by the tank farms (i.e., past leaks). The *TC & WM EIS* Tank Closure alternatives considered for the tank farm system include no action, landfill closure, selective clean closure, and clean closure, which would involve actions to remove the source of contamination. The State of Washington has agreed that the alternative descriptions identify the information needs necessary to meet the State of Washington SEPA requirements. Ecology expects that the analysis provided in this *Final TC & WM EIS* will provide enough information to adequately inform its permitting requirements. When Ecology provides approval of the proposed actions of DOE by issuing a permit, the applicable WAC regulations will be applied and enforced. The state closure standards for the owners and operators of all dangerous waste facilities are defined (WAC 173-303-610(2)); references to tank systems (WAC 173-303-640) and corrective action (WAC 173-303-645) requirements are included. The regulations describe specific requirements for closure of the tank system (WAC 173-303-640(8)(a) and (b)). This part of the regulations provides a requirement for DOE to "remove or decontaminate all wastes residues, contaminated soils, and structures and equipment contaminated with waste" for the tank system. And if DOE "demonstrates that no contaminated soils can be practically removed or decontaminated," then the corrective action regulations (WAC 173-303-645) will apply.

504-125 See response to comment 504-17 regarding groundwater remediation at Hanford.

504-126 As indicated in Appendix N, Section N.1.2, of the draft EIS, field-sampling data from approximately 140 vadose zone boreholes were used to calibrate the vadose zone model and to make regional-scale groundwater plume measurements for the BY Cribs, BC Cribs, 216-T-26 Crib, and the REDOX and PUREX waste sites. DOE's view is that the overall level of characterization data for Hanford supports differentiation among the alternatives, which is a key feature of a NEPA analysis. As part of the closure and permitting processes, additional subregional-scale site characterization data may be developed to support smaller-scale, more-detailed modeling assessments.

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

When some of the massive releases occurred, soils were at near-saturation conditions, causing downward flow along preferential drainage pathways to the groundwater. This type of contaminant migration is common at most of the Hanford tank farms as indicated by patterns of contamination distribution and as is found in the similar geologic conditions in the lower Columbia Basin. With these conditions, it is inappropriate to use the type of vadose zone contamination migration model that was used in the EIS.

The first step to completing a valid risk assessment is to characterize the nature and extent of contamination in the soil around the tank farms. This means tracing the contamination from the source through the unsaturated zone soil and into groundwater at most of the contamination plumes. Currently active sources of groundwater contamination are not included in the risk models. Active sources of vadose zone contamination are also not included in the risk models. I believe it is premature to make tank closure decisions and create groundwater sacrifice zones until the subsurface conditions are understood and vadose zone plumes are adequately characterized. *504-126 cont'd*

The EIS should also evaluate a large scale soil excavation/removal strategy for deep contamination removal. *504-127*

I recommend that the DOE should revise and reissue the draft EIS and not move forward with a final EIS. The problems with the existing draft EIS are too extensive to simply fix. A complete rewrite is required after site characterization is complete and after valid risk assessment models are developed. *504-128*

DOE should adopt an interim policy that the farms will be clean-closed. Tank farm closure decisions can be made after completing a more comprehensive characterization of the groundwater and vadose zone in order to understand the basic characteristics of the contamination migration processes. *504-129*

References

Agnew,S.F., J.Boyer, R.A. Corbin, T.B. Duran, J.R. FitzPatrick, K.A. Jurgensen, T.P. Ortiz and B.L. Young. 1996. *Hanford Tank Chemical and Radionuclide Inventories: HDW Model,* LA-UR-96-858, Rev. 3, Los Alamos National Laboratory, Los Alamos, New Mexico

Agnew, S.F. and R.A. Corbin, 1998. *Analysis of SX Farm Leak Histories — Historical Leak Model, HNF-3233, Rev. 0,* prepared by Los Alamos National Laboratory, Los Alamos, New Mexico for Lockheed Martin Hanford Corporation

Epple,T., D.A. Seaver and D. von Winterfledt, 1998 *Tank Leak Assessment Process: Technical Background* HNF-3747, prepared for Lockheed Martin Hanford Corporation, Richland, WA

504-127 This *TC & WM EIS* has evaluated large-scale soil excavation/removal strategy. This approach is considered in Tank Closure Alternatives 4, 6A, and 6B, which involve selective or complete clean closure of the SST system and are representative of excavation actions that result in removal of the source of contamination from the vadose zone (i.e., contaminated soils between the tank farms and the groundwater). Clean closure of the tank farms would involve removing all SSTs, associated ancillary equipment, and contaminated soil to a depth of 3 meters (10 feet) below the tank base, all of which would be managed as HLW. Where necessary, deep soil excavation would then be conducted to remove contamination plumes within the soil column.

504-128 DOE has satisfied NEPA requirements by responding to public comments in this CRD and by making changes to the draft EIS where appropriate and necessary. Subsequent to the issuance of the *Draft TC & WM EIS*, DOE prepared an SA to analyze 14 topics it identified where it is unclear whether updated, modified, or expanded information warrants preparation of a supplemental or new draft EIS. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* is not required. See Chapter 1, Section 1.8.2, for more information.

504-129 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

Commentor No. 504 (cont'd): Tom Carpenter, Executive Director, Hanford Challenge; Geoffrey Fettus, Senior Project Attorney, Natural Resources Defense Council

Lewis, W.S. to D.R. Groth, 1987. Internal Memo, Subject: 241-SX-109 Leak Volume, 65950-87-091, Westinghouse Hanford Company, Richland, WA

Sobczyk, S.M., P.D. Henwood, R.G. McCain, and J.M. Silko, 2003. *Vadoze Zone Characterization of the B-BX-BY Waste Management Area and Surrounding Disposal Facilities, Hanford Site, Washington*, presented at the National Groundwater Association's Pacific Northwest Focus Conference, Anchorage, AK, June 25, 2003

Sobczyk, 2004. *Interpreted Extent of Subsurface Contamination Resulting from the 241-BX-102 Tank Leak, 200 East Area, Hanford Site*, Washington. Prepared for Confederated Tribes of the Umatilla Indian Reservation, Dept. of Sciences and Engineering, Mission, OR

US DOE, 1992, *Tank 241-SX-109 Leak Assessment*, WHC-MR-0301, prepared by Westinghouse Hanford Company, Richland, WA

US DOE, 1998, *TY Tank Farm Report*, GJO-97-30-TAR, US Department of Energy Grand Junction Office

US DOE, 2004, B-*BX-BY WMA and Adjacent Waste Sites Summary Report (Draft)*, GJO-2003-545-TAC, prepared by SM Stoller Corp for the US Department of Energy Grand Junction Office.

See response to comment 504-107 regarding groundwater contamination and remediation.

See response to comment 504-6 regarding factors influencing future DOE decisions.

Commentor No. 505: Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

From: Lauren Goldberg [lauren@columbiariverkeeper.org]
Sent: Monday, May 03, 2010 6:20 PM
To: tc&wmeis@saic.com
Cc: 'Brett VandenHeuvel'; 'Daniel Serres'
Subject: TC and WM EIS Comments, Columbia Riverkeeper
Attachments: FINAL TCWMEIS_CRK Cmnt (5-10).pdf; Att. A 4.29.10 Letter to Chu.pdf; Att. B OrDOE Letter.pdf; Att. C. OrDOE Altern Ltr.pdf

On behalf of Columbia Riverkeeper, please accept the following comments and comment attachments. If possible, please send me an email to confirm receipt of these public comments.

Regards,

Lauren Goldberg
Staff Attorney
Columbia RIverkeeper

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

P.O. Box 912 Bingen, WA 98605
724 Oak Street,
Hood River, OR 97031 (mailing)
Phone: 541.387.3030
www.columbiariverkeeper.org

May 3, 2010

Ms. Mary Beth Burdant
Document Manager
U.S. Dept. of Energy, Office of River Protection
P.O. Box 450
Mail Stop H6-60
Richland, WA 99352
TC&WM@saic.com
Fax: 509-376-7701
TC&WMEIS@saic.com

Via U.S. Mail and Email

RE: Tank Closure and Waste Management Environmental Impact Statement Public Comments

Dear U.S. Department of Energy:

On behalf of Columbia Riverkeeper ("CRK"), please accept these comments on the Tank Closure and Waste Management Environmental Impact Statement ("TC/WM EIS"). These comments supplement CRK's testimony at the public hearings in Hood River, Portland, and La Grande.

Columbia Riverkeeper is a membership-based 501(c)(3) nonprofit organization. CRK's mission is to protect and restore the Columbia River, from it headwaters to the Pacific Ocean. Since 1989, CRK has played an active role in monitoring and improving cleanup activities at the Hanford Nuclear Reservation ("Hanford"). A legacy of the Cold War, the Hanford site continues to leach radioactive pollution into the Columbia River. Hanford's legacy is not a local issue. Nuclear contamination from Hanford threatens the Pacific Northwest's people, a world renowned salmon fishery, as well as countless other cultural and natural resources. Cleary, Columbia Riverkeeper and our members have a strong interest in the U.S. Department of Energy's EIS.

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I. Columbia Riverkeeper Supports "Clean Up First."

CRK's staff and members are dedicated to a long-term solution for Hanford cleanup. As DOE is well aware, Hanford is one of the world's most contaminated sites. Despite this status, the public and CRK members continue to catch and consume fish from the Columbia River and recreate near and downstream of Hanford. For example, each summer CRK leads a series of kayak trips on the Hanford Reach of the Columbia River. The Hanford Reach is particularly unique because it is the last free-flowing stretch of the Columbia. On these outings, our members and staff pass the shores of the Hanford Nuclear Reservation and learn about the ESA-listed salmon and steelhead that spawn, rear, and migrate in the Hanford Reach.

DOE's current decision on the level of tank cleanup is a pivotal decision: what is an acceptable level of risk for the people and heritage of the Pacific Northwest? Columbia Riverkeeper joins thousands of individuals, organizations, and entities in urging DOE to adopt a protective cleanup standard that reflects the long-term future of the Northwest. This future includes a fishable, swimmable Columbia River.

Columbia Riverkeeper's members and staff kayaking the Columbia River's Hanford Reach.

As the TC/WM EIS clearly demonstrates, importing new waste to the site will only compound the waste treatment and disposal problems, not accelerate the cleanup. Moreover, shipping waste to Hanford or near other waterways of the Columbia Basin raises significant concerns for CRK and our members. In turn, CRK respectfully requests that DOE carefully consider these EIS comments.

On April 29, 2010, Columbia Riverkeeper and twenty of region's leading public health and conservation organizations submitted a letter to DOE Secretary Chu and Ines Triay, Assistant Secretary for Environmental Management. Columbia Riverkeeper, by this reference, incorporates the April 29 letter into these comments. *See* Attachment A (Apr. 29, 2010 Letter). In the letter, CRK and others urged DOE to withdraw its 2000 and 2004 Records of Decision selecting Hanford as a disposal site for large volumes of radioactive low-level waste (LLW) and mixed low-level waste (MLLW) from across the Nation. The letter is a direct outcome of DOE's TC/WM EIS. As the letter explains, the Department's own draft EIS clearly demonstrates that importing and burying off-site waste at Hanford poses serious human health and environmental impacts.

505-1

CRK's letter joins the State of Oregon Department of Energy's formal request, submitted to the Department on March 23, 2010. *See* Attachment B (Letter from Oregon Dept. of Energy to Asst. Sec. Triay). Oregon's letter discusses both the impacts and the flawed process relied upon by DOE in issuing a Record of Decision before analyzing the impacts at Hanford from importing and disposing of off-site waste. DOE's TC/WM EIS is a critical opportunity to

505-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Subsequent to the issuance of the *Draft TC & WM EIS*, DOE prepared an SA to analyze 14 topics it identified where it is unclear whether updated, modified, or expanded information warrants preparation of a supplemental or new draft EIS. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* is not required.

DOE has carefully considered and, in this CRD, provided detailed responses to all comments received on the *Draft TC & WM EIS*, including those received from HAB.

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reverse its 2000 and 2004 Records of Decision selecting Hanford as a nation-wide nuclear waste depository.

DOE's TC/WM EIS disclosed the long-term impacts adding more nuclear waste to Hanford's existing nuclear waste legacy. Against this backdrop, CRK urges DOE to:

a) withdraw its prior decisions selecting Hanford to dispose of off-site waste;
b) issue a new formal decision that DOE will not add more waste to Hanford;
c) commit that DOE will conduct a new environmental impact statement if DOE revisits this decision after 2022; and
d) commit to issuing a new, revised draft of the TC/WM EIS for public comment which does not propose adding off-site waste and cures the numerous defects in the current draft, as the Department was advised by its Hanford Advisory Board (March 4, 2010).

505-1 cont'd

In addition to critical decisions on the issue of waste importation, DOE's TC/WM EIS also addresses the "acceptable" levels of toxic and radioactive waste from underground tanks that will remain untreated. Specifically, DOE is deciding how thoroughly to clean up the 55 million gallons of waste currently held in 177 underground storage tanks. DOE is considering 90%, 99%, and 99.9% waste retrieval rates. Figure S-14 of the TC/WM EIS demonstrates that the risk of cancer significantly increases if DOE leaves waste in the tanks. In turn, CRK urges DOE to adopt a 99.9% retrieval tank waste rate.

505-2

Furthermore, CRK urges DOE to clean up the millions of gallons of nuclear waste that has already leaked and is reaching the Columbia River. DOE's TC/WM EIS proposals fail to address important soil and groundwater contamination that threatens the Columbia. CRK urges DOE to excavate and fully clean miles of ditches and trenches that contain toxic and radioactive waste.

In particular, DOE should treat the soil and groundwater beneath the leaky storage tanks. As the TC/WM EIS discloses, unchecked plumes of this contamination are moving toward the river. Complete cleanup is necessary to protect people and salmon from Hanford's long-lived radioactive and chemical waste.

505-3

II. NEPA REQUIRES THAT DOE TAKE A "HARD LOOK" AT THE ENVIRONMENTAL IMPACTS OF ITS DECISION.

NEPA is "our basic national charter for protection of the environment." 40 C.F.R. § 1500.1(a). By design, NEPA "is a procedural statute that requires the Federal agencies to assess the environmental consequences of their actions before those actions are undertaken." *Klamath-Siskyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 993 (9th Cir. 2004). It "contains

505-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

505-3 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

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'action forcing' provisions to make sure that federal agencies act according to the letter and spirit of the Act." 40 C.F.R. § 1500.1. An Environmental Impact Statement "ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts; it also guarantees that the relevant information will be made available to the larger [public] audience that may also play a role in both the decisionmaking process and implementation of that decision." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

Columbia Riverkeeper submits the following specific TC/WM EIS comments:

- ***Adopt a 99.9% Tank Waste Cleanup Standard:***

  For the reasons stated above, CRK strongly urges DOE to adopt a 99.9% tank waste cleanup standard. Compared to the alternative standards reviewed in the TC/WM EIS, the 99.9% cleanup standard best reflects public's extensive use of the Columbia River as a food and drinking water resource, as a source of irrigation water from large portions of Washington and Oregon agricultural land, as a spiritual and cultural resource for multiple Native American tribes and their members, and as a recreational resource for swimmers, boaters, windsurfers, kite boarders, and many others who use the Columbia River, and in turn, support river communities, for recreational purposes. ***505-2 cont'd***

- ***Permanently Reverse Plans to Import Off-site Nuclear and Toxic Waste to Hanford:***

  The Department's claims that it prioritizes cleanup of Hanford and will honor a voluntary moratorium on disposing of off-site waste at Hanford until the vitrification plant is operational (estimated for 2022) have no credibility so long as the Department continues to insist that the TC/WM EIS include disposal at Hanford for 3 million cubic feet of off-site waste. The promised moratorium on adding off-site waste until 2022 does nothing to diminish the severe impacts to groundwater, the Columbia River, and human health projected by DOE itself in the draft TC&WM EIS. The Department's insistence that it will implement its decision made in 2000 to add that waste – prior to any site specific impact analysis – does, however, greatly diminish the Department of Energy's credibility.

  Thousands of citizens have sent in comments on the TC&WM EIS objecting to the Department's insistence that it will use Hanford to dispose of off-site waste, and hundreds turned out at the public hearings held in Washington and Oregon. The people of the Northwest, including many of the members of our organization, responded to the analysis put forth by the Department in the TC/WM EIS with unified objections to disposing of off-site waste at Hanford. ***505-4***

  The latest information, disclosed to the public in the TC/WM EIS, confirms that the assumptions underlying DOE's 2000 decision have not withstood the test of time.

  - Question 1: How does importing new waste comport with Hanford's cleanup mission? Please explain.

505-4 DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates. In the *WM PEIS*, DOE indicated that additional analyses would be prepared to implement these programmatic decisions. This *TC & WM EIS* analyzes the potential environmental impacts associated with a number of proposed actions, including disposal of LLW and MLLW potentially shipped to Hanford from offsite DOE locations. Depending on the outcome of this *Final TC & WM EIS* and its ROD, DOE will evaluate whether additional NEPA reviews or updates to previous decisions are appropriate, as needed.

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- Question 2: How does importing new waste raise conflicts with DOE's obligations under the Tri-Party Agreeement? Please explain. **505-4 cont'd**

- ***Cumulative Impacts:***

In assessing Hanford as candidate site for off-site waste, DOE must carefully examine the cumulative impacts of this proposal and the past, present, and reasonably foreseeable future actions at Hanford. DOE must analyze how adding more toxic waste to existing nuclear and toxic waste at Hanford will impact cleanup. In this analysis, DOE must consider DOE's history at Hanford, including delays in cleanup milestones and budget miscalculations. DOE has a poor record of managing and cleaning up nuclear waste. For example, the states of Washington and Oregon sued and settled a lawsuit against the U.S. Department of Energy for delays and failures in cleanup at Hanford. **505-5**

In its comments to DOE, Friends of the Columbia Gorge raised substantial concerns about the cumulative impacts of transporting waste along the Columbia River and through the Columbia River Gorge. Columbia Riverkeeper, by this reference, incorporates the TC/WM EIS comments of Friends of the Columbia Gorge. For example, in a previous, non-route-specific EIS, DOE estimated that trucking radioactive wastes to Hanford could cause approximately 816 fatal cancers in adult humans. Notably, this statistic is incomplete and inadequate because it fails to include children, who are three to ten times more likely to get cancer from exposure to radioactive waste than adults. DOE's TC/WM EIS fails to analyze the cumulative environmental impacts of adding more waste to Hanford's existing waste challenges. **505-6**

- ***Consider and Disclose Environmental Impacts of the "Oregon Proposal" and Respond to the Serious Critiques Raised by the State of Oregon:***

On January 4, 2010, the Oregon Department of Energy (ODOE) submitted a letter to DOE outlining Alternative 7, dubbed the "Oregon Proposal." *See* Attachment C (ODOE Jan. 4, 2004 Letter and Attachment). ODOE developed the Oregon Proposal based on the following criteria: (1) long-term protectiveness of the Columbia River, primarily associated with preventing additional migration of contaminants into Hanford's groundwater; (2) compliance with the Tri-Party Agreement (i.e., meeting schedules for waste treatment and requirements for quality of the final waste form); (3) permanence of the actions (i.e., durability of the waste form so as to prevent future releases); (4) minimizing natural resource injury liability; (5) protectiveness of human health and the environment. CRK requests the DOE carefully consider and respond to both the serious concerns raised by ODOE as well as the viability and environmental impacts of the Oregon Proposal. **505-7**

In particular, CRK requests that DOE respond to following critiques raised in ODOE's letter:

Question 3 [Alternative 2A]: ODOE described Alternative 2A as "a step backward from existing plans." Does DOE agree that "treating waste until 2093 would likely result in extensive tank leaks during that period and additional wide- **505-8**

505-5 Chapter 6 of this *TC & WM EIS* presents an analysis of cumulative impacts. This analysis includes the impacts of past, present, and reasonably foreseeable future actions at Hanford. Section 6.4.1 shows the cumulative impacts on groundwater quality of the actions evaluated in this EIS, including the disposal of offsite waste.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

505-6 Please see responses associated with comments 237-1 through 237-4 for DOE's responses to Friends of the Columbia River Gorge. No waste shipments are planned through the Columbia River Gorge because no waste shipments would originate along the West Coast, thus negating the need to use either Interstate 5 or Interstate 84 west of its intersection with Interstate 82.

The value of 816 LCFs is from the results provided in the *GNEP PEIS* (DOE 2008b). This value represents the maximum impacts associated with 50 years of transportation activities supporting the operations of all existing U.S. commercial light-water reactors if they all were replaced with high-temperature, gas-cooled reactors. The *GNEP PEIS* was canceled by DOE on June 29, 2009 (74 FR 31017). As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

There is no existing guidance that recommends dose coefficients for children's exposure to external radiation. DOE acknowledges that children have an elevated sensitivity to radiation exposure. The most recent guidance for use of exposure-to-dose coefficients related to external exposure (ionizing radiation) is used in the analysis. This guidance can be found in Federal Guidance Report No. 12, *External Exposure to Radionuclides in Air, Water, and Soil* (Eckerman and Ryman 1993). This guidance provides estimates for an adult, but not for children. For internal exposure to radiation through inhalation and ingestion, EPA currently recommends that assessors calculate chronic exposures by summing time-weighted exposures that occur at each stage of life (EPA 2009). Using this approach, exposure-to-dose coefficients for internal exposure could be determined; however, guidance that provides this information has yet to be developed.

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spread environmental contamination"? If DOE does not agree with this statement, please explain. **505-8 cont'd**

Question 4 [Alternative 2A]: How is Alternative 2A a "reasonable alternative" under NEPA, given that it excludes technetium from pretreatment and technetium is one of the primary radionuclides in terms of projected long-term impacts? Please explain. **505-9**

Question 5 [Alternative 2B]: Alternative 2B includes removing soil and tank infrastructure down to 15 feet from two tank farms. On what basis does DOE contend that the 15 foot removal will adequate address contamination existing at greater depths in many, if not all, of the single-shell tank farms? Please explain. **505-10**

Question 6 [Alternatives 3A – 3C]: Does DOE agree with ODOE's statement that "[n]one of these [i.e., technologies in Alternatives 3A, 3B, and 3C] supplemental treatment technologies are demonstrated to be effective at safely immodbilizing the waste once disposed in Hanford's soils"? Please explain. **505-11**

Question 7 [Alternatives 3A – 3C]: Does DOE agree with ODOE's assessment that Alternatives 3A, 3B, and 3C were "effectively eliminate[d]" by DOE decision ruling out treating and sending some waste to the Waste Isolation Pilot Plant? If so, why did DOE retain these alternatives in the draft TC/WM EIS? Specifically, how could they be "reasonable" alternatives pursuant to NEPA and its implementing regulations? **505-12**

Question 8 [Alternative 4]: Does DOE agree with ODOE's assessment that supplementing the WTP with a combination of cast stone and bulk vitrification is not a protective form of treatment? Please explain. **505-13**

Question 9 [Alternative 4]: How is Alternative 4 "reasonable" given its exclusion of technetium 99 from pretreatment? **505-14**

Question 10 [Alternative 5]: DOE notes that "[t]ank waste retrieval to only 90 percent would leave an amount of waste within the tanks that would likely eventually cause significant adverse environmental impacts." Alternative 5 also calls for the use of cast stone and bulk vitrification and excludes technetium 99 from the pretreatment process. Given the serious concerns and critiques raised in the ODOE letter, please explain why DOE considered Alternative 5 as an alternative that falls within "range of reasonable alternatives" for this action. **505-15**

Question 11 [Alternative 6A]: Does DOE agree or disagree with ODOE's statement that Alternative 6A "does not comply with the Tri-Party Agreement"? Please explain. **505-16**

Question 12 [Alternative 6A]: Does DOE agree or disagree with ODOE's assessment that "the increased time to vitrify all the wastes [proposed under **505-17**

As stated in the National Research Council's Report in Brief on BEIR VII, *Health Risks from Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2* (National Research Council 2006), BEIR VII estimates excess deaths for the sex and age distribution of the U.S. population in terms of the number of excess deaths per million people per absorbed dose, which supports the previously reported dose-to-risk conversion factor estimate for developing LCFs (DOE 2003a). The National Research Council report also shows that the maximum number of excess deaths would be 610 LCFs per million people per person-rem of dose, compared with about 42 out of 100 individuals who are expected to develop solid cancer or leukemia from other causes, assuming a sex and age distribution similar to that of the entire U.S. population. The BEIR VII dose-to-risk conversion factor is essentially equivalent to the estimate of 600 LCFs per million people per person-rem used in the transportation analysis in this *TC & WM EIS*. The health risk effect in the *Draft* and *Final TC & WM EIS* transportation analysis is therefore consistent with BEIR VII in regard to determining the number of LCFs.

This *TC & WM EIS* takes into account the additional waste that would be disposed of at Hanford in the modeling of the long-term impacts on groundwater and the Columbia River. The *Draft TC & WM EIS* analyzed the transportation of RH-LLW from INL to Hanford for disposal. Based on the public's input and concerns about offsite waste disposal at Hanford, DOE has included in this *Final TC & WM EIS* an example of a potential mitigation measure that could be taken by DOE. Specifically, an offsite waste stream containing a significant inventory of iodine-129 (i.e., RH-LLW resins from INL) was eliminated from the analysis. This mitigation measure has been incorporated into the Waste Management alternatives.

505-7 Chapter 2, Section 2.6.4, of this *Final TC & WM EIS* has been revised to include a discussion of the Oregon Department of Energy's proposal and how DOE has addressed the range of reasonable alternatives for tank waste retrieval, treatment, and storage, and remediation of the existing tank farms in its original alternatives. DOE has carefully considered the Oregon proposal and, as explained in Section 2.6.4, has determined that it is not reasonable.

505-8 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management), and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives.

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Alternative 6A] increases the chances of additional tank leaks during the treatment mission, which could pose an increased threat to the Columbia River and would not be protective of human health and the environment"? Please explain. **505-17 cont'd**

Question 13 [Alternative 6B]: Under Alternative 6B, would technetium end up in shallow burial at Hanford? Please explain. **505-18**

- ***Threatened & Endangered Species:***

For thousands of years, the Columbia River supported the most abundant salmon runs on Earth.[i] Today, the Columbia River is a highly regulated and used river, with eleven federal hydroelectric dams on the Columbia's mainstem alone. Beginning in the late 1990s, the National Marine Fisheries Services listed thirteen stocks of migratory salmonids as threatened or endangered under the Endangered Species Act. These fish spend part of their life-cycle in the Columbia River and its tributaries and part of their life in the Pacific Ocean, eventually returning to the Columbia to reproduce and die.

Among the forty-three species of fish present in the Hanford Reach are several endangered and threatened species, including the upper Columbia River spring-run chinook salmon, steelhead, and bull trout. Critical habitat for both salmon and steelhead includes the entire Hanford Reach of the Columbia River.[ii] Spring-run Chinook salmon juveniles pass through the area during migration, and use the areas for forage and nursing.[iii] Steelhead also use the Hanford Reach area for spawning, nursing, foraging and as a migration corridor. Juvenile steelhead may overwinter in the Reach; thus steelhead are present in the area at all times of the year.

The Hanford Reach is well documented as the only remaining significant spawning grounds for the fall run Chinook salmon on the mainstem of the Columbia River.[iv] According to the U.S. Fish and Wildlife Service, "[t]he [Hanford] Reach contains islands, riffles, gravel bars, oxbow ponds, and backwater sloughs that support some of the most productive spawning areas in the Northwest, including the largest remaining stock of wild fall Chinook salmon in the Columbia River."[v] The fall Chinook salmon that spawn and rear throughout the Hanford Reach support in-river commerical and tribal fisheries, commercial fisheries in the North Pacific Ocean, and sport fisheries.[vi] Biologists conduct annual, aerial surveys of fall Chinook salmon spawning nests (referred to as "redds") in the Hanford Reach. The peak redd count in the fall of 2008 was estimated at 5,588, which was higher than the 2007 count of 4,018 and below the previous 5-year average of 7,206.[vii]

Chromium, strontium-90, uranium and other contaminants are well documented entering salmon spawning grounds along the Reach.[viii] Chromium is a contaminant of major concern and is associated with groundwater seeps. The concentrations of chromium in groundwater upwellings exceed the chronic ambient water quality criteria for the protection of aquatic life, established by the U.S. Environmental Protection Agency and the Washington State.[ix] Spring Chinook, unlike fall Chinook, spend a year in the

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Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. DOE disagrees with the commentor's reference to Tank Closure Alternative 2A as being a "step backward"; rather, it is a reasonable alternative that evaluates the current design of the WTP. The construction of the WTP has already commenced and its currently planned configuration includes two HLW and two LAW melters. Treatment of tank waste with this configuration without expanded capacity or supplemental treatment would take significantly longer to complete and is analyzed under Tank Closure Alternative 2A, where treatment through the WTP would last until 2093. It should be noted that not all of the Tank Closure alternatives are projected to require operation through 2093, for example, under Tank Closure Alternative 2B operations are projected to occur through 2043. DOE completed interim stabilization of SST wastes in 2009 to limit the potential for tank leaks to occur.

See response to comment 505-2 regarding factors influencing future DOE decisions.

505-9 DOE does believe that Tank Closure Alternative 2A is reasonable because it represents the current permitted configuration of the WTP, which does not include technetium-99 removal in the pretreatment process. As discussed in Appendix E, Section E.1.2.3.1.1, the Pretreatment Facility (of the WTP) was originally designed to remove technetium. Based on reviews of technetium-99 in ILAW glass, DOE and Ecology agreed to eliminate technetium removal from the WTP permit. Construction of the Pretreatment Facility to date has eliminated the capability to remove technetium from the LAW stream. This *TC & WM EIS*, however, assumed that technetium-99 removal could be completed in the existing Pretreatment Facility and analyzes it under Tank Closure Alternatives 2B and 3B. Design and construction modifications would be necessary to add the technetium-99 removal capability, if required. Technetium-99 is a risk driver and is one of the reasons its removal from ILAW and immobilization in IHLW is analyzed in two of the Tank Closure alternatives.

505-10 As discussed in this *TC & WM EIS*, Appendix E, Section E.1.2.5.3, removal of near-surface soils to a depth of 4.6 meters (15 feet) is based on the estimates of the contaminated soil or suspect contaminated soil and the partial removal of ancillary equipment. Based on eventual soil characterization data, some tank farms may require less than 4.6 meters (15 feet) of soil excavation, while others may require deeper excavation. The 4.6-meter (15-foot) depth was chosen as an average for analysis purposes in this EIS.

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freshwater habitat after hatching, with potentially higher exposure to the ill-effects of Hanford contamination.[x]

The EIS must disclose and analyze DOE's ESA obligations and how the action and no action alternatives may adversely affect listed species and their critical habitat. This includes threats posed by shipping, storage, and cleanup levels. Among the forty-three species of fish present in the Hanford Reach are several endangered species, including the Upper Columbia River spring-run Chinook salmon and steelhead ESUs. DOE must pay particular attention to the direct and indirect effects of this proposal on cleanup delay and impacts to listed species. Pursuant to Section 7 of the Endangered Species Act, DOE must consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) to determine how the alternatives would impact any threatened or endangered species. *505-19*

Question 14: Has DOE, or will DOE in the future, consult with NMFS and/or USFWS on the impacts of its actions under the TC/WM EIS on ESA-listed species? Please explain.

- ***Decommissioning the Fast Flux Test Facility*:**

CRK joins other public interest organizations in recommending that DOE decommission the Fast Flux Test Facility and treat the waste at Hanford. This alternative avoids the human health and environmental risks associated with putting more radioactive waste on the road. *505-20*

III. Conclusion.

Columbia Riverkeeper urges DOE to carefully consider the testimony and comments on the TC/WM EIS, as well as the April 29, 2010 letter to Secretary Chu.

Thank you in advance for considering Columbia Riverkeeper's comments on the TC/WM EIS.

Sincerely,

/s/Lauren Goldberg

Lauren Goldberg
Staff Attorney, Columbia Riverkeeper

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[i] National Resource Council, *Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival* (2004).
[ii] *See* 65 Fed. Reg. 7764, Feb. 9, 2000; 65 Fed. Reg. 7778, Feb. 9, 2000.

505-11 As DOE understands the comment, the commentor is asking whether DOE agrees with the Oregon Department of Energy's statement that none of the supplemental treatment technologies analyzed in Tank Closure Alternatives 3A, 3B, and 3C (i.e., bulk vitrification, cast stone, and steam reforming) are demonstrated to be effective at safely immobilizing the waste after it has been disposed of in a Hanford disposal facility. DOE disagrees with this Oregon Department of Energy statement. As discussed in Appendix E, Section E.1.2.3.5, DOE has spent years and resources researching and evaluating different technologies for treating Hanford tank waste. As a result of recent reviews, three supplemental treatment technologies were selected as representative technologies for immobilizing LAW. Cast stone represents a nonthermal supplemental treatment technology because it does not require heat to solidify the waste. Bulk vitrification and steam reforming represent two types of thermal supplemental treatment technologies because they both would require heat to solidify the waste. As discussed in Chapter 2, Section 2.12, DOE does not have a preferred alternative regarding supplemental treatment for LAW. DOE believes it is beneficial to study further the potential cost, safety, and environmental performance of supplemental treatment technologies. DOE is committed to meeting its obligations under the TPA regarding supplemental treatment for LAW.

505-12 The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences between the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be required if it is selected for implementation. For a more comprehensive discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

Chapter 2, Section 2.7, of this EIS presents an overview of the key parameters associated with each of the alternatives, including the methodology for developing the alternatives so as to provide comparisons of how parameter differences may affect potential impacts. In the ROD, DOE will identify and

Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

[iii]U.S. Department of Energy, *Threatened and Endangered Species Management Plan*, DOE/RL 2000-27; *Preliminary Natural Resource Survey for the four Hanford Aggregate (100, 200, 300 and 1100) Superfund Sites*, NOAA Fisheries, Dec. 9, 1988, Pg. 8. http://www5.hanford.gov/pdw/fsd/ar/fsd0001/fsd0008/da06370969/1.pdf.
[iv]"The Hanford Reach of the Columbia River provides the only major spawning habitat for the upriver bright race of fall Chinook salmon in the mainstem Columbia River." USDOE-PNNL, PNL-7289; USDOE OSTI ID: 7051730. "Today, however, the 51-mile Hanford Reach is the only significant spawning habitat that remains for the upriver bright race of fall Chinook salmon in the main stem Columbia River." USDOE-PNNL at: http://science-ed.pnl.gov/pals/resource/cards/Chinooksalmon.stm (2009).
[iv]U.S. Fish and Wildlife Service Website, http://www.fws.gov/hanfordreach/salmon.html.
[v]*Id.*
[vi]*Id.*
[vii] U.S. Department of Energy, *Summary of the Hanford Site Environmental Report for Calendar Year 2008*, at 30.
[viii]*See e.g. Groundwater Contaminants at Hanford*, Washington Dept. of Ecology http://www.ecy.wa.gov/programs/nwp/gwhanfordcont.htm; *Hanford Site Groundwater Monitoring for Fiscal Year 2008*, Department of Energy, DOE/RL-2008-66; *Hanford Integrated Groundwater and Vadose Zone Management Plan*, Department of Energy, DOE/RL-2007-20, Pg. 3.
[ix]Woodward, DF *et al.* The Potential for Contaminated Ground Water to Adversely Affect Chinook Salmon (*Oncorhynchus tshawystcha*) under Exposure Conditions Simulating the Hanford Reach of the Columbia River, Washington, USA, http://toxics.usgs.gov/pubs/wri99-4018/Volume2/sectionD/2509_Woodward/pdf/2509_Woodward.pdf.
[x]NW Power and Conservation Council: http://www.nwcouncil.org/history/SalmonAndSteelhead.asp

discuss the factors considered in reaching its decisions, such as health and safety, environmental, economic, technical, and national policy considerations, along with mitigation and monitoring measures that DOE will implement.

DOE disagrees with the commentor's assessment that Tank Closure Alternatives 3A, 3B, and 3C were "effectively eliminated." As stated in Chapter 2, Section 2.2, of this EIS, DOE believes there may be certain IHLW storage tanks that it could demonstrate should be classified as TRU waste based on the origin of the waste. This EIS evaluates the environmental impacts of managing this waste as TRU waste because it assumed the historical processing data support this classification. For Tank Closure Alternatives 3 through 5, this EIS evaluates treating the waste stream associated with the TRU waste portion as both TRU waste and HLW because this waste has not yet gone through the TRU waste confirmation and certification process.

505-13 The commentor is referred to Chapter 2, Section 2.12, for a discussion of DOE's Preferred Alternatives for tank closure, FFTF decommissioning, and waste management. See response to comment 505-2 regarding factors influencing future DOE decisions.

505-14 As described in Chapter 2, Section 2.7.1, Tank Closure Alternative 4 analyzes treatment of waste streams in the WTP and/or by using a thermal or nonthermal supplemental treatment process (bulk vitrification or cast stone). DOE does believe that Tank Closure Alternative 4 is reasonable because, consistent with the current permitted configuration of the WTP, it does not include technetium-99 removal in the pretreatment process. As a result, the ILAW glass, bulk vitrification glass, and cast stone waste would contain most of the technetium-99 and would be disposed of on site in an IDF, allowing a comparison of a range of closure conditions relative to the long-term impacts on groundwater of bulk vitrification and cast stone waste forms that include technetium-99. As discussed in Appendix E, Section E.1.2.3.1.1, the Pretreatment Facility (of the WTP) was originally designed to remove technetium. Based on reviews of technetium-99 in ILAW glass, DOE and Ecology agreed to eliminate technetium removal from the WTP permit. Construction of the Pretreatment Facility to date has eliminated the capability to remove technetium from the LAW stream. This *TC & WM EIS*, however, assumed that technetium-99 removal could be completed in the existing Pretreatment Facility and analyzes it under Tank Closure Alternatives 2B and 3B. Design and construction modifications would be necessary to add the technetium-99 removal capability, if required. Technetium-99 is a risk driver,

Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

which is one of the reasons its removal from ILAW and immobilization in IHLW is analyzed in two of the Tank Closure alternatives.

505-15 See response to comment 505-12 regarding the development of the alternatives in this EIS.

Chapter 2, Section 2.7, of this EIS presents an overview of the key parameters associated with each of the alternatives, including the methodology for developing the alternatives so as to provide comparisons of how parameter differences may affect potential impacts. In the ROD for this EIS, DOE will identify and discuss the factors considered in reaching its decisions, such as health and safety, environmental, economic, technical, and national policy considerations.

505-16 See response to comment 505-12 regarding the development of the alternatives in this EIS.

505-17 The commentor is directed to Chapters 4 and 5 of this EIS for discussions of the potential impacts of Tank Closure Alternative 6A. DOE has not chosen Alternative 6A as the Preferred Alternative (see Chapter 2, Section 2.12, for a discussion of DOE's Preferred Alternatives). See response to comment 505-2 regarding factors influencing future DOE decisions.

505-18 As discussed throughout this EIS and shown in Appendix D, Table D–57, approximately 98.6 percent of the technetium-99 would be captured in the IHLW glass, ILAW glass, and ILAW retired melter. In the case of Tank Closure Alternative 6B, the ILAW glass and ILAW retired melter would be managed and disposed of as IHLW glass; i.e., they would be disposed of off site. As explained throughout this EIS, the current Administration has established a Blue Ribbon Commission on America's Nuclear Future that has issued a report and recommendations for a path forward for managing the country's HLW. DOE's decisions regarding management of Hanford waste will be consistent with Administration policies. For a more comprehensive discussion of this topic, see Section 2.10 of this CRD.

505-19 In 2003, DOE initiated informal consultation with USFWS and NMFS, as well as the State of Washington, at a time when the proposed scope of this EIS was limited to the retrieval, treatment, and disposal of tank waste and closure of SSTs. However, since that time, the scope of this EIS has been expanded to include decommissioning of FFTF and waste management. Accordingly, DOE reinstituted informal consultation with USFWS, NMFS, and the state in

Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

2008 (see Appendix C, Section C.2.1). While responses to consultation letters were received from the state, none was received from USFWS or NMFS (see Appendix C, Section C.2.3). Each agency was also provided a copy of the *Draft TC & WM EIS*; however, whereas USFWS commented on the document, NMFS did not. It should be noted that neither the 2003 nor 2008 letter to NMFS implied that the proposed actions "may affect" Columbia River resources, but rather sought information from the agency concerning what species DOE should consider in its analysis. In addition, while the *Threatened and Endangered Species Management Plan, Salmon and Steelhead* (DOE 2000b) defines DOE's commitment to stocks of steelhead and spring Chinook salmon, it was not used to support DOE's position relative to the commentor's statement.

Potential long-term impacts on salmonids of actions taken under the various alternatives presented in this *TC & WM EIS* are addressed in Appendix P. The analysis indicates that chromium is the only COPC that could have a potential toxic effect on salmonids (i.e., the Hazard Quotient was above 1 under all Tank Closure alternatives, including No Action, and some Waste Management alternatives). However, it should be noted that there is virtually no difference between the Tank Closure action alternatives and the No Action Alternative, indicating that a source(s) other than the tank farms is contributing significantly to the results. Further, when Hazard Quotients for chromium under Alternative Combinations 2 and 3 are compared to values that include Alternative Combinations 2 and 3 plus nontank sources (i.e., cumulative impacts), it can be seen that the Hazard Quotient of the latter is approximately 10 times that of the former (see Chapter 6, Section 6.4.3.2), again indicating that a source(s) other than the tank farms is contributing the majority of chromium at the Columbia River. Analysis has shown that the majority of chromium comes from the 100-K Mile-Long Trench, 216-C-1 Hot Semi Work Crib, 216-S-8 Trench, and certain ponds in the 200-West Area and 300 Area. Considering that actions proposed in this *TC & WM EIS* would not be the major contributors to a Hazard Quotient that is greater than 1 for chromium at the Columbia River, they cannot lead to a finding of "may affect" relative to threatened or endangered species, or critical habitat, associated with the river. Thus, further consultation with NMFS is not indicated.

As noted above, communications have occurred with DOE and with USFWS, NMFS, and the state concerning listed species that are potentially present on Hanford (see Appendix C). Further, as reported in Chapter 3, Section 3.2.7.4, special studies were undertaken to identify the presence of special status

species within areas potentially disturbed by the various Tank Closure, FFTF Decommissioning, and Waste Management alternatives. Potential impacts on special status species at Hanford are addressed in Chapter 4, Section 4.1, and there is no impact (that is, "no effect") on any federally or state-listed threatened or endangered species. If circumstances change, DOE will evaluate the need and undertake additional informal consultation with the appropriate agencies to ensure protection of listed species.

It should be noted that the analyses of impacts on threatened and endangered species presented in this *TC & WM EIS* address construction and normal operations. Any analyses of potential impacts of shipping accidents would be highly speculative, considering the very low probability of an accident (see Chapter 4, Section 4.1.12).

505-20 Radioactive waste is transported in DOT-certified containers that meet strenuous technical standards established by NRC. See response to comment 505-2 regarding factors influencing future DOE decisions.

505-21 The response to this comment is the entire letter from Frank Marcinowski, DOE-EM, to Ken Niles dated April 22, 2010, provided below.

Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

Oregon
Theodore R. Kulongoski, Governor

OREGON DEPARTMENT OF ENERGY
625 Marion St. NE
Salem, OR 97301-3737
Phone: (503) 378-4040
Toll Free: 1-800-221-8035
FAX: (503) 373-7806
www.energy.state.or.us

March 23, 2010

The Honorable Inez Triay
Assistant Secretary for Environmental Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington D.C. 20585

Dear Dr. Triay:

The issue of bringing additional waste to the Hanford Site for disposal has been a contentious and divisive issue for the Northwest throughout the entire period of Hanford cleanup. The issue was greatly exacerbated in the late 1990s when the U.S. Department of Energy (DOE) considered and then selected Hanford, along with the Nevada Test Site, as a disposal site for potentially large volumes of low-level waste (LLW) and mixed low-level waste (MLLW) from throughout the DOE complex. DOE ratified that decision on February 25, 2000 with the issuance of a Record of Decision (ROD).

In October 1998, the Oregon Department of Energy had expressed concern with DOE's proposal to select Hanford to receive LLW and MLLW from other sites. In a letter to DOE Headquarters, we expressed the view that:

> "Hanford's vadose zone and groundwater are currently contaminated and much uncertainty associated with the type, extent, and movement of this contamination exists. Times of travel for contaminants in Hanford's vadose zone to down-gradient wells have been measured as short as seven to nine years...The presence of the Columbia River on the Hanford site connects all the downstream communities directly to events at Hanford and puts large populations in Oregon and Washington at risk. For this reason, it is imperative that DOE Richland's sole mission at Hanford be cleanup of existing wastes and contamination."

DOE disregarded this comment and comments by others who expressed similar concerns – that past waste disposal at Hanford was already causing environmental problems and would lead to greater problems in the future.

DOE took what it termed a "tiered approach" to its decision to select disposal sites. It first made broad Department-wide decisions about which sites would manage which wastes. DOE then followed these broad decisions with site-wide National Environmental Policy Act reviews.

DOE's decision to select Hanford prior to the site-wide analysis was based on unconvincing rationale. The "Basis for Decision" for the selection of Hanford, as generically explained in

1

505-21

Department of Energy
Washington, DC 20585

April 22, 2010

Mr. Ken Niles
Nuclear Safety Division Administrator
State of Oregon Department of Energy
625 Marion Street NE
Salem, Oregon 97301-3737

Dear Mr. Niles:

Thank you for your March 23, 2010, letter to Assistant Secretary Inés Triay expressing the State of Oregon's concerns about disposal of low-level wastes (LLW) or mixed low-level wastes (MLLW) at the Hanford Site. Your letter refers to the Record of Decision (ROD) (65 FR 10061; February 25, 2000) issued by the U.S. Department of Energy (DOE) for the final Waste Management Programmatic Environmental Impact Statement (WM-PEIS, DOE-EIS/0200-F), choosing Hanford and the Nevada Test Site as the regional locations for the disposal of LLW and MLLW from across the DOE complex.

DOE explained in the WM-PEIS that additional site-specific National Environmental Policy Act (NEPA) analyses would be prepared in order to implement DOE's programmatic decisions. The draft *Tank Closure & Waste Management Environmental Impact Statement* (TC&WM EIS, DOE-EIS-0391) analyzes the potential environmental impacts associated with a number of proposed actions, including disposal of LLW and MLLW potentially shipped to Hanford from offsite DOE locations. Until Hanford-specific analyses are complete, DOE believes it is premature to revisit these programmatic decisions.

The public comment period for the draft TC&WM EIS ends on May 3, 2010. At that time DOE will review all the comments received, including those provided by the State of Oregon, and decide what changes, clarifications, or additional information are needed in the final TC&WM EIS. In the Final EIS, DOE will provide detailed responses to comments and identify where any changes or information have been added to the document, based on the comments received.

Depending on the outcome of the final TC&WM EIS and its ROD, DOE will evaluate whether additional NEPA reviews or updates to previous decisions are appropriate. Please be assured that any such additional NEPA reviews or considerations thereof will be conducted with a full opportunity for public input, consistent with Council on Environmental Quality and DOE NEPA requirements.

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

the February 2000 ROD, was "low impacts to human health, operational flexibility, and relative implementation cost." The only "environmental safety benefit" that the ROD specifically mentioned for Hanford was that as an arid site, "evaporation rates exceed rainfall by approximately 10 to 1 or more." There was no acknowledgement of the fact that the vadose zone and groundwater were already widely contaminated and that the contamination concentrations were far above acceptable levels.

Hanford and the Nevada Test Site were acknowledged as the only two DOE sites that had MLLW disposal facilities already constructed. LLW disposal facilities at Hanford were also cited as having expansion capability that could dispose of a wide range of radionuclides. To summarize, Hanford was selected because it had disposal facilities, disposal capacity, and was located in a desert. There was no recognition of potential impacts to the soil, to the groundwater or most importantly to the Columbia River.

Potential site-specific impacts were finally assessed and documented with the release late last year of the draft Hanford Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS). This document clearly shows that the adverse impacts of disposing of additional off-site waste at Hanford, especially if it contains certain mobile and long-lived radionuclides, would be significant. The analysis in the draft TC&WM EIS shows that no matter where at Hanford DOE proposes to dispose of off-site waste, the impacts exceed standards and are unacceptable. Moreover, the impacts from Hanford-origin wastes in these same areas already exceed standards under the most aggressive cleanup considered, leaving no room for any additional impact from off-site wastes.

Therefore, given that the February 2000 ROD was contingent upon the assumption that the site-specific analysis would demonstrate that the impacts would not be significant, and the draft TC&WM EIS assessments show that they are very significant, the 2000 ROD should be immediately amended to withdraw Hanford as an acceptable disposal location for LLW and MLLW from throughout the DOE complex.

We recently pursued this issue through an unofficial inquiry to DOE Headquarters, and were told that because the draft TC&WM EIS was out for official comment, it would be inappropriate for Headquarters to engage in a separate discussion on a matter related to findings within the draft EIS. We understand that position.

However, the issuance of the February 2000 ROD was a Headquarters action, and we have already been told that the Hanford Site has no authority to revisit that decision. Therefore, we formally request this action by Headquarters as a part of the Waste Management Programmatic Environmental Impact Statement (WMPEIS). The serious problems with the draft TC&WM EIS will necessitate revision and release of a revised draft. DOE Headquarters can greatly simplify the work of the TC&WM EIS team by issuing a revised Record of Decision to the WMPEIS that removes Hanford from further consideration for LLW and MLLW disposal.

In addition, we believe that analyses within the draft TC&WM EIS also makes it clear that Hanford should be withdrawn from consideration as a disposal site for Greater Than Class C

505-21 cont'd

I appreciate your interest and active participation in DOE's NEPA process. If you have any additional questions, please contact me at (202) 586-0370. If you need further information concerning the TC&WM EIS process, please contact Ms. Mary Beth Burandt, Document Manager, at (509) 372-7772.

Sincerely,

Frank Marcinowski
Acting Chief Technical Officer
Office of Environmental Management

Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

waste, and Hanford should no longer be routinely considered as a reasonable alternative for other, future waste disposal missions.

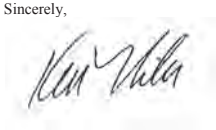
With the exception of some very limited waste streams, DOE has been unable to use Hanford for disposal of complex-wide wastes since the 1990s, and has currently agreed to extend that moratorium to 2022. As a practical matter, DOE does not need Hanford for disposal of off-site waste now or after 2022. There are commercial options with the Energy Solutions and Waste Control Specialists sites in Utah and Texas, respectively, and DOE is pursuing licensing of a new MLLW disposal trench in Nevada.

505-21 cont'd

Now that DOE's own analysis demonstrates the folly of bringing more waste to Hanford, DOE needs to stand behind its own analyses and once and for all eliminate Hanford from consideration for these and other future waste disposal missions.

Thank you for consideration of this request.

Sincerely,



Ken Niles
Nuclear Safety Division Administrator

c.c. Jane Hedges, Washington Department of Ecology
Dennis Faulk, U.S. Environmental Protection Agency
Dave Brockman, U.S. Department of Energy, Richland Field Office
Shirley Olinger, U.S. Department of Energy, Office of River Protection
Stuart Harris, Confederated Tribes of the Umatilla Indian Reservation
Russell Jim, Yakama Indian Nation
Gabriel Bohnee, Nez Perce Tribe
Susan Leckband, Hanford Advisory Board Chair
Max Power, Oregon Hanford Cleanup Board Chair

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

Columbia Riverkeeper • Heart of America Northwest • Sierra Club Cascade Chapter • Oregon Chapter of the Sierra Club • Washington Physicians for Social Responsibility • Oregon Physicians for Social Responsibility • Spokane Riverkeeper • Republicans for Environmental Protection, Washington Chapter • Northwest Environmental Defense Center • Friends of the Columbia Gorge • The Lands Council • Center for Environmental Law & Policy • Oregon Toxics Alliance • Rosemere Neighborhood Association • Eastern Washington Voters • Hanford Challenge • Alliance for Democracy, Portland Chapter • Hanford Watch • Hells Canyon Preservation Council • Olympic Environmental Council • Silver Valley Community Resource Center

April 29, 2010

The Honorable Steven Chu
Secretary of Energy,
U.S. Department of Energy
1000 Independence Ave., SW
Washington D.C. 20585

The Honorable Inés Triay
Assistant Secretary for Environmental Management
U.S. Department of Energy
1000 Independence Ave., SW
Washington D.C. 20585

RE: End Waste Import/Storage Mission at Hanford

Dear Secretary Chu and Assistant Secretary Triay:

On behalf of the undersigned organizations, we are writing to request that the U.S. Department of Energy (DOE) withdraw its 2000 and 2004 Records of Decision selecting Hanford as a disposal site for large volumes of radioactive low-level waste (LLW) and mixed low-level waste (MLLW) from across the Nation. The Department's own draft *Tank Closure and Waste Management Environmental Impact Statement* (TC&WM EIS) clearly demonstrates that importing and burying off-site waste at Hanford poses serious human health and environmental impacts.

We join the State of Oregon Department of Energy's formal request, submitted to the Department on March 23, 2010. Oregon's letter discusses both the impacts and the flawed process relied upon by DOE in issuing a Record of Decision before analyzing the impacts at Hanford from importing and disposing of off-site waste.

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This letter was submitted as an attachment and is a duplicate of Commentor No. 499. Please see Commentor No. 499 for responses to this letter.

Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

Against this backdrop, we urge DOE to:

a) withdraw its prior decisions selecting Hanford to dispose of off-site waste;
b) issue a new formal decision that DOE will not add more waste to Hanford;
c) commit that DOE will conduct a new environmental impact statement if DOE revisits this decision after 2022; and
c) commit to issuing a new, revised draft of the TC&WM EIS for public comment which does not propose adding off-site waste and cures the numerous defects in the current draft, as the Department was advised by its Hanford Advisory Board (March 4, 2010).

The Department's claims that it prioritizes cleanup of Hanford and will honor a voluntary moratorium on disposing of off-site waste at Hanford until the vitrification plant is operational (estimated for 2022) have no credibility so long as the Department continues to insist that the TC&WM EIS include disposal at Hanford for 3 million cubic feet of off-site waste. The promised moratorium on adding off-site waste until 2022 does nothing to diminish the severe impacts to groundwater, the Columbia River, and human health projected by DOE itself in the draft TC&WM EIS. The Department's insistence that it will implement its decision made in 2000 to add that waste – prior to any site specific impact analysis – does, however, greatly diminish the Department of Energy's credibility.

Thousands of citizens have sent in comments on the TC&WM EIS objecting to the Department's insistence that it will use Hanford to dispose of off-site waste, and hundreds turned out at the public hearings held in Washington and Oregon. The people of the Northwest, including many of the members of our organizations, responded to the analysis put forth by the Department in the TC&WM EIS with unified objections to disposing of off-site waste at Hanford.

The latest information, disclosed to the public in the TC&WM EIS, confirms that the assumptions underlying DOE's 2000 decision have not withstood the test of time. As the Oregon Department of Energy stated in its letter:

> Potential site-specific impacts [of importing LLW and MLLW] were finally assessed and documented with the release late last year of the draft Hanford Tank Closure Waste Management Environmental Impact Statement (TC&WM EIS). This document clearly shows that the adverse impacts of disposing of additional off-site waste at Hanford, especially if it contains certain mobile and long-lived radionuclides, would be significant. The analysis in the draft TC&WM EIS shows that no mater where at Hanford DOE proposes to dispose of off-site waste, the impacts exceed standards and are unacceptable. Moreover, the impacts from Hanford-origin wastes in these same areas already exceed standards under the most aggressive cleanup considered, leaving no room for any additional impact from off-site wastes.

The Hanford Advisory Board also issued formal consensus advice to the Department urging DOE to issue a formal Record of Decision that DOE will not add off-site waste to Hanford, stating, in part:

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

> Importation of this waste is projected in the draft TC&WMEIS to increase the contamination levels in groundwater by as much as tenfold above the impacts projected for key contaminants of concern for on-site waste. It could reach a cancer risk level for groundwater in excess of one hundred times Washington State's cleanup risk level for cleanups and landfills.
>
> The draft TC & WM EIS does not include a reasonable alternative to adding more waste to Hanford . . . The draft document clearly shows both alternatives (for where DOE would dispose of off-site waste) analyzed by DOE have contaminants above legal standards due to quantities and composition of the projected wastes disposed. DOE should have and did not consider an alternative that did not import waste for disposal at Hanford.[1]

The Department's draft TC&WM EIS fails to consider and disclose the route specific impacts from trucking 3 million cubic feet of waste to be disposed at Hanford, and fails to meet the legal requirement under the National Environmental Policy Act to disclose to the public that the Department has a pending related proposal to import and dispose of highly radioactive "GTCC" wastes at Hanford – which would greatly increase the cumulative environmental and health impacts. The Department's failure to disclose these plans in TC&WM EIS and in materials discussing the EIS has greatly harmed the Department's credibility, and increased public resolve to oppose the Department's plans to import and dispose of more waste at Hanford.

As evidenced by the overwhelming public outcry at the TC&WM EIS hearings, citizens of the Pacific Northwest will not tolerate off-site waste exacerbating Hanford's existing threats to the Columbia River and people of the Northwest. The Department faces certain litigation if it does not withdraw its decision to use Hanford as a national radioactive waste dump.

In light of these serious issues, we urge the Department to remove consideration of off-site waste in the draft TC&WM EIS and to issue a Record of Decision that off-site waste will *not* be added to Hanford.

Sincerely,

Brett VandenHeuvel
Executive Director
Columbia Riverkeeper

Gerry Pollet
Executive Director
Heart of America Northwest

Sierra Club Cascade Chapter

Oregon Sierra Club

[1] Hanford Advisory Board (HAB) Advice 229, March 4, 2010, Page 11 (parenthetical added).

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April 29, 2010

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

Spokane Riverkeeper

Republicans for Environmental Protection, Washington Chapter

Northwest Environmental Defense Center

Friends of the Columbia Gorge

The Lands Council

Center for Environmental Law & Policy

Oregon Toxics Alliance

Rosemere Neighborhood Association

Eastern Washington Voters

Hanford Challenge

Alliance for Democracy, Portland Chapter

Hanford Watch

Hells Canyon Preservation Council

Washington Physicians for Social Responsibility

Oregon Physicians for Social Responsibility

Olympic Environmental Council

Silver Valley Community Resource Center

CC: Governor Chris Gregoire
Governor Ted Kulongoski
Senator Patty Murray
Senator Maria Cantwell
Senator Ron Wyden
Senator Jeff Merkley

Page 4 of 4
April 29, 2010

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

Oregon
Theodore R. Kulongoski, Governor

OREGON DEPARTMENT OF ENERGY
625 Marion St. NE
Salem, OR 97301-3737
Phone: (503) 378-4040
Toll Free: 1-800-221-8035
FAX: (503) 373-7806
www.Oregon.gov/ENERGY

January 4, 2010

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
Post Office Box 1178
Richland, WA 99352

Dear Ms. Burandt:

The Oregon Department of Energy has completed a preliminary analysis of the draft Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS). In our initial review, we have focused in large part on the 11 Tank Closure alternatives that are analyzed in the EIS. We reviewed each against the following criteria:

- Long-term protectiveness of the Columbia River, primarily associated with preventing additional migration of contaminants into Hanford's groundwater
- Compliance with the Tri-Party Agreement; meeting schedules for waste treatment and requirements for quality of the final waste form
- Permanence of the actions (for example, durability of the waste form so as to prevent future releases)
- Minimizing natural resource injury liability
- Protectiveness of human health and the environment

While the various proposed alternatives provide useful information by analyzing and comparing potential impacts and differences among the alternatives, to our concern we found that perhaps only one of the Tank Closure alternatives satisfied all of these criteria. Many failed most or all of the criteria (see Attachment 1).

The U.S. Department of Energy's (DOE) recent decision not to pursue treating and sending some waste to the Waste Isolation Pilot Plant eliminates alternatives 3A, 3B, 3C, 4 and 5. Notwithstanding that decision, each of these alternatives, along with five of the remaining six alternatives, had one or more fatal flaws that prevented each from meeting our criteria.

There are elements scattered within the range of many of the alternatives which, if combined in a new alternative, would likely provide a preferable long-term approach for

This letter was submitted as an attachment and is a duplicate of Commentor No. 15. Please see Commentor No. 15 for responses to this letter.

Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

successfully immobilizing Hanford's tank waste, closing the tank farms, and protecting the public and the environment.

Therefore, we propose and strongly encourage DOE to analyze the potential impacts of the following new alternative:

Alternative 7 – (the Oregon Proposal)

Tank Waste Storage. Continue current waste management operations using existing tank storage facilities. No new double-shell tanks would be required, *unless* there is a delay in getting the Waste Treatment Plant (WTP) operational. New Waste Receiver Facility tanks would be constructed. These tanks should be sized so that all necessary waste transfers will be possible, and to ease retrieval operations.

Tank Waste Retrieval. Retrieve a *minimum* 99 percent of the waste from each of the tanks. Determine on a tank-by-tank basis whether a final chemical wash, mechanical removal step, or other additional retrieval is necessary.

Tank Waste Treatment. Construct and operate the existing WTP as currently configured (two high-level waste melters and two low-activity waste [LAW] melters). Supplement the existing WTP by expanding LAW vitrification capacity to the extent necessary to complete LAW treatment no later than 2040. Do not use supplemental technologies such as bulk vitrification, cast stone or steam reforming. Pre-treat all waste streams routed to the WTP, and include technetium 99 removal in the pre-treatment process so that technetium is routed to the high-level waste melter. Assume that no waste will qualify as transuranic for disposal at the Waste Isolation Pilot Plant, but programmatically continue to pursue that as an option for the near future for a limited amount of waste.

As a sub-option, DOE should analyze the value of using iron phosphate glass in the second LAW treatment facility to determine whether that would provide useful flexibility in treating some waste streams and also whether it would result in a more durable glass form for those waste streams.

DOE should also analyze the impacts and benefits of using fractional crystallization to remove the bulk of the non-radioactive waste from the tank waste streams, in order to potentially reduce the volume of the glass waste form destined for the deep repository. The separated sodium wastes should be treated to destroy any RCRA hazards and to produce a waste form meeting the land disposal restrictions under RCRA, the Atomic Energy Act and Nuclear Regulatory Commission requirements for near-surface land disposal of mildly radioactive wastes.

Cesium and Strontium Capsules. Do not include the cesium and strontium capsules in the WTP waste stream. Instead, convert from pool storage to dry

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

storage and continue to pursue ultimate disposal into a geologic repository in a form suitable to meet the waste acceptance criteria for the facility as an alternative secondary waste form.

Tank Waste Disposal. Store immobilized high-level waste canisters on site in interim storage facilities until a national disposal facility is available. Assuming shallow burial of the immobilized LAW will be allowed, dispose of vitrified LAW on site. Since vitrified LAW may remain classified as high-level waste, flexibility will be required for planning for its permanent disposal.

Tank Farm Closure. Characterize leaked tank wastes in and beneath the tank farms, along with waste trapped between the steel and concrete tank structures and in pipelines and ancillary equipment. Use that information to make a risk-based decision on which tanks, pipelines and ancillary equipment have leaked and whether contamination may have spread beneath non-leaking tanks. As appropriate, exhume tanks to provide access to contaminated soils. This may include leaking tanks, adjacent (clean) tanks in contact with contaminated soil, and possibly some additional clean tanks that block access to heavily contaminated soil. Sample and characterize the below-tank contaminated soils and remediate soils as deeply as necessary. Build and operate a facility to treat contaminated soils as described in Alternatives 6A and 6B. Replace removed, contaminated material with clean soil from onsite sources.

After waste retrieval of at least 99 percent from tanks, pipelines and ancillary equipment, fill remaining (clean) tanks and ancillary equipment with a highly durable fill material to immobilize the residual waste, prevent future tank subsidence, and discourage intruder access. Close these remaining tanks using a landfill barrier designed to ensure long term permanence and isolation of the remaining wastes. It may be necessary first to remove some soil and ancillary equipment if there have been leaks from pipelines and other equipment.

Dispose of treated contaminated soils, tank shells and ancillary equipment on site in a new disposal facility. Monitor the site using post-closure care.

Tank Farm Cribs and Trenches Closure. As single-shell tank farm closure operations are completed, sample and characterize the associated cribs and trenches (ditches) disposal sites. Remove-treat-dispose of the contaminated materials and soils that exceed protectiveness criteria. Close the cribs and trenches (ditches) using a landfill barrier.

We won't know whether the proposed Alternative 7 will meet the criteria that we have identified until and unless DOE analyzes each of these actions individually and collectively. We hope that DOE will agree to conduct that analysis.

We will provide additional written comments prior to the comment deadline that will address additional details related to tank waste treatment and tank closure. We will

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

also provide comments on the Waste Management and Fast Flux Test Facility alternatives.

If you have questions or comments on Oregon's proposed alternative, please contact me at 503-378-4906.

Sincerely,

Ken Niles
Assistant Director

c.c. Jane Hedges, Washington Department of Ecology
Dennis Faulk, U.S. Environmental Protection Agency
Shirley Olinger, U.S. Department of Energy Office of River Protection
Dave Brockman, U.S. Department of Energy Richland Office
Stuart Harris, Confederated Tribes of the Umatilla Indian Reservation
Gabriel Bohnee, Nez Perce Tribe
Russell Jim, Yakama Indian Nation
Oregon Hanford Cleanup Board
Hanford Advisory Board
Hanford Natural Resource Trustee Council

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

ATTACHMENT 1

Why Existing Tank Closure Alternatives Are Not Acceptable

Alternative 1 – No Action. Leaving the waste in Hanford's tanks for 100 years and canceling the planned waste treatment program would result in wide-spread environmental contamination. Moreover, the "No Action" alternative need not be a stop action alternative. It can and usually is presumed to continue the actions in progress as the basis for which further actions are contrasted.

Alternative 1 is not protective of the Columbia River; does not comply with the Tri-Party Agreement; there are no actions taken that would have a positive permanent affect; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 2A – Existing WTP Vitrification; No Closure. Treatment capacity must be expanded beyond the 2 + 2 configuration of the WTP in order to accomplish immobilization of Hanford's tank waste in a somewhat reasonable time frame. Treating waste until 2093 would likely result in extensive tank leaks during that period and additional wide-spread environmental contamination. Eventually ceasing administrative control of the tank farms without closure would also likely have significant adverse environmental impacts. Prolonging the treatment mission so as to have to replace the WTP, the double-shell tanks, and other major facilities is not reasonable. This alternative also excludes technetium 99 from pre-treatment. As technetium is one of the primary radionuclides in terms of projected long-term impacts, we believe a robust system must be in place to ensure that technetium 99 is diverted to the high-level vitrification waste stream. Alternative 2A is a step backward from the existing plans.

Alternative 2A is not protective of the Columbia River; does not comply with the Tri-Party Agreement schedules; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 2B – Expanded WTP Vitrification; Landfill Closure. Our major objection with this alternative is closing the entire tank farm system using a landfill barrier. That does nothing to deal with leaked waste beneath the tanks farms that is currently in the vadose zone – much of which will likely eventually reach the groundwater and potentially the Columbia River. This alternative does include removing soil and tank infrastructure down to 15 feet from two tank farms. We believe this is a concept that should be expanded to include other tanks farms, but the 15 foot limit does not adequately address contamination existing at greater depth in many if not all of the single-shell tank farms. This alternative does include technetium 99 removal in the pre-

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

treatment process, which would help get one of the longer-lived radionuclides into the high-level glass.

Alternative 2B is not protective of the Columbia River; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 3A – Existing WTP Vitrification with Supplemental Treatment (Bulk Vitrification); Landfill Closure.

Alternative 3B – Existing WTP Vitrification with Supplemental Treatment (Cast Stone); Landfill Closure.

Alternative 3C – Existing WTP Vitrification with Supplemental Treatment (Steam Reforming); Landfill Closure.

None of these supplemental treatment technologies are demonstrated to be effective at safely immobilizing the waste once disposed in Hanford's soils. Bulk vitrification has been demonstrated to not meet the "good as glass" criteria for the final waste form. Cast stone as a waste form is greatly inferior to bulk vitrified waste. Steam reforming as a waste form is greatly inferior to bulk vitrified waste and cast stone. Two of the three alternatives also exclude technetium 99 from pre-treatment. All three of these options have complete landfill closure of the single-shell tank farms, which we have already indicated is not protective. DOE has also ruled out treating and sending some waste to the Waste Isolation Pilot Plant, which effectively eliminates these alternatives, as they were presented in the draft EIS, from further consideration.

Alternatives 3A, 3B, and 3C are not protective of the Columbia River; supplemental technologies are not protective because the waste form will not sufficiently hold the waste over time (fails the permanence criteria) and does not meet Tri-Party Agreement requirements for the quality of the final waste form; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 4 – Existing WTP Vitrification with Supplemental Treatment Technologies; Selective Clean Closure/Landfill Closure. This alternative calls for supplementing the WTP with a combination of cast stone and bulk vitrification, which we indicated above is not a protective form of treatment. This alternative also excludes technetium 99 from pre-treatment. The closure combination of mixing selective clean closure with landfill closure is the most reasonable closure alternative – although it would need to be based on actual conditions in the vadose zone within and beneath the various tank farms. The BX and SX tank farms may or may not be appropriate for clean closure. Certainly other tank farms would need clean or partial clean closure. DOE has also ruled out treating and sending some waste to the Waste Isolation Pilot Plant.

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

Alternative 4 is not protective of the Columbia River; supplemental technologies are not acceptable because the waste form will not sufficiently hold the waste over time (fails the permanence criteria) and does not meet Tri-Party Agreement requirements for the quality of the final waste form; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 5 – Expanded WTP Vitrification with Supplemental Treatment Technologies; Landfill Closure. Tank waste retrieval to only 90 percent would leave an amount of waste within the tanks that would likely eventually cause significant adverse environmental impacts. This alternative also calls for use of cast stone and bulk vitrification, which we have already indicated would not sufficiently immobilize the waste for disposal in Hanford soils. This option also excludes technetium 99 from the pre-treatment process. We do support the idea of further exploring sulfate removal after pre-treatment to reduce the amount of vitrified low-activity waste. This alternative also includes landfill closure of the single-shell tank farms, which we have indicated is not protective. DOE has also ruled out treating and sending some waste to the Waste Isolation Pilot Plant.

Alternative 5 is not protective of the Columbia River; supplemental technologies are not acceptable because the waste form will not sufficiently hold the waste over time (fails the permanence criteria) and does not meet Tri-Party Agreement requirements for the quality of the final waste form; natural resource injury liabilities are not minimized; and this alternative is not protective of human health and the environment.

Alternative 6A – All Vitrification/No Separations; Clean Closure. The WTP is currently being constructed to include pre-treatment and LAW vitrification melters. We support pre-treatment to separate the waste streams and believe it is unnecessary to treat all the waste as high-level waste. It also would unnecessarily prolong the treatment mission to 2163, requiring eventual replacement of the double-shell tanks and construction of two replacement Waste Treatment Plants. We also believe that clean closure of all of the 149 single-shell tanks is probably not necessary.

Alternative 6A may offer the best long-term protectiveness of the Columbia River over any of the other alternatives as all the tank waste is vitrified and disposed off-site. However, the increased time to vitrify all the wastes increases the chances of additional tank leaks during the treatment mission, which could pose an increased threat to the Columbia River and would not be protective of human health and the environment. It also does not comply with Tri-Party Agreement schedules.

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Commentor No. 505 (cont'd): Lauren Goldberg, Staff Attorney, Columbia Riverkeeper

Alternative 6B – All Vitrification with Separations; Clean Closure. This alternative may meet all of our criteria. It would depend in large part on the ultimate disposition of the immobilized LAW canisters. Since there would not be pre-treatment to ensure that the technetium 99 ended up in the immobilized high-level glass, if the immobilized LAW were to end up in shallow burial at Hanford, the disposal environment may not sufficiently contain the technetium. This could eventually lead to spread of technetium into Hanford's groundwater. In addition, this alternative presumes landfill barrier of the cribs and trenches, which may not be protective. This alternative also proposes complete clean closure of all of the 149 single-shell tanks, which is probably not necessary.

Alternative 6B may meet all of our criteria, but not if the technetium ends up in shallow burial at Hanford.

Alternative 6C – All Vitrification with Separations; Landfill Closure. This alternative includes landfill closure of the single-shell tank farms, which we have indicated is not protective.

Alternative 6C is not protective of the Columbia River and is not protective of human health and the environment.

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Commentor No. 506: Heidi Logosz

From: Heidi Logosz [Heidi.Logosz@skihood.com]
Sent: Monday, May 03, 2010 6:51 PM
To: 'TC&WMEIS@saic.com'
Subject: Clean Up and No New Waste at Hanford!

May 3rd, 2010

Mary Beth Burandt
Document Manager
U.S. Department of Energy
Office of River Protection
P.O. Box 1178
Richland, WA 99352

Dear Ms. Burandt,

My name is Heidi Logosz and I am a resident of the Columbia River Gorge.

I have kept my mouth closed on the issue of nuclear waste at Hanford because I am not an expert on the matter. Not only that, I am not able to argue intelligently to the DOE against the waste being kept now and new waste being sent to Hanford. The DOE knows more than I will ever know of the matter and there are innumerous highly intelligent individuals on the opposition's side that say what needs to be said far better than I ever could.

I am, however, gravely concerned about this matter. I am a mother to a two year old and I cherish him more than anything in this world. His Father spends a lot of time in the Columbia River and this concerns me due to the leaking of nuclear waste from Hanford into the Columbia River. My son will also spend time in the Columbia River as he grows up and I fear what the consequences of this nuclear waste crisis will mean for his health, not to mention the health of other people, wildlife, and vegetation. *506-1*

I know there are many more people like me who are afraid to speak up because we don't know what to say that could convince the DOE to clean up the awful mess and not to consider sending more nuclear waste to Hanford… ever. I am in disbelief that the DOE would even consider not cleaning up the existing disaster or making matters worse by shipping more materials to Hanford.

People whose opinions on this matter I respect have thoroughly studied these issues for decades. From what I am told, this is what needs to happen without exception:

1) **Clean up all 55-million-gallons** of radioactive + hazardous tank waste with over 99% retrieval *506-2*

506-1 DOE notes that data indicate that Hanford operations do not represent a serious health threat for Columbia River users. Monitoring data and potential doses to a variety of receptors are reported annually in the Hanford Site environmental reports (Poston, Duncan, and Dirkes 2011). As presented in Chapter 3, Table 3–13, of this *TC & WM EIS*, the estimated dose from liquid releases from Hanford to the MEI in 2010 was 0.056 millirem. The risk of a fatal cancer from this dose is less than 1 in 10 million.

506-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 506 (cont'd): Heidi Logosz

2) Drop the proposal to **ship radioactive wastes from across the nation** to Hanford *506-3*

3) Clean up the millions of gallons of nuclear **waste that has already leaked** + is reaching the Columbia *506-4*

People are counting on you to do what is in the best interest of humanity. Please, drastically change the DOE's position on nuclear waste disposal at Hanford.

Thank you for your time.

Sincerely,

Heidi Logosz
PO Box 304
Hood River OR 97031

506-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

506-4 DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford. One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks. The TPA, a legal agreement between DOE, Ecology, and EPA, identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 507: Douglas and Nancy Milholland

From: Douglas Milholland [douglasmilholland@waypt.com]
Sent: Tuesday, May 04, 2010 12:37 AM
To: tc&wmeis@saic.com
Subject: Hanford as national radioactive waste depository

Douglas & Nancy Milholland
343 35th Street
Port Townsend, Wa 98368
douglasmilholland@waypt.com

Mary Beth Burandt
Document Manager US Department of Energy,
Office of River Protection
PO Box 450, Mail Stop H6-60.
Richland, WA 99353.
TC&WMEIS@saic.com ...

Greetings Ms. Burandt:

We are two of the voters who demanded that Hanford be cleaned up before any additional toxic radioactive waste be allowed into the state. I (Douglas) grew up near Hanford and blame the Department of Energy for poisoning my relatives who lived near the Hanford facility - my Uncle's family suffered from radioactive exposure. They had a big garden and were never warned about the radioactive iodine releases that occurred at Hanford. *507-1* *507-2*

We are deeply upset and insulted to know that the Department of Energy defeated the State of Washington in Court regarding a thorough glassification of all liquid wastes. More than a million gallons of highly toxic waste already has leaked from Hanfords storage tanks, liquid waste that threatens the Columbia river. I understand that the DOE wants to begin bringing more waste into Washington and making it the National Nuclear Waste Depository - a national sacrifice zone. *507-3*

Creating Nuclear Power and all those nuclear bombs was a tragic mistake that in the fullness of time is causing an immense tragedy amongst us mammals - even without a nuclear war.

It seems to us that opening Hanford to receiving radioactive waste from all over the US and probably from overseas as well will open the door to having additional nuclear power plants being built. This is a terrible idea. Humans aren't without options as we move past the peak of fossil fuel availability. Lets invest in wind, tidal

507-1 Comment noted.

507-2 The potential doses to, and health impacts on, the public and workers from past Hanford operations have been the subject of a number of studies. Summaries of these studies are presented in Chapter 3, Section 3.2.10.3, of this EIS. As indicated in that section, the question of whether the population around Hanford has elevated cancer incidence or cancer mortality is unresolved. One past study showed no elevated levels of cancer around nuclear facilities, including Hanford; another study of 16 counties near Hanford determined that cancer incidence in white males and females was below the national average in most counties. The counties in which the incidences of cancer were higher than the national average were not those downwind of Hanford.

The Hanford Dose Reconstruction Project evaluated doses to, but not health effects on, members of the public from releases from 1944 through 1972. Airborne releases of iodine-131 from 1944 through 1957 were responsible for most of the dose from air emissions. The largest organ doses of 24 to 350 rad were to the thyroid. The maximum total effective dose equivalent to an adult from air emissions over the period from 1944 through 1972 was estimated to be 1 rem. The risk of a fatal cancer associated with a dose of 1 rem is about 1 in 1,600. The maximum dose through releases to the Columbia River (from eating nonmigratory fish) was estimated to be 1.4 rem.

507-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

As analyzed in this *TC & WM EIS*, 67 of the 149 SSTs at Hanford are known or suspected to have leaked liquid waste to the environment between the 1950s and the present, some of which has reached the groundwater. Estimates of the total leak loss range from less than 2.8 million to as much as 3.9 million liters (750,000 to 1,050,000 gallons). DOE recognizes that groundwater contamination from past leaks is a concern at Hanford and its potential impact on communities downriver from Hanford.

Commentor No. 507 (cont'd): Douglas and Nancy Milholland

and geothermal power. Lets drive our vehicles on fuel derived from algae farms. Nuclear isnt the only option, and it isn't the best option.

Block the cleanup using the courts? Begin bringing more waste here? And YOU want this, your job asks you to help facilitate this???

Well we say no. We suggest you DO NOT help this to occur. WITHDRAW YOUR CONSENT Quit your job if you must. You do not have our permission to bring more nuclear waste to our state. NO NO NO

507-3 cont'd

FOR ALL LIFE ON EARTH
BREATHING, EATING, DRINKING
MAKING LOVE HAVING BABIES
SAY YES TO LIFE
SAY NO TO
ENLARGING THE TOXIC BURDEN OF NUCLEAR WASTE AT HANFORD

Sincerely

Douglas & Nancy Milholland

Cc
Senator Patty Murray
Senator Maria Cantwell
Representative Norm Dicks
Heart of America NW

One of the purposes of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve waste from the SSTs, treat and dispose of this waste, and close the SST farms via landfill closure, selective clean closure, or clean closure. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks, including remediation of the contamination in the vadose zone.

Commentor No. 508 : Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

From: Patti [mailto:pattimc@nezperce.org]
Sent: Monday, May 03, 2010 3:27 PM
To: Burandt, Mary E
Subject: Draft Tank Closure
Attachments: Draft Tank Closure Comments Letter.pdf; Attachment.pdf

Please see attached. Thank you.

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Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

NEZ PERCE TRIBE TREATY OF 1855

Nez Perce

TRIBAL EXECUTIVE COMMITTEE

P.O. BOX 305 • LAPWAI, IDAHO 83540 • (208) 843-2253

May 3, 2010

Ms. Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
Post Office Box 1178
Richland, WA 99352
Attention: *TC & WM EIS*

Re: Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington, DOE/EIS-0391

Dear Ms. Burandt:

The Nez Perce Tribe (Tribe) thanks the Department of Energy for the opportunity to comment on the *Draft Tank Closure and Waste Management Environmental Impact Statement* (TC/WM EIS). The Tribe's Hanford Programs, the Environmental Restoration and Waste Management Division (ERWM) and the Hanford Cultural Resource Program (HCR), monitored this EIS development and made efforts to gain early participation when afforded by the DOE EIS team. The Tribe is aware of the complex issues and decisions to be made through this EIS and applauds the monumental task to produce this document.

The Tribe does not support all of the Preferred Alternatives produced through this EIS based on policy and technical issues identified by our Hanford Programs, as well as not recognizing and incorporating the Tribe's End State Vision Policy (NP Resolution 05-411). The General Comments and Specific Comments produced by our Hanford Staff are attached. *508-1*

In review of this EIS, the Tribe was concerned about the National Environmental Policy Act (NEPA) and how it was utilized through this effort and its affect on Tribal Nations. For example: *508-2*

- The Department of Energy has associated obligations of the federal fiduciary trustee to the affected Tribes, and to the natural resource Trustees and their constituencies.
- Any NEPA documents that evaluate the Hanford Nuclear site needs to describe affected Tribes and the trust responsibilities of DOE and other federal agencies. It needs to include tribal aboriginal rights, treaty rights and describe responsibilities of Executive Orders 12898, 13084 and 13175 [Applicable Relevant and Appropriate Requirements (ARARs)]. *508-3*
- It is essential that tribal input be integrated to help frame the baseline condition, as well as defining the human and natural environment. *508-4*

508-1 DOE has considered the Nez Perce Tribe's comments, along with all other comments submitted by interested parties on the *Draft TC & WM EIS*.

508-2 As stated in the *U.S. Department of Energy American Indian & Alaska Native Tribal Government Policy* (Bodman 2006), DOE recognizes its Federal trust relationship with American Indian and Alaska Native nations. These trust responsibilities to tribes should not be confused with DOE's trustee responsibilities under provisions of CERCLA, as amended. Section 107 of CERCLA authorizes Natural Resource Trustees, who are Federal resource management agencies, states, and American Indian tribes, to act on behalf of the public to assess and recover damages for injuries to natural resources within their respective trusteeship. DOE, the U.S. Department of Interior, the U.S. Department of Defense, the U.S. Department of Agriculture, and the U.S. Department of Commerce are Federal resource management agencies designated by Executive Order 12580 and the National Contingency Plan to act as Natural Resource Trustees on behalf of the public. DOE is the lead Federal Trustee for all natural resources located on DOE property. This complex process is separately governed by CERCLA and the U.S. Department of Interior regulations and is outside the scope of this *TC & WM EIS*. However, DOE will continue to work with the tribes and other Natural Resource Trustees as part of the Hanford Natural Resource Trustee Council.

508-3 As stated in the *U.S. Department of Energy American Indian & Alaska Native Tribal Government Policy* (Bodman 2006), DOE recognizes that some tribes have treaty-protected and other federally recognized rights to resources and resource interests located within reservation boundaries and outside reservation and jurisdictional boundaries. DOE will, to the extent of its authority, protect and promote these treaty and trust resources and resource interests and related concerns in these areas. A number of Executive orders play a central role in guiding DOE's activities, including the Executive orders identified by the commentor.

508-4 For purposes of the NEPA analysis presented in this *TC & WM EIS*, the "baseline conditions" are reflected in Chapter 3, "Affected Environment." The Nez Perce Tribe, along with other Hanford-area tribes, has had extensive opportunities to provide, and has provided, input to the *TC & WM EIS* process and analyses. Appendix C, Section C.3.1, of this EIS identifies the primary occasions for DOE's interactions with the tribes.

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

- The following sections of the CEQ regulations allow Tribes to: help define presently unquantified environmental entities and values (Section 1507.2(b)), be a Cooperating Agency (Section 1501.6(a)), be part of the scoping process (Section 1501.7(a)(1)), provide comments as a tribal government (Section 1503.1(a)(2ii)), and provide comments as members of the general public (Section 1506.6(b)(3ii)). *508-5*

Once again, the Tribe appreciates the opportunity to comment on the Draft TC/WM EIS. If you have any questions or comments, please direct them to Gabriel Bohnee, ERWM Program Director.

Sincerely,

Samuel N. Penney

Samuel N. Penney
Chairman

Attachment

508-5 The Nez Perce Tribe, along with other Hanford-area tribes, has had the opportunity to provide, and has provided, extensive input to the *TC & WM EIS* preparation process and analysis. Chapter 8, Section 8.3, and Appendix C, Section C.3, of this *TC & WM EIS* identify the process for tribal interaction and the primary occasions for DOE's interactions with the tribes on the subject of the *TC & WM EIS* preparation process. In addition, Section 8.3 of this *Final TC & WM EIS* includes a description of the outcomes of the meetings with the tribes, and a new appendix, Appendix W, describes the tribal perspective as provided by the Hanford-area tribes.

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

General Comments

- Government to Government Consultation: NPT expects to be proactively engaged by DOE during the scoping and alternatives development for Hanford proposals. Tribes are part trustees of Hanford and should be informed and have opportunity to be engaged beyond the NEPA public involvement process. The United States' trust obligation includes a substantive duty to consult with a tribe in decision-making to avoid adverse impacts on treaty resources and a duty to protect tribal treaty-reserved rights "and the resources on which those rights depend." *Klamath Tribes v. U.S.*, 24 Ind. Law Rep. 3017, 3020 (D.Or. 1996). The duty ensures that the United States conduct meaningful consultation "in advance with the decision maker or with intermediaries with clear authority to present tribal views to the … decision maker." *Lower Brule Sioux Tribe v. Deer*, 911 F. Supp 395, 401 (D. S.D. 1995). ***508-6***

- The *TC & WM EIS* states, "Under separate treaties signed in 1855, a number of regional American Indian tribes ceded lands that included the present area of Hanford to the United States. Under the treaties, the tribes reserved the right to fish at usual and accustomed places in common with the citizens of the territory. They also retained the privilege of hunting, gathering roots and berries, and pasturing horses and cattle upon open and unclaimed land. However, it is the position of DOE that Hanford, like other ceded lands that were settled or used for specific purposes, is not open and unoccupied land." The underlined selection is absent the specific legal citation for justification of this DOE position. DOE's opinion isn't the law of the land. Currently the EIS only illustrates that tribes have occupied the given area in the past, but does not recognize an ongoing relationship. ***508-7***

- The *TC & WM EIS* needs to incorporate an understanding that the Hanford site is located within a geographical area that many tribes recognize as significant. It should not be assumed that because much of the archaeological record does not illustrate use and occupation in areas defined within the *TC & WM EIS*, that those areas were never used or occupied. Additionally, it needs to be recognized that the construction of Hanford facilities and infrastructure pre-dates current laws and regulations for protection and preservation of cultural, historic and archaeological materials. ***508-8***

- The Nez Tribe has developed a NEPA narrative for the Greater Than Class C EIS effort by the DOE and will be submitting our narrative separately to the TC/WM EIS team. ***508-9***

- The status of Borrow Pit C area as future borrow material for DOE remedial actions causes much anxiety for the NPT, in part because of its location at the foot of Rattlesnake Mountain. The NPT is also attempting to obtain clarification of the current NEPA coverage for Borrow Pit C. However, the NPT recognizes the more encompassing issue that there exist various interpretations of the numbers of anticipated covers, caps and barriers that will be needed and/or employed in the clean-up and remediation of the entire Hanford Site (interpretations of DOE, the regulators, the Tribes, other stakeholders). The look at the entire site includes – but is not limited to – tank farms, solid waste burial grounds, canyons, and the WTP facilities. Borrow source material will be required to construct these anticipated facilities. Regardless of what the final outcome of caps and ***508-10***

508-6 The *U.S. Department of Energy American Indian & Alaska Native Tribal Government Policy* (Bodman 2006) outlines seven principles in its decisionmaking and interaction with federally recognized tribal governments. Under the policy, all DOE elements are to ensure tribal participation and interaction regarding pertinent decisions that may affect the environmental and cultural resources of tribes. There is no dispute that the actions proposed in this EIS could affect the interests of American Indian tribes located near Hanford. Hence, DOE has actively engaged in government-to-government consultations with tribes in the vicinity of Hanford, including discussions between tribal representatives and such DOE representatives as the DOE-EM Assistant Secretary, DOE-RL, and ORP. Additionally, DOE consults through its CERCLA and TPA processes, HAB, other NEPA actions at Hanford, the Cultural Resources Program, the Public Safety and Resource Protection Program (which includes ecological resources and habitat protection), and the Hanford Natural Resource Trustee Council, to name some of the primary forums. These consultations offer the opportunity for tribes to engage in meaningful dialogue in advance of DOE decisionmaking. See Chapter 8, Tables 8–3 and 8–4, for a list of organizations contacted during the consultation process; Appendix C, Section C.3.1, for additional tribal communications; and Appendix W for a discussion of American Indian perspectives.

508-7 DOE respectfully disagrees with the Nez Perce Tribe's position regarding tribal rights at Hanford. There is substantial documentation indicating that the tribes understood at the time the treaty was signed that the lands were no longer "unclaimed" when they were claimed for the purposes of the white settlers' activities. Most of Hanford had been so "claimed" at the time it was acquired for Government purposes in 1943. DOE is not aware of any judicially recognized mechanisms that would allow these lands to revert to "unclaimed" status merely through the process of being acquired by the Federal Government. The portion of Hanford that remained in the public domain in 1943 (those lands now having underlying U.S. Bureau of Land Management ownership), as well as all the acquired lands, were closed to all access initially under authority of the War Powers Act and then under the authority of the Atomic Energy Act. It is, therefore, DOE's position that the Hanford lands are neither "open" nor "unclaimed."

508-8 This *Final TC & WM EIS* describes the Hanford Site (see Chapter 3, Section 3.2) and states that it is located in areas that the tribes recognize as significant.

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barriers use, and the final numbers employed (and associated sources of the volumes of borrow material), the NPT recommends that the Tri-Party Agencies sponsor an agency/Tribal/Oregon stakeholder discussion to review the effects of the various anticipated results. The NPT believes there is a stark need for all parties to be able to visualize the various outcomes of such actions, because the lasting effects have the potential to be huge. *508-10 cont'd*

- NEPA documents at Hanford need to include sections describing Viewscape and Soundscape impacts from a tribal perspective that are important to our tribal culture. *508-11*
- Socioeconomic Section of a NEPA EIS should receive more focus and have separate sections for "Social" and "Economics". The future of salmon and treaty-reserved fisheries will likely be determined during the life of the *TC&WMEIS*. Tribal expectations are that these species will be recovered to healthy populations. *508-12*
- If aquatic species were to recover, the regional economy and tribal barter economy would likely increase within the Hanford area. The question is, "How might the TC&WMEIS possibly impact these types of activities, both directly and indirectly?" Fish returns and their associated social and economic potential should be considered within the lifecycle of the proposed action. *508-13*
- Direct production by tribes is part of the economy that needs to be represented, especially considering the Tribe's emphasis on salmon recovery. This type of individual commerce in modern economics is termed and calculated as "direct production". The increase in direct production would be relational to the region's salmon recovery, yet there is no economic measure (within the NEPA process) to account for this robust element of a traditional economy. *508-14*
- In a traditional sense, direct production is a term of self and community reliance on the environment for existence as opposed to employment or modern economies. Direct production is use of salmon and raw plant materials for foods, ceremonial, and medicinal needs and the associated trading or gifting of these foods and materials. Direct production needs to be understood and mentioned in documents like this that have long-time frame clean-up proposals and limit access through institutional controls. *508-15*
- Since the Washington Department of Ecology is a cooperating agency in the preparation of the TC & WM EIS, ERWM expected the hydrogeologic and geologic technical work to be certified, by professionals whom are licensed in the State of Washington, in compliance with the State's laws and regulations. *508-16*
- ERWM supports FFTF Decommissioning, which is a component of Alternative 2. ERWM would support a full remediation if the alternative was offered, which would be consistent with our End State Vision. *508-17*
- ERWM believes that the exclusion of Subsurface Barriers from consideration was ill-advised. Due to the widespread lateral movement of moisture in the subsurface, ERWM *508-18*

508-9 A copy of the Nez Perce Tribe's NEPA narrative for the *Draft GTCC EIS* is included in Appendix W of this *TC & WM EIS*.

508-10 The *Final Hanford Comprehensive Land-Use Plan EIS* (DOE 1999) documents the preservation of the McGee Ranch in exchange for Area C borrow source/silt materials. DOE has considered environmental and other concerns presented by cooperating agencies, consulting tribal governments, organizations, and individuals and agrees to explain to stakeholders, in future workshops, how DOE intends to implement the decision(s) reached in the ROD.

508-11 Chapter 3, "Affected Environment," includes discussions of the Hanford viewscape (see Section 3.2.1.2) and noise and vibration (see Section 3.2.3). Chapter 4, "Short-Term Environmental Consequences," includes discussions of the impacts of project alternatives on visual resources (see Sections 4.1.1, 4.2.1, and 4.3.1). It also contains an analysis of the impacts of noise and vibration (see Sections 4.1.3, 4.2.3, and 4.3.3). While the visual aspect is addressed from the American Indian perspective, this is not the case for noise.

508-12 The Bonneville Power Administration provides extensive financial support to salmon recovery efforts and planning activities. Under NEPA, this EIS analyzes the potential environmental impacts associated with specific proposed actions and reasonable alternatives for the storage, retrieval, treatment, and disposal of tank waste generated from defense plutonium production activities; closure of SSTs containing HLW; decommissioning of FFTF; and continued management of LLW and MLLW at Hanford. These analyses include impacts on ecological species (including fish) and habitat, as well as environmental justice and socioeconomic considerations, consistent with current CEQ and DOE NEPA guidance. These analyses can be found in Chapter 4, Sections 4.1.9, 4.2.9, 4.3.9, and 4.4.8; Chapter 5, Sections 5.1.3, 5.2.3, 5.3.3, and 5.4.3; and Appendix P, Section P.3, of this *Final TC & WM EIS*.

508-13 See response to comment 508-12.

508-14 DOE realizes salmon recovery relies on local watersheds. However, this is outside the scope of this *TC & WM EIS*. Under NEPA, this EIS analyzes the potential environmental impacts associated with specific proposed actions and reasonable alternatives, realizing that there could be additional factors that could potentially influence the economy of an area. The EIS analyses include impacts on ecological species (including salmon and other fish) and habitat, as well as environmental justice and socioeconomic considerations, consistent with current CEQ and DOE NEPA guidance.

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doesn't believe that surface barriers will prevent the migration of contaminants in the deep vadose zone. *508-18 cont'd*

- ERWM believes that for the EIS to be complete, it should consider the options available for in-situ soil remediation. *508-19*
- ERWM believes that the *TC & WM EIS* assumption that each of the 149 SSTs would leak an average of 15,000 liters (4,000 gallons) to soils during retrieval operations is overly pessimistic. However, both DOE and Ecology should recognize that the EIS risk modeling indicates that potential retrieval leaks pose a significant environmental risk. Thus, both DOE and Ecology should recognize the importance of not reclassifying tanks suspected of leaking based upon incomplete information. *508-20*
- ERWM has identified numerous outstanding issues related to the tank leak reassessment process in general. At the present time, our issues with the aforementioned process are listed below. *508-21*
  1. Inconsistent tank leak criteria
  2. Failure to review drywell monitoring data from the time of the leak
  3. Reduction of documented leak volumes without a technical basis
  4. Multiple leaks from a tank
  5. Misuse of kriging estimates
  6. Lack of external technical review.
- *TC & WM EIS* modeling should have considered modeling non-native soil moisture conditions underneath the tank farms due to Hanford Operations. *508-22*
- DOE's continued inability to explain the current sources of groundwater contamination at Hanford undermines the credibility of the *TC & WM EIS* analyses, which rely on various modeling approaches to predict the consequences of River Protection Project (RPP) mission activities. *508-23*
- In summary, *TC & WM EIS* modeling uses unsupported inputs into the risk assessment and ignores current groundwater conditions. Thus, the outputs of the risk assessments are questionable and are unsuitable for decision making purposes. *508-24*
- An acceptable waste-form for iodine-129 has not been found to date. The DOE should fully and actively evaluate alternative technologies to successfully and economically immobilize iodine-129 in a glass type format with individual iodine-129 waste performance similar to other radionuclides. *508-25*
- ERWM supports the disposal of mixed TRU waste at WIPP. *508-26*
- ERWM supports removal of technetium-99 in WTP pretreatment. Tank Closure Alternatives 2B and 3B include technetium-99 removal within the WTP pretreatment process. *508-27*

508-15 Comment noted.

508-16 NEPA and CEQ implementing regulations do not require an EIS to include hydrogeologic or geologic technical work certified by professionals licensed in the state where the proposed action would take place. Any permits or licenses issued for completion of work covered by this EIS will be done in accordance with all applicable regulations and, as a result, would receive the appropriate approvals or certifications.

508-17 Decommissioning FFTF would take place under both FFTF Decommissioning Alternatives 2 and 3 (see Chapter 2, Section 2.5.3). In the former case, the facility would be decommissioned through entombment, whereas under the latter, it would be removed.

508-18 Tank Closure Alternatives 4, 6A, and 6B are representative of remediation that would result in removal of the source of contamination from the vadose zone (i.e., the contaminated soils beneath the tank farms that are a source of groundwater contamination). This type of remediation could include the use of subsurface barriers. A more complete discussion of potential remediation actions to achieve vadose zone remediation is provided in Chapter 7, Section 7.5.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

508-19 As discussed in Chapter 2, Section 2.6.1, of this *TC & WM EIS*, in situ technologies were not evaluated in detail because of the difficulties and uncertainties associated with placement of treatment zones; the long periods of time involved in treatment; the questionable uniformity of treatment; and the difficulty in verifying their overall efficacy.

508-20 As discussed in Appendix D, Section D.1.6, of Hanford's 149 SSTs, 67 are listed as "known or suspected" leakers. Although RPP plans to minimize the introduction of liquids into suspected leakers (utilizing VBR), for analysis purposes, all SSTs were assumed to leak during retrieval. The *TWRS EIS* (DOE and Ecology 1996) assumed an average of 15,000 liters (4,000 gallons) would leak during SST retrieval. Due to limitations on currently employed leak detection equipment, this assumption was carried forward in this EIS.

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- The current Enhanced Chemical Cleaning method used in tanks is oxalic acid solution. While this in an improvement over typical sluicing, it is 1940's technology. The DOE should fully and actively evaluate alternative chemical cleaning solutions that use state of the art technology, such as compounds added to sluicing liquid which break chemical bonds in tank heel agglomerates for increased tank retrieval and which exploit control of wetting properties to minimize passage of cleaning fluid though unknown cracks in the steel and/or concrete tank shell. *508-28*
- ERWM supports Tank Closure Alternative 2B with a higher than 99% of tank retrieval and the addition of subsurface barriers to reduce the lateral influx of moisture. *508-29*
- The calculation of tank heel in the *TC & WM EIS* is flawed and under represents uranium and other heavy metals. *508-30*
- ERWM supports the deployment of soil washing capability as outlined in option 6B for the reduction of soil based chemical and radiological risks for the entire Hanford site including the largest tank leaks (A-105, BX-102, SX-108, T-106 …). *508-31*
- In-situ cleaning of intact ancillary equipment should be fully considered and exploited before exhumation is considered. *508-32*
- Retrieval of the associated cribs as outlined in 6A (option case) and 6B (option case) has very limited positive benefit relative to the risk/benefit of the whole site and should not be considered until all sites of greater value have been remediated. *508-33*
- It is imprudent to consider using an SST for staging of waste for processing at the WTP. *508-34*
- DOE has missed an opportunity to estimate groundwater flow rates and lateral transport in the vadose zone based upon the 1951 BX-102 tank leak because DOE has only recently accepted the evidence that this leak has contaminated groundwater (letter from Ms. Stacy Charboneau, Assistant Manager for Tank Farms Project, DOE/ORP to Mr. Gabriel Bohnee, Nez Perce Tribe ERWM, dated March 30, 2009). *508-35*
- Due to its location, no expansion of IDF should be planned. The planned RRPDF should be relocated to 200 West in the proposed IDF west. *508-36*
- Only significant figures should be used when presenting modeling results with superfluous precision. It's doubtful that the modeling results are reliable to five significant figures as reported in many of the tables in the text. *508-37*
- Much of the information related to INL is not necessary for this EIS and does not add any value. In fact ERWM found it confusing at times thinking ERWM was reading about Hanford when in actuality, was INL information. Most of the INL information is not relevant to the Hanford EIS process. ERWM would suggest deleting most of that and just *508-38*

508-21 DOE notes that NEPA analysis is a comparison of the alternatives under consideration; that assumptions used in the analysis must be clearly identified and the uncertainties behind the analysis discussed; and that the assumptions underlying the analysis should not bias one or more alternatives relative to the others. In Appendix D of this *TC & WM EIS*, the derivation of the inventory in the SSTs is discussed. In particular, the identification of the known and suspected tank farm past leaks is based on the *Waste Tank Summary Report for Month Ending December 31, 2002* (Hanlon 2003); the volumes and dates are based on Hanlon (2003) and the field investigation reports; and the inventory is based on field investigation reports or derived from the BBI. DOE disagrees with the supposition that these data sources rely on incorrect statistical analyses, including kriging. In Appendix M of this *TC & WM EIS*, modeling assumptions are discussed, including those related to portrayal of tank farm past leaks. It should be noted that the same modeling assumptions were used to derive environmental consequences under all alternatives. DOE disagrees that uncertainties related to modeled inventories preclude an unbiased comparison of alternatives, and that the analysis suffers from lack of external technical review. Substantial portions of the groundwater and vadose zone analyses were reviewed by the Technical Review Group, the Local Users' Group, and Ecology.

508-22 As reflected in Appendix M, Section M.2, the modeling results of this *TC & WM EIS* are predicated on the presence of nonnative soil moisture conditions at the tank farms.

508-23 The *Draft TC & WM EIS* explicitly compares model results with measured conditions (Appendix U). With two exceptions, these comparisons indicate that the modeling methodology can replicate current conditions within one order of magnitude, the design goal of this EIS. In response to this and similar comments, the discussion in Appendix U of this *Final TC & WM EIS*, specifically with respect to those constituents for which model predictions and actual field conditions show the greatest differences, has been clarified.

508-24 The *Draft TC & WM EIS* explicitly compares model results with measured conditions (Appendix U). Appendix L, Section L.4.3, reveals that field-sampling data from over 5,000 boring logs were used to support lithologic encoding of the regional-scale flow model; Section L.6.1, that field-sampling data from approximately 1,800 groundwater wells were used to calculate the regional-scale flow model; and Appendix N, Section N.1.2, that field-sampling data from approximately 140 vadose zone boreholes were used to calibrate the vadose zone model as well as regional-scale groundwater plume measurements for the

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provide a brief summary for the reader regarding how some of the alternatives relate to INL. **508-38 cont'd**

- ERWM believes that the reasons that uranium, Tc-99, and nitrate activities/concentrations are currently at higher levels than expected is that the use of a Kd = 0.6 for uranium is inappropriate and the copious amounts of water used during Hanford Operations was not incorporated into the model. *Technical Guidance Document for "Tank Closure Environmental Impact Statement" Vadose Zone and Groundwater Revised Analyses* should be revised to address these issues. **508-39**
- Climate is simply not a snapshot in time. Archeological evidence supports tribal oral history that speaks of a time when the region was volcanic, to a glacial period, including great floods, and to what ERWM knows today. **508-40**
- The Nez Perce Tribe recommends that quiet zones and time periods be identified for known Native American ceremonial locations on and near the Hanford Reservation. Non-natural noise can be offensive during traditional ceremonies. Traditional ceremonies have been held and are expected to continue at the Hanford site. Not all tribal ceremonial sites at Hanford are known to DOE. Hanford facilities may presently create noise interference for ceremonies held at Gable Mountain and Rattlesnake Mountain. Noise generating projects can interrupt the thoughts and focus and thus the spiritual balance and harmony of the community participants of a ceremony. **508-41**
- Hanford in general is composed of sandy soils that do not retain water very well. Consideration must be made for long-term moisture percolation to any underground contamination. Soils have a medicinal purpose for tribal healing. Care should be taken at Hanford sites with soils containing important mineral properties like those in the White Bluffs area. **508-42**
- Water is a centerpiece of the American Indian cultures of the Columbia Plateau, so surface waters at Hanford are a high priority to the Nez Perce. Proposal of any new risk or further contamination of the Columbia River system from Hanford operations will receive strong opposition by the Nez Perce Tribe. As stated before, our culture is closely tied to the survival of salmon in the Columbia River system. **508-43**
- DOE's historical record of protecting groundwater at Hanford is poor. Recent DOE efforts and technological limitations have consistently extended the timeframe of contaminant cleanup. **508-44**
- Contaminant transport to groundwater is still largely unknown in areas. The actual volumes of contamination within the groundwater and the direction of its flow are not fully characterized. This uncertainty and the limited technical ability to remediate the vadose zone and groundwater places the Columbia River at continual risk. **508-45**

BY Cribs, BC Cribs, 216-T-26 Crib, and the REDOX and PUREX waste sites. DOE's view is that the overall level of characterization data for Hanford supports differentiation among the alternatives, which is a key feature of a NEPA analysis. In response to this and similar comments, the discussion in Appendix U in this *Final TC & WM EIS*, specifically with respect to those constituents for which model predictions and actual field conditions show the greatest differences, has been clarified.

508-25 As noted in Appendix E, Section E.1.2.3.1.7, the behavior of iodine-129 in ILAW and other thermally generated waste forms, as well as the fraction that would be captured in the final waste form, are difficult to predict. Further demonstration and testing of the iodine recovery technology should provide the necessary performance data to confirm the assumptions used for this EIS and, possibly, support additional retention of iodine-129 in the thermally generated waste forms. If necessary, design changes may have to be implemented if the actual fractions in the secondary-waste streams are demonstrated to be higher than anticipated. However, such retention information was not available at the time of this EIS's preparation. As discussed in Chapter 7, Section 7.1.6, this is a particular area of focus for DOE, especially with regard to partitioning and capture of iodine-129, a conservative tracer, in secondary-waste forms. Additional sensitivity analyses have been added to this final EIS that evaluate the changes in potential impacts that might result if partitioning or recycling of some contaminants, e.g., iodine-129, could be increased into primary-waste forms and/or if secondary-waste-form performance could be improved. The discussion found in Chapter 7, Section 7.5, was added to summarize these results. The results of these analyses will aid DOE in formulating appropriate performance targets for secondary-waste forms. As discussed in Chapter 7, Section 7.5.2.8, and Appendix E, Section E.1.2.4.5.6, DOE has drafted a roadmap that implements a strategy for development of better-performing secondary-waste forms.

508-26 Comment noted.

508-27 Comment noted.

508-28 As discussed in Appendix E, Section E.1.2.2.4, this *TC & WM EIS* assumes a chemical wash system would be required to supplement the MRS and VBR system to achieve 99.9 percent retrieval. In addition, as stated in Section E.1.2.2.4.4, this EIS assumes that the chosen chemicals would be compatible with safety requirements (e.g., worker health and safety and nuclear safety requirements), as well as the construction materials, wastes to be

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- ERWM is against adding any additional waste to the Hanford site that adds risk to tribal health. Many tribal members still live a traditional lifestyle, or portions there of, making them more susceptible to contamination than the general public. A CRITFC fish consumption report from 1992 identified that four Columbia River Tribes, including the Nez Perce, consumed over nine times the amount of fish of the general population. Any evaluation needs to include a Tribal Risk Scenario to calculate risk to our members. These scenarios will also consider inadvertent intruder scenarios, as required by DOE Order 435.1. *508-46*
- The USFWS and the 165,000 acre Hanford Reach National Monument (the Monument) on the Hanford site includes rare plant and wildlife species that must be considered during the NEPA evaluation. *508-47*
- DOE needs to review the USFWS Comprehensive Conservation Plan (CCP) that was prepared for managing the Monument. *508-48*
- Columbia River Tribes have created a salmon recovery plan called the Wy-Kan-Ush-Mi Wa-Kish-Wit (Spirit of the Salmon). ERWM would expect that DOE's EIS evaluation would consider the goals and objectives of this Plan and document in the EIS for public review any potential conflicts the repository might have with this salmon recovery plan. *508-49*
- A goal of Columbia River Tribes, the federal, state, and local governments, is to recover Columbia River Salmon runs. Huge monetary and strategic efforts have been made to that end. Any salmon recovery would substantially change the social and economics of the region. For example our tribal subsistence economy would again flourish. The Economics section needs to describe a subsistence economy as part of the overall economic description. This "personal" enterprise is a term used by economists for self and community reliance on the environment for existence as opposed to employment and modern economies. *508-50*
- Tribal employment at Hanford and surrounding area should also be part of the employment description for the region. *508-51*
- DOE needs to develop, with assistance from affected tribes, a definition for Environmental Justice in Indian country. A tribal Environmental Justice definition needs to include sovereign nation-state status, federal trust responsibility, and include treaty and aboriginal rights. *508-52*
- ERWM maintains that aboriginal rights allow for the protection, access to, and use of open and unclaimed lands of the Hanford Reservation when human health and safety are not in jeopardy. *508-53*

treated, and waste-feed-composition requirements for the WTP or supplemental treatment technologies. However, as further discussed in Section E.1.2.2.4, although the chemical-wash-system process has been demonstrated at Hanford, there are uncertainties; thus, the acid wash analyzed (oxalic acid) is considered representative of the wash fluids that could be used. As noted in Section E.1.2.2.4.2, chemical washing is identified for use in conjunction with MRS and VBR system retrieval of 99.9 percent of the waste, and the specific chemicals to be used for this process would be selected to minimize potential environmental, health, and safety impacts, while maximizing the effectiveness of residual waste retrieval. Thus, oxalic acid was chosen to support the analysis in this EIS; however, DOE will review improved solutions as they become available.

508-29 Tank Closure Alternatives 4, 6A, and 6B are representative of retrieval levels greater than 99 percent and remediation that results in removal of the source of contamination from the vadose zone (i.e., contaminated soils between the tank farms and the groundwater). This type of remediation could include the use of subsurface barriers. A more complete discussion on the potential actions to achieve vadose zone remediation is described in Chapter 7, Section 7.5, of this EIS.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

508-30 With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. For the residual waste remaining within the tank farms in the 200 Areas, closure would require detailed examinations of the tanks and residual waste to support preparation of site-specific radiological performance assessments and closure plans. These examinations would require detailed waste sampling and analyses, assessments of the structural stability of the tanks, and assessments of risk to human health and to the environment. These documents will provide the information and analysis

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- ERWM proposes that ceremonial sites be placed in co-stewardship with DOE, USFWS and the affected tribes for long-term management and protection. *508-54*
- The Comprehensive Land Use Plan (CLUP) has institutional controls (ICs) that limit present and future uses by Native Americans. These ICs should be described as part of the affected environment. Any new proposals that extend, expand, or create new ICs should be considered cumulative impacts to native people. *508-55*
- The 50-year management time horizon of the CLUP and its land use designations are often incorrectly assumed to be permanent designations. CLUP land use designations and their boundaries can be changed at the discretion of DOE with recommendations by Hanford stakeholders, including affected Tribes. *508-56*
- DOE managers must evaluate as part of NEPA any potential access concerns to ceremonial sites. *508-57*
- According to the *American Indian Religious Freedom Act* (AIRFA), tribal members have a protected right to conduct religious ceremonies at locations on public lands where the ceremonies are known to have been practiced.
- *Executive Order 13007* states that Tribal members have the right to access ceremonial sites. DOE and USFWS must maintain access to known ceremonial sites.
- New culturally significant findings are required to be added to the list of sites and locations with special cultural protections. These protections override any land use designation of the CLUP or other resource documents. *508-58*
- From a tribal perspective, all things of the natural environment are recognized as cultural resources. This is a different perspective from those who think of cultural resources as artifacts or historic structures. The natural environment provides resources for a subsistence lifestyle for tribal people. This daily connection to the land is crucial to Nez Perce culture and has been throughout time. All elements of nature therefore are the connection to tribal religious beliefs. Oral histories confirm this cultural and religious connection.

necessary for DOE and the regulators to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

DOE has already begun the process of retrieving waste from the tanks, such as those located in Waste Management Area C. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

508-31 Comment noted.

508-32 Comment noted.

508-33 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

508-34 Appendix E, Section E.1.3.1, of this final EIS provides a discussion on this storage option, which was considered but not evaluated in this EIS. In Appendix E of this *Final TC & WM EIS*, additional discussion is provided on what would be required to implement staging of retrieved waste from SSTs.

508-35 DOE recognizes the commentor's concern about the utility of field data for model design, parameterization, and calibration. In the vadose zone modeling in this *TC & WM EIS*, the degree of lateral migration is a result of competing boundary conditions and material properties, and calibration of the material properties is a challenging problem. The STOMP models in this *TC & WM EIS* were calibrated to groundwater conditions resulting from three reasonably well-characterized sources: the BY Cribs, the BC Cribs, and the 216-T-26 Crib.

508-36 The locations of both the IDF(s) and the RPPDF were selected based on a number of factors, including available room and proximity to associated facilities and processes. As two cells of the IDF currently exist in the 200-East Area, DOE determined it would be logical for expansion to take place on adjacent vacant land to take advantage of existing waste management infrastructure. With respect to relocating the RPPDF, under Disposal Group 2 of Waste Management Alternatives 2 and 3, the land required for the facility far exceeds that set aside in

Specific EIS Comments

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Subsurface Barriers. This option should have been evaluated in detail. *508-59*

In Situ Soil Remediation. A variety of in situ soil remediation technologies should have been evaluated in detail. *508-60*

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DOE has favored computer modeling over the collection of characterization data that could have been used to reduce the uncertainty related to lateral transport of contamination in the vadose *508-61*

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The statement that "Sixty-seven of the SSTs are known or suspected to have leaked liquid waste to the vadose zone between the 1950s and the present, although it is likely that some of the tanks have not actually leaked." has been poorly supported. ERWM has asked for an independent review of the DOE's reassessment of past tank leaks. DOE/ORP has not reviewed drywell monitoring data acquired at the time of the reported leak(s) during this reassessment. It is entirely possible more than 67 tanks have leaked. *508-62*

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The Tribes also retained the right to erect temporary structures and contend that these Federal Lands are open and unclaimed. *508-63*

Pages 3-27, 3-39 and 3-58 *508-64*

the 200-West Area for a possible IDF. Thus, relocation of the RPPDF to the area suggested by the commentor is not practical.

508-37 Data presentation in Chapters 5 and 6 and Appendices N and O in this *Final TC & WM EIS* has been revised in response to this and similar comments regarding precision.

508-38 DOE believes that the data presented relative to INL are relevant and necessary. While it is true that information related to INL does not apply to tank closure (a major portion of this EIS), it is relevant to addressing the FFTF Decommissioning alternatives. This EIS has been structured so that information relative to INL is clearly indicated in the section headers and alternative descriptions, as well as in tables and figures, as appropriate.

508-39 As stated in Appendix L of this *TC & WM EIS*, volumes of water were input into the groundwater and vadose zone models according to the estimates provided by the SIM modeling systems and the cumulative impacts inventory database. Although there is some uncertainty in the volume estimates, comparisons with previous studies show general agreement, and water table rises during the operational period are consistent with the modeled anthropogenic recharge. DOE's view is that while there may be some temporal and volumetric uncertainties in anthropogenic recharge, the modeling results suggest that most of the volumetric inventory is accounted for. As shown in Appendix U, modeled groundwater concentrations of uranium-238 and total uranium exceeded observed values by roughly an order of magnitude in calendar year 2005. An analysis of these discrepancies suggests that the overestimation can be attributed to the rather well constrained water and constituent inventories of several sites. DOE agrees that a likely cause of these discrepancies is the K_d (distribution coefficient) used to model uranium migration. This *Final TC & WM EIS* has been revised to present this issue in more detail.

508-40 DOE acknowledges that climate changes occur due to both natural and human-induced causes. Chapter 3, Section 3.2.5.1.1, of the *Draft TC & WM EIS* discusses the physiography and structural geology of the region, including volcanic activity and glacial flooding. DOE acknowledges that the Hanford climate was different during these earlier periods. Potential future changes to climate are discussed by the Intergovernmental Panel on Climate Change in their 2007 report, *A Report of Working Group I of the Intergovernmental Panel on Climate Change, Summary for Policymakers* (IPCC 2007). DOE has reviewed and revised, as necessary, its analyses on the effects of climate change on

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

The "Geology and Soils", "Water Resources" and the "Ecological Resources" sections in the Affected Environment do not contain or reflect the tribal information or values. ERWM maintain that impacts cannot be assessed correctly if this information is lacking from the Affected Environment section. **508-64 cont'd**

Page 3-39

The 82-kilometer (51-mile) Hanford Reach is not free-flowing since its water levels are regulated by the Priest Rapids Dam. **508-65**

Page 3-47

Given that millions of gallons of water are transported to the 200 Areas annually, in certain areas the major source of recharge may not be natural precipitation as stated in the text. **508-66**

Ditches are not synonymous with trenches. At Hanford ditches (unlined canals) were used to transport dilute low activity waste to the ponds. The trenches were operated on a specific retention basis and received *"special intermediate wastes"* (BNWL-1464). After 1950 and depending on the level of radioactivity, liquid wastes were discharged either to surface ponds and ditches or to underground cribs, trenches, and French drains. Liquid wastes were divided into high (more than 100 microcuries [μCi] of beta emitters per milliliter), intermediate (more than 5 X 10-5 μCi and less than 100 μCi of beta emitters per milliliter), and low-level (less than 5 X 10-5 μCi of beta emitters per milliliter) categories (BNWL-1464). The high- level wastes were sent to the tanks for storage. The intermediate level wastes were disposed to cribs. Cribs are underground structures where liquid wastes were released to the soil column with the expectation that contaminant breakthrough to groundwater would occur and releases would be halted once the maximum permissible concentrations (MPC) in groundwater were reached (BNWL-1464). **508-67**

The paragraph on tank leak volumes should be revised. Based on the Historical Leak Model (HLM), much larger leak loss estimates for tanks SX-108 and SX-109 Were proposed in HNF-3233. Based on HNF-3233 and past DOE communications, it appears that the estimated leak volumes for the SX tanks in RPP-23405 and Hanlon are low. On August 27, 1998, DOE issued a press release concerning HNF-3233 and indicated "…the volume of past leaks from four of the Hanford Site's 149 single shell waste tanks is greater than previously estimated." DOE has not issued a press release in support of HNF-4756 that indicates the leaks in SX Tank farm are smaller than previously thought. Since extent of contamination in the vadose zone near these tanks is undefined, it appears that the actual leak volumes in HNF-3233 are plausible for tanks SX-108 and SX-109 and could potentially be an order of magnitude higher than that reported in RPP-23405 and Hanlon. Additionally, there is evidence that tank BX-102 has leaked more than once (Johnson and Washenfelder, Interoffice Memo, dated Sept. 10, 2003, To: S.M. Mackay) **508-68**

The statement that "Sixty-seven of the SSTs are known or suspected to have leaked liquid waste to the vadose zone between the 1950s and the present, although it is likely that some of the tanks have not actually leaked." has been poorly supported. ERWM has asked for an independent review of the DOE's reassessment of past tank leaks. DOE/ORP has not reviewed drywell monitoring data acquired at the time of the reported leak(s) during this reassessment. It is entirely possible more than 67 tanks have leaked.

Page 3-62 **508-69**

various resources at Hanford and the possible effects on environmental impacts of the *TC & WM EIS* alternatives. As described in Chapter 6, Section 6.3.4, DOE has reviewed climate studies that forecast general trends in Hanford regional climate change. However, there are no reliable methodologies for projections of specific future climate changes in the Hanford region, and thus such changes have not been quantified in this EIS. To account for this uncertainty, Appendix O, Section O.6.2, describes the effects of enhanced infiltration such as that which may occur during a wetter climate. In the *Draft TC & WM EIS*, Appendix V focused on the potential impacts of a rising water table from a proposed Black Rock Reservoir. Following the retraction of this proposal, the focus of Appendix V was changed in this final EIS to analysis of potential impacts of infiltration increases resulting from climate change under three different scenarios. Appendix V includes sensitivity analyses of potential impacts at Hanford that could result from climate changes that may increase model boundary recharge parameters and the rise of the groundwater table. Additional qualitative discussion of the potential effects of climate change on human health, erosion, water resources, air quality, ecological resources, and environmental justice has been added to Chapter 6 of this final EIS. Additional discussion of the types of regional climate change that could be expected has also been added to Chapter 6, Section 6.5.2, Global Climate Change. The potential impacts of the alternatives on climate change are addressed in Chapter 6, Section 6.5.2, and Appendix G, Section G.5, of this *TC & WM EIS*.

508-41 DOE has an active commitment to working with the tribes and coordinates all requests for tribal access through its Office of Communications. In consultation with area tribes, DOE also has made commitments in several recent Memorandum of Agreements (MOAs) negotiated under the National Historic Preservation Act requiring that DOE coordinate schedules with the tribes in an effort to avoid or minimize affecting tribal ceremonies. These include the MOA for the Rattlesnake Mountain Combined Community Communication Facility and Infrastructure Cleanup on the Fitzner-Eberhardt Arid Lands Ecology Reserve (executed by DOE and the State Historic Preservation Officer [SHPO] in July 2009) and the MOA for Use of Borrow Source at Area C (executed by DOE, the SHPO, and the Advisory Council on Historic Preservation in April 2009). In addition, a currently pending Amended MOA associated with closure of the Nonradioactive Dangerous Waste Landfill and Solid Waste Landfill, which has been exchanged with area tribes, the SHPO, and Advisory Council on Historic Preservation, includes a similar stipulation to minimize noise and visual effects associated with project activities by coordinating the timing of construction

The western toad was not mentioned as one of the amphibians present. Pacific tree frogs have not been seen for 30 years. The painted turtle was not mentioned. Documentation of these species can be found in a Nez Perce Tribe publication *"I Am of This Land: Wildlife of the Hanford Site, 1996.* Copies of this publication are available upon request from NPT ERWM. **508-69 cont'd**

Page 3-62

ERWM doesn't necessarily support the premise that a correlation or cause and effect have been scientifically established for increased elk mortality due to fires. Many other variables could account for this if indeed mortality has increased significantly. It would be interesting to actually see the mortality figures pre- and post-fire. **508-70**

Pages 3-69 to 3-71

Species were left out of Table 3-8: western toad (state candidate), sage grouse (state threatened), western grebe (candidate), black tailed jackrabbit (candidate). There may be others; please update the table with latest federal and local lists. **508-71**

Page 3-74

The Cultural Resources section only identifies the impacts in relation to archeological and plant resources. These are simply components of cultural resources. The Cultural Resources section should also include a section regarding the connection and association between the indigenous people and their surrounding environment. **508-72**

Page 3-79

The Tribes also retain the right to erect temporary structures and contend the Federal Lands are open and unclaimed. **508-73**

Page 3-87

The *TC & WM EIS* states, "Results of the current assessments and historic studies indicate little risk of enhanced carcinogenesis; exposures to site radionuclide releases tend to be far loERWMr than those to natural background radiation, and chemical exposures are Well within stipulated guidelines." There is a need to clarify that those studies and assessments, noted in the statement above, Were not inclusive of the Native American scenarios, and therefore the results do not reflect the surrounding native community as a whole. Please see *TC & WM EIS* pages U-63 and U-64 for American Indian Residential Farmer peak Hanford Columbia River radiological dose of 131,000 rems per year in 1985 and 100% chance of cancer or death and peak chemical hazard of 305 in 1978 for a 100% chance of chronic or acute chemical exposure. These results would not indicate low levels of carcinogenesis or risk. **508-74**

Page 5-10

Table 5-1 reports spurious digits introduced by calculations carried out to a greater precision than the modeling supports. For example, the results (chemical versus isotopic) for uranium suggest that the modeling has only three significant figures in regards to the calendar year. **508-75**

Page 5-14 **508-76**

activities to minimize disturbance of ceremonies at Rattlesnake Mountain. DOE will continue, through its active Cultural Resources Program and policy of communication and consultations with the tribes, to be sensitive to these concerns.

508-42 Chapter 3, Section 3.2.5, of this *TC & WM EIS* describes the geologic and soil resources at Hanford and in the vicinity with respect to regional physiography and geologic structure; site stratigraphy; rock and mineral resources; geologic hazards; and soil attributes. This description includes the White Bluffs area.

508-43 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

508-44 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

508-45 DOE's data show that the groundwater model predictions for current conditions presented in the *Draft TC & WM EIS* are within an order of magnitude of recent field measurements. The discussion of the areas of agreement and disagreement has been expanded in Appendix U of this *Final TC & WM EIS*. DOE also believes that the expanded mitigation discussion (Section 7.5) in Chapter 7 addresses some of the questions regarding the near-, mid-, and long-term mitigation actions that could support the decisionmaking process.

508-46 A key purpose of the analyses in this *TC & WM EIS* is to understand the potential impacts of proposed actions on humans so those impacts can be factored into decisionmaking. In analysis of the potential long-term impacts of radioactive materials left at Hanford, a number of different scenarios were developed. These scenarios, described in Appendix Q, "Long-Term Human Health Dose and Risk Analysis," include a groundwater-drinking water user, a resident farmer,

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

According to the text, uranium groundwater concentrations will not exceed 30 ug/L at the core zone boundary until CY 6000. Presently, uranium concentrations in groundwater exceed 30 ug/L at the northern core zone boundary. **508-76 cont'd**

Page 5-32

Figure 5-34 should be corrected to show the presence of a uranium groundwater plume in 200 East. **508-77**

Page 5-41

Table 5-2 reports spurious digits introduced by calculations carried out to a greater precision than the modeling supports. For example, the results (chemical versus isotopic) for uranium suggest that the modeling has only three significant figures in regards to the calendar year. **508-78**

Page D-2

Best Basis Inventory may under represent uranium heel residuals. Review of the DOE uranium documents which talk about total uranium contained in the tanks has an unexplained decrease. The Best Basis Inventory May 1998 gives the Hanford tank uranium inventory of 894,000 Kg. The Best Basis Inventory September 1998 gives the Hanford tank uranium inventory of 878,000 Kg. Most of the references that explain uranium flow at Hanford such as DOE/RL-2000-43 indicate 958,000 Kg of uranium is in Hanford tanks. The Best Basis Inventory 2009 indicates there is an estimated 648,000 Kg of uranium in Hanford tanks. The Best Basis Inventory 2009 also gives standard deviation for total uranium for a total of 47 SSTs and DSTs. The weighted relative standard deviation for these tanks is 30.2%.

Considering the desire for the DOE to minimize the environmental impact of the Hanford site it is very possible the current Best Basis Inventory for uranium is 200,000 Kg low or about 30% low. This would mean 648,000 Kg total uranium is still statistically correct but on the bottom of the distribution. 848,000 Kg total uranium may be a better estimation of actual tank total uranium contents. **508-79**

A possible explanation for the decrease in tank uranium is the decrease in number of tanks thought to have high uranium metal waste. Initially 40 SST Were assumed to have metal waste. This number was deceased to 2 based on sampling 21 of these tanks. HoERWMver even with the large number of samples from tanks there Were a very small number of actual samples of tank heels where the metal waste would be expected (RPP-8847). With very limited data, the amount of metal waste and uranium was adjusted downward for the Best Basis Inventory.

Page D-16

The calculation of tank heel residual after cleaning is flawed. The *TC & WM EIS* basic assumptions for tank heel calculation are found in appendix D-16. The method used (method 1) was selected because of ease of use (DOE statement in tribal consultation) and does not take known tank waste layer composition into consideration. It only treats tanks as a homogenous (fully mixed) waste and computes remaining tank heel waste based on retrieval percentage times total tank inventory. For example, tank X retrieved to 99% would have 1% of the total tank curies or kilograms of an individual component left in the heel. This method fails to take into the consideration all the information in the Best Basis tank inventory that includes individual layer composition for each tank. **508-80**

an American Indian resident farmer, and an American Indian hunter-gatherer. The scenarios reflect recognition of fish as potentially more important in local tribal members' diets than in the diets of the general population. As indicated in Appendix Q, Section Q.2, it was assumed that the American Indian resident farmer and the American Indian hunter-gatherer consume 26 and 226 kilograms of fish per year, respectively. The average adult fish consumption rate in the report cited by the commentor is 58.7 grams per day or about 21.4 kilograms per year.

This EIS also includes analysis of inadvertent intrusion scenarios, the details of which are described in Section Q.2.3. The intruder is assumed to be located on the barrier constructed over a tank farm, a waste disposal facility, or FFTF. The intruder impact model evaluates impacts of construction of a home or drilling of a well at these locations. Residual contamination is brought to the surface, resulting in exposure of construction or drilling workers and subsequent exposure of resident farmers. A detailed description of the intruder model is presented in Section Q.2.3. Results of this analysis, previously included only in Appendix Q, were added to Chapter 5 to make them more available to readers.

508-47 As no action associated with the *TC & WM EIS* alternatives would take place within the Hanford Reach National Monument, no impacts on any rare plants and wildlife species would occur. Accordingly, these species were not specifically addressed in this EIS. As noted in Chapter 3, Section 3.2.7.4, informal consultation was conducted with USFWS, NMFS, Washington State Department of Fish and Wildlife, and the Washington Natural Heritage Program concerning threatened and endangered species that are potentially present within areas to be disturbed by the various alternatives (see Appendix C, Section C.3, for copies of correspondence related to these consultations). Further, as noted in Section 3.2.7.4, special ecological studies were conducted to determine the presence of any rare species within the affected areas. No federally or state threatened or endangered species were identified in these studies. Thus, no such species would be impacted by any of the *TC & WM EIS* alternatives (see appropriate sections of Chapter 4). Rare species at the Hanford Reach National Monument were considered in detail in the *Hanford Reach National Monument Final Comprehensive Conservation Plan and Environmental Impact Statement, Adams, Benton, Grant and Franklin Counties, Washington* (USFWS 2008), to which the commentor is referred.

508-48 DOE did review the *Hanford Reach National Monument Final Comprehensive Conservation Plan and Environmental Impact Statement, Adams, Benton,*

Appendix D-16 gives a more correct method for computing tank heel waste which is method 2. Method 2 takes into consideration that supernatant (liquid) can be easily pumped off the tank and be on top of the waste, salt cake can be readily dissolved or vacuum sluiced which is the next layer and the final bottom sludge layer will be the most difficult to remove. The sludge is heavier and more difficult to dissolve. The remaining heel is calculated based on a proportional volume mix of sludges present in an individual tank and if the heel volumes exceed the total sludge volume a proportional volume mix of the salt cake is used to make up the difference.

The data source for the tank heel estimates is the TWINS Best Basis Inventory (BBI) supported by PNNL. This database is continually updated with new information and radioisotope decay dates to represent the best available knowledge of each tank's contents. The *TC & WM EIS* uses the 2002 BBI. Analysis was done by the Nez Perce Tribe ERWM using the TWINS database updated to November 5, 2009. Compared to the 2009 database the 2002 database under estimates total uranium and PCBs (polychlorinated biphenyls). The 2002 database overestimates iodine-129 and technetium-99. The Nez Perce Tribe analysis uses method 2 of appendix D-16 with the exception that the actual total tank waste volume is used to compute tank heel. This approach is the same method used in the *TC & WM EIS*. It gives a loERWMr estimate than the 99% retrieval of total tank volume or 10 cubic meters for 100-series SST and 0.9 cubic meters for 200-series SST.

The analysis indicates tank heel sludges have a higher content of uranium, plutonium, lead, mercury, chromium, PCBs, strontium-90, and a lower content of carbon-14, technetium-99, iodine-129, cesium-137 and nitrate. The predominate impact is that 6-7 times more total uranium may exist in the tank heel than that used in the EIS.

The following tables list the *TC & WM EIS* SST and DST heels in curies or kilograms for 90, 99 and 99.9% retrieval, the method 2 calculated heels and the numeric ratio of method 2 divided by *TC & WM EIS* values.

SST Heel After 90% Retrieval

Analyte (curies)	*TC & WM EIS 90%*	2009 BBI w/method 2	Ratio method 2/EIS
Hydrogen-3 tritium	8.93E+02	2.25E+02	0.25
Carbon-14	2.59E+02	2.74E+01	0.11
Strontium-90	3.43E+06	5.41E+06	1.58
Technetium-99	1.55E+03	8.32E+02	0.54
Iodine-129	2.99E+00	1.04E+00	0.35
Cesium-137	1.61E+06	1.26E+06	0.78
Uranium-233,234,235,238	8.75E+01	1.71E+02	1.95
Neptumium-237	5.89E+00	4.69E+00	0.80
Plutonium-239,240	6.69E+03	6.60E+03	0.99
Americium-241	NA	8.45E+03	NA

508-80 cont'd

Grant and Franklin Counties, Washington (USFWS 2008) during preparation of this *TC & WM EIS*. DOE also reviewed the *Sport Hunting, Decision Document Package, Wahluke Unit of the Hanford Reach National Monument* (USFWS 2007) and the June 9, 2000, Presidential Proclamation 7319, "Establishment of the Hanford Reach National Monument" (65 FR 37253).

508-49 DOE realizes that salmon recovery relies on local watersheds. However, this is outside the scope of this *TC & WM EIS*. DOE acknowledges the recovery planning that has occurred, including the efforts through the Columbia River Inter-Tribal Fish Commission. The Bonneville Power Administration provides extensive financial support to salmon recovery efforts and planning activities. Under NEPA, this EIS analyzes the potential environmental impacts associated with specific proposed actions and reasonable alternatives for the storage, retrieval, treatment, and disposal of tank waste generated from defense plutonium production activities; closure of SSTs containing HLW; decommissioning of FFTF; and continued management of LLW and MLLW at Hanford. These analyses include impacts on ecological species (including fish) and habitat, as well as environmental justice and socioeconomic considerations, consistent with current CEQ and DOE NEPA guidance. These analyses can be found in Chapter 4; Chapter 5, Sections 5.1.3, 5.2.3, 5.3.3, and 5.4.3; and Appendix P, Section P.3, of this *Final TC & WM EIS*.

508-50 This *TC & WM EIS* acknowledges the role of the agricultural community as one of several driving forces of the economy in the Hanford area since the early 1970s. In addition, Chapter 3, Section 3.2.11, acknowledges that several tribes in the greater Columbia Basin rely on natural resources for subsistence. Additionally, this *TC & WM EIS* analyzes the potential ecological impacts under the various alternatives; this analysis can be found in Chapter 4, Sections 4.1.7, 4.2.7, 4.3.7, and 4.4.6; Chapter 5, Sections 5.1.3, 5.2.3, 5.3.3, and 5.4.3; and Appendix P, Section P.3. Results of this analysis conclude that the alternatives considered in this *TC & WM EIS* would not adversely impact aquatic biota, including salmonids.

508-51 As an Equal Employment Opportunity employer, DOE recognizes the many contributions made by all Hanford employees regardless of race or ethnicity.

508-52 The development of the definition of environmental justice in Indian country is outside the scope of this *Final TC & WM EIS*. The environmental justice analysis presented in this EIS is primarily based on Executive Order 12898 and accompanying CEQ guidance published in 1997. This EIS includes a number

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

Analyte (kilograms)	*TC & WM EIS 90%*	2009 BBI w/method 2	Ratio method 2/EIS
Chromium	4.95E+04	4.52E+04	0.91
Mercury	1.68E+02	3.79E+02	2.25
Nitrate	5.18E+06	3.81E+06	0.74
Lead	7.16E+03	1.31E+04	1.83
Uranium	5.42E+04	1.51E+05	2.79
PCB	8.54E+01	2.82E+02	3.30

508-80 cont'd

of analyses of the potential impacts of the various alternatives on the local American Indian population over the short term (see Appendix J) and long term (see Appendix Q). Based on the comments DOE received on the *Draft TC & WM EIS*, DOE has updated language in the discussion of environmental justice presented in Chapter 3, Section 3.3.11, and Appendix J to accurately reflect CEQ and NRC definitions.

508-53 DOE respectfully disagrees with the Nez Perce Tribe's position regarding tribal rights at Hanford. There is substantial documentation indicating that the tribes understood at the time the treaty was signed that the lands were no longer "unclaimed" when they were claimed for the purposes of the white settlers' activities. Most of Hanford had been so "claimed" at the time it was acquired for Government purposes in 1943. DOE is not aware of any judicially recognized mechanisms that would allow these lands to revert to "unclaimed" status merely through the process of being acquired by the Federal Government. The portion of Hanford that remained in the public domain in 1943 (those lands now having underlying U.S. Bureau of Land Management ownership), as well as all the acquired lands, were closed to all access initially under authority of the War Powers Act and then under authority of the Atomic Energy Act. It is, therefore, DOE's position that the Hanford lands are neither "open" nor "unclaimed."

508-54 The Nez Perce Tribe's proposal concerning ceremonial sites is outside the scope of this *TC & WM EIS*.

508-55 Institutional controls at Hanford are derived primarily through the RCRA/CERCLA decisionmaking process under the framework of the TPA. These controls are put in place to protect workers and the public and generally include nonengineered restrictions on activities, access, or exposure to land, groundwater, surface water, waste and waste disposal areas, and other areas or media. While the *Final Hanford Comprehensive Land-Use Plan EIS* (DOE 1999) and the ROD establishing the Hanford Comprehensive Land-Use Plan do use the words "institutional controls," it means that DOE intends to maintain the remediation institutional controls separately derived from (or established by) RCRA/CERCLA decision documents, which take into account the reasonably foreseeable land uses designated by the Hanford Comprehensive Land-Use Plan. If the stated land use will not support the risks encountered after remediation, and remedial institutional controls are deemed necessary (as determined through the RCRA/CERCLA decisionmaking process), then the land use designation may be changed, but only through the NEPA process as defined by the Hanford Comprehensive Land-Use Plan (i.e., as described in Chapter 6

DST Heel After 90% Retrieval

Analyte (curies)	*TC & WM EIS 90%*	2009 BBI w/method 2	Ratio method 2/EIS
Hydrogen-3 tritium	3.12E+02	9.36E+01	0.30
Carbon-14	5.29E+01	3.59E+01	0.68
Strontium-90	1.62E+06	1.10E+07	6.78
Technetium-99	1.42E+03	1.79E+03	1.26
Iodine-129	1.83E+00	1.90E+00	1.04
Cesium-137	2.98E+06	2.97E+06	1.00
Uranium-233,234,235,238	6.34E+00	3.22E+01	5.08
Neptumium-237	8.22E+00	2.50E+01	3.04
Plutonium-239,240	1.46E+03	7.53E+03	5.16
Americium-241	NA	5.55E+04	0.30

Analyte (kilograms)	*TC & WM EIS 90%*	2009 BBI w/method 2	Ratio method 2/EIS
Chromium	1.04E+04	3.28E+04	3.16
Mercury	1.44E+01	1.37E+02	9.55
Nitrate	1.90E+06	1.42E+06	0.75
Lead	1.25E+03	6.19E+03	4.95
Uranium	5.45E+03	3.24E+04	5.95
PCB	8.31E+01	5.33E+01	0.64

SST Heel After 99% Retrieval

Analyte (curies)	*TC & WM EIS 99%*	2009 BBI w/method 2	Ratio method 2/EIS
Hydrogen-3 tritium	8.93E+01	2.20E+01	0.25
Carbon-14	2.59E+01	1.98E+00	0.08
Strontium-90	3.43E+05	8.95E+05	2.61
Technetium-99	1.55E+02	6.30E+01	0.41
Iodine-129	2.99E-01	8.26E-02	0.28
Cesium-137	1.61E+05	1.31E+05	0.82
Uranium-233,234,235,238	8.75E+00	3.12E+01	3.56
Neptumium-237	5.89E-01	3.83E-01	0.65
Plutonium-239,240	6.69E+02	9.77E+02	1.46
Americium-241	NA	1.44E+03	NA

Analyte (kilograms)	*TC & WM EIS 99%*	2009 BBI w/method 2	Ratio method 2/EIS
Chromium	4.95E+03	4.14E+03	0.84
Mercury	1.68E+01	6.29E+01	3.74
Nitrate	5.18E+05	3.18E+05	0.61
Lead	7.16E+02	1.77E+03	2.47
Uranium	5.42E+03	3.62E+04	6.67
PCB	8.54E+00	3.28E+01	3.84

508-80 cont'd

of the *Final Hanford Comprehensive Land-Use Plan EIS*). Institutional controls are implemented consistent with DOE's *Sitewide Institutional Controls Plan for Hanford CERCLA Response Actions* (Ranade 2009). American Indian access to culturally significant sites or locations at Hanford is provided consistent with the requirements of the American Indian Religious Freedom Act, *U.S. Department of Energy American Indian & Alaska Native Tribal Government Policy* (Bodman 2006), and existing DOE commitments to the tribes.

508-56 DOE agrees that the *Final Hanford Comprehensive Land-Use Plan EIS* (DOE 1999) can change over time. The purpose of that EIS and its implementing policies and procedures is to facilitate decisionmaking about the use of Hanford and its facilities over at least the next 50 years. As stated in Chapter 6, Section 6.6, of that EIS, it is a living document designed to hold a chosen course over an extended period. However, it is recognized that while a fundamentally good plan can do this for a rather short period of time, improvement should be an ongoing program. Thus, the *Final Hanford Comprehensive Land-Use Plan EIS* can be modified as conditions change and, in fact, was reviewed in 2008 through a supplement analysis (DOE 2008c) and clarified in an amended ROD (73 FR 55824).

508-57 DOE has an active commitment to working with the tribes and coordinates all requests for tribal access through its Office of Communications. In consultation with area tribes, DOE also has made commitments in several recent MOAs negotiated under the National Historic Preservation Act requiring that DOE coordinate schedules with the tribes in an effort to avoid or minimize affecting tribal ceremonies. These include the MOA for the Rattlesnake Mountain Combined Community Communication Facility and Infrastructure Cleanup on the Fitzner-Eberhardt Arid Lands Ecology Reserve (executed by DOE and the SHPO in July 2009) and the MOA for Use of Borrow Source at Area C (executed by DOE, the SHPO, and the Advisory Council on Historic Preservation in April 2009). In addition, a currently pending Amended MOA associated with closure of the Nonradioactive Dangerous Waste Landfill and Solid Waste Landfill, which has been exchanged with area tribes, the SHPO, and Advisory Council on Historic Preservation, includes a similar stipulation to minimize noise and visual effects associated with project activities by coordinating the timing of construction activities to minimize disturbance of ceremonies at Rattlesnake Mountain. DOE will continue, through its active Cultural Resources Program and policy of communication and consultations with the tribes, to be sensitive to these concerns.

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

DST Heel After 99% Retrieval

Analyte (curies)	*TC & WM EIS 99%*	2009 BBI w/method 2	Ratio method 2/EIS
Hydrogen-3 tritium	3.12E+00	1.01E+00	0.32
Carbon-14	5.29E-01	3.85E-01	0.73
Strontium-90	3.29E+04	1.54E+05	4.69
Technetium-99	1.42E+01	1.72E+01	1.21
Iodine-129	1.83E-02	2.08E-02	1.14
Cesium-137	2.98E+04	2.91E+04	0.98
Uranium-233,234,235,238	6.34E-02	3.93E-01	6.20
Neptumium-237	8.22E-02	3.71E-01	4.51
Plutonium-239,240	1.46E+01	9.36E+01	6.41
Americium-241	NA	7.80E+02	NA

Analyte (kilograms)	*TC & WM EIS 99%*	2009 BBI w/method 2	Ratio method 2/EIS
Chromium	1.04E+03	3.36E+03	3.23
Mercury	1.44E+00	1.39E+01	9.64
Nitrate	1.90E+05	1.37E+05	0.72
Lead	1.25E+02	6.42E+02	5.14
Uranium	5.45E+02	3.98E+03	7.30
PCB	8.31E+00	9.58E+00	1.15

SST Heel After 99.9% Retrieval

Analyte (curies)	*TC & WM EIS 99.9%*	2009 BBI w/method 2	Ratio method 2/EIS
Hydrogen-3 tritium	8.93E+00	2.26E+00	0.25
Carbon-14	2.59E+00	2.54E-01	0.10
Strontium-90	3.43E+04	1.63E+05	4.75
Technetium-99	1.55E+01	1.13E+01	0.73
Iodine-129	2.99E-02	1.16E-02	0.39
Cesium-137	1.61E+04	2.40E+04	1.49
Uranium-233,234,235,238	8.75E-01	3.93E+00	4.49
Neptumium-237	5.89E-02	1.22E-01	2.08
Plutonium-239,240	6.69E+01	1.73E+02	2.58
Americium-241	NA	2.27E+02	NA

Analyte (kilograms)	*TC & WM EIS 99.9%*	2009 BBI w/method 2	Ratio method 2/EIS
Chromium	4.95E+02	5.59E+02	1.13
Mercury	1.68E+00	9.98E+00	5.94
Nitrate	5.18E+04	4.64E+04	0.90
Lead	7.16E+01	2.61E+02	3.65
Uranium	5.42E+02	4.80E+03	8.86
PCB	8.54E-01	6.36E+00	7.45

508-80 cont'd

508-58 DOE recognizes that the Nez Perce and other area tribes feel a strong connection and association with the surrounding environment, including Hanford. Consistent with its responsibilities under the American Indian Religious Freedom Act, Executive Order 13007, and its government-to-government relationship with the tribes, DOE will continue to provide access and coordinate activities to avoid unnecessary interference with tribal ceremonial activities and religious use of the portion of Rattlesnake Mountain under DOE's jurisdiction and other culturally significant areas located on Hanford, where not inconsistent with the law or essential agency functions.

508-59 In response to this and similar comments, DOE performed a sensitivity analysis to evaluate the potential impacts of certain remediation activities (e.g., subsurface barriers to impede lateral subsurface flow) that could be conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

508-60 As discussed in Chapter 2, Section 2.6.1, of this *TC & WM EIS*, in situ technologies were not evaluated in detail because of the difficulties and uncertainties associated with placement of treatment zones; the long periods of time involved in treatment; the questionable uniformity of treatment; and the difficulty in verifying their overall efficacy.

508-61 The analyses of this *TC & WM EIS* rely on various modeling approaches to predict the future consequences of RPP mission activities that DOE may undertake. In the *Draft TC & WM EIS*, Appendix L , Section L.4.3, reveals that field-sampling data from over 5,000 boring logs were used to support lithologic encoding of the regional-scale flow model; Section L.6.1, that field-sampling data from approximately 1,800 groundwater wells were used to calculate the regional-scale flow model; and Appendix N, Section N.1.2, that field-sampling data from approximately 140 vadose zone boreholes were used to calibrate the vadose zone model as well as regional-scale groundwater plume measurements for the BY Cribs, BC Cribs, 216-T-26 Crib, and the REDOX and PUREX waste sites. In Appendix U, modeled results of contaminant plumes are compared against field measurements for the COPCs. DOE's view is that the overall level of characterization data for Hanford supports differentiation among the alternatives, which is a key feature of a NEPA analysis. As part of the closure and permitting processes, additional subregional-scale site characterization data will be developed to support smaller-scale, more-detailed modeling assessments.

DST Heel After 99.9% Retrieval

Analyte (curies)	*TC & WM EIS 99.9%*	2009 BBI w/method 2	Ratio method 2/EIS
Hydrogen-3 tritium	3.12E+00	1.01E+00	0.32
Carbon-14	5.29E-01	3.85E-01	0.73
Strontium-90	3.29E+04	1.54E+05	4.69
Technetium-99	1.42E+01	1.72E+01	1.21
Iodine-129	1.83E-02	2.08E-02	1.14
Cesium-137	2.98E+04	2.91E+04	0.98
Uranium-233,234,235,238	6.34E-02	3.93E-01	6.20
Neptumium-237	8.22E-02	3.71E-01	4.51
Plutonium-239,240	1.46E+01	9.36E+01	6.41
Americium-241	NA	7.80E+02	NA

Analyte (kilograms)	*TC & WM EIS 99.9%*	2009 BBI w/method 2	Ratio method 2/EIS
Chromium	1.04E+02	3.36E+02	3.23
Mercury	1.44E-01	1.39E+00	9.64
Nitrate	1.90E+04	1.37E+04	0.72
Lead	1.25E+01	6.42E+01	5.14
Uranium	5.45E+01	3.98E+02	7.30
PCB	8.31E-01	9.58E-01	1.15

Appendix D-16 also lists method 3 for evaluating tank heels which is the Hanford Tank Waste Operations Simulator Model. There is limited public access to method 3 results. Some of the data can be found in DOE/ORP-2005-01 for SSTs. DOE/ORP-2005-01 (Method 3) uses 30 cubic feet residuals and 360 cubic feet residual in the heel calculation. This gives a total heel volume 122% larger than 99% retrieval of actual heels.

SST Tank Heel Comparison of 99% EIS Retrieval Method 3 and Method 1

Analyte (curies)	DOE/ORP-2005-1 Method 3	*TC & WM EIS 99%*	Method 3/ *TC & WM EIS 99%*
Hydrogen-3 tritium	NA	8.93E+01	NA
Carbon-14	1.43E+00	2.59E+01	0.06
Strontium-90	1.43E+06	3.43E+05	4.17
Technetium-99	1.37E+02	1.55E+02	0.88
Iodine-129	1.30E-01	2.99E-01	0.43
Cesium-137	1.14E+05	1.61E+05	0.71
Uranium-233,234,235,238	NA	8.75E+00	NA
Neptumium-237	NA	5.89E-01	NA
Plutonium-239,240	1.97E+03	6.69E+02	2.94
Americium-241	2.84E+03	NA	NA

508-80 cont'd

508-62 DOE is not aware of any additional tanks that have leaked and has implemented a more -sensitive leak-detection-and-monitoring system at the SST farms to ensure any further leaks will be detected and appropriate actions will be taken. As discussed in Appendix D, Section D.1.4, DOE believes the *Waste Tank Summary Report for Month Ending December 31, 2002* (Hanlon 2003) best reflects Hanford's knowledge of known or suspected leaking tanks. Estimates in Hanlon (2003) range from 1.9 million to 4 million liters (0.5 million to 1.05 million gallons). Vadose zone field investigations have not been completed for all of the tank farms, and uncertainties regarding the estimated volumes of past leaks remain; therefore, this EIS uses the higher value of 4 million liters (1.05 million gallons) for analysis purposes.

508-63 See response to comment 508-53 regarding tribal rights at Hanford.

508-64 American Indian interests regarding the affected environment are discussed in the *Draft TC & WM EIS*, Chapter 3, Section 3.2.

508-65 DOE believes that the statement in Chapter 3, Section 3.2.6.1.1, of the *Draft TC & WM EIS* characterizing the Hanford Reach as free-flowing, as cited by the commentor, is accurate and unambiguous. Section 3.2.6.1.1 further states that the Hanford Reach "...extends from the Priest Rapids Dam to the upstream edge of Lake Wallula behind the McNary Dam. Because the flows are regulated, flow rates in the Hanford Reach can vary considerably." Further, DOE believes that the term "free-flowing" is synonymous with the term "unimpounded" and is also consistent with descriptions commonly used for the Hanford Reach, including descriptions of the Hanford Reach National Monument used by USFWS, as presented in Section 3.2.1 of this EIS.

508-66 Sections 3.2.6.1, 3.2.6.2, and 3.2.6.3 of Chapter 3 collectively provide a thorough summary and accounting of surface-water, vadose zone, and groundwater interactions, respectively, across Hanford, including sources of groundwater recharge and discharge, whether natural or induced by humans. These descriptions are based on the best-available science and understanding, with uncertainties discussed where they are known to exist. For example, as presented in Section 3.2.6.1 of this EIS, DOE notes that West Lake, located north of the 200 Areas, has decreased dramatically in size over time due to reductions in wastewater disposal and a corresponding reduction in the water table intersecting the lake. As is already stated in Section 3.2.6.2, DOE believes that substantial artificial recharge to the vadose zone ended in the mid-1990s, except those remaining liquid waste disposal facilities such as the State-Approved Land

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

Analyte (kilograms)	DOE/ORP-2005-1 Method 3	*TC & WM EIS 99%*	Methods 3/ *TC & WM EIS 99%*
Chromium	1.45E+04	4.95E+03	2.93
Mercury	NA	1.68E+01	NA
Nitrate	8.18E+04	5.18E+05	0.16
Lead	NA	7.16E+02	NA
Uranium	1.93E+04	5.42E+03	3.56
PCB	NA	8.54E+00	NA

One difference from method 3 over method 1 is method 3 gives higher strontium-90, plutonium-239, 240, chromium and uranium.

Other method 3 data can be found in PNNL-15829 for double shell tank heels. In some cases PNNL-15829 assumes up to 99.999% retrieval for DST which is unlikely. The utility of the Hanford Tank Waste Operations Simulator Model is questioned by the tank waste retrieval contractor. It is likely the best policy to use the most conservative tank residual estimate for individual tank percentage retrieval and refine the actual residual estimate by sampling and characterization. The conservative retrieval estimates should be applied to the source term to estimate environmental impact as Well human and ecological damage.

508-80 cont'd

Page D-24

ERWM has been concerned about the ongoing tank leak assessment process due to its apparent lack of technical rigor. In this process, tank leaks have been estimated primarily by in-tank measurements and to a lesser extent by vadose zone measurements. In-tank measurements are subject to measurement error, boiling wastes, evaporation, sludge collapse, and re-baselining. The minimum detectable leak in a 75 ft tank based on in-tank measurements has been estimated at approximately one-inch or approximately 3,000 gallons. The minimum detectable leak based on drywell measurements has been estimated at 5,000 gallons (RPP-23405, Rev. 0, Appendix A). While the "maximum permissible leak" was estimated at 50,000 gallons, HW-68661 (p. 6) estimated that the "maximum permissible leak" could be detected by one lateral and 4 vertical drywells. It is noteworthy that the drywell moisture logging conducted during the S-102 leak test was unable to detect a 13,150 gallon injection of a sodium thiosulfate and water solution at 40-02-10 (RPP-30121, p. 2-52). These in-tank and vadose zone estimates suggest a minimum detectable leak of 3,000 to 5,000 gallons yet DOE/ORP has supplied a upper bound for some of the tank leaks at 2,000 gallons, which is below DOE expected minimum detection limits based on drywell logging and in-tank measurements.

All tank leak estimates should be reviewed by an independent external expert panel. One of the principles to be used in accomplishing the vadose zone project's goals was: ***"External peer review is important for program success"*** (DOE/RL-98-49, p. 29). By following vadose zone project's guiding principles in this process, DOE/ORP and Ecology would demonstrate an open, resolute and objective process for determining the magnitude of the tank leaks and establishing a tank farm vadose zone project that is credible and defensible.

508-81

Disposal Site, 200 Area Treated Effluent Disposal Facility, and other identified facilities. DOE does not believe that leakage from other sources, such as from export water lines, is a substantial source of artificial recharge across the 200 Areas.

508-67 For analysis purposes in this EIS, the difference between ditches and trenches was deemed unimportant and, for reader ease, these terms were defined consistently throughout this EIS. In the Summary, Section S.9, and Chapter 9 of this EIS, a trench (ditch) is defined as follows: "A depression dug in the ground, open to the atmosphere, and designed for disposal of low-level or intermediate-level radioactive waste. It uses the moisture retention capability of the relatively dry soils above the groundwater." The Summary and Chapter 9 define a crib as follows: "An underground structure designed to distribute liquid waste, usually through a perforated pipe, to the soil directly or to a connected tile field. Cribs use the filtration and ion exchange properties of the soil to contain radionuclides. A crib is operated only if radionuclide contamination observed in the groundwater beneath the crib is below a prescribed limit."

508-68 As discussed in Appendix D, Section D.1.4, DOE believes the *Waste Tank Summary Report for Month Ending December 31, 2002* (Hanlon 2003) best reflects the current knowledge regarding tanks that are known or suspected to have leaked at Hanford. Estimates found in this report range from 0.5 million gallons to 1.05 million gallons. Vadose zone field investigations have not been completed for all of the tank farms, and uncertainties remain regarding the estimated volumes of past leaks; therefore, this EIS uses the higher value of 1.05 million gallons for analysis purposes. A review of *Analysis of SX Farm Leak Histories–Historical Leak Model* (FDH 1998) found that the leak estimates for tanks SX-108 and SX-109 are 203,000 gallons and 44,000 gallons, respectively, and are characterized as follows: "maximum or upper bounds estimates of each leak and are in total volume about six times the previous leak estimates. Minimum leak estimates are about 50 percent of these values, based on judgments about the heat and leak rate uncertainties." For comparison, Hanlon (2003) reports estimates for tanks SX-108 and SX-109 at 2,400-35,000 gallons and less than 10,000 gallons, respectively. Thus, even the minimum leak estimates from Historic Leak Model (HLM) (FDH 1998) exceed the Hanlon (2003) estimates. However, Appendix C of HLM (FDH 1998) also includes replies to comments from the Tank Advisory Chemical Reactions Subpanel, which issued a consensus viewpoint that the "HLM analysis would be of little value without more-detailed uncertainty analyses and the impacts

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Page D-26

A correct reference for the 216-B-38 trench is DOE/RL-2002-42 not Hanlon (2003) as stated in the text. **508-82**

Page D-27

The amount of curies of uranium reported for the B Cribs in Table D-28 is inconsistent with the amount of uranium in kg shown in Table D-29.

The detectable retrieval leak (300 gallons) as estimated in RPP-10413 (Hanson 2003) appears to have been underestimated. The leak injection test at S-102 (RPP-30121) demonstrated that drywell monitoring as conducted by the tank farm contractor was incapable of detecting a 13,150 gallon injection of simulate injected at 40-02-10. Drywell 40-03-03 is located approximately 19 feet to the southwest of the injection drywell 40-02-10. **508-83**

Page E-28

Drywell monitoring as presently conducted by the tank farm contractor isn't a useful method for monitoring for retrieval leaks. The leak injection test at S-102 (RPP-30121) demonstrated that drywell monitoring as conducted by the tank farm contractor was incapable of detecting a 13,150 gallon injection of simulate injected at 40-02-10. Drywell 40-03-03 is located approximately 19 feet to the southwest of the injection drywell 40-02-10.

The EIS indicates that: "The first SSTs known to leak were tanks 241-TY-109 and 241-U-101 in 1959." Since there isn't a Tank TY-109, ERWM assume that the EIS is referring to the confirmed leak in 1959 from tank TY-106. ARH-R-43 lists tank U-104 as the first suspected leaker due to a bulged liner in 1956. Actually, the first recognized tank leak was from tank BX-102 in 1951 (HW-20438). The initial leak estimate of 40,000 gallons (HW-56972) for SX-113 in 1958 is not discussed or included in the leak estimate in Hanlon. During the leak test in 1962 (HW-75714), 15,000 gallons were lost to the subsurface, and this volume is listed in Hanlon. The initial leak estimate of 40,000 gallons is not accounted for. Therefore, a leak estimate for SX-113 should be 55,000 gallons (40K + 15K). It is noteworthy that the Hanford Soil Inventory Model (RPP-26744) lists a leak date of 1958 for SX-113 and that the 1958 leak event triggered the rapid installation of laterals underneath tank SX-113 (HW-60749). **508-84**

Appendix L

It is difficult to evaluate the hydrogeologic basis for the model since there is only one stratigraphic cross-section is shown (found in appendix N, Figure N-3) and only one model layer (the Top of Basalt) is shown (Figure L-7). Maps of the layers above the basalt and additional cross sections should be included in the final version of the EIS. **508-85**

Page L-8

Since the EIS has attempted to attribute groundwater contamination to cribs rather than tank farms, the 200 m cell size (horizontal) has inadequate resolution to separate crib contamination from nearby tank leaks. **508-86**

of uncertainty on HLM conclusions." The author's reply to this comment was, "We agree that uncertainty analyses are very important for the HLM and for any model, but such analyses would be beyond the existing scope of the HLM." In addition, Appendix C of HLM (FDH 1998) further states, "The HLM analysis was meant to demonstrate the viability of this approach, not necessarily to establish the HLM leak estimates as being definitive." Based on the Tank Advisory Chemical Reactions Subpanel comments and the author's replies, DOE continues to believe that Hanlon (2003) best reflects Hanford's knowledge of tanks that are known or suspected to have leaked at the site.

508-69 The western toad has been added to the list of amphibians present on Hanford. The Pacific tree frog is mentioned in Duncan (2007) and Landeen and Crow (1997), and so has been retained. The painted turtle has been added to the list of reptiles present on Hanford.

508-70 The statement that elk mortality due to collisions with motor vehicles occurred after the 24 Command Fire was not intended to imply that there is always a direct relation between fire and such elk mortality. Rather, the statement simply reported USFWS's observation following the fire (DOI 2000).

508-71 The western sage grouse, black-tailed jackrabbit, and western grebe are included in Chapter 3, Table 3–8. The western toad has been added to this table in this final EIS.

508-72 DOE recognizes that the tribes feel a strong connection and association with their surrounding environment. DOE appreciates receiving the Nez Perce Tribe's narrative, which provides its perspectives. DOE included this narrative in this *Final TC & WM EIS* as a new appendix (Appendix W), with references to this appendix added in the main volume of this EIS. DOE acknowledges the importance to the American Indians of cultural resources, including those that predate written records, and of all areas, sites, and materials deemed significant for religious or heritage-related reasons, as well as certain natural resources such as plants, which have many uses (see Chapter 2, Section 2.8.3.8; Chapter 3, Section 3.2.8; and *Hanford Site National Environmental Policy Act (NEPA) Characterization* [Duncan 2007]).

508-73 See response to comment 508-53 regarding tribal rights at Hanford.

508-74 DOE notes that this EIS adequately represents the nature of past assessments and health studies. The past studies of doses and risks are based on populations living near Hanford or other nuclear facilities, on actual releases, or both, and

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Page L-20

The upthrown block of the May Junction fault is mislabeled based upon the orientation of the fault as shown on Figure L-7. None of the faults appear to show any offsets based upon the color contouring. **508-87**

Page M-15, Table M-3

The dates of the tank leaks referenced to Anderson (1990) are inconsistent with those shown in Anderson (1990, p 23).

The volume (70,000 gal) of the BX-102 tank leak, referenced in Knepp (2002) aka RPP-10098, doesn't agree with the volume of 91,000 gal stated in Knepp (2002) aka RPP-10098. Additionally, there is evidence that tank BX-102 has leaked an additional 33,000 gal in the 1960s (Johnson and Washenfelder, Interoffice Memo, dated Sept. 10, 2003, To: S.M. Mackay). **508-88**

Page M-20, Table M-10

Release models for uranium are based on Kd which is not a good representation of the mobilization of uranium**.** The use of Kd is at best an approximation for uranium and other materials moderately retained in soil. PNNL-14022 gives the approximate soil Kd for uranium of very close to zero in water of pH and ionic strength consistent with Hanford vadose zone and groundwater. PNNL-11966 gives a conservative estimate of uranium Kd of 0.5 and a best estimate of 0.6±0.1. PNNL-16531 gives a summary of Kd for uranium of 0.08 to 3.5 for various soil types at Hanford using Hanford groundwater.

The accepted interpretation of and use of Kd is it is at best an approximation for retention in non-homogenous solids. A better explanation of uranium soil mobility can be found in PNNL-15121 and a paper by Jiamin, Wan etal. (Spatially Resolved U(VI) Partitioning and Speciation: Implications for Plume Scale Behavior of Contaminant U in the Hanford Vadose Zone, *Environ. Sci. Technol.*, Publication Date (web): 18 February 2009) where uranium soil mobility is explained by a combination of adsorption, desorption and precipitation factors. Any use of Kd values should be viewed with some suspicion as not being relevant to reality. Alternate modeling should be conducted to accurately predict vadose zone and groundwater transport of contaminates of concern with higher soil retention such as uranium. Uranium should be remodeled in particular because of the large Hanford site inventory and its driver for human risk. **508-89**

Appendix N

These models appear to underestimate moisture content and the hydraulic conductivity of the vadose zone. **508-90**

Page N-3
A description of the vertical grid size needs should be added to the text. It appears that the vertical grid size is approximately 2 m based upon Figure N-4. There are thin (less than one meter thick) fine-grained layers in the Hanford that promote lateral transport in the vadose zone. How have the fine-grained layers been incorporated into the STOMP models? **508-91**

should not be confused with analyses that reflect potential doses to hypothetical receptors. The American Indian hunter-gather receptor is intended to reflect a subsistence lifestyle in which the person consumes wildlife, fish, and plant material taken from the wild and water from the Columbia River for the full year. The source of contamination is assumed to be the groundwater and springs on the Hanford side of the Columbia River, a location where, in 1985, it would not have been possible for a person to be living.

508-75 The groundwater analysis was reported on an annualized basis from calendar year 1940 to calendar year 11,940 (10,000-year period of analysis). The calendar years have four to five significant figures (i.e., are significant to the nearest year). The concentrations reported during each calendar year are more difficult to assess in terms of precision. In a general sense, these concentrations contain only three significant figures. Similarly, in terms of accuracy, as discussed in Appendices O and U, the concentration results are comparable to field data to a close order of magnitude. Data presentation in this *Final TC & WM EIS* has been revised to address issues related to precision raised in this and similar comments.

508-76 The discussion in Chapter 5, Section 5.1.1, of this *TC & WM EIS*, is specific to model results for sources related to Tank Closure Alternative 1. Results in Chapter 5 are intended to demonstrate the impacts of various parts of the alternatives, and are not comparable to current conditions. The appropriate discussion comparing model results with current field measurements is in Appendix U.

508-77 Chapter 5, Figure 5–34, of the *Draft TC & WM EIS* represents a model result for sources related to Tank Closure Alternative 1. Figures in Chapter 5 are not intended to represent current conditions. The commentor is directed to Appendix U for a discussion of the comparison of modeled versus measured groundwater concentrations.

508-78 The groundwater calculations were reported on an annualized basis in these tables, and the date should be interpreted as significant to the nearest year. The concentration data associated with each year probably contain only three significant figures (precision) and are comparable to field measurements to a close order of magnitude (accuracy). Data presentation in this *Final TC & WM EIS* has been revised to address the precision issue raised by this and other commentors.

508-79 To address this specific comment on the draft EIS questioning DOE's use of the 2002 BBI for tank waste inventory data, in 2005, ORP; DOE-RL; DOE Office of Health, Safety, and Security; DOE-EM; DOE Office of the General Counsel;

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Page N-4, Figure N-1
It isn't clear from this figure how the vadose zone transport in the Hanford accounts for the lateral anisotropy of the Hanford due to the presence of fine–grained layers.

508-91 cont'd

Page N-5, Figure N-2
The fine-grained layers in the Hanford aren't being modeled with the STOMP model as shown by the predicted moisture content for Borehole 299-E33-338.

Page N-6
In addition to 200 west, the Cold Creek Unit in 200 East also affects vadose zone transport as shown on Figure N-2, page N-5.

508-92

Pages N-7 and N-8
It doesn't appear to us that the activity level measured and predicted for technetium-99 for the BY Cribs are "in general agreement." In the late 1980s and early 1990s, the predicted activity appears an order of magnitude too high. This comparison suggests that the set of values for the vadose zone hydraulic parameters have underestimated the flux of Tc-99 through the vadose zone from discharges to the BY Cribs.

508-93

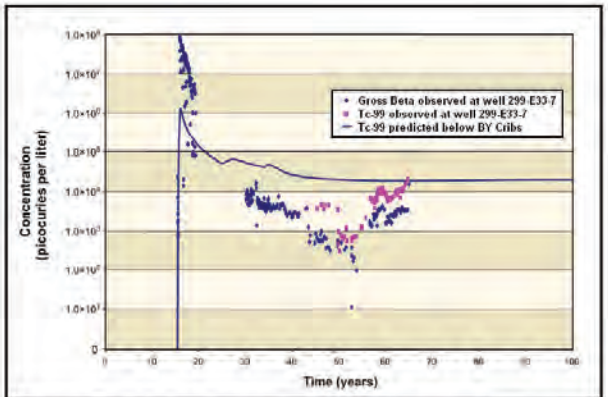


Figure N-5. Time Series of Measured Gross Beta Activity Below the BY Cribs
Figure N-6. Time Series of Predicted Concentration of Technetium-99 Below the BY Cribs

Observed versus predicted Tc-99 activity in groundwater below the BY Cribs as shown in the EIS. Figure N-5 is superimposed on Figure N-6

and Ecology reviewed the 2002 BBI estimates. The conclusion then, and now, is that the 2002 BBI is appropriate for the analyses in this *TC & WM EIS*. This conclusion is supported in Section 4.0, Assumptions, in the *Technical Guidance Document* (DOE 2005), dated March 25, 2005, which was approved by DOE and Ecology. In summary, DOE and Ecology concluded that the 2002 BBI includes inventory values for both technetium-99 and iodine-129, two risk-driving radionuclides, that are at the higher end of the range of numbers based on the inherent uncertainty in the way the BBI is formulated. This use of some conservatism by using the higher number for two risk drivers is still considered appropriate for this EIS analysis. Regarding the use of the SIM, Revision 1, data for analysis of the cribs and trenches (ditches), dated 2005, as explained in Appendix D, Section D.1.5, DOE reviewed the available data and concluded these data are appropriate for the analysis in this *TC & WM EIS*. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

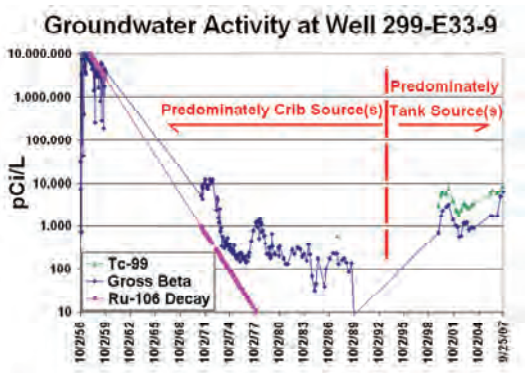
508-80 Regarding the commentor's concerns about the use of the 2002 BBI and the methodology for calculating the tank waste "heels" after waste retrieval, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

508-81 The leak assessment process serves a primary purpose of engaging DOE, the tank farm contractors, and Ecology in review of the current state of knowledge regarding tank leak estimates. Please review the *Process to Assess Tank Farm Leaks in Support of Retrieval and Closure Planning* (Field, Harris, and Johnson 2007) for a more detailed description of this process. DOE and Ecology have provided updates on this process as requested. DOE publishes reports that summarize findings and recommendations throughout this review process. DOE has received comments and responded to them; both Ecology and DOE consider this an open and transparent process. DOE is not aware of any additional tanks that have leaked and has implemented very sophisticated leak detection and monitoring systems at the SST farms. There are detection systems in place to monitor the tanks for leaks while storing waste; an additional detection system monitors for leaks during retrieval operations. During retrieval, DOE and Ecology have agreed to the use of an electrical resistivity system that has a leak detection capability bounded by 7,571 liters (2,000 gallons). In-tank monitoring of the SSTs storing waste involves many considerations; these monitoring systems and detection limits are described

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

As outlined in our April 16, 2007 presentation to the EIS team, ERWM interpret the gross beta activity in groundwater as follows:

- By 1956, the groundwater was significantly contaminated by discharges to the BY Cribs (HW-42612).
- Discharges to the BY Cribs ceased after ^{137}Cs contamination was detected in groundwater at well 299-E33-3 in 1956 (HW-42612).
- The 1959 gross gamma log (HW-84577) for borehole 299-E33-04 showed the entire soil column was highly contaminated to the bottom of the borehole.
- The contaminant flux for the mobile contaminants from the BY Cribs into the aquifer follows a first order decay pattern.
- Since the mid-1990s, the increase technetium-99 groundwater activities are probably due to tank leaks in BY Tank Farm and BX-102 tank leak.



508-93 cont'd

Pages N-9 and N-10
It is difficult to compare Figure N-7 (the observed) to Figure N-8 (the predicted) due to the differences in the scales of these figures for Tc-99 groundwater activity in 2005. The Tc-99 plume underneath the 241-C tank farm isn't shown on Figure N-8. Figure N-8 predicts a Tc-99 plume, which isn't shown on groundwater maps of the area in the 2005 annual groundwater monitoring report (PNNL-15670), northeast of the vitrification plant. A map of observed Tc-99 activity in groundwater follows for comparison to the EIS's Figure N-8.

508-94

in *Single-Shell Tank System Leak Detection and Monitoring Functions and Requirements Document* (Miller 2008), approved by Ecology.

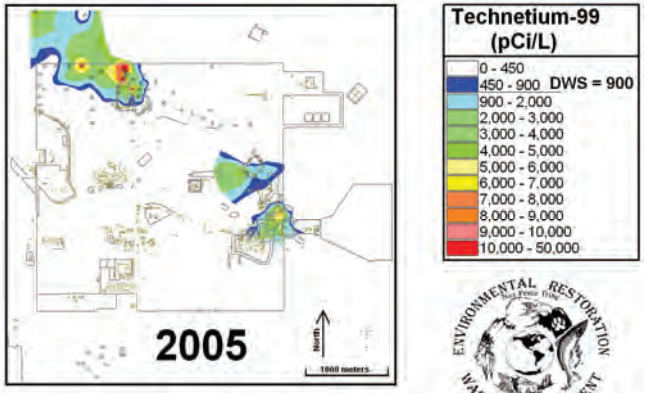
As noted by the commentor and as discussed in Appendix D, Section D.1.4, of this EIS, there is uncertainty regarding the volume of tank waste leaked in the past due to availability of supporting data. For the *TC & WM EIS* analysis, the approach adopted for specification of volumes of past leaks is to use the estimates presented in the *Waste Tank Summary Report for Month Ending December 31, 2002* (Hanlon 2003) and, where leak volume data are missing, to use an estimate of 30,000 liters (8,000 gallons). In addition to those estimates, this *TC & WM EIS* uses a 15,000-liter (4,000-gallon) leak loss volume for each SST for the purpose of modeling impacts of potential retrieval losses or a catastrophic tank failure. This approach was adopted in consultation with Ecology. In addition, tank farm past leaks and associated contamination in the vadose zone are being evaluated under the RCRA Facility Investigation/ Corrective Measures Study process. As such, the vadose zone contamination associated with tank farm past leaks is considered an RCRA operable unit rather than a CERCLA operable unit and is assessed in this *TC & WM EIS*.

To provide additional insight, DOE performed a sensitivity analysis to evaluate the potential benefits if certain remediation activities are undertaken at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

508-82 The reference was corrected in this final EIS. The correct reference is, *Environmental Impact Statement for Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site, Richland, WA: Inventory and Source Term Data Package,* DOE/ORP-2003-02, Rev. 0, Office of River Protection, Richland, Washington, April 17 (DOE 2003b).

508-83 In response to this and similar comments, DOE conducted a detailed review of available inventory data for consistency between radionuclide and chemical inventories for uranium, and has revised several inventories accordingly for this *Final TC & WM EIS*. With respect to the detectable losses during retrieval, this *TC & WM EIS* used an estimate of 15,000 liters (4,000 gallons) per SST (not the 1,100 liters [300 gallons] referenced by the commentor). It should also be noted that Appendix E discusses a variety of technologies that may be employed during retrieval to monitor potential retrieval losses, and that this estimate does not rely solely on drywell monitoring, as is suggested by the commentor.

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee



508-94 cont'd

Pages N-33 to N-35

"Clean closure" of cribs and trenches will have a positive effect as indicated for alternatives 6A optional and 6B optional but the effect is so small as to be waste of resources. Digging cribs, trenches, French drains or other liquid waste disposal sites where large amounts of water was flushed through the soil column for remediation is in general not a good use of resources. The clean closure alternatives propose digging associated cribs in what has been termed "plume diving". The *TC & WM EIS* correctly assumes that all mobile contaminates flushed to the cribs and trenches are already or will be in groundwater and are not retrievable. An evaluating of EIS figures N-46 and N-48 which show estimated chemical and radiological release to aquifer from the six associated cribs and trenches areas without and with exhumation shows slight benefit from digging up trenches and cribs. Specifically the graphs show the same release of hydrogen-3, technetium-99, iodine-129, neptunium-237 and uranium-238. The graphs also show slightly larger release for chromium and slightly smaller release for nitrate. Uranium released to aquifer show benefit for exhumation of the cribs and trenches. The following is a list of uranium releases from cribs and trenches according to EIS and total uranium released to cribs and trenches from *TC & WM EIS* and PNNL-15829:

Uranium cribs and trenches, kilograms			
EIS Total	PNNL-15829 Total (calculated from curies)	Released to Aquifer 10,000 yrs. with cap. EIS	Released to Aquifer 10,000 yrs with exhumation EIS
~4000	4660	~66	~3

508-95

508-84 Appendix E, Section E.1.2.2.5, discusses the physical condition of the SSTs and monitoring technologies that are currently available to support waste retrieval. Appendix M, Section M.3.1.1, discusses the data and analysis supporting past leak estimates for the SST system. The *Technical Guidance Document* (DOE 2005) documents the agreement between DOE and Ecology to use the Hanlon (2003) estimates of past leak volume as the basis for the impacts analysis of the alternatives. DOE notes that NEPA analysis is a comparison of the alternatives under consideration; that assumptions used in the analysis must be clearly identified and the uncertainties discussed; and that the assumptions underlying the analyses should not bias one or more alternatives relative to the others. It should be noted that the same modeling assumptions were used to derive environmental consequences for all alternatives.

508-85 Appendix L of this *Final TC & WM EIS* has been revised to add more views of model layers and cross sections that represent the hydrogeology encoded into the flow model.

508-86 Although, spatially, the cribs and tanks farms can exist within the same MODFLOW grid cell, which has a dimension of 200 meters by 200 meters, the contaminant inventories processed by STOMP and then by the particle tracking code are assigned as site-specific inventories. In this manner, the contaminant inventories from each of the individual sources remain separate and traceable to that source throughout the vadose zone and particle tracking analysis.

508-87 Appendix L, Figure L–22, has been revised in this *Final TC & WM EIS* to include geologic structure labeling for only those features associated with Gable Mountain, Gable Butte, and Rattlesnake Mountain because these features are discernable in this top-of-basalt contour map. Based on the top-of-basalt surface resolution calculated by the geostatistical interpolation tool and represented in Figure L–22, the top-of-basalt vertical offsets associated with the May Junction Fault (and some of the other faults that exist) are not clearly reflected in the contours.

508-88 The reference to Anderson 1990 was a transcription error that is corrected in this final EIS. The *Field Investigation Report for Waste Management Area B-BX-BY* (Knepp 2002) reports two estimates of volume for the 1951 BX-102 tank leak event. The first estimate of 265,000 liters (70,000 gallons) was based on vadose zone moisture logging, while the second estimate of 343,000 liters (90,600 gallons) was based on process data from a Hanford Works monthly report. The two estimates, which differ by approximately 25 percent, are within

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Uranium cribs and trenches, curies			
EIS Total	PNNL-15829 Total	Released to Aquifer 10,000 yrs. with cap. EIS	Released to Aquifer 10,000 yrs with exhumation EIS
6.21	6.64	~0.004	~0.004

As can be seem there is a reduction in total uranium released in 10,000 years of about 60 Kg for exhumation. Also noted the radiological uranium inventory does not take this change into account. A more correct representation would be:

Uranium cribs and trenches, curies			
EIS Total	PNNL-15289 Total	Released to Aquifer 10,000 yrs. with cap, EIS	Released to Aquifer 10,000 yrs with exhumation, EIS
6.21	6.64	~0.086	~0.004

Besides removal of uranium from the soil a portion of neptunium-237 and plutonium-239, 240 would probably be removed by digging up the cribs and trenches. From EIS Table 2-52 the estimated cost of digging up the cribs and trenches is $18.1 billion in 2008 dollars. So assuming total removal of 4000 Kg of uranium from the selected cribs and trenches this gives $4.5 million per kilogram of uranium removed. The consideration of crib and trench removal does not make economic or environmental sense. $18.1 billion would be far better served remediating an area that is of higher priority where a larger environmental impact can be made. Potential cribs to remediate would be 216-A-19, 216-U-8 and 216-B-12.

Uranium other cribs, kilograms	
Crib	Total Uranium (calculated from curies from PNNL-15829)
216-A-19	42,500
216-U-8	25,800
216-B-12	15,200

These three cribs represent 83,500 Kg of uranium. Only 216-A-19 has a small discharge volume and physical size making it easier and less costly to dig. So assuming a 90% uranium recovery from digging crib 216-A-19 this would give 38,000 kilograms of uranium for approximately $548 million (1/33 the cost of *TC & WM EIS)*. This would translate into a cost per kilogram of uranium recovered of $14,400. This would be a 310 fold improvement in the use of remediation dollars and 9.5 times more contaminates removed from the soil.

508-95 cont'd

Page O-8

Since wastes from the vadose zone enter groundwater at the top of the aquifer, it doesn't appear that varying the depth of particle injection into the aquifer should be studied unless the model is unable to describe a fluctuating water table.

508-96

reasonable agreement given the uncertainties associated with both estimation methods.

This *TC & WM EIS* evaluates liquid releases from the tank farms as both past leaks and unplanned releases. Events evaluated as past leaks are associated with 67 out of a total of 149 SSTs tanks listed in the *Waste Tank Summary Report for Month Ending December 31, 2002* (Hanlon 2003) as known or suspected leakers. Events evaluated as unplanned releases include non-past leak events documented in WIDS. With respect to leakage events around tank 241-BX-102, the *TC & WM EIS* analysis adopted the recommendation of Knepp (2002) that contamination around tanks 241-BX-101 and 241-BX-102 can be explained by two major events, a 1951 overfill at tank 241-BX-102 and a 1968-to-1970 pump pit leak at tank 241-BX-101. Inventory estimates for these two events are reported in Knepp (2002) and used in the *TC & WM EIS* analysis. The source of the leak volume estimates is Hanlon (2003).

508-89 The distribution coefficient for uranium in contaminated soil, set at 0.6 millimeters per gram, was based on the *Technical Guidance Document* (DOE 2005) for this *TC & WM EIS*.

In general, the parameterization process for the groundwater models continues to be governed by two primary considerations: the requirement to provide an unbiased evaluation of the alternatives in the context of a consideration of cumulative impacts (the essential point of a NEPA analysis); and the requirement to provide a technically defensible analysis relying on documented sources. DOE's view is that a NEPA analysis is essentially comparative, and that the parameter selection process (particularly for heterogeneous and complex media) should be based on the principle of selecting the simplest parameterization that does not conflict with field observations and that allows for an unbiased comparison of the alternatives. More-complex parameterization (spatially varying K_d [distribution coefficient] values, for example) can actually weaken the value of that analysis.

508-90 In the absence of any more context, it is difficult to see how the commentor drew this conclusion. However, in response to this comment and others, further explanation and description have been provided in Appendix N of this *Final TC & WM EIS*. In particular, the discussion of uncertainty in that appendix has been revised.

508-91 In response to this comment and others, further explanation and description have been provided in Appendix N of this *Final TC & WM EIS*.

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

Appendix O, Section O.3

With respect to uranium, current groundwater conditions (DOE/RL-2008-01) indicate concentrations of uranium in the B-BX-BY area (B Barrier) that far exceed the maximum predicted results reported in Tables O-6 and O-7. For the no action alternative, the EIS should explain why current concentrations of uranium in the B-BX-BY area are at levels that the modeling predicts won't be reached until after calendar year 11,000.

It appears uranium from the BX-102 tank leak is far more mobile in the subsurface than has been modeled by DOE. DOE's previous modeling exercises (RPP-10098 and DOE/ORP-2005-01) also predicted that uranium in groundwater from BX farm wouldn't exceed drinking water standards for thousands of year. Apparently, it is inappropriate to use a Kd = 0.6 for uranium as suggested in the *Technical Guidance Document for "Tank Closure Environmental Impact Statement" Vadose Zone and Groundwater Revised Analyses*, Final Rev. 0, Department of Energy Office of River Protection, Richland, Washington.

Groundwater activities/concentrations for Tc-99 and nitrate in groundwater near T tank and SX tank farms currently exceed the values listed in Tables O-6, O-7 and O-8. The EIS should explain why the modeling is unable to explain the current activities/concentrations for technetium-99 and nitrate near these tank farms.

ERWM believes that one of the reasons that uranium, Tc-99, and nitrate activities/concentrations are currently at higher levels than expected is that water used during Hanford Operations was not incorporated into the models. For example, high moisture content was observed during the installation of the SX-113 caisson in 1959 (HW-60749, p. 6). The relatively non-native soil moisture was attributed to raw water sprinkled for control of contamination in the previous year. *Technical Guidance Document for "Tank Closure Environmental Impact Statement" Vadose Zone and Groundwater Revised Analyses* doesn't address the use of water for dust suppression, radiation control, and water line breaks and leaks.

508-97

Page O-80, Figure O-17
Please refer to the comment for Pages N-9 and N-10.

508-98

Section O.6.4, Long Term Analysis of Uranium-238
Since the BX-102 tank leak is the largest single release of uranium in the tank farms, ERWM believe that EIS should have applied the analysis to BX tank farm instead of SX tank farm. The BX-102 tank leak is probably the best characterized of all the tank leaks. This leak has contaminated groundwater (letter from Ms. Stacy Charboneau, Assistant Manager for Tank Farms Project, DOE/ORP to Mr. Gabrial Bohnee, Nez Perce Tribe ERWM, dated March 30, 2009). BX tank farm is located closer to the Columbia River than SX tank farm. Further study of the impacts of the spill of uranium at BX-102 is necessary to address the risks posed to the environment by this event. A model of the BX-102 leak(s) could be validated with actual field results and supported by laboratory studies of soil samples acquired at boreholes 299-E33-45, 299-E33-343, and 299-E33-344. The BX-102 tank leak offers a unique opportunity to actually

508-99

508-92 For purposes of developing the groundwater flow model for this *TC & WM EIS*, detailed hydrogeologic data were compiled in part from a review of approximately 5,000 Hanford boring logs. This review, described in Appendix L, Section L.4.3, was conducted to discern textural differences between layers of mud, silt, sand, and gravel and associated differences in hydraulic characteristics for development of the geologic layers for the groundwater model flow field. In this scheme, the Plio-Pleistocene Unit was retained as a separate unit, and individual layers within it and the Hanford and Ringold Formations and Cold Creek Unit were further assigned to 1 of 13 material types. The names assigned to these material types are subsequently used throughout the discussion of the vadose zone analysis presented in Appendices M and N and the groundwater transport analysis in Appendix O of this EIS.

508-93 In response to this comment, DOE has rescaled Figure N–13 to make it more consistent with Figure N–14 in this final EIS. There are two key points in comparing these two figures (i.e., the measured results and the reproduced model results): (1) both show peak concentrations of the BY Cribs nearing 10,000 picocuries per liter; and (2) both show the location of the plume along the eastern side of Gable Gap. This comparison is based on a qualitative agreement; a point-by-point or line-by-line agreement would be unrealistic. In response to this comment and others, further explanation and description have been provided in Appendix N of this *Final TC & WM EIS*.

508-94 See response to comment 508-93.

508-95 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). As pointed out by the commentor, the analysis shows that removal of the contaminants from the vadose zone would not capture the contaminants from past practices—i.e., past leaks and infiltration from the contiguous cribs and trenches (ditches)—that have already reached the water table.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

validate a risk model with field results, while the SX study in the EIS is just another uncertain projection into the future.

Furthermore, uranium is modeled for 10,000 years in the EIS but actual peak groundwater concentration at Columbia River edge is estimated to occur at 22,000 years. This modeling was done with releases from SX tank farm only and indicated a 3 fold increase in uranium groundwater concentration. The uranium long term modeling does not take into consideration the entire site EIS and non-EIS uranium inventory. Just because the modeling indicates peak groundwater concentration is in 22,000 years there is no firm evidence that peak concentration would not occur before 10,000 years. Sensitivity analysis for uranium transport was not done as it was for technetium-99 and iodine-129 in Appendix N. A change in water recharge rate or a decrease in Kd used in the programs could easily produce results that would show increased and sooner uranium mobilization. Such observations are consistent with actual field results of uranium plumes. ***508-99 cont'd***

Page O-112, Section O.7, Summary
The text claims that "…the model could produce results that compared reasonably Well to measured concentrations in groundwater from sources significant to the *TC & WM EIS* alternatives and cumulative impacts analysis." ERWM believe that our comments on Appendix O indicate that the modeling has failed to adequately describe the movement of uranium in the subsurface and that the modeling of Tc-99 and nitrate is problematic. As stated previously, the prescribed parameters for moisture flux and the Kd for uranium from *Technical Guidance Document for "Tank Closure Environmental Impact Statement" Vadose Zone and Groundwater Revised Analyses* should be revised. ***508-100***

Page R-5

The Tribes also retained the right to erect temporary structures and contend the Federal Lands are open and unclaimed. ***508-101***

Page S-9 Independent Review and Verification (Quality Assurance) Process
This discussion should be expanded to discuss who performed the review. ***508-102***

Page S-10 Emerging Data
Since the SIM is a computer model, it is misleading to label model results as data. This section should be labeled "Emerging Estimates." ***508-103***

Pages S-68 to S-163 non-EIS Radiological and Chemical Inventory

A major concern is the inadequate representation of the radiological and chemical inventory of non-EIS sites in Appendix S. The most obvious of these is the lack of listing 96% of the total uranium on site. Appendix S list total uranium as "Total Uranium (soluble salt)" this does not take into the consideration the dissolution over 10,000 to 30,000 years that could occur from "insoluble" uranium sources. Below is a table of some of the major non-EIS sources of uranium from PNNL-15829 and *TC & WM EIS* and total for all non-EIS sites listed in Appendix S. The PNNL-15829 data is taken from the report's 2070 estimates which include retrieval of TRU waste. Among these large chemical sources of uranium not listed in the *TC & WM EIS* are sources from US Ecology and the solid waste burial grounds. ***508-104***

the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

508-96 The commentor assumes that the only reason for studying particle injection depth would be due to the model's inability to describe a fluctuating water table. This assumption is false. The *TC & WM EIS* groundwater transport model includes a three-dimensional representation of the water table that changes with time based on changing boundary conditions. For example, during the operational period, significant amounts of liquid were discharged onto the ground surface at Hanford waste sites. This liquid migrated through the vadose zone and created local fluctuations, or mounding, in the water table. The *TC & WM EIS* flow model and particle tracking transport model represent these fluctuations. Likewise, because these significant liquid discharges have ceased in the recent past, the water table, which was rising during times of high discharge, is now relaxing and the local water mounds are dissipating. The *TC & WM EIS* models represent these fluctuations as well. Studying the effects of varying particle injection depths is important because *TC & WM EIS* concentrations are calculated based on the mass of contaminant present and the volume of liquid present at any given time and location of analysis. Near-field calculations of contaminant concentrations are particularly sensitive to the particle injection depth because this calculation is made near the source of the contaminant release (i.e., near the location where the particles are injected). If particle injection depth is not studied and selected based on a clear rationale, it is possible that contaminant concentration calculation results, particularly near the source of the release, could be significantly overstated (e.g., if particle injection depth is too low) or significantly understated (e.g., if particle injection depth is too high).

508-97 In response to this and similar comments, the discussion in Appendix O, Section O.6, of this *Final TC & WM EIS* has been expanded to include a more detailed analysis of the comparison of modeled versus measured conditions at the five tank farm barriers.

508-98 DOE assumes the comment is suggesting that the model result shown in Appendix O, Figure O–39, should be compared with a figure similar to Figure N–8, in Appendix N of the draft EIS, which includes concentration contours based on field observations. The discussion in Appendix O, Section O.6.1 (which includes Figure O–39), is intended to describe a comparison between the Base Case and Alternate Case flow models, and draws the conclusion that the results from both flow models are similar during the operational period.

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

Site	PNNL-15829				EIS Curies U	Calculated Kg U PNNL	Kg U EIS
	U 233	U 235	U 234/238	Total U Ci			
US Ecology	0	30.58	1789.10	1819.68	1820.00	4242898	0
218-W-5	0.32	18.41	657.34	676.07	654.00	1001214	0.055
218-W-4A	0	6.97	329.19	336.16	132.00	500359	0
218-W-3AE	0.20	4.01	246.92	251.13	185.00	374747	0
218-W-4C	3.02E-06	0.79	77.50	78.29	72.80	117402	83.5
ERDF	0	0	0	0	54.00	0	0
218-W-3	0	0.98	46.12	47.09	23.50	70093	0
218-W-3A	0	0.82	38.95	39.77	0.00	59197	0
618-11	0	0.74	34.94	35.68	0.00	53110	0
221-U	0	0.63	29.55	30.18	0.00	44917	0
216-A-19	2.19E-05	0.63	28.70	29.33	29.30	42493	43400
316-1	68.57	0.40	19.26	88.23	84.50	29278	26200
216-U-8	1.17E-05	0.37	16.95	17.32	17.20	25765	25500
316-2	49.74	0.30	14.29	64.33	61.60	21727	19400
216-B-12	6.52E-06	0.22	10.03	10.24	10.20	15241	15100
216-A-25	5.69E-04	0.21	9.01	9.22	9.23	13705	12200
618-9	0	0.12	5.90	6.02	0.00	8968	0
Site Total	142.63	67.19	3400.62	3610.43	3220.00	6.69E+06	2.73E+05

As noted in the table above the *TC & WM EIS* lists the largest site of uranium at Hanford as having 1,820 Curie uranium inventory but zero "Total Uranium". These are actually mutual exclusive since to have a radiological exposure from uranium mobilized by waster or air at the Hanford site there must also be a possibility of topical or internal chemical exposure. The non-EIS inventory for sites 218-W-3, 618-11, 221-U etc. are not listed for radiological or chemical uranium. It is likely there are other omissions. The cumulative radiological inventory in Appendix S is approximately 89% of the current estimated inventory and the total chemical uranium is only 4% of estimated chemical inventory for the sites listed in the *TC & WM EIS*. The omission potentially multiples the uranium chemical risk by a factor of 24.5. Considering there has been minimal characterization of the majority of the solid waste burials grounds and the waste uranium leaching characteristics are unknown, it is inadvisable to consider the vast majority of the uranium chemical source term as nonexistent. ERWM consider the uranium buried in unlined trenches as being equivalent to high level waste that should be processed through the Waste Treatment Plant and shipped to an offsite repository. The lack of inclusion of chemical uranium source term seriously compromises the *TC & WM EIS* analysis of cumulative risk.

508-104 cont'd

This comparison is completed using the Base and Alternate Case model results shown in Figures O–35 through O–42. This section in Appendix O is not intended to compare modeled results to field observations. See Appendix O, Section O.2.6, for this comparison. The discussion in Appendix N (Figures N–7 and N–8 in the draft EIS) referred to in this comment describes the methodology used to evaluate and select vadose zone hydraulic properties to be used in STOMP for vadose zone modeling.

508-99 This *Final TC & WM EIS* has been revised to present the result of the long-term analysis of uranium-238 for the BX tank farm in addition to the SX tank farm.

508-100 DOE disagrees with the commentor's assertion that the difficulties in matching uranium predictions with field observations are related to issues involving moisture flux and distribution coefficients. DOE's view is that, for the regional-scale modeling conducted for this EIS, the major uncertainties in the analysis are in the source term. As stated in Appendix U, the issues with the uranium plumes (comparison of field measurements to model predictions) are isolated to three sites in the cumulative impacts analysis, and the inventories and release histories for these sites are characterized in the reference document SIM as moderately uncertain. The overall agreement with the tritium, iodine, and technetium plumes, which sample a much larger portion of the aquifer, and the overall agreement of predicted head versus water table elevation across the site suggest that the models are suitable for a long-term regional-scale comparison of the alternatives, and that the predicted flow field and transport properties do not bias one alternative relative to others.

508-101 Please see response to comment 508-53 regarding tribal rights at Hanford.

508-102 This section of the *TC & WM EIS* Summary is intended to highlight, in a brief bulleted format, a timeline of the management of Hanford's waste inventories. The Summary states that a team of experts in quality assurance, groundwater analysis, transportation, and human health and safety impacts was convened by DOE to conduct the quality assurance review. Detailed information about the review can be found in the team's *Report of the Review of the "Hanford Solid Waste Environmental Impact Statement (EIS)" Data Quality, Control and Management Issues* (DOE 2006b). This report is referenced in this EIS and is available in DOE reading rooms.

508-103 DOE believes that the phrase "Emerging Data" is appropriate and accurate when referring to the data/information for the SIM computer modeling results.

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

The non-EIS chemical inventory totally ignores the US Ecology chemical inventory. DOH Publication 320-31 indicates there is 17,000 cubic feet on non-radioactive hazardous waste placed in the site from 1965 to 1985. This includes 9 drums of beryllium/copper metal shaving, 56 drums of unknown waste, several thousand drums of phenolic waste and some toluene, benzene and xylene wastes. It is likely there are many other waste sources not included in the *TC & WM EIS*, which leaves us to question the data and quality review procedures used in the *TC & WM EIS*. *508-105*

There is major disconnect in the method of treatment of past, present and future solid waste burial at Hanford and the environmental goals of the *TC & WM EIS*. Early practice of solid waste (late 1940s) burial had almost no restrictions in what could be put in the ground, later there Were some rules such as retrieval of Post 1970 TRU and regulations for low level waste, mixed low level wastes, greater than class C waste and remote handle waste. The majority of the waste in solid waste burial grounds was placed there in the earlier years with minimal records and little regulations. Estimates for the waste are typically understated by starting the burial ground inventory time in the late 1980s instead of when waste was first placed in the ground (Solid Waste EIS waste inventory start time was September 26, 1988). Inventory is incomplete because of lack of records or characterization. Lack of characterization data is not evidence lack of contamination. *508-106*

The *TC & WM EIS* categorizes solid waste burial as a non-EIS issue but there is a large amount of solid waste generated by the Waste Treatment Plant and tank closure. This waste is not solid waste such as ILAW glass or HLW glass but waste that is to be placed in boxes or drums and buried in the ground as part of tank waste retrieval. The tabulation of generated waste from the SWIFT (Solid Waste Integrated Forecast Technical Report 2008) site shows that *TC & WM EIS* generates 73% of the volume of solid waste from 2009 to 2035. Approximately 75% of the volume is low level waste and will remain onsite.

508-104 DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication. None of the reviewed documents included a total uranium inventory estimate for these burial grounds. However, due to a number of comments, DOE again reviewed the data and revised the burial ground inventories to include a calculated total uranium inventory for those that had not been reported in the referenced documents, as appropriate. This inventory was included in this *Final TC & WM EIS* and analyzed appropriately. As an example of the increase in total uranium inventory resulting from this analysis, the total uranium inventory for LLBG 218-W-3A increased from 0 kilograms in the draft EIS to 3.70×10^5 kilograms in this final EIS.

508-105 Appendix S of this *TC & WM EIS* explains the process used to develop the inventory data set for the cumulative impacts analysis. All disposal sites for which an inventory was identified and considered a potential contributor to cumulative impacts on groundwater are included in the inventory listing provided in Appendix S and, therefore, were modeled. The inventories listed in Appendix S represent the radionuclide inventories (measured in curies) and chemical inventories (measured in kilograms) that were identified for those sites and for those constituents that were screened (described in Section S.3.6 as COPCs, i.e., those constituents that control groundwater impacts). The source cited in this final EIS for the information listed in the Appendix S tables is SAIC 2011, which is a more extensive database of the inventory information used by DOE to accomplish the screening and identify the COPCs. For US Ecology, the *Final Environmental Impact Statement, Commercial Low-Level Radioactive Waste Disposal Site, Richland, Washington* (Ecology and WSDOH 2004) was the primary source for the inventories presented in Appendix S. Other constituents not included in Appendix S, i.e., those determined not to be COPCs, particularly other volatile organic chemicals, were screened out. Additionally, as explained in Appendix S, the inventories for the cumulative impacts sites were identified using the most recent information available. DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication.

508-106 As discussed in Appendix S, "Waste Inventories for Cumulative Impact Analyses," DOE conducted a detailed review of available inventory data and believes the inventory estimates analyzed in this EIS represent the best-available data at the time of its publication. Section S.3.5, Analysis of Sites with Missing Inventory, describes from a macro perspective the availability and uncertainties

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

FY2008.0 Forecast Ranked by Waste Generator Volume (m3)

Functional Group	Generator	Total	% of Total	LLW I	LLW III	LLW GTCIII	CH MLLW	RH MLLW	CH TRUM	RH TRUM	End of Life Cycle
Forecast Total		**40,677**	1	12,659	633	6	12,114	946	7,572	6,747	2046
Bechtel-Washington Group	Waste Treatment Plant - Operations	**16,169**	39.7%	7,375			7,636	759		399	2035
CH2M Hill Hanford Group, Inc.	Tank Closure	**13,604**	33.4%	2,637	180		3,419	180	2,210	4,979	2033
Fluor Hanford	Plutonium Finishing Plant, 234-5 Z	**4,739**	11.7%						4,739		2016
Washington Closure Hanford	618-10/11 Burial Grounds	**1,202**	3.0%						249	953	2017
Pacific Northwest National	Pacific Northwest National Laboratory	**961**	2.4%	467	214		191		52	38	2028
Fluor Hanford	T Plant Operations, 221-T/2706-T	**822**	2.0%	661			43		118		2035
Fluor Hanford	Waste Encapsulation & Storage Facility	**682**	1.7%	635	26	6	8	6			2026
Fluor Hanford	RH and Oversized MLLW/TRU(M) Facilities (M-91)	**636**	1.6%	174			423		13	27	2029
Fluor Hanford	Waste Sampling & Characterization Facility, 6266	**422**	1.0%	110			313				2035
Fluor Hanford	Balance of Sludge	**347**	<1							347	2015
Fluor Hanford	Waste Receiving and Processing Facility, 2336-W	**340**	<1	192	52		6		90		2032
Offsite	Knolls Atomic Power-Shipyards	**208**	<1	171	38						2029
Fluor Hanford	Fast Flux Test Facility	**128**	<1	31	97						2010
Fluor Hanford	Canister Storage Building	**111**	<1	111							2035
Fluor Hanford	Ground Water Monitoring	**80**	<1	20			33		27		2035
Fluor Hanford	231-Z Materials Engineering Laboratory	**61**	<1	4					57		2008
Fluor Hanford	K-Basins and Cold Vacuum Drying Facility	**48**	<1		26				18	4	2008
Fluor Hanford	Liquid Waste Processing Facilities, 200 Area	**36**	<1				36				2034
Fluor Hanford	Low Level Burial Grounds; 218 E/W	**28**	<1	28							2035
Fluor Hanford	Hanford Site Operations (Infrastructure)	**20**	<1	18			2				2035
Fluor Hanford	B Plant	**11**	<1	11							2009
Fluor Hanford	REDOX	**5**	<1	4			1				2008
Fluor Hanford	209-E Critical Mass Laboratory	**4**	<1	4							2008
Fluor Hanford	PUREX	**4**	<1	4							2008
Fluor Hanford	224-T Transuranic Storage and Assay Facility	**4**	<1	4							2008
Fluor Hanford	Central Waste Complex	**2**	<1				2				2034
Fluor Hanford	U Plant	**2**	<1	1			1				2008
Washington Closure Hanford	River Corridor Closure Contract		<1								2008
Offsite	Bettis Atomic Power-Shipyards		<1								2018
Offsite	Stanford Linear Accelerator Center		<1								2035
Offsite	Princeton Plasma Physics Lab		<1								2035
Offsite	Lawrence Berkeley Laboratory		<1								2011
Offsite	Brookhaven National Laboratory		<1								2035
Offsite	Argonne National Laboratory-East		<1								2035
Offsite	Ames Laboratory-Ames, Iowa		<1								2033
Offsite	Idaho National Laboratory		<1								2035

508-106 cont'd

Review of the onsite waste content indicates contact handle and remote handle mix low level waste have a high technetium-99 and iodine-129 content. Consideration should be given for better immobilization of these waste fractions (such as soil or waste washing) with eventual disposal in ILAW glass, HLAW glass or a yet to be developed iodine-129 suitable waste form.

508-107

Based on *TC & WM EIS* Chapter 6 Cumulative Impact Alternative Combination 2 or 3 the vast majority of human health impact is from non-*TC & WM EIS* sources. A large discrepancy for uranium source term has already been noted. Overview of groundwater core zone boundary and Columbia River near shore maximum contaminate level indicate excessive technetium-99, iodine-129, uranium isotopes, uranium metal, plutonium, chromium, lead, mercury nickel and nitrate. Total risk is at 1.0 for Core Zone boundary and Columbia River nearshore.

The highest value non-*TC & WM EIS* components available for remediation are solid waste burial grounds and US Ecology. These burial grounds have not been subjected to intentional liquid discharges such as cribs or trenches and most of the more mobile contaminants are expected to remain in the upper vadose zone. The proposed plan for the vast majority of the solid waste burial grounds in the 200 area is to cap to prevent water infiltration. These caps will fail in 500-1,000 years, and the problem remains. Digging up areas of the solid waste burial grounds with high iodine-129, technetium-99 and uranium would reduce site risk. US Ecology will likely need to be mined for uranium. It is a relatively small area with very high inventory. Another

508-108

of the cumulative impacts analysis data, including the data for the burial grounds. DOE agrees there is minimal characterization of the burial grounds waste, but has provided this insight to give the reader a sense of the uncertainties in the cumulative impacts analysis inventory estimates.

This EIS does not categorize the disposal of solid waste as a "non-EIS issue." For example, this EIS analyzes solid waste at IDF-East and/or IDF-West, including ILAW, solid waste generated from supplemental treatment technologies (e.g., bulk vitrification glass and sulfate removal waste product), as well as secondary solid waste from these treatment technologies. The Summary, Section S.5.5, and Chapter 2, Section 2.10, Key Environmental Findings, provide some insight into the issues regarding the secondary waste and state that the EIS analysis suggests additional treatment or waste form development may be needed for secondary waste. DOE is currently evaluating potential secondary-waste form R&D efforts, including ceramic and other waste forms. It is anticipated that these R&D efforts will continue to address treatment of the liquid secondary waste, as this stream would not be generated until the WTP is operational. Measures could also be pursued regarding the increased capture of iodine-129, technetium-99, or other target constituents in ILAW glass. Additionally, DOE analyzed several potential mitigation measures such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification. These potential measures are discussed in Chapter 7, Section 7.5, of this EIS.

508-107 As discussed in Chapter 7, Section 7.1.6, onsite waste-form performance is a particular area of focus for DOE, especially with regard to partitioning and capture of iodine-129, a conservative tracer, in waste forms. Additional sensitivity analyses have been added to this final EIS that evaluate the changes in potential impacts that might result if partitioning or recycling of some contaminants, e.g., iodine-129, could be increased into primary-waste forms and/or if secondary-waste-form performance could be improved. The discussion found in Chapter 7, Section 7.5, was added to summarize these results. The results of these analyses will aid DOE in formulating appropriate performance targets for secondary-waste forms. As discussed in Chapter 7, Section 7.5.2.8, and Appendix E, Section E.1.2.4.5.6, DOE has drafted a roadmap that implements a strategy for development of better-performing waste forms.

508-108 In general, the scope of this *TC & WM EIS* does not include remediation of groundwater, the LLBGs, or US Ecology as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

notable burial ground is the submarine reactor burial grounds 218-E-12B which has 1.06 million kilograms of lead shielding.

The use of soil washing would be very beneficial in such remediation and likely could be justified in context of whole site remediation.

Digging up the solid waste burial grounds does pose a greater worker health hazard but the environmental/cost rewards ratio is better. A list of the hottest solid waste burial grounds or solid waste containing sites is:

508-108 cont'd

Solid Waste Sites/Storage Sites, curies or metric tons which are not scheduled for RTD							
Iodine-129		Technetium-99		Uranium-curies		Total Uranium-metric tons	
US Ecology	5.6	218-W-5	141	US Ecology	1820	US Ecology	4243
218-W-4B	0.50	US Ecology	50	218-W-5	676	218-W-5	1001
218-W-5	0.038	218-W-3AE	37	218-W-4A	336	218-W-4A	500
218-W-4C	0.035	218-W-4C	17	218-W-3AE	251	218-W-3AE	375
218-W-3AE	0.035	221-B	14	218-W-4C	78	218-W-4C	117
221-B	0.028	218-W-3A	4.6	ERDF	54	218-W-3	70
218-W-3A	0.024	218-E-12B	4.0	218-W-3	47	218-W-3A	59
218-E-12B	0.012	218-W-4B	2.00	218-W-3A	40	ERDF	40
218-E-15	0.003	218-E-15	1.60	218-W-4B	2.6	218-W-4B	4
218-W-2A	0.002	218-W-2A	0.80	218-W-2A	1.8	218-W-2A	3
218-E-14	0.001	218-E-14	0.30	218-W-2	0.9	218-W-2	1
218-W-1A	0.0003	218-W-1A	0.15	218-E-12A	0.7	218-E-12A	1

508-109

Appendix U

The explanation of why the uranium-238 and total uranium simulation results show higher impacts than actually observed found on page U-10 should be expanded. It appears that it is unlikely that the release of approximately 2,800 kg at the 216-B-3 pond could result in the extensive uranium groundwater plumes in 200 East. As shown in Table 6-25 from RPP-26744, much larger releases of uranium occurred in 200 East (e.g. 216-A-19, 216-B-12, and 241-BX-102).

Hanford as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones, and is governed by the requirements of CERCLA. CERCLA and the implementing EPA regulations require that the substantive requirements of all applicable or relevant and appropriate Federal and state laws and regulations be met for each cleanup action taking place at Hanford. CERCLA also requires consideration of detailed decision criteria for each cleanup alternative as part of determining cleanup levels for each operable unit or waste management area. NEPA's purpose is different; its focus is to ensure agencies take a "hard look" at the potential environmental impacts associated with a proposed action and the reasonable alternatives to that proposed action. Agencies must conduct a comparative analysis of the alternatives and present the results; consider the cumulative impacts of the alternatives when added to other ongoing actions; and identify potential mitigations that could be used to offset the impacts identified by the NEPA analysis. The goal is to consider the best-available information at the time of the agency's decisionmaking process. However, NEPA does not require that an agency ultimately choose the most environmentally preferred alternative based on a "ranking" process.

As shown in Chapter 6, Table 6–19, for Alternative Combination 2, many of the Core Zone Boundary and Columbia River nearshore maximum concentrations for the COPCs occurred in the past. In recognition of concerns about the potential effects of future remedial actions, DOE added sensitivity analyses to Appendix U of this *Final TC & WM EIS* to provide information concerning the effects of reasonably foreseeable remedial actions on contaminant concentrations in groundwater. The results of these sensitivity analyses are discussed in Chapter 7, Section 7.5. A potential mitigation measure that could be taken by DOE is elimination of specific offsite waste streams containing significant inventories of iodine-129 or technetium-99. This mitigation measure is discussed in Section 7.5.2.2. The results of this sensitivity analysis illustrate the difference this mitigation measure would make in relation to potential groundwater impacts and are included in Appendix U.

508-109 It should be noted that many of the contaminant plumes modeled in the *Draft TC & WM EIS* have generally good agreement with field observations. However, reviews of the EIS groundwater modeling results found some disagreement between certain modeling results and field observations for the historical period (1940 through 2006). Several of the modeled contaminant plumes have been found to overestimate the size of observed plumes. As a result, the

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

Table 6-25. Distribution of U-Total Inventory by Specific Site

Operable Unit	Site	U-Total Mean Inventory (kg)	Percent of Total Inventory Lost
200-E PONDS ZONE	216-A-19	4.34E+04	21.08%
UNASSIGNED 300 AREA	316-1	2.62E+04	12.70%
U PLANT ZONE	216-U-8	2.55E+04	12.38%
UNASSIGNED 300 AREA	316-2	1.94E+04	9.41%
B PLANT ZONE	216-B-12	1.51E+04	7.33%
200-E PONDS ZONE	216-A-25	1.22E+04	5.92%
B FARM ZONE	241-BX-102	1.01E+04	4.88%
U PLANT ZONE	216-U-12	6.46E+03	3.13%
PUREX ZONE	216-A-4	5.39E+03	2.61%
U PLANT ZONE	216-U-1%2	3.96E+03	1.92%
Top 10 Total Inv. (kg)		1.68E+05	81.36%

The explanation should consider the possibility of the following:

1. The TC&WM modeling of uranium is unrealistic and unreliable.
2. The uranium plume southeast of 200 East may have gone undetected by the current groundwater monitoring network because it is deeper than the screened interval of the monitoring wells. The groundwater model assumed a screened interval of 40 m.
3. The uranium plume in 200 East underneath the BY Cribs has been attributed to the 241-BX-102 tank leak (letter from Ms. Stacy Charboneau, Assistant Manager for Tank Farms Project, DOE/ORP to Mr. Gabrial Bohnee, Nez Perce Tribe ERWM, dated March 30, 2009).
4. Uranium should be modeled with more mobility in the subsurface. The release of uranium at the 216-B-12 should be considered.

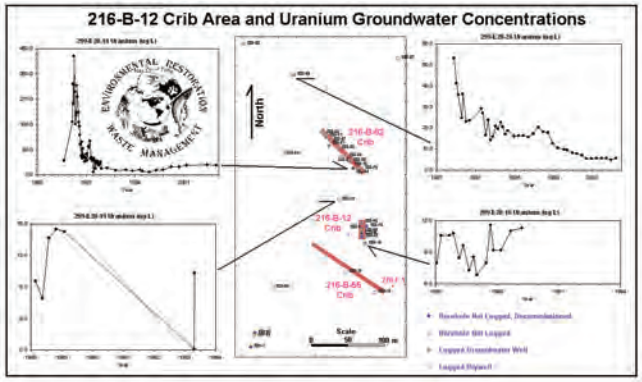
The occurrence of a uranium groundwater plume (Figure 1) near the 216-B-62 crib is problematic. Its origin is the 216-B-12 crib, which is located approximately 150 m (500 ft) to the south (Figure 1). According to the Hanford Soil Inventory Model (RPP-26744), discharges of uranium at the 216-B-12 crib are estimated at 15,100 kg, which ranks as the fifth largest release of uranium at Hanford. The discharges to the crib occurred between 1952 and 1957 as Well as 1967 to 1973. The 216-B-62 crib is estimated to have received 1.04 kg of uranium (RPP-26744) and releases occurred in the November 1973 through September 1991 time period. Uranium (treated essentially as being immobile by DOE) from the 216-B-12 crib has travelled more than 300 ft vertically to reach groundwater and 500 ft horizontally.

508-109 cont'd

TC & WM EIS modeling team determined that certain model parameters should be reevaluated between the draft and final EISs. DOE has compared model behavior at both general and specific levels. Both comparisons serve important purposes: The general comparisons, as well as many of the specific ones, provide confidence that model behavior is largely as it should be and that the analysis and results provide an unbiased comparison of impacts of the alternatives within the context of the cumulative impact analyses.

Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

Figure 1. Index map of the 216-B-12 area and uranium groundwater concentrations.



Based on the publically released version of HEIS (Data Viewer and Evaluator), a uranium groundwater plume was present in the area at the end of 1980 (Figures 1 and 2). The gross alpha activities in groundwater are assumed to be primarily due to the present of uranium in groundwater (Figure 2). Groundwater monitoring data prior to 1980 may not exist as only data after 1980 are available to the public. Thus, the status of prior uranium groundwater concentrations in the area is not known. Maximum observed uranium concentrations occurred in 1985 at Well 299-E28-18 near the 216-B-62 crib (Figure 1) while maximum observed alpha activities Were observed in 1982 (Figure 2). Due to the lack of groundwater monitoring data, it is not possible to ascertain the initial breakthrough of uranium to groundwater in this area or the actual maximum uranium concentrations. The plume appears to have travelled to the north where uranium concentrations Were detected above the drinking water standard (30 ug/L for uranium and 15 pCi/L for alpha activity) by at least 1988 at Well 299-E28-26 (Figures 1 and 2). North of the 216-B-62 crib, groundwater monitoring data are only available from the late 1980's onward, and uranium concentrations have been increasing at Well 299-E28-27 while decreasing at Well 299-E28-28. Uranium groundwater concentrations have been below drinking water standards at both locations. The plume appears to have either dispersed or the higher concentrations of the plume have gone undetected below the screened interval of the nearby groundwater monitoring Wells. A residual uranium groundwater plume is still being detected in the area.

508-109 cont'd

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Commentor No. 508 (cont'd): Samuel N. Penney, Chairman, Nez Perce Tribal Executive Committee

Figure 2. Map of the 216-B-12 area and gross alpha activities in groundwater.

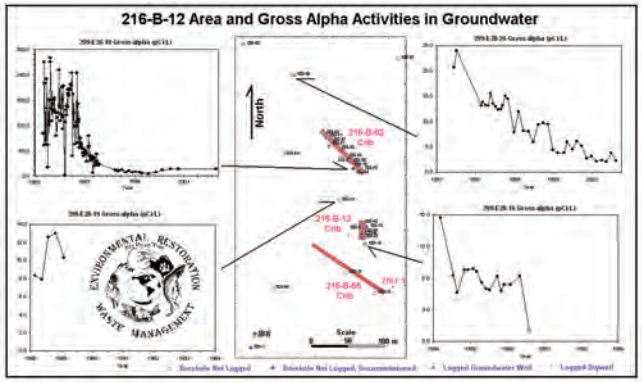
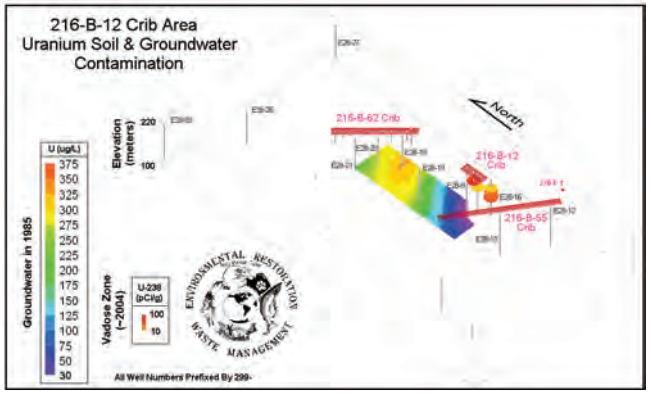


Figure 4. Visualization of the B-12 crib area showing current uranium vadose zone contamination and uranium groundwater contamination in 1985.



508-109 cont'd

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Pages U-10

The *TC & WM EIS* states, "Therefore, the prediction of the uranium-238 and total uranium contaminant plumes for the non-*TC & WM EIS* sources should be considered an overestimate of the actual impacts by about an order of magnitude." This statement is likely not valid considering the *TC & WM EIS* missed 96% of the chemical uranium inventory. Samplings at some missed sites like US Ecology are showing initial signs of uranium mobilization in the vadose zone and plutonium in the groundwater. It is likely the *TC & WM EIS* understates the future uranium groundwater contamination of the Hanford site. ***508-110***

508-110 Regarding the commentor's concern as to the accuracy of data, DOE reexamined the inventories used in this *Final TC & WM EIS* and determined that the best-available data were used in the analysis, with the understanding that uncertainty still remains. For a more comprehensive discussion of this topic, see Section 2.2 of this CRD.

Commentor No. 509: Richard B. Parkin, Acting Director, U.S. Environmental Protection Agency, Region 10

From: Mbabaliye.Theogene@epamail.epa.gov [mailto:Mbabaliye.Theogene@epamail.epa.gov]
Sent: Monday, May 03, 2010 5:30 PM
To: Olinger, Shirley J
Subject: FW: EPA Comments on the Draft Tank Closure and Waste Management EIS for the Hanford Site, Richland, WA
Attachments: Project number 06-004-DOE 5-3-10.pdf

Dear Ms. Olinger:

Attached, please find EPA Comments on the DEIS for your proposed Tank Closure and Waste Management (TC&WM) Project (CEQ#20090362) at the Hanford Site in Benton County, Washington State. A hard copy of the same comments is also being mailed out to your Office in Richland under separate cover using the US Postal Service.

If you have questions about our comments, please contact me for assistance.

Thank you,

(See attached file: Project number 06-004-DOE 5-3-10.pdf)

Theo Mbabaliye, Ph.D.
US EPA Region 10
1200 6th Ave., Suite 900
Seattle, WA 98101-3140
Phone: (xxx) xxx-xxxx
Fax: (xxx) xxx-xxxx

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Commentor No. 509 (cont'd): Richard B. Parkin, Acting Director U.S. Environmental Protection Agency, Region 10

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

REGIONAL ADMINISTRATOR

May 3, 2010

Shirley J. Olinger, Manager
U.S. Department of Energy
Office of River Protection
P.O. Box 550
Richland, Washington 99352

Re: Comments on the Draft Tank Closure and Waste Management EIS for the Hanford Site, Richland, WA
EPA Region 10 Project Number: 06-004-DOE

Dear Ms. Olinger:

The U.S. Environmental Protection Agency (EPA) has reviewed the Department of Energy (DOE) Draft Environmental Impact Statement (DEIS) for the proposed **Tank Closure and Waste Management (TC&WM) Project** (CEQ#20090362) at the Hanford Site in Benton County, Washington State. This review is in accordance with our authorities under Section 102(2)(C) of the National Environmental Policy Act (NEPA), 42 U.S.C. Section 4332(2)(C) and Section 309 of the Clean Air Act, 42 U.S.C. Section 7609. DOE has gathered valuable information into this DEIS that will inform a series of decisions to be made under DOE Orders and through permits under the Washington State Department of Ecology's Dangerous Waste Regulations, a delegated Resource Conservation and Recovery Act (RCRA) program.

The DEIS analyzes potential environmental impacts associated with three sets of proposed actions: *a) Tank Closure* that would store, retrieve, treat, and dispose of nearly 53 million gallons of radioactive and chemical waste from 149 single-shell tanks (SSTs) and 28 double-shell tanks (DSTs), and closure of the SST system; *b) Decommissioning of the Fast Flux Test Facility* (FFTF); and *c) Waste Management* that would include disposal of Hanford's and potentially other DOE sites' low-level and mixed low-level wastes. Preferred Alternatives have been selected for the FFTF decommissioning and Waste Management actions (Alternatives 2 and 2, respectively). Of 11 potential Tank Closure actions, Alternatives 2A, 2B, 3A, 3B, 3C, 4, and 5 would capture DOE's preferred options for tank waste retrieval, treatment, and closure of the SST system. The DEIS does not identify a specific Tank Closure Alternative.

EPA's primary interest is a clear indication that combined cleanup actions at Hanford will result in conditions that are protective of human health and the environment. The DEIS should show how preferred alternatives fit firmly into that trajectory. The document as written does not clearly show the mechanisms and requirements that will assure that proposed actions will achieve a protective outcome. The analyses must be effectively presented to make closure

509-1

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509-1 Throughout this EIS, DOE identifies the legal requirements that it would need to comply with concerning the specific activities that are part of the proposed action and alternatives. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; Section 1.2.7 discusses the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE Order requirements that must be met for DOE to implement the Tank Closure alternatives. The very nature of "environmental impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply.

Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter. Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives, as well as the permits and approvals DOE must obtain from Federal, state, and local agencies.

While DOE's Preferred Alternative for waste management in this *TC & WM EIS* may not be the most environmentally preferred alternative, the ROD issued by DOE will identify any additional mitigation and monitoring commitments adopted by DOE and specify other factors considered by DOE in reaching its decision, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. In announcing its decision in the ROD based on the EIS analyses, DOE will be obligated to carry out the decision consistent with the requirements identified in this EIS. These requirements will be interpreted and applied by Federal, state, and local regulatory agencies through their independent authorities. These agencies may also impose additional mitigation measures through future permitting processes or remedial actions under the scope of the TPA, which include additional opportunities for public comment.

In response to comments on the *Draft TC & WM EIS* concerning the potential long-term impacts on groundwater resources, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. Additional sensitivity analyses were performed to evaluate improvements in both IDF performance (e.g., infiltration rates) and in

Commentor No. 509 (cont'd): Richard B. Parkin, Acting Director U.S. Environmental Protection Agency, Region 10

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decisions, yet the document does not describe closure requirements that will be necessary in order to obtain permits related to these decisions. **509-1 cont'd**

The DEIS shows that all tank closure alternatives would leave contaminants such as Technetium-99 (Tc-99) and Iodine 129 (I-129) in the vadose zone soils leading to groundwater contamination well above drinking water standards for thousands of years at the core zone boundary. For example, under Alternative 2B, according to analyses in this DEIS, concentrations of Tc-99 in groundwater at the core zone boundary would exceed standards by factors of 2 – 100 for about the next 3,000 years, over an area up to 5.3 square kilometers. The DEIS also shows that standards for Tc-99, I-129, uranium isotopes, total uranium, chromium and nitrate would be exceeded at the core zone boundary for all alternatives. We recognize that contaminants in the vadose zone have come from multiple activities at the site and that multiple cleanup programs are responsible for addressing the contamination. However, we believe that significant, additional mitigation is necessary for the actions that are informed by this DEIS. Clean closure techniques may be warranted to meet permit requirements and/or to prevent further contamination of the deep vadose zone and groundwater. While we understand that technologies are not yet fully developed, commitments should be made to fully develop viable, effective methods to remove contaminants from the vadose zone for use within the cleanup timeframe and as part of actions proposed in this DEIS. **509-2**

Under the Preferred Waste Management Alternative, there would also be Tc-99 and I-129 releases to the groundwater from the Integrated Disposal Facility (IDF) in 200 Area East, with concentrations 25 and 15 times higher than the standards for Tc-99 and I-129 at the IDF, core zone boundary, and Columbia River, respectively (Tables 5-77 through 88). We also have concerns about stability of radionuclides in secondary waste that will be disposed in landfills and assumptions about the tribal exposure used in radiological risk assessments. **509-3**

The DEIS analyses do not take credit for ongoing Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) actions, nor do the analyses acknowledge that future CERCLA actions are intended to remediate contaminants in a manner protective of human health and the environment. Descriptions and analyses in the EIS should account for CERCLA remediation actions where applicable in order to fully account for present and future resource conditions. **509-4**

We are concerned about the models as presented in the DEIS. The presentation of information was not easy to follow, critical assumptions were presented with very little justification, and too little information regarding specifics of most model applications was provided. In addition, we have concerns regarding the way uncertainties in many aspects of the flow and transport modeling were recognized and analyzed. Because there was a limited attempt to aggregate the uncertainties resulting from all of the modeling components, the conclusion in the DEIS was that there is *"a lot"* of uncertainty in the simulated groundwater contamination results. Thus, we cannot currently ascertain with a high degree of confidence the modeling predictions of impacts. Also, we cannot know how omitted CERCLA cleanup data would influence the extent of predicted impacts in the DEIS. We believe that additional analyses are necessary to characterize the proposed actions' impacts correctly. **509-5**

We acknowledge progress made in addressing some of our concerns at a meeting held among EPA, Department of Energy, and State of Washington Department of Ecology on April

secondary-waste-form performance (e.g., release rates). The discussion found in Chapter 7, Section 7.5, was added to summarize these results. The results of these analyses will aid DOE in formulating an appropriate mitigation action plan subsequent to this EIS and its associated ROD and in prioritizing future Hanford remedial actions that would be protective of human health and the environment and reduce long-term impacts on groundwater resources.

For further discussion on compliance with regulatory requirements, see Section 2.7 of this CRD.

509-2 In response to comments received on the *Draft TC & WM EIS* concerning the potential impacts on groundwater resources, additional sensitivity analyses have been added to this EIS that evaluate remediation of both RCRA and CERCLA sites. Consequently, the discussion found in Chapter 7, Section 7.5, was added to summarize these results and appropriate mitigation measures. The sensitivity analyses and mitigation discussion recognize that an appropriate mitigation action plan would involve different strategies for mitigating short-, mid-, and long-term impacts. It should be noted that the process analyzed in the EIS for technetium-99 removal in the WTP for LAW and HLW glass is not related to and cannot be applied as a technetium-99 soil remediation technology. Additional information on potential soil remediation options and technological challenges has been included in Appendix U, Section U.1.3.4.1; Chapter 7, Section 7.5; and Chapter 2, Section 2.10.

509-3 DOE recognizes the potential negative impacts on Hanford groundwater posed by offsite waste and secondary-waste streams generated from WTP operations under Waste Management Alternatives 2 and 3. The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating the impacts of the offsite waste inventory would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this final EIS.

In response to the commentor's concern regarding the assumptions used for the tribal exposure scenarios, the Hanford-area tribes have had the opportunity to provide, and have provided, extensive input to the *TC & WM EIS* preparation process and analysis. Chapter 8, Section 8.3, and Appendix C, Section C.3,

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5th and 6th, 2010 in Richland, WA. At that meeting, all agencies agreed that the TC&WM EIS would include the following:

- Analysis of a range of secondary waste performance at IDF. This will include how that range would perform when combined with primary waste forms.
- A write up related to the goals of the CERCLA cleanup program, annotation of graphics in the cumulative sensitivity analysis, and support for discussion in cumulative impacts.
- Analysis of a certain set of sites which have resulted in contamination in the vadose zone, assuming, in a sensitivity analysis, a certain level of cleanup which could be achieved and projection of the results.
- Sensitivity analyses that include both off-site waste mitigation and off-site waste not coming to the site (done for IDF East at a 3.5 mm background rate).

Because of serious concerns about potential impacts to groundwater that will require substantial changes to the suite of preferred alternatives, concerns about stability of radionuclides in secondary waste, and concerns about some of the modeling and presentation of the results, we have assigned an EO-2 (Environmental Objections – Insufficient Information) rating to the DEIS. A detailed discussion of our concerns is included in the enclosed comments (Enclosure 1). *509-6*

We recognize that significant progress has been made and look forward to continuing collaboration as work on this EIS continues.

Sincerely,

Richard B. Parkin

Richard B. Parkin
Acting Director
Office of Ecosystems, Tribal, and Public Affairs

Enclosures
1. EPA Detailed Comments
2. EPA criteria for rating draft EISs

of this *TC & WM EIS* identify the process for tribal interaction and the primary occasions for DOE's interactions with the tribes on the subject of the *TC & WM EIS* preparation process. In addition, Chapter 8 of this *Final TC & WM EIS* includes a description of the outcomes of the meetings with the tribes, and a new appendix, Appendix W, describes the tribal perspective as provided by the Hanford-area tribes.

509-4 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

509-5 Regarding quantification of the uncertainties in the groundwater modeling system, DOE's view is that, for a comparative analysis (as required under NEPA), predictions of long-term impacts that are differentiated by one or more orders of magnitude in concentration should be considered significant by stakeholders and decisionmakers. The discussions in the Summary and Chapters 2 and 5 of this *TC & WM EIS* are all consistent with this view. In Appendix U, comparisons are made between model predictions of current concentrations and measurements of current concentrations. In response to this and similar comments, the discussion in Appendix U has been amplified in this *Final TC & WM EIS* to assist the reader in evaluating the precision and accuracy of the groundwater modeling system.

509-6 As discussed during the meetings with EPA and Ecology on April 5 and 6, 2010, regarding EPA's comments on and rating of this *TC & WM EIS*, and in response to other comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis), DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

As discussed in Chapter 7, Section 7.1.6, of this EIS, this is a particular area of focus for DOE, especially with regard to partitioning and capture of iodine-129, a conservative tracer, in secondary-waste forms. Additional sensitivity analyses have been added to this *Final TC & WM EIS*. These additional analyses evaluate what changes in potential impacts might occur if partitioning of contaminants

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EPA Detailed Comments on the Draft Tank Closure and Waste Management EIS for the Hanford Site, Richland, WA

Contaminants in the Vadose Zone

Radionuclide and chemical contamination levels in the vadose zone are currently very high and would remain higher than the standards for Constituents of Potential Concern (COPCs). The DEIS shows that all tank closure alternatives would leave contaminants such as Tc-99 and I-129 in the vadose zone soils leading to groundwater contamination well above drinking water standards for thousands of years at the core zone boundary. For example, under Alternative 2B, concentrations of Tc-99 in groundwater at the core zone boundary would exceed standards by factors of 2 – 100 for about the next 3,000 years, over an area up to 5.3 square kilometers. The DEIS also shows that standards for Tc-99, I-129, uranium isotopes, total uranium, chromium and nitrate would be exceeded at the core zone boundary for all alternatives. Under the Preferred Waste Management Alternative, there would also be additional Tc-99 and I-129 releases to the vadose zone in concentrations that would exceed standards for each of these two COPCs by as much as 15 and 25 times (Tables 5-77 through 88). We believe that the EIS should address vadose zone contamination and structure tank closure decisions such that actions will be taken to reduce existing contamination in the vadose zone and prevent worsening contamination problems in groundwater (Table 2-17) that would require more cleanup activity. *509-7*

Contamination in the vadose zone would be mostly due to past leaks from multiple sources (tanks, cribs, trenches and ditches), and continued leakage from these areas, including tank leaks that may occur during waste removal, and leaks from residual waste remaining in the tanks as the tanks deteriorate over time. The DEIS is not clear about vadose contamination levels present or expected from each source, nor about requirements that must be met for tank closure. *509-8*

Section 2.2.2.4.2 discusses clean closure. Unlike RCRA, clean closure is defined in the DEIS as removal of the SST, waste receiving facilities, ancillary equipment, and soil within the tank farms to a depth 10 feet below the bottom of the tanks. The 10-foot depth is an estimate of the depth necessary to capture leakage from the tanks during the retrieval process. Clean closure, as defined in the DEIS, may also include deep soil excavation of 65 to 225 feet below the land surface to remediate contaminant plumes (page S-95). We acknowledge the technical challenges that deep removal would entail. However, we believe that the DEIS should clearly state that drinking water Maximum Contaminant Levels (MCLs) are the overall target for cleanup. Further, the EIS should clearly describe tank closure requirements that will cover responsibilities under the RCRA actions. *509-9* *509-10*

Section S.2.1.2 does state that options include retrieving waste to the maximum extent that is both technically practical and required to support closure of the SST system. Chapter 8 also discusses potentially applicable laws, regulations, and other requirements. However, the DEIS does not clearly document meeting the limits of technical practicability. It is not clear how the 90%, 99%, and 99.9% retrieval levels selected for the various SST retrieval/closure options relate to the closure performance standards of WAC 173-303-640(8)(a) applicable to dangerous/mixed waste tank systems, which require tank systems to close by removal or *509-11*

could be increased in primary-waste forms and/or if secondary-waste-form performance could be improved. The discussion found in Chapter 7, Section 7.5, was added to summarize these results. The results of these analyses will aid DOE in formulating appropriate performance targets for secondary-waste forms. As referenced in the Section 7.5.2.8 discussion, DOE has drafted a roadmap that implements a strategy for development of better-performing secondary-waste forms. DOE's response to EPA's specific issues or concerns regarding the modeling and presentation of the results is addressed in the following comment responses.

509-7 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

The clean closure alternatives considered for the SST system, which take into account the contamination in the vadose zone resulting from past leaks, are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating the impacts of the offsite waste inventory would be for DOE to limit disposal of offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this EIS.

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decontamination ("clean" closure). Further, it is not clear how the retrieval levels, or the corresponding analysis of them, relate to the provisions of WAC 173-303-640(8)(b), which requires closure of tank systems as a landfill if it is not practicable to remove or decontaminate contaminated soils (and presumably other tank system components) associated with tank systems. EPA notes that the choice between clean closure and landfill closure under RCRA is not discretionary, but is explicitly contingent on a demonstration by the owner or operator that it is not practical to remove or decontaminate soils. The DEIS, with critical regulatory input from Ecology as the lead decision-maker, should ensure that alternatives and analyses of them explicitly address these points. *509-11 cont'd*

Recommendation:

- *The final EIS should consolidate and briefly discuss requirements that pertain to tank closure actions, especially for removal of contaminants from soils, and measures that will be taken to meet the requirements. That information could clarify (1) the degree of waste retrieval from tanks that should be required, given the amount of radionuclides in the immediately surrounding environment, and (2) the application of removal to the "maximum extent practical" to leaked radionuclides.* *509-12*
- *The final EIS should discuss in sufficient detail ongoing CERCLA remediation actions, their effectiveness in removing contamination, and future cleanup goals of the program to protect human health and the environment.* *509-13*
- *The final EIS should include a Preferred Alternative for tank closure that would prevent additional contaminant releases to surface soils and the vadose zone in the project area and/or develop effective technologies to remove or immobilize the appropriate amount of existing contamination beneath tank farms.* *509-14*

Most of the vadose zone in the project area (200-, 400-, and Borrow-C Areas) is made up of unconsolidated sands and gravels of the Hanford formation, which are highly permeable, with depths ranging from 164-328 ft. Groundwater generally flows eastward across the site from recharge areas and discharges to the Columbia River. The Yakima River is also considered a source of recharge. Over the years and with wastewater disposals, the water table has risen about 30 ft. - 89 ft. within the project site. Some contaminants move with groundwater (e.g., tritium and nitrate), while movement of the others (e.g., strontium and cesium) is slower due to their interaction with minerals within the hydrologic system. In this "suprabasalt" aquifer system of the project site, hydraulic head data have indicated that groundwater flows toward the Columbia River, with travel time ranging from 10-50 years. This time could be shortened, however, by other proposed projects and natural events (floods, climate change, and other events) with the potential to affect groundwater flow speeds.

The EIS assumes that most of the 200 Area waste sites are capped in place (landfill closure) (Tables in Appendix S). The EIS, as summarized on page 6-169, shows that such a general remedial strategy would not be protective of groundwater. The first threshold criterion for all CERCLA remedial actions is to be protective of human health and the environment. The second threshold criterion is to comply with (or waive) applicable or relevant and appropriate requirements. One such requirement would be groundwater drinking water standards. The

509-8 For the waste remaining within the 200 Area tank farms, closure would require examinations of the tanks and residual waste to support the preparation of site-specific radiological performance assessments and closure plans. These examinations would require extensive waste sampling and sample analyses, assessments of the structural stability of the tanks, and assessments of risk to human health and the environment. These documents will provide the information necessary for DOE and regulators to make sound decisions on what levels of residual tank waste are acceptable in terms of short-term and long-term risks. Tank farm past leaks and associated contamination in the vadose zone are being evaluated under the RCRA Facility Investigation/Corrective Measures Study process. As such, the vadose zone contamination associated with tank farm past leaks is considered an RCRA operable unit rather than a CERCLA operable unit and is assessed in this *TC & WM EIS*.

509-9 The scope of this *TC & WM EIS* includes decisions on storage, retrieval, treatment, and disposal of tank waste and closure of the SST system, including the tank system and the vadose zone impacted by the tank farms (i.e., by past leaks). The *TC & WM EIS* closure alternatives for the tank farms include no action, landfill closure, selective clean closure, and clean closure (which would involve actions to remove the source of contamination). This EIS does not include proposed actions to address potential groundwater impacts resulting from the tank farms (i.e., past leaks), as such actions will be addressed as part of CERCLA remedial action for the non-tank-farm areas within the 200 Areas, including consideration of all applicable, relevant, and/or appropriate requirements under Federal and state laws and regulations.

DOE would like to point out to the commentor that the initial removal of the 10 feet of soil below the bottom of the tanks is the assumption used to determine the extent to which the soils would be removed and managed as HLW. The remaining contaminated soil beneath this 10-foot depth would be removed and treated; however, it would not be managed as HLW and would be disposed of on site in the proposed RPPDF after appropriate treatment. This has been further clarified in the Summary and is explained in more detail in Appendix E of this EIS.

509-10 DOE's Preferred Alternatives for tank closure, FFTF decommissioning, and waste management in this EIS may not necessarily represent the most environmentally preferred alternatives, but this is not required by NEPA or CEQ regulations. Potential conflicts with laws and regulations also do not necessarily cause an alternative to be unreasonable, but additional mitigation commitments may be

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numerous Hanford 100 Area and 300 Area records of decision and the one 200 Area record of decision for groundwater have been at least as stringent as the drinking water standard. Therefore, it is not appropriate for the EIS to assume that the remedial action end state for the 200 Area waste sites is landfill closure which is not protective of groundwater. The EPA understands that these waste site cleanup actions are outside the scope of the EIS. However, this non-EIS cleanup scope is included in the EIS cumulative analysis and the EIS makes comparative conclusions such as the following: "Estimated impacts from groundwater releases that are not associated with the *TC & WM EIS* alternatives, e.g., past leaks, are greater than estimated impacts from releases associated with the *TC & WM EIS* alternatives" (page 6-169). This approach under-represents the relative groundwater consequences of DOE's alternatives. **509-15**

Recommendation:

- *EPA recommends that DOE change the assumed end state for the CERCLA vadose zone and groundwater cleanup actions such that groundwater contamination meets Washington State Model Toxics Control Act (MTCA) and drinking water standards throughout the 200 Area, plus surface water quality standards immediately adjacent to the Columbia River, as this is the logical extrapolation from all existing CERCLA Record Of Decisions (RODs).*

Table D-37, which is for tank closure alternative 2B (in-place closure of tanks, cribs, and trenches), states, "For analysis purposes, waste inventories from tank waste retrieval leaks and ancillary equipment were assumed to be treated in the Waste Treatment Plant." However, this appears to be a faulty assumption, as under this alternative, those wastes would be left in place, not retrieved and sent to the waste treatment plant. Leaks during retrieval contribute additional waste inventory that is available for leaching to the soil beneath tanks. Comparing Table D-31 (leaks during retrieval) to Table D-27 (historical leaks) shows that retrieval leaks for most tanks will contribute about as much new waste to the underlying soil as historical leaks. To assume these leaks will be treated via the vitrification plant when, in fact, most alternatives (including DOE's preferred alternatives) leave the leaked waste in the soil, likely significantly underestimates future groundwater impacts. This needs clarification. There are other tables in section D with this same footnote, which is inconsistent with the alternative. **509-16**

The DEIS indicates DOE's preferred percent tank waste retrieval is 99%, which would leave 1% of tank waste in place. We believe that level of waste removal from the tanks is an important step forward in dealing with tank waste, especially in leak-prone SSTs that are now twice their original design lifecycle (10-20 years). The remaining waste, however, would more likely be composed of radionuclides of concern, particularly phosphates that contain strontium-90 and transuranic isotopes. Tank waste at Hanford is heterogeneous due to use of different separation processes (p. S-96). Heels therefore left in the tanks may have to be characterized to demonstrate that the waste has been adequately removed from tanks and that the residues can be left in tanks, with minimal risk. DOE Order 435.1 requires that residues remaining in the tank "have been processed, or will be processed, to remove key radionuclides to the maximum extent that is technically and economically practical." If characterized, then it would be easier for DOE to identify an appropriate immobilization technology tailored to the type of chemical and concentration in residual waste. **509-17**

Recommendation:

required if it is selected for implementation. This *TC & WM EIS* addresses the potential laws and requirements that would apply, depending on the alternative. Issues concerning the ability to meet legal standards or requirements are also discussed, along with the potential mitigation measures that may be needed and are feasible for implementation by DOE. Additional mitigation measures could be required to obtain future permits issued by the State of Washington, or they may be addressed under the scope of the TPA as part of future remedial actions that are subject to CERCLA. In the ROD for this EIS, DOE will identify and discuss the factors it considered in reaching its decisions, such as economic, technical, and national policy considerations, as well as the mitigation and monitoring measures that will be implemented.

The draft EIS indicates that closing the SSTs is better than not closing the SSTs. The issue identified is the contamination that is currently in the soil from both RCRA and CERCLA past practices. The analysis shows that the removal of the contaminants from the vadose zone does not capture the contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; Section 1.2.7 discusses the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE Order requirements that must be met for DOE to implement the Tank Closure alternatives.

DOE acknowledges that, in CERCLA cleanups conducted under the TPA (which is a separate process and is not part of the scope of this *TC & WM EIS*), MCLs are used as goals for cleanup of groundwater operable units aimed at restoring and protecting the beneficial uses of groundwater (e.g., drinking water) and to

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- *EPA recommends that the final EIS include a discussion describing how vadose zone contamination resulting from waste remaining after tank waste retrieval will be remediated, additional contamination from such waste (heels) will be prevented, and plans for long-term stewardship of the site to prevent future contamination.* **509-18**

Modeling

Our review of modeling is based on information presented in Appendices L, N, and O. We found that the document was very difficult to review in a meaningful way. Apparently, there is a body of supporting documentation in the public record, which is not referenced in the EIS or made available to reviewers. We recommend that this material be referenced in the final EIS and included on the web site. The presentation of information was not easy to follow, critical assumptions were presented with very little justification, and too little information regarding specifics of most model applications was provided. In addition, we have concerns regarding the way uncertainties in many aspects of the flow and transport modeling were recognized and analyzed. Because there was a limited attempt to aggregate the uncertainties resulting from all of the modeling components, the conclusion in the DEIS was that there is *"a lot"* of uncertainty in the simulated groundwater contamination results. Based on conclusions in summary results, we are particularly concerned with: **509-19**

a) The conclusion that *"The bulk of the cumulative human health impacts would result from releases of contaminants attributable to past leaks and releases independent of the alternatives evaluated in this TC & WM EIS"* is not supported by the modeling work because past, current, and planned future CERCLA remediation activities were not considered. After our meeting with DOE and Ecology, EPA expects to see more clarifying information in the final EIS. **509-20**

b) Data in Table S-10 show cumulative maximum peak concentrations in groundwater. With the exception of four values that have occurrence dates in the future, this information may be irrelevant to future decision making. The entire period during which COPCs concentrations exceeded the benchmark concentrations at the Columbia River near shore should be shown on the table.

It is, however, likely that the modeling effort as a whole provides results that are useful for comparing the impacts from the different alternatives against each other, but there is little certainty in the actual predicted outcome for any alternative (peak concentrations, arrival times, cumulative risk, etc.)

Groundwater Flow Field Development

In general, we agree that the *Groundwater Flow Field Development* (Appendix L) processes are reasonable and are the best documented approaches to dealing with the subject. We believe the hydrogeologic framework used is consistent with past work at the site, the flow directions look to be reasonable, and the water-level predictive errors were minimized. Our concerns with the process relate to boundary conditions, parameter estimation and Monte Carlo runs, and other issues as indicated below. Despite these issues, it looks like the base case and alternative case models are generally reasonable and perform in the near-term as desired. However, the subjective elements in their construction and calibration add a substantial degree of uncertainty into their utility as predictive models, particularly when the predictions are for the next 10,000 years.

protect the Columbia River from adverse impacts. DOE notes that, under the Safe Drinking Water Act, MCLs apply at the point of delivery to a consumer; thus, for groundwater that is being evaluated using the CERCLA ARARs process, MCLs are considered "relevant and appropriate" standards. The "benchmark standards" used in this *TC & WM EIS* represent dose or concentration levels that correspond to known or established human-health effects. To determine potential groundwater contamination, the benchmark standard used in this *TC & WM EIS* is the MCL, if one is available. This is consistent with the manner in which MCLs are considered and used in the CERCLA process.

509-11 The commentor is referred to Chapter 8, Section 8.1.4 (page 8–13 of the *Draft TC & WM EIS*), for further information regarding the RCRA closures, including landfill and clean closure for tank systems. In addition, page 8–14 of the draft EIS provides details on the TPA, which is the legal mechanism used to address and define cleanup commitments and to establish goals to achieve compliance and remediation with enforceable milestones. Chapter 2, Section 2.2.2.1.1, provides more discussion on how the retrieval benchmarks (0 percent, 90 percent, 99 percent, and 99.9 percent retrieval) coincide with Milestone M-45-00 and Appendix H of the TPA. The tank closure process, which involves detailed examinations of the tanks and residual waste, will include preparation of a performance assessment and a closure plan. These required documents will provide the information and analysis necessary for DOE and the regulators (i.e., Ecology) to make specific decisions on what levels of residual tank waste are acceptable in terms of short- and long-term risks.

509-12 Additional detailed analyses pertaining to tank closure, including removal of contaminants from soils, will occur within the context of future cleanup actions that are governed by the TPA process and will be based on the applicable, relevant, and appropriate requirements of Federal and state laws and regulations. Ecology's issuance of a closure permit will follow prerequisites under Washington State's Hazardous Waste Management Act, which implements RCRA. DOE must comply with certain legal requirements to undertake specific activities that are part of the proposed actions and alternatives; these requirements are identified throughout this EIS. For example, Chapter 1, Section 1.2.1, discusses Hanford regulatory compliance requirements; Section 1.2.7 discusses the WAC regulations DOE must meet for the proposed closure of the SSTs. Section 1.9, which describes the alternatives evaluated in this EIS, refers to the RCRA, WAC, and DOE Order requirements that must be met for DOE to implement the Tank Closure alternatives. The very nature of "environmental

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c) *Boundary conditions*

i) Groundwater inflow to the model domain from the west was found by the authors to be a very important parameter, but the manual calibration of that parameter appears to have been done prior to the final calibration (Monte Carlo Optimization). The assumption of non-varying recharge along the western boundary is poorly justified. It is likely that irrigated agriculture on the western flanks of Rattlesnake Mountain and other areas bordering and upgradient of the site will increase over the coming decades (as it has over the past decades), thus changing the influx over time. The reader should (at a minimum) be referred to Appendix V where the analysis of potential effects of the proposed Black Rock reservoir are presented; that analysis serves as a proxy for increased groundwater inflow to the model domain from the west due to expansion of irrigated lands. *509-21*

ii) Assuming a non-varying recharge of 3.5 mm/year for the next 10,000 years subjectively eliminates a potentially large source of long-term uncertainty in the model. Additional justification of this assumption is warranted. *509-22*

iii) Justification is needed for the assumption that there is negligible water exchange between the unconsolidated sediments and the underlying basalts. This no-exchange assumption is perhaps reasonable for predictive simulations over a few decades, but the implications for that assumption over the 10,000-year predictive window are never mentioned. Because of the no-exchange assumption, on-site effects due to changes in such things as irrigated agriculture may not be realistically simulated over the long term. The Columbia River Basalt Group of the Columbia Plateau Regional Aquifer System is one of the nation's principal aquifers and is a significant source of groundwater for irrigation, domestic, and other uses. A default assumption would therefore be that there is water exchange with the basalts. The EIS should be updated to reflect existence of water exchange between the project area basalts. *509-23*

iv) The DEIS was not clear about whether or not groundwater extraction from past, current, and planned future remediation activities at the site were included in the model. Given that the current 90% design for the pump and treat system for the 200-ZP-1 groundwater operable unit is planned to pump at a rate nearly equivalent to the natural recharge rate over the area, the system will have a substantial impact on the flow field over the next few decades. The system will have an even greater impact on the fate of existing and near-future groundwater contaminants. For the 200 West Area in particular, a substantial amount of carbon tetrachloride has been removed from groundwater to date, and the 90% design for the greatly expanded pump and treat system for the 200-ZP-1 GW operable unit will remove much more, as well as uranium and Tc-99. Because remediation systems are not included in the model, the simulation results that are influenced by contaminants that are already in groundwater (or will drain to groundwater in the next few decades) are not realistic. The final EIS should discuss impacts on the fate of existing and near-future groundwater contaminants, and clarify how past, current, and planned remediation impacts were considered in modeling groundwater flow through established boundaries. *509-24*

d) *Parameter estimation and Monte Carlo runs*

impacts analysis" requires DOE to analyze and describe in this EIS how proposed processes and technologies would operate; what results they are expected to achieve; what end products or byproducts might result; and how these measure up against the legal requirements that apply. Statutory, regulatory, Executive order, and DOE requirements are discussed in the context of each chapter and are listed in the references at the end of each chapter.

Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives, as well as the permits and approvals DOE must obtain from Federal, state, and local agencies. In Sections 8.1.7 and 8.3, DOE identifies the consultations and coordination that DOE has undertaken with American Indian tribes and would need to continue for the purpose of implementing the proposed actions and alternatives.

509-13 As stated in Chapter 1, Section 1.4.2, of this EIS, groundwater contamination in the non-tank-farm areas of the 200 Areas (which include cribs, trenches [ditches], and tile fields) is being addressed under CERCLA, which will also satisfy substantive RCRA and Washington State Hazardous Waste Management Act corrective action requirements. Contamination in the vadose zone resulting from tank farm past leaks would be addressed during the SST closure process. The cumulative impacts analysis for this *TC & WM EIS* (see Chapter 6 and Appendix U) includes the vadose zone of the 200 Areas, in addition to other areas of Hanford.

The commentor brings up the issue of integration and cleanup activities for CERCLA and RCRA units that could influence each other. DOE received comments on the potential impacts of future remediation activities that are in various stages of planning (which, given the inherent uncertainty, were not included in the cumulative impacts analysis). In response, DOE performed a sensitivity analysis to evaluate the potential impacts if certain remediation activities were conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. The goal of the sensitivity analysis is to help DOE, EPA, and Ecology prioritize cleanup efforts in the future. This analysis is provided in Appendix U of this EIS and is discussed further in Chapter 7, Section 7.5.

509-14 Tank Closure Alternatives 4, 6A, and 6B are representative of remediation that results in removal of the source of contamination from the vadose zone (i.e., contaminated soils between the tank farms and the groundwater). This type

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i) The parameter estimation of the flow model would have been more informative if the estimation included contaminant concentrations predicted by a transport model, and/or the flux into the groundwater system from natural recharge, mountain-front recharge, and water exchange with basalts were allowed to vary within certain ranges. A flow-field calibration that only considers water level data will be highly uncertain. Are there sections of other appendices where the flow model results are verified by transport simulation results? *509-25*

ii) Overall, the calibration approach was a mix of quantitative and subjectively prescribed conditions. It is unclear why the Monte Carlo analysis was done because 1) it doesn't look like the uncertainty analysis was carried through to the transport modeling and risk assessment, so quantified uncertainty in the flow field is only marginally relevant, and 2) selection of the Base Case relied on the prescription that "The Technical Guidance Document …directed that the Base Case flow model would flow predominantly eastward from the 200 Areas of Hanford," and the alternate case relied on the prescription that "The majority of the particles released to the water table within the core zone boundary (200 Area Central Plateau of Hanford) move to the north through Gable Gap rather than to the east toward the Columbia River." Following those prescriptions essentially negated any objective parameter estimation. And although the base case and alternate case hydraulic conductivity parameter values are different, they are essentially equivalent for the predominant material types at the site. *509-26*

iii) The assumption of invariant hydraulic characteristics for each "material type" (unit) is unnecessary and unlikely. Results showed how specifying different characteristics for the "highly conductive Hanford gravel" improved the water level matching. Were the hydraulic parameter values for other material types allowed to vary in particular zones? With parameter estimation, it is reasonable to let characteristics for a unit vary within a certain range. *509-27*

e) *Other specific Comments on Appendix L:*

(1) Page L-3, Section L.2 - "Relatively impermeable" has no hydrogeologic meaning. The basalt can be assumed impermeable, but in reality, it just has relatively low permeability when compared to the overlying sediments. *509-28*

(2) Page L-6, Section L.3.1—A list of all MODFLOW packages used should be included. Additional discussion on selection of some packages is warranted. For example, it seems as though the HUF rather than the LPF package was used; why? There are implications for using either package that should be discussed. *509-29*

(3) Figure L-1—The model domain is not shown in the figure. Use a topographic or similar map that shows Rattlesnake Ridge and the western boundary of the domain. *509-30*

(4) Page L-9, final paragraph—The statement "This finding justifies a uniform 200- by 200-meter (656- by 656-foot) grid across the entire model domain" is not true. The simulation of many surface features, such as source areas and recharge *509-31*

of remediation could include the use of technologies to remove or immobilize the appropriate amount of existing contamination.

See response to comment 509-13 regarding future remediation activities.

509-15 See response to comment 509-13 regarding future remediation activities.

509-16 The cited statement, which is found in Note b in Appendix D, Table D–39, in this EIS, as well as following tables, was included to advise the reader that these waste inventories (tank waste retrieval leaks and ancillary equipment) were assumed to be both treated in the WTP and present in the soil and were included in the groundwater analysis. DOE does not believe this is a faulty assumption; analyzing this waste stream from all perspectives, including air emissions, treatment, and groundwater impacts, is representative of the conservatism of analysis in this EIS.

509-17 With regard to the disproportionate amount of radioactivity in the residues at the bottom of the tanks, DOE currently does not have a technical basis for making more-specific assumptions about the expected compositions of the waste "heels" that would remain in the tanks after retrieval. Retrieval has been completed for only a small number of SSTs, and not much is known about the behavior of, or ability to remove, small volumes of residual waste. However, the tank closure process, which includes detailed examinations of the tanks, residual waste, and surrounding waste in the soil, requires preparation of detailed performance assessments and a closure plan per DOE Order 435.1. These documents will provide the information and analysis necessary for DOE and the regulators to make specific RCRA and permitting decisions on what levels of residual tank waste and contaminated soil are acceptable for closure in terms of short- and long-term risks. DOE disagrees with EPA that, in analyzing 15 feet of soil removal, which was done to represent removal of surface spills and ancillary equipment and piping, we are precluding additional soil removal or treatment as each waste management area is closed. Text has been added to this EIS to describe how soil could be addressed, as well as information on the permitting process related to closure of the tanks and associated soil.

509-18 Chapter 7, Sections 7.1 and 7.5, of this *TC & WM EIS* discuss mitigation measures that could be used to avoid or reduce potential impacts on all resource areas. Many of the mitigation measures discussed would apply across all alternatives because of the similar nature of some of the activities analyzed in this EIS (e.g., construction of facilities). However, the resource subsections of Section 7.1 do acknowledge specific alternatives where only certain mitigation

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basins, also depends on cell size. The 200x200 cells are likely not a problem, but the issue of the TOB in Gable Gap is just one consideration. The final EIS should expand this discussion to address the other factors considered in selecting cell size. Additional information on cell size in groundwater modeling can be found online at http://pubs.usgs.gov/sir/2004/5038/ (see p. 5-10). *509-31 cont'd*

(5) Page L-14, Section L.4.2.4—Are the stated "natural area" recharge rates applied throughout the entire 10,000-year period? *509-32*

(6) *Page L-24:*

(a) It is stated that "If more than one geologic layer is contained within one MODFLOW cell, the cell is assigned the properties of the hydrostratigraphic type with the largest total thickness over the range of elevations represented by the MODFLOW layer." Why was this done rather than using effective parameter values for cells with heterogeneous sediments? If you want to have uniform materials in cells, perhaps the LPF package approach would be a better choice. *509-33*

(b) Page L-24, final bullet: Were there any stratigraphic data from borehole logs to support this high conductivity channel? Given that flow through the gap was a primary modeling question, this assumption is more than "fine-tuning" and would benefit from additional justification. *509-34*

(c) Page L-26, Section L.5.2—The preconditioning period was really 503 years long as described in L.5.4. *509-35*

(7) Page L-31, L.7.2.2—What was the resulting flux of water into the model domain? Was it large relative to natural or anthropogenic recharge? *509-36*

(8) Page L-37; Section L.9—It is unclear why the Monte Carlo analysis was needed. PEST gave reasonable parameter values. It doesn't look like the uncertainty analysis was carried through to the transport modeling and rick assessment, so why focus on it for the flow field? *509-37* *509-38*

(9) Page L-72 through L-81, Sections L.10.1.3.1 and 2—The tritium plume particle tracking exercise was non-conclusive, and as stated, many of the runs could be considered acceptable. The Central Plateau Pathline Analysis was based on the subjective criterion that flow should predominantly be to the east. Neither of those exercises lends objective credibility to selecting the preferred Base Case over the other runs. These same comments apply to the path line analyses for the alternate case. *509-39*

Vadose Zone Flow and Transport

A flow diagram illustrating the procedure for selection of values of vadose zone hydraulic parameters is given in Fig. N-1. The first step in this process is "determine hydraulic parameters for 16 soil types by matching predicted moisture profiles to moisture profiles observed in undisturbed bore holes." An example fit to measured moisture content profiles is given in Fig. N-2. This is an extremely insensitive method for determining hydraulic parameters. A "good fit" to a moisture content profile such as that shown in Fig. N-2 can be obtained for virtually any set of soil hydraulic parameters by adjusting the assumed recharge rate, which is generally unknown. If the recharge rate is assumed to be known and constant, then what a *509-40*

measures would apply or where additional mitigation consideration may be warranted. Text has been added to this EIS to describe how soil could be addressed, as well as information on the permitting process related to closure of the tanks and associated soil.

509-19 All sources of data used in the EIS modeling efforts have been referenced in Appendices L, N, and O; references are provided at the end of each appendix. In response to this and similar comments, Appendices L, N, and O have been revised in this final EIS to include a more complete discussion of the modeling approach with a focus on clarifying the reasons for making certain assumptions; presenting data that provide more comparison among the alternatives; and clarifying uncertainties associated with the analysis.

509-20 Appendices L, M, N, and O show numerous parameter variation exercises, and the overall uncertainty in the models versus field measurements is discussed in Appendix U. DOE's view is that, for a comparative analysis (as required under NEPA), predictions of long-term impacts that are differentiated by one or more orders of magnitude in concentration should be considered significant by stakeholders and decisionmakers. The discussions in the Summary and Chapters 2 and 5 of this *TC & WM EIS* are all consistent with this view. In response to this and similar comments, the discussion in Appendix U has been amplified in this *Final TC & WM EIS* to assist the reader in evaluating the precision and accuracy of the groundwater modeling system. In addition, Appendix U has been revised in this final EIS to expand on the potential impacts of planned future CERCLA remediation activities.

509-21 DOE agrees with the comment regarding time-varying fluxes into the model. In response to this and similar comments, Appendix V of this *Final TC & WM EIS* has been updated to include analysis of future increased water flux into the flow model from its western boundary. DOE agrees with the comment regarding the Black Rock Reservoir scenario and related analysis being a proxy for increased groundwater inflow to the model domain from the west. In addition to the reanalysis related to time-varying water fluxes per the first part of this comment response, Appendix L of this *Final TC & WM EIS* has been revised to include a pointer to Appendix V as an additional analysis representing increased water influx to the western boundary of the model domain.

509-22 The primary justification for this assumption is explained in the *Technical Guidance Document* (DOE 2005). This document codifies modeling assumptions and agreements between ORP, RL, DOE Headquarters, and Ecology. The

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moisture content profile such as is shown in Fig. N-2 tells you is the moisture content at which the unsaturated hydraulic conductivity is equal to the assumed recharge flux per unit area – and that is all. Van Genuchten parameters cannot be deduced from this information. This proposed method indicates a lack of understanding of basic vadose zone physics. The rest of the flow diagram" (Fig. N-1) appears to make little sense and will not yield reasonable estimates. **509-40 cont'd**

Regarding the *Groundwater Transport Analysis*, the particle-tracking approach adopted for the transport simulations is potentially useful if used correctly and carefully. However, there is little information on the specifics of the application to evaluate the quality of the results. For example, it is unclear what computer program was used for the transport analysis. Is there a citation for the computer program whether it was an existing program or created just for this application? **509-41**

The figures illustrating particle-tracking results have some troubling features that are unexplained and suggest problems with the implementation. For example, figures O-5 through 7 show random concentrations in cells surrounding the main plume. We suspect they are noise in the method, or result from not using enough particles. Figures like O-17 that show the 2005 Tc-99 plume beneath most of the Hanford Site are simply mysterious. **509-42**

The phrase "a close order of magnitude" is used to describe the transport calibration results. If simulation results for the few decades between 1980 and 2003 were within a "close order of magnitude," what is to be expected for the 10,000-year simulation results? Are four orders of magnitude appropriate? Why was so much effort spent on exploring the uncertainty of the flow field, while the transport uncertainty is described in largely qualitative terms? **509-43**

Overall, the transport simulations likely have some value in illustrating differences in relative groundwater contamination that may result from alternative management scenarios. However, the results presented do not indicate that they should be interpreted quantitatively, and even the order of magnitude of likely error in the long-term simulation results is unknown. Specific comments include the following: **509-44**

(1) Tables O-6 through O-59 show maximum COPC concentrations for alternatives—For decision making, it helps to know the duration of the COPC exceedance at a receptor; was there one sharp concentration peak that persisted for a few years, or was there a lower peak concentration that was sustained for many millennia? Consider showing the entire time period during which COPC concentrations exceeded the benchmark concentrations at the locations specified and shown on tables. It appears this has essentially been done with regard to risk (if we understand figures like S-18 correctly), but it would be useful for the concentration data also. **509-45**

(2) Page O-1, final sentence – Flux has the units of mass/time. Curies and grams are not units of flux. **509-46**

(3) Page O-5, Section O.2—Sensitivity of the model to tritium transport is not a robust test of the transport capabilities of the model for analytes that potentially sorb or react because tritium in groundwater does not sorb or react with aquifer sediments. Thus, the sensitivity of the model to changes in parameters related to uranium or carbon tetrachloride transport, for example, are not reflected in the analysis of the tritium transport simulations. **509-47**

value of 3.5 millimeters per year was agreed upon after extensive discussions and technical input from the Local Users' Group. Additionally, the Black Rock Reservoir sensitivity analysis documented in Appendix V of the *Draft TC & WM EIS* considers increased water flux into the model due to the construction of a reservoir just west of Hanford. This analysis serves as a surrogate for increases in water flux that could occur over the period of analysis.

509-23 A simplifying assumption was made that there is no hydraulic connectivity between the unconfined aquifer and any existing confined aquifers. It is likely that some interaction between unconfined and confined aquifers exists. However, the availability of data that describe the locations, sizes, and water flux amounts between the aquifers is not sufficient to encode these features into the model. This simplifying assumption should not bias the EIS analysis, and is, therefore, believed to be reasonable in light of the uncertainty related to this feature.

509-24 The *Draft TC & WM EIS* did not include groundwater extractions from past, current, and future remediation activities in its analysis. These extraction activities were not included in the full Base Case analyses, but are part of this *Final TC & WM EIS* due to the relative duration of these activities when compared with the 10,000-year period of analysis. However, in response to this and similar comments, Appendix U of this *Final TC & WM EIS* has been revised to include an analysis of groundwater contaminant containment and removal activities. More generally, Chapter 7, Sections 7.1 and 7.5, of this *Final TC & WM EIS* have been revised to include a more detailed description of past, current, and planned mitigation activities.

509-25 As described in Appendix L, Section L.7, of the *Draft TC & WM EIS*, river conductance, mountain-front recharge head and conductance, flow storage properties for material types, and hydraulic conductivity properties for material types were considered adjustable calibration parameters. Section L.7 includes a discussion of each of these adjustable calibration parameters. Natural recharge was specified by the *Technical Guidance Document* (DOE 2005) and was, therefore, not considered an adjustable parameter for either the flow model or the transport model calibrations. A simplifying assumption was made that there is no hydraulic connectivity between the unconfined aquifer and any existing confined aquifers. It is likely that some interaction between unconfined and confined aquifers exists. However, the availability of data that describe the locations, sizes, and water flux amounts between the aquifers is not sufficient to encode these features into the model. This simplifying assumption should not bias the EIS analysis and is, therefore, believed to be reasonable in light of the

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(4) Page O-31, Section O-2 Final Conclusions: Due to different map scales and concentration scales, it is extremely difficult to compare the plumes in Fig. O-3 and O-4 to Fig. O-5 and O-10 in a meaningful way. There is also no discussion or comparison of what other parameter set results were like. Tables O-2 and O-3 are not useful and should be replaced with a simplified 1-page table that describes the calibrations ranges. A general discussion of the calibration findings should be added. In addition, the parenthetical phrase at the end of the second bullet highlights the shortcomings of an approach that does not reflect ongoing remediation. This suggests that once the expanded 200 ZP-1 pump and treat system is operational, simulated flow and transport to the north will be entirely unrealistic. ***509-48***

(5) Page O-31, Section O-3—The tables of results are sometimes difficult to understand. For example, we compared peak tritium values from Table O-6 to Tables O-12, -15, and -18. All peaks were simulated to occur prior to the year 2000. The peak tritium values for alternative 1 were slightly different than those in all the other tables. Granted the differences were not large, but why were they different at all? Related to this, it is unrealistic to report these peak concentration values using 8 significant digits. Two significant digits would be adequate for comparison to other alternatives. ***509-49***

(6) Figures O-11 through O-12—Unless we do not understand these figures correctly, the simulated chromium plume is in no way comparable to the observed plumes shown in Fig. S-6 of "Hanford Site Groundwater Monitoring for Fiscal Year 2005" report. Likewise, for the I-129 and Tc-99 maps. ***509-50***

(7) Section O.6.3, K_d sensitivity—It is unrealistic to assume uniform K_d values are applicable to the entire site. It is often the variation in K_d values between different types of sediments that leads to substantially different transport times and peak concentrations. Page U-10 states that a K_d of 0.6 was used for uranium. Uranium has been studied extensively at Hanford, especially in the past few years regarding the mobility, and the conclusion is consistent with non-Hanford studies. The conclusion is that uranium does not behave with a single K_d. The fact that this value of 0.6 was set forth in the DOE 2005 Technical Guidance Document for this EIS does not mean that it is the correct number. There are other modeling results presented in this EIS which are different than the collective conclusion of many other specific technical studies done at Hanford, such as future plutonium concentrations in groundwater at the Columbia River. When faced with the decision to use the modeling parameters in the DOE 2005 Guidance Document vs. the best available technical and scientific information, DOE should use the latter and explain use of alternative sources of information. As discussed in our April meeting, the final EIS should include more clarifying information on selection of model parameters, such as K_d and infiltration rates, and associated uncertainties. ***509-51***

(8) Page U-10 states "Uranium-238 and total uranium simulation results show higher impacts resulting from large discharge facilities in the 200-East Area (e.g., B Pond) than actually observed." This page also states "the prediction of the uranium-238 and total uranium contaminant plumes for large non–*TC & WM EIS* sources should be considered an overestimate of the actual impacts by about an order of magnitude." This paragraph, which discusses the model results, should provide a specific reference to the model calibration discussion wherein should reside an explanation for why this order of ***509-52***

uncertainty related to this feature. Therefore, this feature was not considered an adjustable parameter for either the flow model or the transport model calibrations. DOE acknowledges the question regarding whether there are other appendices where the flow model results are verified by transport simulation results. The groundwater transport model (particle tracking) parameter estimation and sensitivity analysis is described in Appendix O, Section O.2.

509-26 The Monte Carlo optimization as described in Appendix L, Section L.9, of the *Draft TC & WM EIS*, was performed because the hydraulic conductivity value uncertainties were not well estimated in the gradient-based calibration. Section L.9 of the Draft EIS further states: "To further understand the behavior of the flow model to changes in the hydraulic conductivity parameters, a Monte Carlo optimization and uncertainty analysis was conducted on the groundwater flow model."

Extensive tests were run to check the sensitivity of the particle tracking code to parameter changes. See Appendix O, Section O.2.6, for a description of this analysis. Regarding the basis for selecting the final Base Case and Alternate Case flow models, the technical approach to down-selecting from thousands of flow model run cases to a single Base Case and a single Alternate Case applied the *Technical Guidance Document* (DOE 2005) guidance regarding easterly versus northerly flow direction and included an objective Monte Carlo analysis of the root mean square error resulting from changes to hydraulic conductivity values; it also included an objective evaluation of the MODPATH particle pathlines representing a tritium release. DOE agrees with the comment that, although the Base Case and Alternate Case hydraulic conductivity parameter values are different, they are essentially equivalent for the predominant material types at the site.

509-27 Although a single Base Case flow model (with a specific set of hydraulic conductivity values for the 13 material types) was selected for use in the *Draft TC & WM EIS* analysis, thousands of model runs were evaluated prior to selecting the Base Case. The Monte Carlo optimization and uncertainty analysis, as described in Appendix L, Section L.9, evaluated over 6,000 Base Case model runs, with each model run having a different set (within a reasonable range) of hydraulic conductivity values for each of the 13 material zones. The Monte Carlo analysis results were used to narrow the field of model runs down to a smaller set of 26 Base Case model runs, which had the lowest amount of error when model-simulated heads were compared with historical field-observed heads across the

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magnitude error in the model was deemed acceptable rather than refining the model to better match actual data. The final EIS should include more clarifying information on uranium simulation, calibration, and predicted impacts to reflect on site experiences with uranium contamination and related impacts. *509-52 cont'd*

(9) Page O-112, third paragraph—Although uncertainty in many aspects of the flow and transport modeling was recognized and analyzed with various degrees of quantification, an "accurate assessment of uncertainty in the model" results for even the short-term was not quantified. All that can be said is that there is "a lot" of uncertainty. *509-53*

Models used in the DEIS analysis are complex and associated with large degrees of uncertainties, particularly about how waste moves in the vadose zone and interact with groundwater (p. S-96). For example, Fig. 2-91 shows human health risk from drinking groundwater under Alternative 6B (Option Cases), but it is not clear how much of the future risk presented in the figure is the result of contamination already in the groundwater vs. how much risk would be expected from continued contaminant loading to the vadose zone by the proposed actions. Impacts resulting from residual waste left in place are also not considered in Fig. 2-91. That process is seen throughout the EIS volumes. Pages R-22 to R-23 state that cleanup and protection of groundwater are among current and future DOE activities at Hanford, but results for all alternatives analyzed in the DEIS (Chapter 5) consistently show a failure to protect groundwater. *509-54*

Secondary Waste

The DEIS indicates that secondary waste would be waste that is generated from other activities, e.g., waste retrieval or waste treatment, that is not further treated by the WTP or supplemental treatment facilities, and includes liquid and solid wastes (p. S-89). Secondary waste can also be characterized as low-level radioactive waste, mixed low-level radioactive waste, transuranic waste, or hazardous waste.

Under the Preferred Waste Management Alternative, secondary waste from proposed actions would be disposed of in IDF-East only, supplemented by disposal at the River Protection Project Disposal Facility (RPPDF) (Table 5-75). As a result, the waste disposed of in these two facilities would become available for release to the environment. Groundwater transport results show that waste disposals that include secondary waste would cause significant exceedances of groundwater quality standards for I-129 (1 pCi/L) and Tc-99 (900 pCi/L) at the core zone boundary and Columbia River nearshore (Table O-36 through 47). Exceedances for I-129 would range from 7.4-14.5 pCi/L at the core zone boundary and 4.6-7.2 pCi/L at the Columbia River nearshore. Those for Tc-99 would range from 238-23,882 pCi/L at the core zone boundary and 786-6,708 pCi/L at the Columbia River nearshore. *509-55*

We are also concerned that while release of radionuclides from an immobilized low activity waste (ILAW) glass disposed in landfills would be relatively low, the major release impact of the ILAW treatment would be associated with secondary wastes, including the release of I-129 (S-90). It is also possible that secondary waste from supplemental technologies, such as

model domain. This set of 26 of the "best" model runs was further evaluated using particle pathlines analyses.

509-28 In Appendix L of this *Final TC & WM EIS*, the reference to "relatively impermeable" has been removed from the text.

509-29 DOE agrees with the comment regarding the need for a more detailed discussion of the MODFLOW 2000 packages used to develop the groundwater flow model. In response to this and similar comments, Appendix L of this *Final TC & WM EIS* has been revised to include this additional discussion.

509-30 Figure L–16 in Appendix L of this *Final TC & WM EIS* is intended to represent the Columbia and Yakima River reaches and river-head control points. Figure L–16 has been revised to show the western/southwestern boundary of the model domain.

509-31 Appendix L of this *Final TC & WM EIS* has been revised to expand the groundwater flow model gridding discussion to include factors (other than top of basalt in Gable Gap) that were considered as part of selecting model cell size. It should be noted that, for groundwater transport analysis purposes, source areas are modeled at their actual locations and at their actual sizes. The *TC & WM EIS* groundwater modeling methodology retains the utility to model sources at their actual locations and sizes although the flow model only models flow conditions (heads and velocities) to a resolution of 200 meters by 200 meters in the horizontal plane.

509-32 Yes, natural area recharge is applied in the flow model throughout the 10,000-year period of analysis.

509-33 A reasonable approach to assigning hydraulic properties across the model domain could be to use effective parameter values as noted in this comment. Another reasonable approach to assigning these properties is the method used in the *Draft TC & WM EIS*, which assigns hydraulic properties to each material type consistently across the model domain no matter where that material type occurs. Either of these approaches represent only approximations of the real world due to the uncertainty of the available data and their interpretation. DOE believes that assigning Hanford sand the same name with the same hydraulic properties no matter where it occurs in the model is the simplest and most straightforward approach to encoding the model with these data, and also the easiest approach to communicate to the EIS audience. Therefore, because the *TC & WM EIS*

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steam reforming and cast stone, would contribute substantial releases of I-129 and Tc-99 to the environment. Modeling results presented in Tables 5-77 through 88 indicate that because of steam reforming supplemental technology, for example, maximum COPC concentrations in the peak year would exceed the standards for Tc-99 by as much as 30,100 pCi/L at the IDF, 24,800 pCi/L at the core zone boundary, and 7,610 pCi/L at the Columbia River nearshore. For I-129, corresponding exceedances would be 24 pCi/L at the IDF, 16 pCi/L at the core zone boundary, and 8 pCi/L at the Columbia River nearshore.

Recommendation:

- *We recommend that the final EIS include a discussion of treatment methods to reduce the amount of COPCs, especially Tc-99 and I-129, in secondary waste and to stabilize the remaining waste such that contaminants would be resistant to leaching.*

Tribes

Information in the DEIS indicates that conditions on the Hanford Site affect resources important to the Wanapum Tribe, Confederated Tribes and Bands of the Yakama Nation (or YN), Nez Perce Tribe, Confederated Tribes of Umatilla Indian Reservation (or CTUIR), and to some extent the Confederated Tribes of the Colville Reservation upstream, particularly groundwater and surface water quality, fisheries, and on-site cumulative risks. While we note that DOE communicated with the Tribes, it is not clear, how the issues raised by the tribes were resolved. Of great concern to most affected tribes is the radiological exposure scenario used in analyzing tribal health risk assessment and DOE's assumption of Hanford site ownership that affected tribes consider too long for their restricted site use.

Some of the Tribes, such as the Yakama Nation and CTUIR have developed exposure scenarios for risk assessments for use at Hanford that DOE agreed to use. Their scenarios reflect tribal natural resource usage patterns, including fish consumption as well as on-site traditional activities. Because DOE's current land use plan is a flexible short-term plan, and longer-term use is unpredictable, the risk assessment in the DEIS should use an appropriate tribal exposure scenario as one of the reasonably foreseeable land uses and analysis scenarios. Even if future site land uses remain unclear, tribal scenarios could provide information that the tribes need. The CTUIR, for example, believes that the scenario that DOE developed underestimates tribal risks roughly 10-fold because the scenario does not reflect actual tribal site usage patterns.

The DEIS indicates that because of proposed actions, serious long-term impacts to aquatic biota/salmonids would occur due to potential contaminant releases to groundwater on aquatic and riparian resources at the Columbia River (Table 5-172). That impact would be about 21-22 times above the standards for, for example, chromium. During the year of peak dose, this receptor would receive a radiological dose of 3.4 rem and a Hazard Index greater than 1, all of which would be in excess of regulatory limits and chemical exposures. Tribes believe that the radiological risk evaluation by DOE underestimates tribal exposure to radionuclides. For example, the CTUIR consider estimated risks to be about 10 times less than they would be if the tribe's exposure scenario was used. Their scenario can be found online at www.hhs.oregonstate.edu/ph/tribal-grant-main-page.

Consistent with the National Defense Authorization Act that required DOE to develop a future land use plan for at least the next 50 years, DOE completed the Hanford Comprehensive

509-55 cont'd

509-56

groundwater flow model achieves a reasonable head calibration when model-simulated heads are compared with field-observed head values, and the *TC & WM EIS* transport model achieves a reasonable transport calibration when the model-simulated tritium plume is compared with the field-observed tritium plume in terms of extents, concentrations, and timing for reaching the Columbia River, DOE prefers this more-simple and straightforward approach to assigning hydraulic properties.

509-34 The highly conductive material is generally not called out in the stratigraphic data from borehole logs. Information is available regarding hydraulic conductivity values determined from aquifer pumping tests. These results are shown in the *Draft TC & WM EIS*, Appendix L, Figure L–53, and related text in Section L.10.1. Additionally, it is known from head observation data that the water table is essentially flat through Gable Gap and across the eastern parts of, and to the east and southeast of, the 200-East Area. Finally, it is generally agreed that cataclysmic flooding in the region created a paleochannel where older material was removed and new high-energy material deposits were made in these areas of the site. These data and information, along with input from the Technical Review Group, the Local Users' Group, and professional judgment from the modeling team, led to the conclusion that there must be a zone of highly conductive material at or near those locations where the *TC & WM EIS* model has this material type encoded. Appendix L of this *Final TC & WM EIS* has been revised to expand the discussion of the technical approach to identifying and encoding the highly conductive Hanford gravel into the model.

509-35 Appendix L, Section L.5.2, is intended to describe how the time-stepping/stress periods are divided up during the model simulation. The initial stress period of 4 years (1940–1943) is intended to transition the model from the initial condition as described in Section L.5.4 to the transient part of the model simulation, where time-varying anthropogenic water fluxes are applied to the model. This is a point that has been clarified in this *Final TC & WM EIS* by revising the second sentence of Section L.5.2 as follows: "In addition to the model preconditioning described in Section L.5.4, Initial Head Distribution, the model is further preconditioned by simulating the years 1940 through 1943..."

509-36 For the Base Case model, total flux of water in and out of the model domain over time is shown in Appendix L, Figure L–55, of the *Draft TC & WM EIS*. Natural and anthropogenic recharge water flux into the model domain is on the order of a few times 10^7 during the Hanford operational period and settling to about

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Land Use Plan EIS in 1999 (p. 3-7). With proposed actions, however, tribes are concerned that DOE would extend that initial site control period of 50 years to 10,000 years i.e., through year 11940 (pages 5-3, 5-2, S-57) or indefinitely (p. Q-31). Tribes want the Site use restriction lifted sooner rather than late after cleanup is complete and assurance of safe use.

Recommendations:

- *We recommend that the final EIS should include a discussion on how issues raised by the Tribes during consultations with DOE were addressed, especially regarding impacts to water resources – quantity and quality, land use and radiological exposure. Please note that some of the affected Tribes have developed plans for their own water quality standards and radiological exposure risk scenarios that may be relevant when addressing impacts to their water resources and subsequent human health impacts. As an example, EPA recently approved new water quality standards for the CTUIR that changed their fish consumption rate of 6.5 grams/day to 389 grams/day. The tribal radiological exposure scenario used in the DEIS should therefore be revised to reflect the new 389 grams/day fish consumption rate. Under separate correspondence, we are sending you a copy of these EPA-approved water quality standards.*

509-56 cont'd

Land Use

Section R.3 discusses historical use of the Hanford site. Notable are tribal residential and seasonal use and non-tribal uses, including residential, agricultural, commercial, industrial, and wildlife protection areas. In contrast to the reality of historical actual land uses at Hanford site and uses the site has and can successfully support, section R.4 discusses future land use at Hanford site as constrained by DOE's current Comprehensive Land-Use Plan (CLUP), which does not consider reasonably anticipated future land uses.

Recommendation:

- *The final EIS should revise wording in the document (e.g. on page Q-31) so that it does not assume that DOE will retain long term or permanent control of the site.*
- *Because the DEIS states that implementation of proposed actions would comply with both CERCLA and RCRA requirements (Appendix R, p. 6), we recommend that the final EIS discuss future land uses at Hanford site using EPA Guidance on Land Use in the CERCLA Remedy Selection Process and Reuse Assessments: A Tool to Implement the Superfund Land Use Directive (http://www.epa.gov/superfund/policy/remedy/sfremedy/landuse.htm). Unlike the CLUP, CERCLA cleanup and subsequent land use decisions consider both past and reasonably anticipated future land uses the Hanford site could support. We believe that such uses should be consistent under both programs – CERCLA and CLUP. One important difference between the two programs is that the DEIS currently assumes that DOE would control the site indefinitely, whereas the CERCLA program would not.*

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Human Health Risk Analysis

(1) Radiological exposure risk analysis

1×10^7 after the Hanford operational period. Due to this and other comments received regarding water flux values in and out of the flow model, this *Final TC & WM EIS* includes three new tables in Appendix L (L–17, L–20, L–24) that discuss water flux from sources in the west and volumes that pass through Umtanum Gap, Gable Gap, and east to the Columbia River.

509-37 See the *Draft TC & WM EIS*, Appendix L, Section L.8, for a complete discussion of the results of the parameter estimation module calibration and the shortcomings identified with that analysis. In summary, the parameter estimation module-defined upper and lower confidence limits for the hydraulic conductivity values were considered unreasonably narrow for a primary purpose of this *TC & WM EIS*, which is to adequately describe the uncertainty of the groundwater flow model with respect to the parameters. Therefore, after it was demonstrated with calculations that the objective function does not vary smoothly with parameter variations as described in Section L.8, the Monte Carlo optimization and uncertainty analysis was performed as described in Section L.9.

509-38 DOE disagrees with the comment that there is no uncertainty analysis completed for the transport model. An extensive evaluation of the sensitivity of the transport model to varying transport parameters is included in Appendix O, Section O.2.6. This analysis represents DOE's acknowledgement that there is uncertainty associated with the selection of contaminant transport parameters and, thus, the selected parameters should produce results that best fit the field-observed conditions.

509-39 DOE agrees with the commentor's observation that many of the flow fields developed for the *Draft TC & WM EIS* analysis could be considered acceptable. The flow field that was selected for the Base Case met the following criteria (in sequential order of application): (1) the flow field was in the lowest 2 percent of root mean square error (i.e., among those most in agreement with historic water levels); (2) the flow field produced a tritium plume originating from the 200-East Area (PUREX plume) whose first arrival time at the Columbia River was within 10 years of the measured value, whose peak values were within an order of magnitude of the measured peak values, and whose aspect ratio (length versus width of the plume) was within 25 percent of the measured aspect ratios; (3) the flow field produced a tritium plume originating from the 200-West Area (REDOX plume) whose peak values were within an order of magnitude of the measured peak values, and whose aspect ratio was within 25 percent of the measured aspect ratios. The process was repeated for the Alternate Case (with the higher top of basalt). For both the Base and Alternate Cases, approximately 20 of the flow

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Figure 2-91 presents human risk from drinking groundwater under alternative 6B (Option Case), wherein all SSTs are clean closed as defined by the DEIS, as are the six sets of cribs and trenches. It might be assumed that under these actions, groundwater loading from residual contamination in the soil left behind would be minimal (i.e. "protective of human health"). It would be informative to the DEIS reader to add a risk reduction curve for existing groundwater inventory with no future vadose loading. This new figure would provide perspective of how the alternatives impact groundwater over time vs. residual risk in the groundwater not resulting from the EIS scope alternatives. Otherwise, the reader cannot tell how much of the future risk presented in Figure 2-91 (and other future risk figures) is the result of contamination already in the groundwater vs. how much risk is the result of continued loading from the vadose zone because of different EIS alternative actions. **509-58**

Section K.1.1.4 discusses radiation protection guides. Most of what is presented, however, is non-enforceable (guidance, recommendations). Only a few of the regulations are mentioned, and none of the laws. This section should be expanded to be consistent with Table 8.1 that lists potentially applicable legal and other requirements. Please note that the CERCLA cancer risk range of 1 in 10,000 to 1 in 1,000,000 would be more stringent than the 100 mrem/year standard used in this DEIS, which is missing from Table K-1. The 100 mrem/year dose limit used in this EIS for the 70-year exposure scenarios would be a lifetime cancer incidence risk of nearly 7 in 1,000, which is much worse than the acceptable CERCLA risk range. EPA has recommended not using dose based recommendations for CERCLA cleanup levels because of the inconsistency with risk based cleanups (see "Radiation Risk Assessment at CERCLA Sites: Q&A" at http://www.epa.gov/superfund/health/contaminants/radiation/pdfs/riskqa.pdf). *EPA therefore recommends DOE use the CERCLA cancer risk range and update the discussion in the final EIS accordingly.* **509-59**

Section 6.4.2 describes one of the receptor scenarios as a resident farmer. The DEIS explains that the scenario assumes that the garden and crops provide about 25% of the resident farmer's crop and animal product needs. That scenario is different from scenarios used in CERCLA decision documents for the river corridor. The Washington State Model Toxics Control Act (MTCA) B (residential) cleanup regulations do not have any consumption of produce from the site, but do have an exposure duration of 6 years (WAC 173-340-740 equations 740-4 and 740-5). The CERCLA cleanup process considers other applicable or relevant and appropriate requirements including those from the state and thus MTCA provided residential cleanup standards for chemicals have been used for the non-radionuclide cleanup levels in Hanford CERCLA documents. For radionuclides, which aren't covered by MTCA, the CERCLA cleanups have used a rural residential farmer / unrestricted exposure scenario in which 100% of the resident's food is grown on-site and the exposure duration is 70 years ("Remedial Design Report / Remedial Action Work Plan for the 100 Area", DOE/RL-96-17, Revision 6, dated October 2009, table B-8; and Remedial Design Report / Remedial Action Work Plan for the 300 Area", DOE/RL-2001-47, Revision 3, dated December 2009, table B-8b). *EPA recommends DOE consult these and other documents and compare the resident farmer scenario used in the DEIS to the rural residential farmer and the MTCA residential cleanup scenarios found in Hanford CERCLA RODs; note differences between scenarios; highlight the scenario with lowest cancer risk; and update the final EIS with any new information reflecting the scenario that would be more protective of human health.* **509-60**

fields (among the roughly 15,000 examined) met these criteria, and, in DOE's view, satisfactorily matched both water level and concentration measurements taken in the field.

Examining these flow fields in terms of flux through Gable Gap revealed two ranges of fluxes for both the Base and Alternate Cases, and indeed these ranges had a significant overlap. This result strongly suggests that, within the set of calibrated models that were examined, some uncertainty remained regarding the percentage of flow north through Gable Gap relative to the percentage of flow to the east. One of the purposes of this *TC & WM EIS* was to compare long-term impacts among the alternatives, and to demonstrate, to the degree feasible, how the comparison might be affected by uncertainties in the modeling. The amount of flow north through Gable Gap relative to the amount of flow east was a significant uncertainty, even among the well-calibrated models. To bracket the uncertainty, DOE chose two cases from among the roughly 40 well-calibrated models: one with the largest percentage of flow to the east (the Base Case) and one with the largest percentage of flow to the north (the Alternate Case). In comparing among the alternatives, Appendix L demonstrates that, for releases in critical areas, key metrics are not strongly affected by the difference between the Base and Alternate Cases. These include general shapes and locations of plumes predicted in 2005 versus field measurements; peak concentrations of plumes; concentrations versus time at the barriers, Core Zone Boundary, and Columbia River nearshore; and areas of plumes above the MCL. DOE agrees with the commentor's observation that, for the purposes of comparing among the alternatives, there is little objective preference for the chosen Base Case flow field or Alternate Case flow field. DOE's view is that the analysis of the differences among the long-term impacts can be elucidated even in light of the uncertainty regarding the relative amount of flow to the north versus flow to the east.

509-40 The commentor has correctly identified a key difficulty with the determination of soil hydraulic parameters. Additional assumptions, which were thought to be obvious assumptions, were required to arrive at a set of usable parameters consistent with observations at the site. An enhanced discussion of the soil parameterizations appears in this *Final TC & WM EIS*. The infiltration is indeed prescribed by the *Technical Guidance Document* (DOE 2005), thus the unsaturated hydraulic conductivity was set to the recharge flux as indicated by the commentor. The saturated hydraulic conductivity and saturated moisture content were set consistent with the saturated zone parameterizations. The remaining

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Under Section 6.4.2.1, the DEIS discusses potential human health impacts. The dose to risk calculation should be checked for accuracy, and explained. The DEIS states that for the period prior to CY 2000, lifetime radiological risks for the year of peak risk at the core zone boundary and Columbia River locations were high, approaching unity. For the period after calendar year 2000, risks remain high, with values between 1×10^{-3} and 1×10^{-2}. The estimated off-site population dose of 215 person-rem per year for the year of peak dose is about 0.01 percent of the average background dose for the population. The EIS doesn't state what the risk numbers 1×10^{-3} and 1×10^{-2} refer to. The reader may guess these refer to lifetime incremental cancer risk, which is a common expression of the principal risk from radionuclides, namely the probability of cancer. The EIS provides a comparison to background, but doesn't explain what background value is used. At the time the DEIS was started, average background radiation dose for the population was generally considered to be about 0.360 rem/year. Converting background radiation to risk, 0.360 rem/year, for a 70 year exposure scenario, times 0.0008 cancer incidence per rem, equals 2×10^{-2} (two in 100) lifetime incremental cancer risk due to background radiation for the 70 year exposure scenarios in this EIS. The figure from the DEIS, 0.01 percent of the background (which was just calculated to be about 2 in 100), would give an incremental cancer risk increase of 2×10^{-6} which clearly is not between 1×10^{-3} and 1×10^{-2} as stated in the DEIS. Please note that, due to due to increased medical exposures, the new National Council on Radiation Protection (NCRP) and Measurements Report 160 (http://www.ncrponline.org/Publications/160press.html) has updated the background radiation dose to be 0.62 rem/year. *The final EIS risk calculations should therefore be checked for accuracy and be update with the new NCRP background dose.* **509-61**

Under section 6.4.2.1, the DEIS states that for the period after calendar year 2000, risks remain high, with values between 1×10^{-3} and 1×10^{-2} and that the estimated offsite population dose of 215 person-rem per year for the year of peak dose is approximately 0.01 percent of the average background dose for the population. It was not clear how the risk range was determined, and the peak year dose gives a false estimate that the high risks are only 0.01 percent of the average background dose for the population. *The final EIS should explain how the risk range and related peak dose were obtained.*

Incremental health risk is the increased risk that a receptor (normally a human being living nearby) will face from (the lack of) a remediation project. The use of incremental health risk is based on carcinogenic and other effects and often involves value judgments about the acceptable projected rate of increase in cancer. In some jurisdictions, this is 1 in 1,000,000 but in others, the acceptable projected rate of increase is 1 in 100,000. A relatively small incremental health risk from a single project is not of much comfort if the area already has a relatively high health risk from other operations like incinerators or other emissions, or if other projects exist at the same time causing a greater cumulative risk or an unacceptably high total risk.

When explaining MEI, it is said "this person is assumed to be exposed to radionuclides in the air and on the ground from Hanford emissions, ingest locally grown food irrigated with water from the Columbia River downstream from Hanford, ingest fish from the Columbia River, and use the river for recreation." This statement is true, but excludes consumption of dairy products (p. 3-88, 89). *Because of their influence on risk of exposure to Iodine isotopes, we recommend that dairy products be included in exposure risk calculations.* **509-62**

two parameters, shape parameters, were estimated by observing moisture profile behaviors in the vicinity of material interfaces or, in some cases, by adapting parameters for texturally similar materials on site. This need for the assumptions, relating to the uniqueness of parameter sets, is a primary motivation in additional calibration relative to plume concentration matching. The practical goal of the parameterization was consistency with observations at the site.

509-41 The development and application of the particle tracking method to evaluate contaminant transport for this *TC & WM EIS* is discussed in Appendix O, Section O.2, of the *Draft TC & WM EIS*. This discussion includes references to numerous open literature publications and to information regarding any modifications or additions made to the particle tracking code, as applicable, to this *TC & WM EIS*.

509-42 In response to this and similar comments, Appendix O has been revised in this *Final TC & WM EIS* to include presentation of the spatial and temporal fluctuations in the predicted concentration field. In addition, the data presentation in figures in Chapters 5 and 6 and Appendix O has been revised to more clearly represent the range in predicted concentrations.

509-43 In response to this and similar comments, Appendix U of this *Final TC & WM EIS* has been expanded to clarify the purpose and results of the comparison of modeled results to measured results for the current timeframe, as well as the relevance of this comparison to the comparative analysis required under NEPA. Finally, Appendix O has been revised to more clearly present uncertainties in the groundwater modeling and the response of the models to those uncertainties.

509-44 Regarding quantification of the uncertainties in the groundwater modeling system, DOE's view is that, for a comparative analysis (required under NEPA), predictions of long-term impacts that are differentiated by one or more orders of magnitude in concentration should be considered significant by stakeholders and decisionmakers. The discussions in the *TC & WM EIS* Summary and Chapters 2 and 5 of this *TC & WM EIS* are all consistent with this view. In Appendix U, comparisons are made between model predictions of current concentrations and measurements of current concentrations. In response to this and similar comments, this discussion has been amplified in this *Final TC & WM EIS* to assist the reader in evaluating the precision and accuracy of the groundwater modeling system.

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At what temperature will the waste be when retrieved from tanks? If the temperature of the waste will be above 100°C, then all radionuclides in tank waste should be considered gases in accordance with the Clean Air Act (see 40 CFR 61, Subpart H-Appendix D). If that was overlooked, *we recommend that the final EIS verify whether air emissions resulting from radionuclide gases would generate doses that could exceed regulatory limits.* **509-63**

Over the life of the project, there will be an annual average dose of 0.13 mrem (p. 4-132). If all of it were air emissions from 200 Area activities and vented with one stack, this would be considered a major stack for rad emission and will be subject to continuous monitoring. *We recommend that the final EIS include a brief description of sampling and monitoring plans for air emission units that could be present on site during implementation of proposed actions.* **509-64**

Some dose assessment data presented in Section 5.1 show expected doses that are much higher than the average annual dose (360 mrem/year) for a regular citizen. *The final EIS needs to clarify whether calculated doses are ALARA (as low as reasonably achievable) or not, and measures that will be taken to lower higher doses for the receptors.* **509-65**

Tables 5-10 through 5-15 show that expected doses at peak year are generally three or four times higher for Native Americans compared to another individual near the site. *The final EIS should include the rationale used in developing the module for Native Americans and reasons for high doses in their dose assessment. Also, please note that cumulative doses are missing for all members and they should be included in the final EIS.* **509-66**

Iodine-129 is a gas when emitted from the tanks. DOE claimed in p. K-25 that "a second screening analysis was done that assumed that the air treatment system removed 99% of the I-129." For purposes of estimating air emissions, all gaseous radionuclides are released in their entirety or 100%. By assuming 99% removal rate, DOE may have significantly under-estimated doses from I-129. *The final EIS needs to review the list of radionuclides considered to be gaseous under the Clean Air Act and ensure that assumptions used are accurate, and explain which air treatment systems would be used to achieve such high I-129 removal efficiency.* **509-67**

Section K.2.1.1.4 describes the approach used in determining annual emissions i.e., using an annual average and indicates that the method can result in the peak impact spanning a number of years rather than occurring in a single year. We are concerned that that approach may not be realistic since it would not give the worst case scenario for resultant doses. It is also not possible to know whether doses would exceed regulatory limits or not. *The final EIS should address these issues and demonstrate that the doses would not exceed acceptable limits because of proposed actions.* **509-68**

Table Q-9 listed an indoor dust filtration factor of 1. Since normal HEPA filter efficiencies range from 99 - 99.5%, *the final EIS should indicate which filters were used and how they were able to filter all contaminants from the air.* **509-69**

Much of the risk discussion in Chapter 5 and Appendix U is provided as unitless measures of risk. Other than the Hazard Index, which is unitless, but has meaning relative to a value of 1, the remaining risk numbers appear meaningless to the EIS reader and cleanup decision-makers. *The final EIS should include appropriate risk measure units; risk calculations that are a "lifetime incremental cancer risk" should be so marked, and other risk numbers should be appropriately labeled.* **509-70**

(2) Air quality impacts

509-45 Graphs of concentration as a function of time are provided for all of the alternatives in Chapter 5 of this *TC & WM EIS*.

509-46 DOE agrees with the commentor that, as used in the context of Appendix O, the units of flux should be expressed in units of mass (or quantity of radioactivity) per time. Appendix O and its figures have been revised to refer to the integrated flux released from STOMP in terms of curies per year or grams per year.

509-47 It should be noted that among the primary human health and ecological risk drivers driven by the groundwater pathway, risks from technetium-99 and iodine-129 are dominant during the majority of the period of analysis, and that both are conservative species. It should also be noted that, to first order, the primary differentiating factor between conservative species (e.g., iodine-129 and technetium-99) and non-conservative species (e.g., uranium-238, the third-most dominant risk driver that is important in the later time period of analysis [roughly after calendar year 7500]) is the retardation factor. The net effect of retardation is that non-conservative species follow the same transport pathways, but at a slower rate than the pore water velocity. This makes these species relatively unsuitable for calibrating a regional-scale transport model with data spanning a 60-year period. The reason the tritium, iodine, and technetium plumes are useful for calibration of the regional-scale transport model is simply that these plumes have sampled a large portion of the unconfined aquifer, from the 200-East Area southeast to the Columbia River; from the northern part of the 200-East Area into Gable Gap, and across the majority of the 200-West Area. A secondary reason is that the source terms (inventories and release histories) of these constituents are relatively well constrained.

509-48 The data presentation in Chapter 5 and Appendix O has been revised to provide greater clarity. The discussion in Chapter 7, Section 7.5, has been added to highlight the importance of groundwater containment and contaminant removal as a short-term mitigation strategy.

509-49 The data presentation in Chapters 5 and 6 and Appendices N and O has been revised to remove rounding artifacts, reflect the actual precision of the calculation, and address this comment.

509-50 The discussion in Appendix O, Section O.6.1 (which includes Figures O–35 through O–42), is intended to describe a comparison between the Base Case and Alternate Case flow models, and draws the conclusion that the results from both flow models are similar during the operational period. This section in

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For better protection of public health from air pollution exposure, EPA has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants or criteria pollutants (see http://www.epa.gov/air/criteria.html) that should be used to determine if emissions from a project would exceed daily and annual standards. Any projects that would generate emissions exceeding the standards would have to include measures to demonstrate that, if implemented, the project would comply with both state and federal air quality regulations.

Even though background concentrations of criteria pollutants at Hanford are currently below the standards (Table 3-3), it is likely that emissions within the project area could exceed the standards because of proposed actions. As the DEIS noted, particulate matter (PM) concentrations in eastern Washington can change suddenly and reach higher levels due to extreme natural events such as dust storms and large brush fires. On a windy day in 2005, for example, monitoring values for PM_{10} exceeded the 24-hour standard (p. 3-26). Air quality may also be impacted due to management of radioactive waste, dust from road construction and site operations, quarrying, regular traffic on dirt roads, emissions from vehicles, and cumulative impacts from surrounding activities such as agriculture and fire. Of particular concern is the consistent detection of some radionuclides (strontium-90, I-129, cesium-137, plutonium (238, 239, 240, and 241), americium-241, and uranium-235) in air samples collected from the project area in 2006 (Table 3-5). Since data for other radionuclide emissions are missing from the table, it is not possible to determine the level of impacts that would be associated with their emissions. *509-71*

Results of air quality modeling for the proposed actions indicate potential exceedances of NAAQS for the PM_{10} (24-hour) and carbon monoxide (1-hour) under most Tank Closure and Waste Management alternatives as shown in Tables 4-3 and 4-129, respectively. Under Tank Closure, Alternatives 2A, 3A-C, and 5 would result in incremental criteria pollution concentrations for carbon monoxide ranging from 600-17,700 $\mu g/m^3$ above the standard (40,000 $\mu g/m^3$), and these exceedances could occur over as many as 7 years under each of the alternatives. All Tank Closure Alternatives would result in exceedances of the 24-hour PM_{10} standard, with emissions over the standard (150 $\mu g/m^3$) ranging from 396 (No Action) to 4,960 $\mu g/m^3$ (Alternative 6B). These exceedances could occur over 3 years (No Action) to as many as 192 years under Alternative 6A. Although concentrations of $PM_{2.5}$ were not included in the DEIS, they could also occur at levels higher than the standards during the project life. *509-72*

Under the Preferred Alternative for Waste Management action, incremental criteria pollution concentrations for carbon monoxide (1-hour) would exceed the standard by as much as 49,800-257,000 $\mu g/m^3$ and for 8-hour carbon monoxide by as much as 41,200 $\mu g/m^3$ (Table 4-129). Similarly, activities under Alternative 3 would also generate emissions of CO with concentrations exceeding the standards for CO (8-hour) by 41,000 $\mu g/m^3$ (disposal group 2 and 3) and for CO (1-hour) by 51,200 (disposal group 1) to 256,000 $\mu g/m^3$ (disposal groups 2 and 3), respectively. These exceedances would also last a very long time covered by the project. Although not provided in the DEIS, concentrations of $PM_{2.5}$ could also occur at levels significantly higher than the standard during the project life. *509-73*

Mitigation measures, such as construction of a tent-like building over a portion of a tank farm during tank retrieval could provide protection to make closure less environmentally risky. Enclosures provide multiple benefits, such as containment of air releases (protection to adjacent workers, the public, and the environment to reduce short-term impacts) and environmentally sheltered work space for workers (which supports year-round work to reduce inclement weather *509-74*

Appendix O is not intended to compare modeled results to field observations; the commentor is directed to Appendix U for that comparison. Appendix U draws the conclusion that, with the exception of several sites involving uranium and carbon tetrachloride, the modeling results predicted for calendar year 2005 are in agreement with the corresponding field measurements to within an order of magnitude. In response to this and similar comments, the discussion in Appendix U has been expanded to facilitate comparison between model predictions and field observations and provide further detail regarding those comparisons.

509-51 In general, the parameterization process for the groundwater models continues to be governed by two primary considerations: the requirement to provide an unbiased evaluation of the alternatives in the context of the cumulative impact sources (the essential point of a NEPA analysis), and the requirement to provide a technically defensible analysis that relies on documented sources. DOE's view is that a NEPA analysis is essentially comparative, and that the parameter selection process (particularly in heterogeneous and complex media) should be based on the principle of selecting the simplest parameterization that, to first order, does not conflict with field observation and allows an unbiased comparison of the alternatives. More-complex parameterization (spatially varying distribution coefficient values, for example) can actually weaken the comparative value of the analysis.

509-52 The discussion in Appendix U has been revised in this *Final TC & WM EIS* to address this and similar comments.

509-53 DOE disagrees with the commentor's assertion that "all that can be said is that there is 'a lot' of uncertainty." Appendices L, M, N, and O show numerous parameter variation exercises, and the overall uncertainty in the models versus field measurements is discussed in Appendix U. DOE's view is that, for a comparative analysis (as required under NEPA), predictions of long-term impacts that are differentiated by one or more orders of magnitude in concentration should be considered significant by stakeholders and decisionmakers. The discussions in the Summary and Chapters 2 and 5 of this *TC & WM EIS* are all consistent with this view. In response to this and similar comments, the discussion in Appendix U has been amplified in this *Final TC & WM EIS* to assist the reader in evaluating the precision and accuracy of the groundwater modeling system.

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shutdowns which saves on costs and schedule). The DEIS states that containment structures are impractical due to "a large degree of uncertainty concerning the feasibility" (page S-56). However, we note that containment buildings are commercially available and being used successfully elsewhere, including by DOE at other sites. As a specific example, the so-called ARP IV enclosure over pit 5 at the Idaho National Lab is operational and is 235 x 270 ft. Section 7.1.4 also lists additional mitigation measures to reduce air quality impacts. The mitigation measures are, however, not quantified and discussed in a manner that clarifies the extent to which predicted air quality impacts and associated exceedances of applicable standards, as discussed above and further explained on p. S-103, would be minimized to meet the standards. **509-74 cont'd**

Recommendations:

- *Since the project area and surrounding areas may include sensitive populations such as the elderly and children, the final EIS should quantify and describe in sufficient detail measures that will be taken to reduce predicted emissions to assure NAAQS, particularly for PM and carbon monoxide, will be met by the proposed project. It will also be important to monitor air quality and take corrective action if air quality standards are not met. Monitoring strategies should be tailored to local conditions because localized air quality impacts can be substantial, even though area-wide and/or long term monitoring may show compliance with air quality standards.* **509-75**
- *The DEIS document should include separate concentrations for PM_{10} and $PM_{2.5}$ because each measure may exceed the standards, while the other might not. As of December 18, 2006, EPA promulgated the revised $PM_{2.5}$ NAAQS to protect the public from short-term fine particle exposure. Thus, the revised NAAQS for $PM_{2.5}$ should be used to help determine the significance of proposed actions' air quality impacts pursuant to 40 CFR 1508.27(b)(2) and (10), as well as when considering the need for and extent of mitigation, for all proposed actions for which NEPA decision documents, i.e., Record Of Decision (ROD) in this case, have not yet been issued. The final EIS therefore needs to evaluate potential $PM_{2.5}$ emissions that would result from the proposed actions for public review and comment; indicate whether the NAAQS for $PM_{2.5}$ would be exceeded or not; and discuss measures that would be taken to assure NAAQS for $PM_{2.5}$ would be met during implementation of proposed actions.* **509-76**
- *Because the DEIS does not include refined analysis of emissions utilizing reasonable control technologies and more-detailed construction activities (p. 2-144, 4-34, and 7-10), the final EIS should include that information so accurate air quality impacts and mitigation measures and their effectiveness can be determined.* **509-77**

509-54 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

In response to comments received concerning the reader's ability to distinguish the impacts of the different tank farm sources, the figures under Tank Closure Alternative 2B in Chapter 5 were revised to split out the sources resulting from past leaks, cribs and trenches (ditches), ancillary equipment, tank residuals, and retrieval leaks.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

509-55 As discussed in Chapter 7, Section 7.1.6, secondary-waste-form performance is a particular area of focus for DOE, especially with regard to partitioning and capture of iodine-129 and technetium-99, both conservative tracers, in secondary-waste forms. Additional sensitivity analyses have been added to this final EIS that evaluate the changes in potential impacts that might result if partitioning or recycling of some contaminants, e.g., iodine-129, could be increased into primary-waste forms and/or if secondary-waste-form performance were improved. The discussion found in Chapter 7, Section 7.5, was added to summarize these results. The results of these analyses will aid DOE in formulating appropriate performance targets for secondary-waste forms. As discussed in Chapter 7, Section 7.5.2.8, and Appendix E, Section E.1.2.4.5.6, DOE has drafted a roadmap that implements a strategy for development of better-performing secondary-waste forms.

509-56 Early stakeholder participation in the EIS planning and development process is important to DOE, and DOE has provided numerous opportunities for such

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U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

Environmental Impact of the Action

LO – Lack of Objections
The U.S. Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC – Environmental Concerns
EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO – Environmental Objections
EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU – Environmentally Unsatisfactory
EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 – Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 – Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 – Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

interaction. Hanford-area tribes have had the opportunity to provide, and have provided, extensive input to the *TC & WM EIS* preparation process and analysis, which is outlined in Chapter 8 and Appendix C. In addition, Chapter 8 of this EIS includes a description of the outcomes of the meetings with the tribes, and a new appendix, Appendix W, describes the tribal perspective as provided by the Hanford-area tribes. DOE disagrees with EPA's recommendation to use fish consumption rates specific to the CTUIR reservation, because it conflicts with the information the tribes submitted to DOE that was used in Appendix W.

Clarification has been added to this EIS to explain the difference between land assumptions related to administrative control and the groundwater period of analysis.

509-57 The language referred to by the commentor in Appendix Q on page Q–31 of the *Draft TC & WM EIS* has been revised to clarify that DOE does not anticipate near-term loss of institutional controls of the site. DOE disagrees that use of *EPA Guidance on Land Use in the CERCLA Remedy Selection Process and Reuse Assessments: A Tool to Implement the Superfund Land Use Directive* is appropriate for the cumulative impacts analysis completed for this EIS. That guidance is used within the context of the CERCLA remedial actions being conducted under the TPA, which are not part of the scope of the proposed actions evaluated in this EIS. Appendix R, Section R.4, of this *TC & WM EIS* describes the purpose of the TPA, which is an agreement for achieving compliance with the remedial action provisions of CERCLA and corrective action provisions of RCRA. The EPA guidance takes into account reasonably foreseeable land uses that have been established for a site.

In 1999, after an extended NEPA process involving EPA and numerous other agencies as cooperating agencies, DOE issued the *Final Hanford Comprehensive Land-Use Plan EIS* (DOE 1999). Based on that EIS, DOE issued a ROD establishing the Hanford Comprehensive Land-Use Plan, which designates the various land uses for Hanford. In the same timeframe, the Hanford Reach National Monument was established by President Clinton (65 FR 37253; Presidential Proclamation 7319), which applies to portions of Hanford. In 2008, DOE issued the *Supplement Analysis, Hanford Comprehensive Land-Use Plan EIS* (DOE 2008c); this analysis was performed to determine whether there were any significant changes in circumstances or substantial new information that would affect the basis for DOE's original land use designation decisions. DOE issued an amended ROD in 2008 to clarify how DOE will continue to implement the Hanford Comprehensive Land-Use Plan, including the use of other regulatory

processes such as the TPA to ensure consistency with the land-use plan. However, no significant changes in circumstances or new information substantial enough to merit preparing a supplemental EIS were identified.

This *TC & WM EIS* discusses several different types of end-state management in Chapter 2, the Glossary, and the Summary. These include administrative controls, active institutional controls, and postclosure care, as appropriate. Each of these end-state management options would take place at the completion of an action. For analysis purposes, this EIS assumed that administrative controls or postclosure care and monitoring would continue for 100 years beyond the construction, operations, and deactivation phases of an alternative. As discussed in Appendix M, closure features were assumed to fail after a period of time (e.g., RCRA landfill barriers at 500 years; Hanford landfill barriers at 1,000 years; grouted secondary-waste forms at 500 years). The failure of these systems is reflected in the impacts analysis presented in this EIS. The 10,000-year time period described in this *TC & WM EIS* represents the period of analysis used for the long-term impact analyses for groundwater, human health, and ecological risk. It does not represent the assumed period of institutional controls. For clarity, a definition of "10,000-year period of analysis" has been included in the *Final TC & WM EIS* Glossary.

It should be noted that it is DOE policy (DOE Policy 454.1, April 9, 2003) to use institutional controls as essential components of a defense-in-depth strategy that uses multiple, relatively independent layers of safety to protect human health and the environment (including natural and cultural resources). DOE would implement institutional controls, along with other mitigating or preventive measures as necessary, to provide a reasonable expectation that, if one control temporarily fails, other controls will be in place, or other actions will be taken, to mitigate significant consequences. Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that include developing better-engineered landfill barriers and waste-form performance, among other potential measures.

509-58 The commentor observes that risk reduction in the groundwater system as a whole has two components: reduction resulting from a decrease in loading from the vadose zone, and reduction resulting from processes in the groundwater system itself (i.e., advection, dispersion, retardation, and radioactive decay). DOE agrees with the commentor's suggestion that clear presentation of both of these components of risk reduction is of importance to decisionmakers, stakeholders, and the public. To address this comment, DOE has added analyses

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to this *Final TC & WM EIS* that show risk reduction curves resulting from several different degrees of reduction in the vadose zone for selected sites. The results of these analyses are presented in Chapter 7, Section 7.5, of this *Final TC & WM EIS*.

509-59 Appendix K, Section, K.1.1.4, Radiation Protection Guides, presents the documents prepared by national and international bodies on which the United States has based its radiation protection policies and standards. Section K.1.1.5, Radiological Exposure Limits, explains how these guides are used in establishing EPA standards for the public and DOE standards for workers. As the commentor notes, Chapter 8, Table 8–1, provides a broad-ranging list of laws and regulations that are potentially applicable to the implementation of an alternative evaluated in this EIS and would include permitting actions for air and liquid releases. The intent of Section K.1 is to present the criteria that are used in NEPA (not CERCLA) impact analyses.

509-60 In the NEPA process, multi-pathway exposure scenarios are needed for comparison of impacts of the EIS alternatives. The individual scenarios used in this capacity are intended to be representative of a location and lifestyle, while collectively spanning a range of plausible exposures. Both the activities and parameters used in the scenarios are based on existing reports and compilations. DOE does not agree that comparison of the NEPA scenarios to the CERCLA scenarios in other documents would provide additional value. Chapter 5 and Appendix Q present information on risk ranges for different scenarios for the alternatives. Chapter 6 presents information on risk ranges for the cumulative impacts.

509-61 Dose-to-risk calculations were reviewed as part of the quality assurance program implemented during preparation of this *TC & WM EIS*. The introductory paragraphs of Chapter 6, Section 6.4.2, state that (1) long-term human health impacts were estimated as lifetime risk of incidence of cancer, (2) background dose to an average individual is 365 millirem per year, and (3) approximately 5 million individuals live downstream of Hanford. The word "excess" has been added to the definition of risk, and identification of background dose has been clarified to not include the contribution of large doses to a small portion of the population, which would increase the estimate of background dose to 620 millirem per year. The ranges of total risk reported in Section 6.4.2 are derived from detailed results presented in Appendix Q. A sentence has been added to the introductory paragraph of Section 6.4.2 directing the reader to

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Appendix Q for a detailed description of methods and results of estimation of long-term human health impacts.

509-62 This representation of doses from current Hanford operations comprises doses from all pathways, including potential doses from dairy products. This discussion was updated to reflect data from the *Hanford Site Environmental Report for Calendar Year 2010* (Poston, Duncan, and Dirkes 2011) and to indicate that ingested food was also assumed to be from locations downwind of Hanford. Note that the 2010 environmental report states that concentrations in "dairies downwind of the site are now similar to levels measured in samples obtained from the dairy generally upwind of the site."

509-63 The cited appendix of 40 CFR 61 applies to evaluations in support of applications to construct or modify facilities or notifications of startup, and not necessarily to evaluations performed under NEPA. Nonetheless, DOE has confirmed that the temperature of waste during retrieval will not exceed 100 degrees Celsius.

509-64 DOE acknowledges that if the potential for releases in excess of regulatory triggers were anticipated when facilities were built and operated, the appropriate sampling and monitoring programs would have to be implemented. This is a NEPA document, not a permitting document, so details regarding permitting are not necessary. However, the section has been modified to indicate that the site would comply with the applicable regulations and, if projected emissions so indicated, sampling equipment would be installed and monitoring performed.

509-65 Two aspects have bearing on calculated doses. First, there is some conservatism in the predicted doses presented in the draft EIS. While refinements in the approach used in this *Final TC & WM EIS* lessened the predicted doses, modeled exceedances of standards are still predicted. This is why the second aspect—the regulatory context—remains important. This EIS addresses those laws and requirements that would apply to the proposed actions, depending on the alternative. Issues concerning the ability to meet legal standards or requirements are also discussed, as are the potential mitigation measures that may be needed and are feasible for implementation by DOE. The legal standards include, in particular, ALARA, a process used instead of a specific dose limit to minimize doses to workers and the public to as far below limits as is practicable.

509-66 The higher doses for the American Indian scenario reflect the differences in the exposure parameters, as indicated in Appendix Q on pages Q–6 and Q–27 of the *Draft TC & WM EIS*. The basis for these parameters reflects higher consumption rates and participation in religious ceremonies that do not apply to non–American

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Indian scenarios. Cumulative impacts on the American Indian receptors are presented in Appendix U of this EIS.

509-67 DOE recognizes that iodine is one of the principal radionuclides that will require attention when implementing a selected alternative. When engineering the systems to process waste and treat the effluent, the performance assumed in this EIS will be one of the factors considered, thus silver reactors or other technology capable of capturing iodine will have to be included in the air treatment train. The second screening referred to was to determine if removal of iodine-129 changed the dominant nuclides, which it did not. A sensitivity analysis was performed to evaluate the impacts of a failure to remove iodine to the level indicated. This sensitivity analysis showed that the estimated dose in the year of maximum impact could increase by about 15 percent. Given this increase, the dose to the MEI would remain below the 10-millirem-per-year regulatory limit.

509-68 DOE acknowledges that there are limitations in the approach used to estimate annual doses from facilities' emissions. To enable the analysis, assumptions were made regarding the average emissions and the time that various activities would occur. In practice, the emissions from facilities and the schedule for performing the various activities may be different from those assumed in the analysis. Regardless, DOE will comply with the regulatory requirement to maintain doses to an MEI below 10 millirem per year and will ensure compliance with conditions that are included in permits for the emission points at Hanford.

509-69 The indoor dust filtration factor in RESRAD is not the same as a high-efficiency particulate air filtration efficiency. Instead, the RESRAD factor is a simple multiplier used to account for any attenuation of the indoor dust concentration relative to the outdoor concentration. The default value for RESRAD is 0.4, adjusting the indoor dust to 40 percent of the outdoor value, but for this EIS, this factor is set equal to 1.0, thus conservatively allowing for no attenuation.

509-70 The discussion of the units of risk has been clarified, as necessary, and consistent usage has been applied throughout this final EIS.

509-71 DOE generally agrees with commentor's summary of information on criteria air pollutants, which was presented in the *Draft TC & WM EIS*, Chapter 3, Section 3.2.4.1. Information on natural events and wildfires that would result in exceedance of the particulate matter standards, such as the event in 2005, is normally reported in the annual site environmental report. Data on radionuclide emissions in Chapter 3, Section 3.2.4.1, were updated (2010 data) in this final EIS. Table 3–5 represents emissions for the entire Hanford Site. The Hanford

Site environmental report (Poston, Duncan, and Dirkes 2011) referenced in the table is the most recent yearly report available and is representative of all recent years of impacts at the site.

509-72 DOE generally agrees with the commentor's summary of the nonradiological modeling results for the Tank Closure alternatives presented in Chapter 4 of the *Draft TC & WM EIS*. The draft EIS assumed for analysis purposes that emissions of particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$) were the same as PM_{10} emissions. More-detailed emissions were not developed. A more detailed independent $PM_{2.5}$ analysis would require estimates of $PM_{2.5}$ emissions, which are not currently available; perhaps estimates of emissions of secondary components of $PM_{2.5}$ (sulfates and nitrates); and modeling of $PM_{2.5}$. For this final EIS, based on the assumption stated above, concentration values for $PM_{2.5}$ were added to Tables 4–3 (Tank Closure alternatives), 4–100 (FFTF Decommissioning alternatives), and 4–130 (Waste Management alternatives) in Chapter 4 in addition to the PM_{10} values presented.

The discussion found in Chapter 7, Section 7.1, summarizes potential mitigation measures that could be used to control air pollutant emissions under the alternatives. Following issuance of this *Final TC & WM EIS* and its associated ROD, DOE is required to prepare a mitigation action plan that addresses mitigation commitments expressed in the ROD. This plan would be prepared before DOE would implement any action that is the subject of a mitigation commitment. During the design process and permitting, more-precise estimates of air emissions and the control of these emissions would be determined as necessary to meet the ambient standards; this level of detail is not necessary for NEPA analysis.

509-73 The incremental criteria pollutant concentrations under Waste Management Alternative 2 for carbon monoxide (1-hour averaging period) would exceed the standard by 9,800 to 217,000 micrograms per cubic meter and, for the 8-hour averaging period, by as much as 31,200 micrograms per cubic meter, based on the modeling results presented in Chapter 4, Table 4–130, of this *Final TC & WM EIS*. Under Waste Management Alternative 3, carbon monoxide concentrations would exceed the 1-hour standard by 10,300 (Disposal Group 1) to 216,000 (Disposal Groups 2 and 3) micrograms per cubic meter and the 8-hour standard by 31,000 micrograms per cubic meter (Disposal Groups 2 and 3). Please see response to comment 509-72 regarding analysis of $PM_{2.5}$ emissions.

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The discussion found in Chapter 7, Section 7.1, summarizes potential mitigation measures that could be used to control air pollutant emissions under the alternatives. Following issuance of this *Final TC & WM EIS* and its associated ROD, DOE is required to prepare a mitigation action plan that addresses mitigation commitments expressed in the ROD. This plan would be prepared before DOE would implement any action that is the subject of a mitigation commitment. During the design process and permitting, more-precise estimates of air emissions and the control of these emissions would be determined as necessary to meet the ambient standards; this level of detail is not necessary for NEPA analysis.

509-74 As stated, containment structures are commercially available and have been successfully used at other sites. However, the containment structures that would be needed to cover excavations of tank farms in this EIS would have to be much larger than those that have been demonstrated elsewhere. For example, the commentor cites an example of a 235- by 270-foot containment structure used over Pit 5 at INL, whereas containment structures that would be required for tank closure would be significantly larger. For example, the tank farm excavations would range from 200 by 200 feet to 1,000 by 800 feet. DOE is assuming the use of containment structures for tank closure sized at 500 by 550 feet, based on scaled-up data. In stating "a large degree of uncertainty concerning the feasibility," DOE recognizes that construction of such large structures may have its limitations. Appendix E, Section E.1.2.5.3, describes the containment structures proposed for tank and soil removal activities.

509-75 Ambient air quality standards are set to protect human health, including those of the elderly and children. Activities resulting from decisions made to meet the purpose and need of this EIS would be designed and implemented to meet the ambient air quality standards. Chapter 4, Section 4.1.4, of the *Draft TC & WM EIS* discusses some of the conservatism included in the EIS analysis, stating, "For the purpose of this analysis, emissions of PM_{10} and $PM_{2.5}$ from general construction activities were assumed to be the same as the total suspended particulate emissions. This results in a substantial overestimate of PM_{10} and $PM_{2.5}$ emissions. Further, the analysis did not consider emission controls that could be applied in the construction areas, as discussed in Chapter 7, Section 7.1. A refined analysis of emissions, based on more-detailed engineering of the construction activities and application of appropriate control technologies, is expected to result in substantially lower estimates of emissions and ambient

concentrations from the major construction activities under any of the Tank Closure alternatives." Section 7.1.4 discusses the need for additional control measures, other types of controls that could be applied to construction-type sources, and some of the control measures included in the WTP design. Detailed design of the facilities and control measures has not been performed, and more-detailed information on an air pollution control program is not available. Identification of the need for a monitoring program and development of the program would be part of the permitting process.

509-76 The *Draft TC & WM EIS* assumed for analysis purposes that $PM_{2.5}$ emissions were the same as PM_{10} emissions (see Chapter 4, Table 4–3, note "c"). More-detailed emissions data do not currently exist for $PM_{2.5}$ for the activities analyzed. A more detailed independent $PM_{2.5}$ analysis would require estimates of $PM_{2.5}$ emissions, perhaps estimates of emissions of secondary components of $PM_{2.5}$ (sulfates and nitrates), and modeling of $PM_{2.5}$. A more refined analysis of emissions, based on more-detailed engineering of the construction activities and application of appropriate control technologies, is expected to result in substantially lower estimates of emissions and ambient concentrations from the major construction activities under any of the alternatives. The analysis for $PM_{2.5}$ is considered to be conservative because it is based on emission factors for total suspended particulates or PM_{10}; the fact that detailed control technologies were not applied in the analysis; and other assumptions as described in Appendix G of the draft EIS. DOE considers the current level of engineering and emission estimates to be adequate for the comparative analysis performed for this EIS. Additional analysis would be performed as needed when more-detailed engineering is performed and as required for permitting of the various facilities.

509-77 Consistent with CEQ requirements, DOE has used the best-available information to address emission controls and the technologies that may be used when the selected alternative is implemented. Since NEPA is done early in the process, more-detailed information about construction activities is not available for reanalysis for this *Final TC & WM EIS*; nor is an analysis of reasonable control technology application for these activities and the operational sources. A more refined analysis of emissions, based on more-detailed engineering of the construction activities and application of appropriate control technologies, is expected to result in substantially lower estimates of emissions and ambient concentrations from the major construction activities under any of the alternatives because conservative assumptions were made in the analysis in estimating

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emissions and emission control. DOE considers the current level of engineering and emissions estimates to be adequate for the comparative analysis performed for this EIS. Additional analysis would be performed as needed when more-detailed engineering is performed and as required for permitting of the various facilities.

The discussion found in Chapter 7, Section 7.1.4, summarizes potential mitigation measures that could be used to control air pollutant emissions under the alternatives. During the design process and permitting process, more-precise estimates of air emissions and the control of these emissions would be required to meet the ambient standards; this level of detail is not necessary for NEPA analysis.

Commentor No. 510: Denny Palmer

April 6, 2010

Mary Beth Burandy, Document Manager
Office of River Protection
Department of Energy
PO Box 1178
Richland, WA 99352
Attention: TC & WM EIS

To whom it may concern,

I would like to initially state that I am writing as a concerned citizen who lives and works in the City of Spokane, Washington. It has come to my attention that the Department of Energy's (DOE) preferred alternatives for tank closure and waste management at Hanford will likely affect myself and others in the City of Spokane.

First, the DOE owes to the citizens of Washington implementation of the best and most widespread cleanup option technologically available. Unacceptable and less extensive alternatives the DOE is considering would allow for additional groundwater contamination and potential contamination of the Columbia River. Previous leaks from just a section of Hanford's tanks is a major factor adding to long-term ground and surface water impacts. Under DOE's current plan, none of these leaked materials would be retrieved, and would thus eventually lead to the groundwater and the Columbia River. It is unacceptable for the DOE to save money when the health and wellbeing of the citizens of Washington are at stake. **510-1**

The DOE recognizes that risks of cancer from drinking water miles away from the tank farms will be approximately 50 times that State's cancer risk cleanup standard in the year 3600. As a citizen who enjoys the recreational aspects of the Columbia River corridor, I understand the grave impact such a decision would have on local economies and lives in that region. **510-2**

The DOE's proposal to ship radioactive waste from across the nation to Hanford once the Waste Treatment Plant is operational is completely unacceptable. This preferred alternative by the DOE poses short and long-term environmental and public health risks that must be avoided. The DOE's choice for landfill closure of cribs and trenches adjacent to the tank farms would result increased amounts of contamination reaching the groundwater and the river. I have been informed that the proposed influx of off-site waste from across the nation would likely add an additional 15 curies of iodine, which under current plans, would not be immobilized in glass and would be highly prone to leach into the groundwater and the Columbia River. **510-3**

With 90% of the radioactive iodine and 74% of the radioactive technetium releases would be imported from other areas of the country, as a citizen I have to question the DOE's decision to transport such waste through my city. I live and work close to I-90 and the DOE's decision to transport such waste along this corridor poses an enormous health risk not only to myself, but to the thousands of others who also live along this path. Unjust exposure to these materials is unconscionable. The Spokane River which flows adjacent to I-90 also poses risk to contamination due to this transportation influx. **510-4**

It is entirely inequitable to force Washington residents to bear a disproportionate burden of housing much of the nation's most hazardous substances given the fact that the citizens of Washington State have clearly and unequivocally voiced their opposition to becoming the **510-5**

510-1 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

510-2 Two aspects have bearing on predicted cancer risk in the Columbia River corridor. First, there is some conservatism in the predicted risks presented in the draft EIS. While refinements in the approach used to prepare this *Final TC & WM EIS* lessened the predicted risks, modeled exceedances of standards are still predicted. This is why the second aspect—the regulatory context—remains important. This *TC & WM EIS* addresses those laws and requirements that would apply to the proposed actions, depending on the alternative. Issues concerning the ability to meet legal standards or requirements are also discussed, as are the potential mitigation measures that may be needed and are feasible for implementation by DOE. In particular, additional mitigation measures could be required to obtain future permits issued by the State of Washington, or they may be addressed under the scope of the TPA as part of future remedial actions that are subject to CERCLA. In the ROD for this EIS, DOE will identify and discuss the factors it considered in reaching its decisions, such as economic, technical, and national policy considerations and the mitigation and monitoring measures that will be implemented. In all cases, DOE will select a set of activities designed to protect public health and safety.

510-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

The impacts of the offsite waste in terms of radiological risk are presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East.

The *TC & WM EIS* analysis shows that receipt of offsite waste streams that contain specific amounts of certain isotopes, specifically, iodine-129 and technetium-99, could cause an adverse impact on the environment. Therefore, one means of mitigating this impact would be for DOE to limit disposal of

Commentor No. 510 (cont'd): Denny Palmer

nation's radioactive dumping ground. DOE's plan calls upon Washington residents to shoulder the entire burden of transporting and storing the nation's nuclear waste while, through the passage of Initiative 2004, the people of Washington overwhelmingly expressed their reluctance to allow additional shipments of radioactive waste to Hanford until existing waste is cleaned up. Delaying the addition of more hazardous wastes until the WTP becomes operational in 2022 does absolutely nothing to protect the Columbia River and the health of our children for generations to come. *510-5 cont'd*

I respectfully request that the DOE clean up the millions of gallons of nuclear waste that has already leaked from the leaky single-shell tanks and reaching the Columbia River; and also to entirely drop the proposal to ship radioactive waste from across the nation to Hanford. Under absolutely no circumstance whatsoever, should DOE transport hazardous radioactive waste along I-90 directly above the sole source Spokane-Valley/Rathdrum-Prairie Aquifer. *510-6*

Sincerely,

Denny Palmer
438 W. Shoshone
Spokane, WA 99203

offsite waste streams at Hanford. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification glass, are discussed in Chapter 7, Section 7.5, of this final EIS.

Closure of past-practice units, e.g., cribs and trenches (ditches), is not part of the proposed actions analyzed in this EIS. Closure of these units would be addressed at a later date subject to appropriate NEPA and/or CERCLA review.

510-4 DOE disagrees with the assertion that 90 percent of the total (both onsite and offsite) inventory of iodine-129 and 74 percent of the total inventory of technetium-99 would be transported to Hanford from offsite DOE facilities. Appendix D shows that onsite inventories of iodine-129 and technetium-99 are much larger than inventories assumed to be present in offsite waste. The *Draft TC & WM EIS* analyzes the transportation of RH-LLW from INL to Hanford for disposal. Based on the public's input and concerns about offsite waste disposal at Hanford, DOE has included in this *Final TC & WM EIS* an example of a potential mitigation measure that could be taken by DOE. Specifically, an offsite waste stream containing a significant inventory of iodine-129 (i.e., RH-LLW resins from INL) was eliminated from the analysis. This mitigation measure has been incorporated into the Waste Management alternatives. In addition, a sensitivity analysis is included that shows the impacts of limiting offsite waste streams containing iodine-129 and technetium-99. The results of this sensitivity analysis illustrate the difference this would make in potential groundwater impacts and are included in Appendix M. Other mitigation measures, such as recycling secondary-waste streams into the primary-waste-stream feeds within the WTP to increase iodine-129 capture in ILAW and bulk vitrification, are discussed in Chapter 7, Section 7.5, of this EIS. As shown in the Summary of this *TC & WM EIS*, Section S.5.3; Chapter 2, Section 2.8.3.10; and Chapter 4, Section 4.3.12, it is unlikely that the estimated total public radiation exposures from transporting radioactive waste to Hanford for disposal would result in any additional LCFs.

510-5 See response to comment 510-3 for a discussion on the transport and disposal of offsite waste.

510-6 See response to comment 510-1 regarding groundwater contamination and remediation.

One of the purposes of this *TC & WM EIS* is to analyze potential impacts of DOE's proposed actions to retrieve waste from the buried tanks, treat and dispose

Commentor No. 510 (cont'd): Denny Palmer

of this waste, and close the SST farms. This analysis is also intended to aid DOE in making decisions regarding cleanup of the past leaks.

See response to comment 510-3 for a discussion on the transport and disposal of offsite waste.

Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 511: Arthur Babitz, Mayor, City of Hood River, Oregon

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
PO Box 1178
Richland, WA 99352

Dear Ms. Burandt,

We are elected officials who represent many of the cities along the Columbia River downstream from the Hanford Site. We have diverse economies of farmlands, fisheries, forestry, and recreation-based tourism. Many of our high-tech and light industries are located close to or on the banks of the river. The health of our communities is inextricably linked to the health of the Columbia River.

We are concerned that the cumulative analysis in the U.S. Department of Energy's Draft Tank Closure and Waste Management Environmental Impact Statement predicts a wide-spread and persistent environmental contamination of the Columbia River that could affect our cities for thousands of years (Chapter 6 and Appendix U). The DOE's EIS also concludes accepting offsite waste to the Hanford Site would have long-term negative impacts on the river (Chapter 6). *511-1*

The Columbia River is the life blood of our communities. We will not accept this vision of our future.

We expect the DOE to implement the highest level of cleanup possible and to continually research new technologies that will allow the removal of contaminants deep in the soil. We expect the DOE to make decisions to guarantee the highest level of protection of human health and the environment. We endorse the Oregon Department of Energy's proposed Alternative 7 and urge the DOE to analyze each of the proposed actions individually and collectively. We also ask you to rescind your February 2000 record of decision that opened up Hanford to off site waste. *511-2*

We understand the desire to complete cleanup as quickly and cheaply as possible. Unfortunately, the extent of the contamination and the complexity of the cleanup means there are no acceptable shortcuts. *511-3*

Our communities cannot tolerate the long-term contamination of the Columbia River as foreseen in this EIS. We are counting on the Department of Energy to take the requested actions to preserve our collective health, safety, and security.

Sincerely,

Arthur Babitz, Mayor
City of Hood River

cc: Senator Ron Wyden, Senator Jeff Merkley, Congressman Greg Walden, County Commission Chair Ron Rivers

301 OAK STREET • P.O. BOX 27 • HOOD RIVER, OREGON 97031 • (541) 386-1488

511-1 As described in Chapter 6, Section 6.4.2, the cumulative risk to downstream users of the Columbia River would be low under all alternative combinations (i.e., a Hazard Index lower than 1.25×10^{-3} and a total risk lower than 1.0×10^{-6}), and would be dominated by non–*TC & WM EIS* sources. The estimated offsite population dose of 215 person-rem per year for the year of peak dose is approximately 0.01 percent of the average background dose for the population. In addition, the estimates of cumulative risk presented in the *Draft TC & WM EIS* do not take into account all ongoing and future cleanup actions. Therefore, actual cumulative risk is expected to be even lower.

In recognition of concerns about the effects of remedial actions, DOE has added sensitivity analyses to Appendix U of this *Final TC & WM EIS* to provide information on the potential effects of reasonably foreseeable remedial actions on the concentrations of contaminants in groundwater. The results of these sensitivity analyses are discussed in Chapter 7, Section 7.5. Reducing contaminant concentrations in groundwater would reduce the discharge of contaminants to the Columbia River, further reducing the already-low risks to downstream water users.

511-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Chapter 2, Section 2.6.4, of this *Final TC & WM EIS* has been revised to include a discussion of the Oregon Department of Energy's proposal and how DOE has addressed the range of reasonable alternatives for tank waste storage, retrieval, and treatment and remediation of the existing tank farms in its original Tank Closure alternatives. DOE has carefully considered the Oregon proposal and, as explained in Section 2.6.4, has determined that it is not reasonable.

511-3 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is

Commentor No. 511 (cont'd): Arthur Babitz, Mayor, City of Hood River, Oregon

implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 512: Andrea Rogers, Mayor, City of Mosier, Oregon

Mayor Andrea Rogers
Council President Allan Rodrick
Peny Wallace
Kathy Fitzpatrick
David Princehouse
Tim Mortenson
Rae Jackson

City of Mosier
P.O. Box 456 Mosier, OR 97040
541-478-3505 541-478-3810 (fax)
mosiercityhall@mosierwinet.com

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
P.O. Box 1178
Richland, WA 99352

Dear Ms. Burandt,

We are elected officials who represent many of the cities along the Columbia River downstream from the Hanford Site. We have diverse economies of farmlands, fisheries, forestry, and recreation-based tourism. Many of our high-tech and light industries are located close to or on the banks of the river. The health of our communities is inextricably linked to the health of the Columbia River.

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We understand the desire to complete cleanup as quickly and cheaply as possible. Unfortunately, the extent of the contamination and the complexity of the cleanup means there are no acceptable shortcuts. *512-3*

Our communities cannot tolerate the long-term contamination of the Columbia River as foreseen in this EIS. We are counting on the Department of Energy to take the requested actions to preserve our collective health, safety, and security.

Sincerely,

Andrea Rogers, Mayor
City of Mosier

cc: Senator Ron Wyden, Senator Jeff Merkley, Congressman Greg Walden, County Commissioner Bill Lennox

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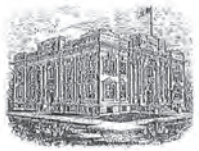
In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is

Commentor No. 512 (cont'd): Andrea Rogers, Mayor, City of Mosier, Oregon

implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 513: Bill Lennox, County Commissioner, Wasco County Board of Commissioners



WASCO COUNTY

Board of County Commissioners

511 Washington Street, Suite 302
The Dalles, Oregon 97058-2237
(541) 506-2520
Fax: (541) 506-2521

Dan Erickson, *Chair of the Board*
Sherry Holliday, *County Commissioner*
Bill Lennox, *County Commissioner*

March 18, 2010

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
PO Box 1178
Richland, WA 99352

Dear Ms. Burandt:

We are elected officials who represent many of the communities along the Columbia River downstream from the Hanford Site. We have diverse economies of farmlands, fisheries, forestry, and recreation-based tourism. Many of our high-tech and light industries are located close to or on the banks of the river. The health of our communities is inextricably linked to the health of the Columbia River.

We are concerned that the cumulative analysis in the U.S. Department of Energy's Draft Tank Closure and Waste Management Environmental Impact Statement predicts a wide-spread and persistent environmental contamination of the Columbia River that could affect our communities for thousands of years (Chapter 6 and Appendix U). The DOE's EIS also concludes accepting offsite waste to the Hanford Site would have long-term negative impacts on the river (Chapter 6). *513-1*

The Columbia River is the life blood of our communities. We will not accept this vision of our future.

We expect the DOE to implement the highest level of cleanup possible and to continually research new technologies that will allow the removal of contaminants deep in the soil. We expect the DOE to make decisions to guarantee the highest level of protection of human health and the environment. We endorse the Oregon Department of Energy's proposed Alternative 7 and urge the DOE to analyze each of the proposed actions individually and collectively. We also ask you to rescind your February 2000 record of decision that opened up Hanford to offsite waste. *513-2*

We understand the desire to complete cleanup as quickly and cheaply as possible. Unfortunately, the extent of the contamination and the complexity of the cleanup means there are no acceptable shortcuts. *513-3*

513-1 As described in Chapter 6, Section 6.4.2, the cumulative risk to downstream users of the Columbia River would be low under all alternative combinations (i.e., a Hazard Index lower than 1.25×10^{-3} and a total risk less than 1.0×10^{-6}) and would be dominated by non–*TC & WM EIS* sources. The estimated offsite population dose of 215 person-rem per year for the year of peak dose is approximately 0.01 percent of the average background dose for the population.

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In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called

Commentor No. 513 (cont'd): Bill Lennox, County Commissioner, Wasco County Board of Commissioners

MARY BETH BURANDT
March 18, 2010
Page 2

Our communities cannot tolerate the long-term contamination of the Columbia River as foreseen in this EIS. We are counting on the Department of Energy to take the requested actions to preserve our collective health, safety, and security. ***513-3 cont'd***

Sincerely,

WASCO COUNTY BOARD OF
COUNTY COMMISSIONERS

Bill Lennox,
WASCO COUNTY COMMISSIONER

milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor No. 514: Betty J. Barnes, Mayor, City of Bingen, Washington

CITY OF BINGEN

March 18, 2010

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
PO Box 1178
Richland, WA 99352

Subject: Draft Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS)

Dear Ms. Burandt:

The City of Bingen is one of many cities along the Columbia River downstream from the Hanford site. We have a diverse economy of agriculture, fisheries, forestry and recreation-based tourism. Many of our high-tech and light industries are located close to or on the banks of the river. The health of Bingen and other cities is linked to the health of the Columbia River.

The City of Bingen is concerned that the cumulative analysis in the U.S. Department of Energy's Daft Tank Closure and Waste Management Environmental Impact Statement (EIS) predicts a wide-spread and persistent environmental contamination of the Columbia River that could affect Bingen and other cities for thousands of years (Chapter 6 and Appendix U). The EIS also concludes that accepting offsite waste at the Hanford site would have long-term negative impacts on the river (Chapter 6). *514-1*

The Columbia River is the life blood of communities adjacent to it. The City of Bingen does not accept the vision portrayed in the EIS as the vision of our future.

We ask the Department of Energy to implement the highest level of cleanup possible and to continually research new technologies that will allow the removal of contaminants deep in the soil. The Department of Energy should make decisions to guarantee the highest level of protection for human health and the environment.

The City of Bingen endorses Oregon Department of Energy's proposed Alternative 7 and urges the U.S. Department of Energy to analyze each of the proposed actions individually and collectively. We also ask you to rescind your February 2000 record of decision that opened up Hanford for storage of off-site waste. *514-2*

The City understands the desire to complete cleanup of Hanford as efficiently and effectively as possible. However, due to the extent of the contamination and the complexity of the cleanup there are no acceptable shortcuts.

112 N Ash Street PO Box 607 Bingen, Washington 98605
Telephone: 509.493.2122 Fax: 509.493.1391 E-mail: bingen@gorge.net

514-1 As described in Chapter 6, Section 6.4.2, the cumulative risk to downstream users of the Columbia River would be low under all alternative combinations (i.e., a Hazard Index lower than 1.25×10^{-3} and a total risk lower than 1.0×10^{-6}) and would be dominated by non–*TC & WM EIS* sources. The estimated offsite population dose of 215 person-rem per year for the year of peak dose is approximately 0.01 percent of the average background dose for the population.

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Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

In general, the scope of this *TC & WM EIS* does not include groundwater remediation activity as part of the proposed actions evaluated. DOE is implementing an extensive, ongoing cleanup program at Hanford, as required under RCRA, CERCLA, and/or the TPA, a legal agreement between DOE, Ecology, and EPA. The TPA identifies cleanup actions and schedules, called

Commentor No. 514 (cont'd): Betty J. Barnes, Mayor, City of Bingen, Washington

Page 2

The communities along the Columbia River cannot tolerate the long-term contamination of the Columbia River as foreseen in the EIS. We urge the Department of Energy to take the requested actions to preserve our collective health, safety and security. **514-2 cont'd**

Sincerely,

Betty J. Barnes
Mayor

112 N Ash Street PO Box 607 Bingen, Washington 98605
Telephone: 509.493.2122 Fax: 509.493.1391 E-mail: bingen@gorge.net

milestones. The TPA agencies completed negotiations on several Hanford cleanup projects, including the establishment of 29 additional and/or accelerated groundwater and Columbia River protection milestones and target dates.

Commentor Number 515 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 514.

Commentor No. 516: Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
Eastern Washington Field Office
11103 East Montgomery Drive
Spokane Valley, WA 99206

April 19, 2010

Ms. Mary Beth Burandt
EIS Document Manager
Department of Energy
Office of River Protection
P.O. Box 1178
Richland, WA 99352

Dear Ms. Burandt:

Thank you for the opportunity to comment on the "Draft Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, WA." Detailed comments are attached. The Department of the Interior, U.S. Fish and Wildlife Service (Service) is providing these comments as part of our continuing effort to support DOE's cleanup activities and Natural Resource Damage Assessment and Restoration (NRDAR), and to help assure that cleanup and NRDAR activities are efficient and well coordinated with other Tribal, State, and Federal activities at the Hanford Facility.

The Service appreciates the significant effort made by DOE to produce a detailed and relatively transparent evaluation of various cleanup approaches. In general, we prefer alternatives that reduce long-term habitat disturbance and provide for mitigation of lost habitats when disturbance footprints cannot be avoided. We are concerned that capping wastes in place may not be the best long-term solution to waste management except in certain limited circumstances, especially given the history of problems with cap effectiveness at sites throughout the United States. *516-1*

The smaller the footprint of waste sites, and smaller the total capped area, the more manageable cap maintenance will be over the long term. Moreover, protection of groundwater is of utmost importance, as movement of contaminated groundwater can adversely impact biota at springs, seeps, wetlands, and the Columbia River. Alternatives that limit migration of contaminated groundwater, and remediate already contaminated groundwater to the maximum extent practicable, are preferred by the Service.

TAKE PRIDE IN AMERICA

516-1 A discussion of impacts on habitat, especially sagebrush habitat, is presented in Chapter 4, Sections 4.1.7, 4.2.7, and 4.3.7. These sections, as well as Chapter 7, Section 7.1.7, also address mitigation of sagebrush habitat loss, as well as other actions that can mitigate impacts on habitat and wildlife. The commentor mentions that there is a "history of problems with cap effectiveness at sites throughout the United States." Further clarification indicated that the issue is the potential footprint of a disposal facility and to reduce the overall footprint of the site by removing the waste and relocating it to one disposal area would be more desirable. DOE understands the commentors desire to reduce the waste disposal footprint at Hanford. A discussion on the closure requirements for a RCRA facility, including the closure of a tank system, is provided in Chapter 8, Section 8.1.4. Before implementing any closure actions, DOE will develop a tank farm system closure plan that will be implemented for each of the waste management areas. The State of Washington "Dangerous Waste Regulations" (WAC 173-303) implement the Hazardous Waste Management Act of 1976, as amended. These regulations provide the requirements for decisionmaking regarding the cleanup and permitting of dangerous wastes. The regulations define the state closure standards for the owners and operators of all dangerous waste facilities (WAC 173-303-610(2)) and include references to requirements for tank systems (WAC 173-303-640). The regulations describe specific requirements for closure of the tank system (WAC 173-303-640(8)(a) and (b)). This part of the regulations provides a requirement for DOE to "remove or decontaminate all wastes residues, contaminated soils, and structures and equipment contaminated with waste" for the tank system. If DOE "demonstrates that not all contaminated soils can be practically removed or decontaminated," then landfill closure is required (WAC 173-303-640(7)). DOE must close the tank system and perform postclosure care in accordance with closure and postclosure care requirements that apply to a dangerous waste landfill (WAC 173-303-640(8)(b)). Closure of a landfill requires the placement of a barrier that meets specified requirements.

Table 4–1 summarizes major new facilities needed under the Tank Closure alternatives, including barriers. A full description of both the modified RCRA Subtitle C and Hanford barriers is provided in Appendix E, Section E.1.2.5.4.1. It is noted in that section that the modified RCRA Subtitle C Barrier is designed to provide long-term containment and hydrologic protection for a performance period of 500 years, while the Hanford barrier is designed for 1,000 years. Following closure, DOE would implement postclosure care (which is assumed in this EIS to be 100 years).

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

If you have any questions, please contact Dr. Joe Bartoszek at (509) 546-8338 or Russell MacRae at (509) 893-8021.

Sincerely,

for Ken S. Berg, Manager
Washington Fish and Wildlife Office

Cc:
Kate Benkert, U.S. Fish and Wildlife Service, Lacey, WA
Joe Bartoszek, U.S. Fish and Wildlife Service, Burbank, WA
Don Steffeck, U.S. Fish and Wildlife Service, Portland, OR
Dave Brockman, U.S. Department of Energy, Richland, WA
Dennis Faulk, U.S. Environmental Protection Agency
Jane Hedges, Washington Department of Ecology
Stuart Harris, Confederated Tribes of the Umatilla Indian Reservation
Gabriel Bohnee, Nez Perce Tribe
Russell Jim, Yakama Indian Nation

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Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety; environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

DRAFT TANK CLOSURE AND WASTE MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT FOR THE HANFORD SITE

Volume 1

Commenting Organization: USFWS Commenter: JEB/RKM
Section #: General Pg #: NA Line #: NA Code: C
Comment: We are interested in reducing exposure and potential exposure of wildlife to hazardous materials below any known effect threshold and to the maximum extent practicable. As such we are not in favor of capping waste in place but prefer removal, treatment, and consolidation in centralized disposal areas. Capping in place is not preferred for long-term protection of wildlife. Any cost/benefit analyses must also consider the long-term impacts to natural resources and their services due to residual contamination. Not only is leaving contamination in place problematic from a basic resource protection standpoint, it may also result in additional costs associated with compensating the public for continued natural resource "injuries" as defined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Natural Resource Damage Assessment and Restoration (NRDAR) provisions. ***516-2***

Commenting Organization: USFWS Commenter: JEB
Section #: General Pg #: NA Line #: NA Code: C
Comment: There are some contaminant issues that appear to be absent from this document. For example, PCB oils had been used in this (and other) area(s) of the site on the roads as dust control, yet no mention is made of this in this EIS. How does DOE intend to handle issues such as this? More assessment of this issue seems warranted. ***516-3***

Commenting Organization: USFWS Commenter: JEB
Section #: General Pg #: NA Line #: NA Code: C
Comment: Lacking from the scenarios or analyses is any planning for disaster. For example, how would a breach of the Grand Coulee Dam affect what occurs on site? This type of planning is required of local emergency planning agencies by the federal government; it makes sense that the federal government should consider these same scenarios in their planning for remedial actions. ***516-4***

Commenting Organization: USFWS Commenter: JEB
Section #: 2.5.4.3 Pg #: 2-120 Line #: NA Code: C
Comment: The DOE (and the Service) have trust responsibilities for the natural resources on the Hanford site. This alternative proposes an additional disposal facility in the 200 west area. Creation of this disposal facility would remove trust resources from use for the public in perpetuity. While we generally prefer removal and disposal rather than capping wastes in place, we prefer alternatives and recommend actions that will reduce the final footprint to the smallest area practicable and mitigate for those areas that are lost. ***516-5***

Commenting Organization: USFWS Commenter: JEB
Section #: 2.8.1.7 Pg #: 2-146 Line #: NA Code: C

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516-2 The clean closure alternatives considered for the SST system are represented by the Base and Option Cases of Tank Closure Alternatives 6A and 6B. For both Base Cases, the assumption is that the SST system would be cleaned to levels that would allow for unrestricted use, which would involve removal of the tanks, ancillary equipment, and soils beneath the tanks (contaminated as a result of past leaks) down to the water table. The two Option Cases represent this type of clean closure along with removal of soils beneath the tank farms (contaminated as a result of infiltration from the contiguous cribs and trenches [ditches]). The analysis shows that removal of the contaminants from the vadose zone would not capture those contaminants that may have already reached the groundwater table due to past practices (i.e., past leaks and contiguous cribs and trenches [ditches]).

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

Although a formal cost-benefit analysis is not required for EISs prepared under the CEQ's regulations implementing NEPA (40 CFR 502.23), or under the State of Washington's SEPA rules (WAC Chapter 197-11-450), DOE did prepare an analysis of the total costs of each alternative to better understand their relative relationship and to support the EIS's evaluation of potential environmental impacts. Compensation for potential natural resource injuries is addressed under a separate process consistent with CERCLA, as amended (42 U.S.C. 601, 9607) through regulations issued by the Department of Interior (43 CFR Part 11). These regulations establish an administrative process for conducting assessments that includes technical criteria for determining whether releases have caused injury, and if so, what actions and funds are needed to implement restoration. As a Trustee for natural resources at Hanford, DOE will continue to meet its responsibilities under CERCLA, as spelled out in the TPA, which includes addressing natural resource injuries. DOE's policy is to integrate natural resource concerns and restoration through the CERCLA cleanup process. Both DOE and the Department of the Interior are participating, along with other trustees, in ongoing injury assessment planning and related Natural Resource Damage Assessment and Restoration activities.

516-3 DOE discontinued the previous use of oils containing polychlorinated biphenyls (PCBs) as a method of dust control at Hanford in 1978, after which time the use of PCBs was restricted to contained systems. Areas previously contaminated

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

Comment: The DOE (and the Service) have trust responsibilities for the natural resources on the Hanford site. Reducing disturbance to the least amount practicable is preferred, in particular reducing impacts to the existing sagebrush habitat should be minimized for both the short- and long-term. **516-6**

Commenting Organization: USFWS Commenter: JEB
Section #: 2.8.3.7 Pg #: 2-190 Line #: NA Code: C
Comment: The DOE (and the FWS) have trust responsibilities for the natural resources on the Hanford site. Reducing disturbance to the least amount practicable is preferred; in particular reducing impacts to the existing sagebrush habitat should be minimized for both the short- and long-term. **516-7**

Commenting Organization: USFWS Commenter: JEB
Section #: 2.9.1.2 Pg #: 2-215 Line #: NA Code: C
Comment: This section states that "Impacts on other types of receptors vary in proportion to the impacts on the drinking-water well user and do not provide additional information to discriminate among alternatives." There is no additional information on which alternative is the most conservative, what is the proportional relationship of the other alternatives to the drinking-water well user, or other information which would aid the reader in evaluating the relative risk to other receptors/scenarios. Some information to guide the reader in this regard needs to be provided in this section. **516-8**

Commenting Organization: USFWS Commenter: JEB
Section #: 2.9.1.3 Pg #: 2-225 Line #: NA Code: C
Comment: The exposure scenario and calculation does not adequately characterize the potential risk to ecological receptors. These HQs are derived without considering the potential additive effects of chemicals, inputs of contaminants from ground water, aerial deposition on plants, etc. Missing are impacts from contaminated soil left in place, transport from disposal cells over time (generally through ground water), direct contact from air deposition and rain splash (on plants), and surface water pools (fed by surface water runoff and ground water). **516-9**

Commenting Organization: USFWS Commenter: RKM
Section #: 3.2.7.4 Pg #: 3-73 Line #: NA Code: C
Comment: Critical habitat for the federally threatened bull trout has recently been revised, and the current proposal includes the Hanford Reach of the Columbia. The EIS should be updated to reflect potential effects of Hanford activities on this critical habitat. We would also recommend additional conversations with the Service and the National Marine Fisheries Service (NMFS) regarding Endangered Species Act (Act) consultation regarding possible effects to federally listed species and their critical habitat. The current effects analysis in the EIS should be expanded. **516-10**

Commenting Organization: USFWS Commenter: RKM
Section #: 4.1.7 Pg #: 4-436 Line #: NA Code: C
Comment: This and other sections that discuss potential effects to threatened and endangered species should be expanded. The scope of your analysis should explicitly include any interrelated or interdependent project activities, (e.g., equipment staging areas, offsite borrow **516-11**

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by this past practice are being addressed as part of the Hanford Site cleanup program and will be addressed in accordance with the requirements and timing of that program. Note that this *TC & WM EIS* does not address the cleanup of PCB-contaminated soils such as those referred to by the commentor; it does, however, include an analysis of the potential environmental impacts associated with a number of nonradioactive contaminants, including PCBs. Some of the waste in the Hanford SSTs and DSTs is known to contain PCBs. Appendix D, Section D.1.1.3, of this EIS explains how sample data were used to derive an estimated inventory for the tank farms. As indicated by that analysis, because the tank farms are high above the water table and remote from the river, PCBs have a negligible impact. Appendix M shows the projected PCBs released to the vadose zone from the tank farms (see, for example, Figures M–20, M–21, and M–22). Appendix N presents figures on the projected PCBs that travel through the vadose zone and reach the groundwater. As reflected in Figures N–16, N–17, and N–18 of the draft EIS, PCBs would not reach the groundwater in any significant quantity in the 10,000-year period of analysis.

516-4 As discussed in Chapter 3, Section 3.2.10.5, Emergency Preparedness, of this *TC & WM EIS*, DOE contractors are responsible for maintaining emergency plans and response procedures for all facilities, operations, and activities under their jurisdiction. The Hanford Site Emergency Plan, established in compliance with DOE Order 151.1C, *Comprehensive Emergency Management System*, provides for hazard-specific planning of, preparedness for, and response to a wide range of facility emergencies and natural phenomena, including flooding. Appendix K, Section K.3, covers the range of accidents considered and evaluated in this EIS. The accidents include facility accidents as well as natural events (e.g., an earthquake) deemed capable of affecting project facilities. A dam failure, as noted in the comment, was not included, as it is not deemed to have that capability. Chapter 3, Section 3.2.6.1, has been revised to include information from a study by the U.S. Army Corps of Engineers indicating that a hypothetical 50 percent instantaneous breach of Grand Coulee Dam would not inundate the 200 Areas or the 400 Area, where the activities addressed in this EIS are concentrated.

516-5 As noted in Chapter 2, Section 2.12, DOE's Preferred Alternative for waste management is Alternative 2, which would utilize less land, including less sagebrush habitat, than Alternative 3 but more than Alternative 1, No Action. With respect to mitigation, DOE would mitigate the loss of sagebrush habitat as stipulated in the *Hanford Site Biological Resources*

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

material areas, or utility relocations) and any indirect or cumulative effects. The current draft EIS does not contain a Biological Assessment that comprehensively summarizes effects in one place. Please coordinate with the Service and NMFS. **516-11 cont'd**

Commenting Organization: USFWS Commenter: JEB
Section #: 5.1.3 Pg #: 3-362 Line #: NA Code: C
Comment: Long-term ground water impacts are only considered for the Columbia River, not resources that may be impacted on the travel route from the source to the Columbia River. The ponds near Gable Mountain provide evidence that the ground water contamination at the site is capable of impacting biota other than those only found in the Columbia River. Scenarios in which contaminated ground water impacts biota as it travels to the Columbia River need to be considered. **516-12**

Commenting Organization: USFWS Commenter: JEB
Section #: 5.3.3 Pg #: 5-1162 Line #: NA Code: C
Comment: Long-term ground water impacts are only considered for the Columbia River, not resources that may be impacted on the travel route from the source to the Columbia River. Air deposition alone is not sufficient to characterize potential impacts to biota along the contaminated ground water pathway. The ponds near Gable Mountain provide evidence that the ground water contamination at the site is capable of impacting biota other than those only found in the Columbia River. Scenarios in which contaminated ground water impacts biota as it travels to the Columbia River need to be considered. **516-13**

Commenting Organization: USFWS Commenter: JEB
Section #: 5.4.3 Pg #: 5-1269 Line #: NA Code: C
Comment: Long-term ground water impacts are only considered for the Columbia River, not resources that may be impacted on the travel route from the source to the Columbia River. The ponds near Gable Mountain provide evidence that the ground water contamination at the site is capable of impacting biota other than those only found in the Columbia River. Scenarios in which contaminated ground water impacts biota as it travels to the Columbia River need to be considered. **516-14**

Commenting Organization: USFWS Commenter: JEB
Section #: 6.3.7 Pg #: 6-19 Line #: NA Code: C
Comment: Wetland creation incidental to construction, remediation, and treatment may occur. Any surface waters created should not adversely impact wildlife which may utilize them. **516-15**

Commenting Organization: USFWS Commenter: JEB
Section #: 6.3.7.1 Pg #: 6-21 Line #: NA Code: C
Comment: Impacts to mature shrub-steppe should be minimized. **516-16**

Commenting Organization: USFWS Commenter: JEB
Section #: 6.4.3 Pg #: 6-164 Line #: NA Code: C
Comment: Long-term ground water impacts are only considered for the Columbia River, not resources that may be impacted on the travel route from the source to the Columbia River. The ponds near Gable Mountain provide evidence that the ground water contamination at the site is **516-17**

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Management Plan (DOE 2001) and the *Hanford Site Biological Resources Mitigation Strategy* (DOE 2003c) (see appropriate ecological resources sections of Chapter 4 and Chapter 7, Section 7.1.7).

516-6 DOE is cognizant of its trust responsibilities. As noted in Chapter 7, Section 7.1.7, where impacts would occur, mitigation would be implemented as stipulated in the *Hanford Site Biological Resources Management Plan* (DOE 2001) and the *Hanford Site Biological Resources Mitigation Strategy* (DOE 2003c).

516-7 See response to comment 516-5 regarding sagebrush habitat.

516-8 As indicated in Chapter 2, Section 2.9, of this *TC & WM EIS*, detailed analysis and discussion of the long-term human health impacts for the drinking-water well user and the other receptors are provided in Appendix Q of this EIS. The purpose of Section 2.9 is to provide a summary of the results. Therefore, the drinking-water well user was used as a representative for the four types of receptors. The statement is trying to explain that the results from the other three types of receptors (i.e., the resident farmer, the American Indian resident farmer, and the American Indian hunter-gatherer) are proportional to the impacts on the drinking-water well user, so are not needed in this section in order for the reader to compare the alternatives. However, Chapter 5 and Appendix Q of this *TC & WM EIS* provide the results from the analyses for all four types of receptors and how they compare to each other and across the alternatives.

516-9 As stated in Appendix P, Section P.2.1, comparing alternatives is the primary purpose of the ecological risk analysis in this *TC & WM EIS*. The risk analysis is not intended to fully characterize the risk, as might occur in an ecological risk assessment under laws such as CERCLA; therefore, every exposure pathway (e.g., rain splash on plants) and its incremental contribution to a potential impact is not quantified. The most important pathways from sources to receptors (air emission and the subsequent deposition on soil, releases to groundwater) that are evaluated in this EIS are common to all of the alternatives, but vary in magnitude under different alternatives. The amounts released via these pathways and the resulting concentrations in the different media to which receptors are directly or indirectly exposed also vary under the different alternatives, but the extent to which receptors are exposed to the different media does not vary. Therefore, the risk to receptors under the different alternatives does not change if common but minor exposure routes are not included in the risk estimates for the receptors as long as the risk estimates for all alternatives are calculated in the same way for

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

potentially capable of impacting biota other than those only found in the Columbia River. Scenarios in which contaminated ground water impacts biota as it travels to the Columbia River need to be considered.

Scenarios also appear to assume no changes in geomorphology of the Columbia River. It is assumed that in the timeframe considered (10,000 years) the flow path of the Columbia River will change. A recent article (2/1/2010) in the Tri-City Herald interviewing Alan Rohay, a seismologist at Pacific Northwest National Laboratory, stated that about 2,000 earthquakes occurred during 2009 in a small area beside the Columbia River on the Hanford site. There was an uplift of about an inch in this area. This would seem to support the concept that the river may indeed change course within 10,000 years. The most likely change in this area is to the south, first through the Hanford Ditch area, then possibly further south to the southwest of Gable Mountain. This would change exposure scenarios particularly with respect to inputs to the Columbia River. Geomorphological changes need to be considered for the various scenarios. *516-17 cont'd*

Commenting Organization: USFWS Commenter: JEB
Section #: 7.2.7 Pg #: 7-26 Line #: NA Code: C
Comment: This section states that "Furthermore, under all TC & WM EIS alternatives, some COPCs would eventually migrate to and seep into the Columbia River. However, as discussed in Chapter 5, most of these impacts for all TC & WM EIS alternatives are not projected to be a risk to ecological receptors." Although we concur that COPCs will eventually migrate to the Columbia River, there was not adequate characterization to state that they are not projected to be a risk to ecological receptors and it appears as though there will be potential risk to ecological receptors that may be significant. *516-18*

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the same set of exposures and receptors. The additive effects of chemicals can be evaluated by calculating the Hazard Indices as the sum of the Hazard Quotients of individual chemicals.

516-10 The paragraph that discusses critical habitat in Chapter 3, Section 3.2.7.4, has been revised to include designation of the main stem upper Columbia River and Yakima River critical habitat units for the bull trout. Appropriate sections of Chapters 3 and 4 have been expanded accordingly.

Communications have occurred with DOE and with USFWS, NMFS, and the state concerning listed species that are potentially present on Hanford (see Appendix C). Potential impacts on special status species at Hanford are addressed in Chapter 4, Section 4.1, and there is no impact (that is, "no effect") on any federally or state-listed threatened or endangered species. If circumstances change, DOE will evaluate the need and undertake additional informal consultation with the appropriate agencies to ensure protection of listed species.

516-11 As noted in the response to comment 516-10, appropriate sections of Chapters 3 and 4 dealing with threatened and endangered species have been expanded to address the designation of critical habitat for the bull trout. DOE has considered the land needed for construction laydown in its land use estimates. Nearly all geologic material would be derived from Borrow Area C, although small amounts of material, such as cement, would be purchased from licensed offsite commercial facilities (see Chapter 4, Section 4.1.5). The small land area that could be needed to supply utilities to individual construction sites has not been included in the land use estimates provided in Chapter 4 because the extensive existing utility network in the 200 and 400 Areas would likely require little expansion. Nevertheless, DOE would consult with USFWS and the State of Washington prior to constructing utility corridors through undeveloped portions of the 200 and 400 Areas. Further, these areas would be surveyed for threatened and endangered species. It should be noted that a road has already been constructed off of Route 240 to access Borrow Area C. As no threatened or endangered species occur in the immediate vicinity of areas affected by project activities, indirect impacts would be minimal or nonexistent.

A general discussion of indirect impacts on biota is presented in Section 4.1.7.2.1 and other appropriate sections of Chapter 4. Potential cumulative impacts on threatened and endangered species are addressed in Chapter 6, Section 6.3.7. The format chosen for this *TC & WM EIS* is to present a discussion of each resource

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

Appendix P

Commenting Organization: USFWS Commenter: JEB
Section #: General Pg #: NA Line #: NA Code: E
Comment: The Service has limited its review of this document due in part to its large size, and in part due to the focus on sub-surface and engineering-related issues. Nonetheless, even our review was made difficult by errors in cross referencing within the document. *516-19*

Commenting Organization: USFWS Commenter: JEB
Section #: General Pg #: NA Line #: NA Code: C
Comment: Scenarios appear to assume no changes in geomorphology of the Columbia River. Based on historical changes in the geomorphology of the Columbia Basin, and continuing earthquakes and uplift in the Hanford Reach area, it can be assumed that in the time frame considered (10,000 years) the flow path of the Columbia River will continue to change. A recent article (2/1/2010) in the Tri-City Herald interviewing Alan Rohay, a seismologist at Pacific Northwest National Laboratory, stated that about 2,000 earthquakes occurred during 2009 in a small area beside the Columbia River on the Hanford site. There was an uplift of about an inch in this area. This would seem to support the concept that the river may indeed change course within 10,000 years. The most likely change in this area is to the south, first through the Hanford Ditch area, then possibly further south to the southwest of Gable Mountain. This would change exposure scenarios particularly with respect to inputs to the Columbia River. Geomorphological changes need to be considered for the various scenarios. *516-20*

Commenting Organization: USFWS Commenter: JEB
Section #: General Pg #: NA Line #: NA Code: C
Comment: There is a general sense that the goal of the risk analysis was to demonstrate there is an acceptable risk under the various alternatives. For example when Hazard Quotients exceed 1, it is stated that this doesn't mean there is unacceptable risk (e.g. "The chromium Hazard Quotients above 1.0 did not necessarily indicate high risk to aquatic biota"). Arguments are made to support these statements (e.g., given the magnitude of the Hazard Quotients and the conservative exposure assumptions… aquatic biota and sediment-dwelling biota… would be unlikely to be at unacceptable risk), rather than suggesting further analysis may be needed. Although the document considers the exposure assumptions conservative, we believe that these HQs are derived without considering the potential additive effects of chemicals, inputs of contaminants from ground water, aerial deposition on plants, etc. Thus we do not agree that these results are "conservative" or "overestimated" as stated in the text. Additionally some exposure factors have been dropped from the calculations (e.g., in the exposure model for plants, the exposure from direct deposition (P_d) is missing). We disagree with the conclusion that the analyses indicate acceptable risk (page P-51 "Conservative exposure assumptions and TRVs mitigated these uncertainties and allow for confidence in "no risk" conclusions"). *516-21*

Commenting Organization: USFWS Commenter: JEB
Section #: General Pg #: NA Line #: NA Code: C
Comment: There are several shortcomings with the current ecological risk assessment and we are concerned about the adequacy for predicting current and future risk. *516-22*

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area (e.g., land use, infrastructure, ecological resources) under each Tank Closure alternative, followed by similar discussions under the FFTF Decommissioning and Waste Management alternatives. Thus, it is not possible to present all information for threatened and endangered species within one section. The format used in this EIS attempts to present the material in a logical manner that permits the reader to readily review the potential impacts.

516-12 Potential impacts on terrestrial ecological resources were evaluated for multiple exposure pathways and sources (air emissions and subsequent deposition on soil, releases to groundwater). Impacts on terrestrial receptors were evaluated at the maximum onsite location (air deposition only) and offsite/Columbia River location (air deposition and groundwater discharge). For consistency with other *TC & WM EIS* assessments of long-term impacts, the line of analysis for the maximum terrestrial exposure location was the Core Zone Boundary in the predominant downwind direction, and exposure to groundwater upwelling/discharging was only evaluated at the Columbia River. Based on DOE's review of the site descriptions, the conceptual model for Hanford does not include locations (such as Gable Mountain ponds) along the pathways from potential contamination sources to the Columbia River. This is consistent with the conceptual site model for long-term future groundwater levels. This EIS does not state or assume that terrestrial receptors are never exposed to groundwater in upland habitats; however, discharge of contaminated groundwater beneath the Core Zone to upland habitats is considered a minor pathway because if it occurs, it only occurs in a few places, infrequently, and only at small volumes, and the extent and magnitude of the ecological exposure is accordingly small. The most important pathways from sources to receptors that are evaluated in this EIS are common to all of the alternatives, but vary in magnitude under different alternatives. Therefore, the risk to receptors under the different alternatives does not change if common but minor exposure routes are not included in the risk estimates for the receptors as long as the risk estimates for all alternatives are calculated in the same way for the same set of exposures and receptors.

516-13 See response to comment 516-12 for a discussion of long-term groundwater impacts.

516-14 See response to comment 516-12 for a discussion of long-term groundwater impacts.

516-15 DOE agrees with the commentor that any surface waters created as a result of activities associated with any of the Tank Closure, FFTF Decommissioning,

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

Commenting Organization: USFWS Commenter: JEB
Section #: P.1 Pg #: P-1 Line #: NA Code: E
Comment: Review was made difficult by errors in cross referencing within the document. For example Appendix P, section P1 refers to Chapter 3, Figure 3-13 for habitat information whereas this information appears to be in Figure 3-16 and the reader is referred to sections 3.9.4.1 and 3.9.4.2 for threatened and endangered species however these sections do not exist. **516-23**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2 Pg #: P-5 Line #: NA Code: C
Comment: What appears to be missing from the analysis is upland waters that would be ground water fed. These types of water bodies have been found historically on site (e.g. Gable Mountain ponds) and could appear again through erosion of ground surface and/or changes in ground water elevation or other geomorphological changes over the next 10,000 years. This scenario indeed may be likely. Analyses of impacts to wildlife under the different scenarios when these conditions appear need to be conducted. **516-24**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2 Pg #: P-5 Line #: NA Code: C
Comment: Impacts to terrestrial ecological receptors were evaluated by using values from air and soil concentrations resulting from air deposition. Missing are impacts from contaminated soil left in place, transport from disposal cells over time (generally through ground water), direct contact from air deposition and rain splash (on plants), and surface water pools (fed by surface water runoff and ground water). These impacts need to be included. **516-25**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2 Pg #: P-5 Line #: NA Code: C
Comment: It is stated that immediately following operations soil concentrations are expected to be at their maximum, attenuating thereafter. However predicted failure of disposal containment shows increases in ground water levels long after operations have ceased. These releases will likely impact surface water through migration to the Columbia River as well as providing a source for more upland surface water bodies; analyses of impacts to wildlife under these conditions needs to be conducted. **516-26**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1 Pg #: P-6 Line #: NA Code: C
Comment: It appears as though the exposure scenarios were run during remedial operations only although it is stated that predicted releases were used "…to evaluate the impacts…in the distant future following operations." These analyses were not evident. We are concerned about the potential long-term impacts to wildlife that may occur after remedial activities have ceased. What are the exposure scenarios and potential impacts for the different alternatives in Calendar Year 2050 and beyond? **516-27**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1 Pg #: P-6 Line #: NA Code: C
Comment: Exposure was not evaluated using the newer ICRP Publication 108 (October, 2008). What would the result be using the newer guidance? **516-28**

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or Waste Management alternatives should not adversely impact wildlife. Such surface waters would most likely be associated with runoff/sedimentation ponds put in place during construction and would be temporary in nature. Because water captured in these ponds would be unlikely to be contaminated and would readily infiltrate or evaporate, adverse impacts on wildlife would also be unlikely. Nevertheless, appropriate precautions to eliminate or minimize adverse impacts on wildlife would be implemented as part of such projects at the time they occur.

516-16 During the process of siting facilities for the various alternatives addressed in this *TC & WM EIS*, DOE selected locations that were within disturbed areas to the greatest extent possible. Nevertheless, some undisturbed areas containing sagebrush habitat would be needed for locating a few facilities. If sagebrush habitat would be disturbed under alternatives selected in the ROD, its loss would be mitigated as stipulated in the *Hanford Site Biological Resources Management Plan* (DOE 2001) and the *Hanford Site Biological Resources Mitigation Strategy* (DOE 2003c) (see the appropriate ecological resources sections of Chapter 4 and Chapter 7, Section 7.1.7).

516-17 In general, the features and processes (e.g., geomorphology) included in the groundwater model were governed primarily by two considerations: the requirement to inform decisionmaking by providing an unbiased evaluation of the impacts of the alternatives and the requirement to provide a technically defensible analysis of the impacts using documented data and methodologies. Many important features or processes can be thought to occur, but are not essential to a comparative analysis, which would be weakened or clouded by modeling features and processes that are speculative or may occur, but that lack essential characterization data. Due to the uncertainty of occurrences 10,000 years in the future, any assumption made would have to be applied consistently to all alternatives, which would not affect their relative ranking. This *TC & WM EIS* is designed to evaluate impacts to support decisions regarding retrieval of waste from the SST system, closure of that system, and processing and disposal of the waste streams resulting from those activities. Those evaluations are best supported by analyses that model future conditions similar to current conditions in the absence of data that strongly demonstrate the degree and nature of change.

516-18 As stated in Appendix P of this *TC & WM EIS*, comparing alternatives is the primary purpose of the ecological risk analysis in this EIS. Based on the conservative nature of the exposure assumptions and on the estimated Hazard Indices and Hazard Quotients for the representative receptors, no adverse effects

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1 Pg #: P-6 Line #: NA Code: C
Comment: Comparing alternatives is the primary purpose of the ecological risk analysis however without including impacts from contaminated soil left in place, transport from disposal cells over time (generally through ground water), and surface water pools (fed by surface water runoff and ground water) comparison of the long term potential impacts to wildlife are inadequate. As written, the analysis is primarily for releases during remedial treatment and does not consider impacts after closure. **516-29**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1 Pg #: P-6 Line #: NA Code: C
Comment: Benchmarks from the newer ICRP Publication 108 (October, 2008) should also be considered. **516-30**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1 Pg #: P-8 Line #: NA Code: C
Comment: Since hazards from exposures to multiple chemicals can be and usually are additive (although they can be antagonistic or synergistic) evaluating impacts from chemicals individually is generally not acceptable. Several acceptable methods are available for such analyses (see e.g. "Methods and Guidance for Health Risk Assessment of Chemical Mixtures," L. K. Teuschler, M. Mumtaz, R. C. Hertzberg, and G. E. Rice, 2003). **516-31**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1 Pg #: P-8 Line #: NA Code: C
Comment: Use of partial dose because further information is not available is not appropriate without explicitly showing where only partial dose was used and indicating why no acceptable method of estimating total dose was available. **516-32**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1 Pg #: P-8 Line #: NA Code: C
Comment: Using bird toxicity test data for lizards and particularly amphibians is not appropriate. There should be no shortage of chemical toxicity data that could be used for amphibians and reptiles so that there is no need to use any other class of animal. **516-33**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1.1 Pg #: P-9 Line #: NA Code: C
Comment: Exposure pathways to plants should include aerial deposition (e.g., foliar adsorption), rain splash, and ground water uptake. **516-34**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1.4 Pg #: P-10 Line #: NA Code: C
Comment: In the exposure model for plants, the exposure from direct deposition (P_d) is missing (USEPA, 1999, Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Vol. 3, Appendix F, Peer Review Draft, EPA530-D-99-001C, Office of Solid Waste and Emergency Response, Washington, D.C., August.) **516-35**

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of chemical or radioactive COPCs in air or groundwater releases to the Columbia River are expected to result under the various alternatives evaluated.

516-19 For those who may not want to read through this entire EIS, DOE published a Summary. The Summary is intended to provide a brief overview of the material contained in the *Draft TC & WM EIS*. For those interested in reading this entire EIS, DOE has also issued a Reader's Guide to assist the public in navigating through the information presented. This guide serves as an introduction and guide to the contents of this EIS, highlights the key features of the reasonable alternatives, and provides references to specific sections of the document to assist the reader in reviewing the technical analyses presented. Recognizing that many people may not read beyond the EIS Summary, the information presented in both the Summary and the Reader's Guide attempts to strike a balance between those readers interested in the technical details regarding DOE's proposed actions and alternatives and readers seeking a simple overview.

DOE also held a 1-hour open house prior to each public hearing on the draft EIS to allow the public to meet informally with members of the *TC & WM EIS* team, ask questions, and learn more about the draft EIS. Informative factsheets also were provided at these open houses. In response to the commentor's concern regarding any cross-referencing errors that may have occurred during production of the draft EIS, DOE has done an extensive review to ensure that the cross-references of this *Final TC & WM EIS* are improved. In addition, DOE has conducted thorough reviews of this EIS, including technical editing and proofing, as well as reviews by subject matter experts and DOE staff to ensure the accuracy of cross-references within this document.

516-20 See response to comment 516-17 regarding groundwater model features.

516-21 As stated in Appendix P, Section P.2.1, comparing alternatives is the primary purpose of the ecological risk analysis in this *TC & WM EIS*. The risk analysis is not intended to fully characterize the risk, as might occur in an ecological risk assessment under laws such as CERCLA; therefore, every exposure pathway (e.g., rain splash on plants) and its incremental contribution to a potential impact is not quantified. Nevertheless, the magnitude of exposures over the important pathways is overestimated, as described in Appendix P, Section P.2, by using maximum average annual air concentrations and cumulative soil concentrations resulting from air deposition over the entire operations period and ignoring all loss mechanisms. These hypothetical maximum exposures for the evaluated pathways are compared with benchmarks associated with no impact, resulting in

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1.4 Pg #: P-11 Line #: NA Code: C
Comment: In the exposure model for soil-dwelling invertebrates, the exposure from ingested water (P_w) is missing (USEPA, 1999, Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Vol. 3, Appendix F, Peer Review Draft, EPA530-D-99-001C, Office of Solid Waste and Emergency Response, Washington, D.C., August). This may be significant in the long-term due to failure of disposal cells and movement of contaminated ground water. **516-36**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1.4 Pg #: P-11 Line #: NA Code: C
Comment: The soil organic carbon content referenced as 0.01 in DOE 1998 (DOE (U.S. Department of Energy), 1998, Screening Assessment and Requirements for a Comprehensive Assessment, Columbia River Comprehensive Impact Assessment, DOE/RL-96-16, Rev. 1, Pacific Northwest National Laboratory and CRCIA Management Team, March) could not be found within that reference. Please provide more detail of the source of this value. **516-37**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1.4.1 Pg #: P-11 Line #: NA Code: C
Comment: The ECF for mule deer is 1, taken from Sample et al (1997). However Sample states that "For relatively small mammals (e.g., mice, voles, and shrews) that are effectively much closer than 1 m to the source, an elevation correction factor (ECF) of 2 should be applied to account for the increased dose expected at ground level relative to the effective height of a standard human used to derive the dose coefficients. For large animals the ECF may be set at 1. If desired, more complex modeling may be conducted to arrive at ECFs for organisms of any given effective height above the ground." In the case of deer, an ECF of 1 does not seem appropriate since, unlike humans, adult deer sleep on the ground and fawns, a physiologically more sensitive life stage, spend even more time lying on the ground. **516-38**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1.4.1 and P.2.1.4.2 Pg #: P-11 to P-18 Line #: NA Code: C
Comment: Exposure was not evaluated using the newer ICRP Publication 108 (October, 2008). Why wasn't the newer guidance used and what would the result be using the newer guidance? **516-39**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.1.5 Pg #: P-20 Line #: NA Code: C
Comment: The toxicological benchmarks used for vertebrates (0.1 rad per day) and plants/invertebrates (1 rad per day) were derived from IAEA (1992). Are these at least as protective as the no effect level values for reference plants and animals in Environmental Protection: the Concept and Use of Reference Animals and Plants, ICRP Publication 108 Approved by the Commission in October 2008 using the appropriate dose calculations? We would like the most protective values to be used. **516-40**

Commenting Organization: USFWS Commenter: JEB
Section #: P.2.2.1 Pg #: P-25 Line #: NA Code: C

conservative Hazard Quotients. Statements addressing Hazard Quotients greater than 1 acknowledge the deliberate conservatism of some of the parameters used in the risk analysis and the uncertainty associated with interpreting Hazard Quotients that are greater than 1, which are indicative of likely adverse impacts. This EIS does not unequivocally state that there are no risks to ecological receptors under the various alternatives. As stated in Appendix P, a more precise evaluation would be required to resolve the uncertainties in the risk characterization. A risk assessment precise enough to support risk characterization with acceptable uncertainty, however defined, such as might be required to support a decision under CERCLA, would typically require field studies quantifying actual exposure of, and adverse impacts on, ecological receptors, i.e., a baseline ecological risk assessment. A baseline ecological risk assessment is unnecessary, because such an assessment is not required to provide an unbiased comparison or to differentiate the impacts among the alternatives evaluated in this *TC & WM EIS*. As suggested in Appendix P, a more precise evaluation is not possible for this *TC & WM EIS* because of incomplete and unavailable information.

516-22 As stated in Appendix P, Section P.2.1, comparing alternatives is the primary purpose of the ecological risk analysis in this *TC & WM EIS*. The risk analysis is not intended to fully characterize the risk, as might occur in an ecological risk assessment under laws such as CERCLA; therefore, every exposure pathway (e.g., rain splash on plants) and its incremental contribution to a potential impact is not quantified. The most important pathways from sources to receptors (air emission and the subsequent deposition on soil, releases to groundwater) that are evaluated in this EIS are common to all of the alternatives, but vary in magnitude under different alternatives. The amounts released via these pathways and the resulting concentrations in the different media to which receptors are directly or indirectly exposed also vary under the different alternatives, but the extent to which receptors are exposed to the different media does not vary. Therefore, the risk to receptors under the different alternatives does not change if common but minor exposure routes are not included in the risk estimates for the receptors as long as the risk estimates for all alternatives are calculated in the same way for the same set of exposures and receptors.

516-23 The text has been corrected in Appendix P, Section P.1, of this *Final TC & WM EIS*.

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

Comment: Here reference is made to using the soil-dwelling invertebrate BAF-S that might have been overestimated. The BAF-S was based on a Daphnia BCF as described in section P.2.1.4 page P-11. Since using the Daphnia raised uncertainty for the soil dwelling invertebrate, why wasn't the earthworm used instead? For example, the following approach to calculate a soil-earthworm BAF is from SADA (2000):

Kow-based soil-to-invertebrate BAFs generated using
the following equation from EPA (2000):
BAFworm = soil to earthworm bioaccumulation factor
(mg/kg dry invertebrate / mg/kg soil)
foc = fraction organic carbon in soil. Default is set to 1%.
Kow = octanol-water partitioning coefficient.

516-41

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516-24 Ecological risk information used to assess and compare the alternatives is presented in this EIS. Potential impacts on terrestrial ecological resources were evaluated for multiple exposure pathways and sources (air emissions and subsequent deposition on soil, releases to groundwater). Impacts on terrestrial receptors were evaluated at the maximum onsite location (air deposition only) and offsite/Columbia River location (air deposition and groundwater discharge). For consistency with other *TC & WM EIS* assessments of long-term impacts, the line of analysis for the maximum terrestrial exposure location was the Core Zone Boundary in the predominant downwind direction. This EIS does not state or assume that terrestrial receptors are never exposed to groundwater in upland habitats; however, discharge of contaminated groundwater beneath the Core Zone to upland habitats is considered a minor pathway. The most important pathways from sources to receptors that are evaluated in this EIS are common to all of the alternatives, but vary in magnitude under different alternatives. The amounts released via these pathways and the resulting concentrations in the different media to which receptors are directly or indirectly exposed also vary under the different alternatives, but the extent to which receptors are exposed to the different media does not vary. Therefore, the risk to receptors under the different alternatives does not change if common but minor exposure routes are not included in the risk estimates for the receptors as long as the risk estimates for all alternatives are calculated in the same way for the same set of exposures and receptors.

516-25 As stated in Appendix P, Section P.2.1, comparing the alternatives is the primary purpose of the ecological risk analysis in this *TC & WM EIS*. The risk analysis is not intended to fully characterize the risk, as might occur in an ecological risk assessment under laws such as CERCLA; therefore, every exposure pathway (e.g., rain splash on plants) and its incremental contribution to a potential impact is not quantified. The most important pathways from sources to receptors (air emission and the subsequent deposition on soil, releases to groundwater) that are evaluated in this EIS are common to all of the alternatives, but vary in magnitude under different alternatives. The amounts released via these pathways and the resulting concentrations in the different media to which receptors are directly or indirectly exposed also vary under the different alternatives, but the extent to which receptors are exposed to the different media does not vary. Therefore, the risk to receptors under the different alternatives does not change if common but minor exposure routes are not included in the risk estimates for the receptors as long as the risk estimates for all alternatives are calculated in the same way for the same set of exposures and receptors.

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

Appendix R

Commenting Organization: USFWS Commenter: JEB
Section #: R.4 Pg #: R-10 Line #: NA Code: C
Comment: The following two bullets are presented on this page:

• Contaminated materials and soils will be left in place, unless removal and disposal are more cost-effective.
• Removing, treating, and disposing of contaminated materials, especially soil.

Contaminated materials and soils should be removed, treated, and disposed of unless doing so is cost prohibitive and leaving those materials in place will not present an unacceptable risk. ***516-42***

Commenting Organization: USFWS Commenter: JEB
Section #: Table R-3 Pg #: R-20 Line #: NA Code: C
Comment: Long-term ground water impacts are only considered for the Columbia River, not resources that may be impacted on the travel route from the source to the Columbia River. The ponds near Gable Mountain provide evidence that the ground water contamination at the site is capable of impacting biota other than those only found in the Columbia River. Scenarios in which contaminated ground water impacts biota as it travels to the Columbia River need to be considered.

The analyses appear to assume no changes in geomorphology of the Columbia River. It is assumed that in the time frame considered (10,000 years) the flow path of the Columbia River will change. A recent article (2/1/2010) in the Tri-City Herald interviewing Alan Rohay, a seismologist at Pacific Northwest National Laboratory, stated that about 2,000 earthquakes occurred during 2009 in a small area beside the Columbia River on the Hanford site. There was an uplift of about an inch in this area. This would seem to support the concept that the river may indeed change course within 10,000 years. The most likely change in this area is to the south, first through the Hanford Ditch area, then possibly further south to the southwest of Gable Mountain. This would change exposure scenarios particularly with respect to inputs to the Columbia River. Geomorphological changes need to be considered. ***516-43***

Commenting Organization: USFWS Commenter: JEB
Section #: Table R-12 Pg #: R-23 Line #: NA Code: C
Comment: The listed activity "Management of the Hanford Reach of the Columbia River as a national monument and a national wildlife refuge" should include as a wild and scenic river in accordance with Public Law 100-605 as amended by Public Law 104-333, Section 404 in this and other relevant sections of the document (e.g. Section 6.2). ***516-44***

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516-26 See response to comment 516-24 regarding ecological receptors.

516-27 Long-term impacts of releases to air throughout the remedial period were evaluated at the end of that period, when the concentrations would be at their theoretical maximum due to accumulation of contaminants released throughout the period, assuming no decay or other entropic processes following deposition. At the end of the remedial period, concentrations would begin to be reduced by decay and other entropic processes. Direct exposure of wildlife to wastes in burial grounds after the end of the period was not evaluated in this EIS, except to the extent that wildlife would be exposed to releases of contaminants to groundwater. Long-term impacts on wildlife exposed to maximum concentrations in discharging groundwater over 10,000 years were evaluated.

516-28 This *TC & WM EIS* used the guidance of Valentin (2007) [ICRP Publication 103]. DOE believes the benchmarks in that guidance are adequate for the purposes of this EIS (Hanford-specific receptors). The primary purpose of the ecological risk analysis for this *TC & WM EIS* is to provide an unbiased comparison of alternatives, and that comparison is independent of the benchmark used for any given receptor and COPC. The secondary purpose is a screening-level assessment of risk, and DOE believes the benchmarks used in the ecological risk analysis for this *TC & WM EIS* are conservative benchmarks that are appropriate for that purpose. ICRP Publication 108 "introduces the concept of Reference Animals and Plants, and defines a small set. It discusses their pathways of exposure, and collates and discusses the adequacy of the best-available data relating to their dosimetry at different stages of their life cycles. In addition, this publication further develops and uses this information to derive sets of tabulated data (dose conversion factors, in terms of (µGy/day)/(Bq/kg)) that allow the dose to be calculated for 75 radionuclides that may be within, or external to, each organism" and "…derives a set of derived consideration reference levels for each biotic type in order to help optimise the level of effort that might be expended on its environmental protection, or that of similar types of organisms." ICRP Publication 108 does not claim to have any new data for calculating rad dose; rather it applies existing data to calculating dose and "reference levels" to generic "reference" receptors.

516-29 DOE agrees with the commentor's assertion that impacts after closure are a key component to distinguishing among the alternatives considered in this *TC & WM EIS*. DOE disagrees with the commentor's assertion that the analysis in the *Draft TC & WM EIS* is primarily for releases during remedial treatment. In both the alternatives impacts analysis (Chapter 5) and the cumulative

impacts analysis (Chapter 6), impacts are explicitly included from past releases, contaminated soils and other materials left in place following closure, and potential future waste disposal activities. In addition, connectivity from the source locations through the groundwater system to the locations of ecological receptors is considered through the long-term impacts analysis (Chapters 5 and 6 and Appendix P).

516-30 See response to comment 516-28 regarding the use of data resources.

516-31 Calculated risk indices, Hazard Quotients for individual chemical COPCs, and Hazard Indices for all radioactive COPCs combined were used to compare *TC & WM EIS* alternatives (see Chapter 5). Additive effects of chemicals can be evaluated by calculating Hazard Indices as the sum of Hazard Quotients of individual chemicals. Doing so assumes that effects are additive. This assumption is not necessary for the purpose of comparing risks of *TC & WM EIS* alternatives.

516-32 Appendix P documents where information was not available to calculate total dose. Using partial dose is acceptable because, as stated in Appendix P, comparing alternatives is the primary purpose of the ecological risk analysis in this *TC & WM EIS*, and the same information is available across alternatives for a given receptor or pathway.

516-33 Regarding the use of bird toxicity data for reptiles and amphibians, commonly accepted screening-level toxicity benchmarks for reptiles and amphibians were not available for the chemical COPCs. The lack of toxicity reference values for reptiles and amphibians does not thwart the primary purpose of this *TC & WM EIS*, i.e., to compare alternatives. Rather than exclude these receptors for lack of toxicity reference values, the risk analysis estimates the exposure of reptiles and amphibians, which likely differ from that of birds because of differences in receptor parameters such as body weight and ingestion rate, resulting in potential differences in risk estimates even when calculated using the same toxicity reference values. This approach provides a broader range of risk estimates with which to compare alternatives and screen the risk of alternatives.

516-34 See response to comment 516-25 regarding the ecological risk analysis.

516-35 Long-term impacts of releases to air were evaluated at the end of the remedial period, when the concentrations in soil would be at their theoretical maximum due to accumulation of contaminants released throughout the remedial period, assuming no decay and other entropic processes following deposition. After

Commentor No. 516 (cont'd): Ken S. Berg, Manager, U.S. Department of the Interior, Washington Fish and Wildlife Office

the remedial period, there would be no direct deposition on plants from releases to air, only from resuspended soil. Uptake of chemicals and radionuclides into plants from soil is included in the dose for herbivores, in addition to soil ingestion, as well as in the internal radiation dose for plants, as shown in equations in Appendix P, Sections P.2.1.4 and P.2.1.4.2. The risk to plants is estimated from the soil concentration of chemicals because the toxicological benchmarks for plants are soil concentrations, as discussed in Section P.2.1.5.

516-36 Benchmarks for soil-dwelling invertebrates cover all pathways from soil to invertebrate. The risk to ecological receptors from ingestion of groundwater for the *TC & WM EIS* alternatives is estimated for a variety of vertebrate receptors for which there are commonly accepted estimates of water ingestion rates and ingestion-based toxicity reference values. There is no commonly accepted method for estimating risk to soil-dwelling invertebrates from ingestion of water specifically because there are no commonly accepted estimates of water ingestion by soil-dwelling invertebrates nor ingestion-based toxicity reference values. Rather, risk to soil-dwelling invertebrates is estimated using the concentration of COPC in soil and concentration-based toxicity reference values (benchmarks) that are commonly assumed to include all exposure pathways from soil to soil-dwelling invertebrates, including ingestion of and direct uptake from soil pore water.

516-37 Regarding the commentor's request for additional information concerning the DOE 1998 reference, the value and source are listed in Appendix P, Section P.2.1.4, of this *TC & WM EIS*. The value of 0.01 is found on page I-D.2 of DOE 1998 in Appendix I-D of the referenced document.

516-38 The purpose of the risk analysis was not to assess the risk to every species and every life stage. Comparing alternatives is the primary purpose of the ecological risk analysis in this *TC & WM EIS*.

516-39 See response to comment 516-28 regarding the use of data resources.

516-40 See response to comment 516-28 regarding the use of data resources.

516-41 The decision was made not to use the earthworm due to the aridity of the site, because earthworms are not a major component of the soil-dwelling invertebrate fauna in arid lands. Applying bioaccumulation factors derived from octanol-water partitioning coefficients to other classes of soil-dwelling invertebrates at Hanford, as suggested in the comment, would not reduce uncertainties. Uncertainty about values of parameters in exposure models does not reduce

their utility given the primary purpose of the ecological risk analysis for this *TC & WM EIS*, namely the unbiased comparison of alternatives. Furthermore, not every species is required to be used in the analysis of alternatives for this *TC & WM EIS*.

516-42 The statements in question are from the *Plan for Central Plateau Closure*, which presents a strategic approach to closing the Central Plateau area of Hanford (Fluor Hanford 2004). As stated in Appendix R, page R–10, of the *Draft TC & WM EIS*, the first bullet was an overall assumption from the plan, and the second bullet was the closure approach for the Waste Site Closure Element. There are 12 operable units on the Central Plateau. An interim decision has been made for one of them and others are planned. An assumption was made about the potential remediation choice for other units on the Central Plateau. Actual cleanup actions under RCRA and CERCLA will be governed by site-specific analyses and decisions made in consultation with state and Federal regulators, as appropriate. Central Plateau closure is not the subject of a decision in this *TC & WM EIS* but is included because of the potential contribution to cumulative impacts.

516-43 See response to comment 516-17 regarding groundwater model features.

516-44 Management of the Hanford Reach as a Wild and Scenic River by USFWS has been added to Chapter 6, Section 6.2, of this *TC & WM EIS*. The status of the Hanford Reach relative to the laws noted by the commentor is addressed in Chapter 3, Section 3.2.6.

Commentor No. 517: Dee Tvedt

From: dee@dtvedt.com
Sent: Tuesday, May 04, 2010 1:36 AM
To: ^DOE
Cc: Gamache, Lori M
Subject: Hanford Clean up comments

Thank you for the opportunity to comment on the Hanford Clean-up. Following is my feedback:

THERE SHOULD BE NO MORE WASTE ADDED TO HANFORD! I am completely opposed to Hanford being a national radioactive and radioactive-hazardous waste dump. The USDOE must do all it can to protect the Columbia River and the health of children and adults living on and around it for thousands of years.

Limit wastes in Hanford landfills to amounts and types of Hanford clean-up wastes which won't cause future leakage & violate cancer risk and other standards. This means using off-site landfills that are not next to major rivers or above drinkable groundwater, and not importing off-site waste to Hanford. *517-1*

Dig up Plutonium and other "Transuranic" wastes in unlined soil disposal ditches and tank leaks, treat the wastes and dispose of them in deep geologic repositories. Dig up other wastes from unlined soil ditches and tank leaks, treat them, and dispose of them in a regulated commercial radioactive waste facility which is not above drinkable groundwater or next to a river. *517-2*

USDOE must remove the tanks ("clean closure") and investigate and remediate the soil contamination from
tank leaks. Washington State's hazardous waste law says that landfill closure can only be used after practical efforts to cleanup contamination have been attempted.

The USDOE must remove 99.9% of the tank wastes, or remove to the limits of technical capabilities. *517-3*

The Washington State standard for decommissioning nuclear reactors requires removal and site restoration. Oregon did this for the Trojan reactor. Do not put more radioactive waste on the road unnecessarily – treat the waste at Hanford. *517-4*

The USDOE should plan to start up the LAW vitrification portion of WTP prior to 2019 and start funding a second LAW facility in 2012 in order to have it ready to operate by 2022. The "supplemental treatment" options should be discarded as they are less effective and less protective of the environment. *517-5*

USDOE should drop completely their proposed trucking of nearly 3 million cubic feet of radioactive and "mixed" radioactive wastes to Hanford under its "preferred *517-1 cont'd*

517-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

517-2 Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

DOE policy and the *WM PEIS* specify disposal of LLW and MLLW within the DOE complex. However, for MLLW, DOE may continue to use commercial disposal facilities, consistent with DOE Order 435.1 and current DOE policy. Any LLW generated by the tank closure or FFTF decommissioning activities would be disposed of in the LLBGs, in one of the two active trenches (31 and 34); an IDF; and/or the RPPDF, all of which would have liners.

517-3 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary and Chapter 1 of this *TC & WM EIS*, DOE will not make decisions based on this EIS on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process as implemented under the TPA. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

517-4 Under NEPA, agencies identify the laws, regulations, and requirements that may apply to the proposed action and alternatives and identify where standards may

alternatives" in the Tank Closure & Waste Management Environmental Impact Statement. This plan is a huge danger to the people of Oregon and Washington and future generations. 517-1 cont'd

Do not endanger any more living beings with these hazardous radioactive wastes. Clean up Hanford now – future generations need to not suffer for the stupid decisions of this generation.

Sincerely,

Dee Tvedt
801 Lynn Lane
Eugene, OR 97404
Phone: xxx-xxx-xxxx

be exceeded. Chapter 8 of this *TC & WM EIS* provides both a listing and short description of the laws, regulations, and requirements that may apply to the proposed actions, including decommissioning of FFTF.

Radioactive waste is transported in DOT-certified containers that meet strenuous technical standards established by NRC.

517-5 As discussed in the *TC & WM EIS* Summary, Chapter 1, and Chapter 2, this EIS analyzes additional waste treatment capability that includes expanding the vitrification process capability currently being constructed in the WTP or supplementing the WTP's capability with supplemental treatment technologies. Thus, decisions to be made by DOE regarding whether to treat all waste in the WTP, as is or expanded, or to supplement its capacity by adding new treatment capability depend on demonstrating the feasibility of supplemental treatment technologies, including supplemental treatment waste-form performance (durability) for long-term groundwater protection.

Appendix E, Section E.1.3.3.1, discusses the DOE Technology Readiness Assessment that included Business Case No. 7 (LAW First and Bulk Vitrification with Tank Farm Pretreatment), i.e., early startup of the LAW treatment process. However, at the time of the *Draft TC & WM EIS* preparation, DOE had not made a decision on whether to support implementation of this business case. Since then, DOE has commissioned an external technical review of the system planning for alternative supplemental treatment of LAW at Hanford (Kosson et al. 2008). The report (Kosson et al. 2008) from this review concluded that, although the current schedule for completion of the WTP LAW Vitrification Facility and supporting facilities could support early treatment of LAW in 2014, such early startup would require an interim pretreatment capability and the means for disposition of secondary waste. Since 2008, DOE has been evaluating the transition of the WTP from construction to commissioning and has issued a startup strategy, the *2020 Vision* (WRPS and BNI 2011). Information on this strategy is provided in Appendix E, Section E.1.3.3.2, of this *Final TC & WM EIS*. The *2020 Vision* evaluates some of the elements identified in earlier DOE reports but focuses on commissioning of the WTP project and activities essential to starting up the LAW Vitrification Facility, the Analytical Laboratory, the BOF, as well as the Pretreatment Facility and the HLW Vitrification Facility.

Commentor No. 518: Dave Tvedt

From: David Tvedt [david@dtvedt.com]
Sent: Tuesday, May 04, 2010 1:03 AM
To: DOE
Cc: Gamache, Lori M
Subject: Hanford draft

I am writing regarding your Hanford draft Tank Closure and Waste Management EIS. I am totally opposed to Hanford being used as a national radioactive waste dump. It's already one of the most polluted and toxic places in the United States and it is in no way an appropriate place for storing more radioactive waste. *518-1*

I urge you to do a "clean closure" of the High-Level Nuclear Waste Tanks and not just a partial cleanup. The millions of gallons of radioactive waste leaked from these tanks is appalling. The long term ramifications of the over 40 miles of unlined soil trenches of radioactive and chemical wastes needs to be taken seriously and cleaned up as best it can. A "complete and thorough" cleanup of this contamination is very important. Please do the responsible thing and not just do an inadequate quick fix solution to the huge toxic entity that is Hanford. Future generations will curse you if you don't. *518-2*

Dave Tvedt
801 Lynn Lane
Eugene, Oregon
xxx-xxx-xxxx
David@dtvedt.com

518-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

518-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. These include Tank Closure Alternatives 4, 6A, and 6B, which evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. This closure includes the tank system, along with the vadose zone as impacted by the tank farms (i.e., past leaks). However, as discussed in the Summary, Section S.1.3.2, and Chapter 1, Section 1.4.2, of this *TC & WM EIS*, DOE will not make decisions on groundwater remediation, including the remediation of groundwater contamination resulting from non-tank-farm areas in the 200 Areas, because that is being addressed under the CERCLA (42 U.S.C. 9601 et seq.) process. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor No. 519: Craig McDonald

From: webmaster@RL.gov [mailto:webmaster@RL.gov]
Sent: Tuesday, May 04, 2010 10:34 AM
To: ^Webmaster
Subject: HANFORD.GOV Feedback

Forward To: Webmaster
SUBJECT: HANFORD.GOV Feedback
EASY TO USE: yes
FOUND EVERYTHING: yes
COMMENT: My concern as citizen down stream of the Hanford site is the clean up must continue and no further material come to Hanford. Nuclear waste must be contained and our lands, streams and groundwater be kept free of contamination. *519-1*
URL: http://www.hanford.gov/orp/?page=146&parent=0
NAME: craig mcdonald
PHONE: xxx-xxx-xxxx
EMAIL: zeek@hughes.net

519-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

Commentor No. 520: Nancy Lou Tracy

FAX: 1-888-785-2865

TC & WM EIS
P.O. Box 1178
Richland, WA 99352

Dear Heart of America,

As the outrage mounts regarding more dumping of radioactive wastes at a site which has failed for decades to provide containment - or even care - I find myself coming at this from a different angle. Have just finished reading James Hansen's book, "Storms of My Grandchildren, The truth about the Coming Climate Catastrophe and Our Last Chance to save humanity." At first his support of nuclear power dismayed me - until I read on about the possibility of a so-called 4th generation nuclear power, and wonder why we're now even considering so-called 3rd generation which - like all previous light-water reactors will burn about 1% of the uranium mined, leaving civilizations to continue to "baby sit" the 10,000 years-active wastes. Fourth generation power plants sound almost too good to be true. "Author" of 4 was Enrico Fermi. 520-1

Fourth generation, the fast breeder, uses about 99% of energy from mined uranium. Further, the fast breeder also produces energy from transuranic actinides, fertile materials now dumped as radioactive waste. Nuclear waste from nuclear weapons development alone (some 600,000 tons) of uranium hexafluoride by-products, now in "storage" can fuel these fast-breeder reactors. Wastes from a generation 4 plant have a life of several hundred, not 10,000 years, and they can't be used for weapons production. 520-2

If all these claims are so - these accumulated wastes of decades past that now threaten all of life - would become valuable commodities. Uranium mining could be at an end, destructive as it is, for generation 4 power plants can extract uranium from sea water. The catch is that a first plant needs to be built. Wouldn't the Hanford reservation (I can't believe I'm saying this!) be the best site, with such a ready fuel supply? Three Mile Island's disaster stopped construction that was ready to go during the Clinton/Gore Administration.

Sincerely, and with hope this may proof out

Nancy Lou Tracy
7310 SW Pine St
Portland OR 97223

520-1 Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

520-2 Advanced nuclear power development is beyond the scope of this *TC & WM EIS*.

Commentor Number 521 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 467.

Commentor Number 522 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 488.

Commentor No. 523: Harry Smiskin, Chairman, Tribal Council, Confederated Tribes and Bands of the Yakama Nation

Confederated Tribes and Bands of the Yakama Nation

Established by the Treaty of June 9, 1855

May 3, 2010

David A. Brockman, Manager
Richland Operations Office
U.S. Department of Energy
P.O. Box 550
Richland, Washington 99352

Mary Beth Burandt, Document Manager
Office of River Protection
U.S. Department of Energy
Post Office Box 1178
Richland, WA 99352
TC&WMEIS@saic.com

RE: SUPPLEMENTAL COMMENTS ON DOE DRAFT TANK CLOSURE AND WASTE MANAGEMENT EIS FOR THE HANFORD SITE (DOE/EIS-0391-D)

Dear Mr. Brockman and Ms. Burandt:

Thank you again for the opportunity to comment on the Draft Tank Closure and Waste Management Environmental Impact Statement (Draft EIS) for the Hanford Site, Richland, Washington (DOE/EIS-0391-D) prepared by the U.S. Department of Energy (USDOE). This letter supplements the extensive comments previously submitted by the Yakama Nation dated March 12, 2010.

1. Institutional Controls:

   a. The Draft EIS states that "long-term cumulative impacts are assessed for approximately 10,000 years into the future" (Appendix R, Section R.10, page R-21). It is not a reasonable alternative to assume that any federal agency will exist and maintain control of the site for 10,000 years. The range of alternatives in a revised Draft EIS should include those that can achieve cleanup levels that allow for safe, unrestricted subsistence use of all Treaty resources within a realistic timeframe. This includes full access to cultural resources by the Yakama Nation and its members within its ceded land and aboriginal territory, including on the Hanford Site and the Columbia River adjacent to the site. *523-1*

Post Office Box 151, Fort Road, Toppenish, WA 98948 (509) 865-5121

523-1 This *TC & WM EIS* assumes several different types of end-state management, as described in Chapter 2, the Glossary, and the Summary. These include administrative controls, institutional controls, and postclosure care, as appropriate. Each of these end-state management options would take place at the completion of an action and is assumed to occur for 100 years following the end of the action (e.g., active institutional controls would be maintained for 100 years following final placement of waste in a storage facility). The 10,000-year time period described in this *TC & WM EIS* represents the period of analysis used for the long-term impact analyses for groundwater, human health, and ecological risk; it does not represent the assumed period of institutional controls. For clarity, the definition of "10,000-year period of analysis" is included in this final EIS in Chapter 2, the Glossary, and the Summary, as appropriate.

DOE respectfully disagrees with the tribes' position regarding tribal rights at Hanford. There is substantial documentation indicating that the tribes understood at the time the treaty was signed that the lands were no longer "unclaimed" when they were claimed for the purposes of the white settlers' activities. Most of Hanford had been so "claimed" at the time it was acquired for Government purposes in 1943. DOE is not aware of any judicially recognized mechanisms that would allow these lands to revert to "unclaimed" status merely through the process of being acquired by the Federal Government. The portion of Hanford that remained in the public domain in 1943 (those lands now having underlying U.S. Bureau of Land Management ownership), as well as all the acquired lands, were closed to all access initially under authority of the War Powers Act and then under authority of the Atomic Energy Act. It is, therefore, DOE's position that the Hanford lands are neither "open" nor "unclaimed." DOE included the tribes' positions and views in Appendix W of this *Final TC & WM EIS*.

Commentor No. 523 (cont'd): Harry Smiskin, Chairman, Tribal Council, Confederated Tribes and Bands of the Yakama Nation

b. DOE's speculative reliance on institutional controls essentially abrogates Yakama rights reserved under Article III of the Treaty without congressional authority by potentially restricting the Tribe's ability to safely access and use trust resources through hunting, fishing and gathering. *523-2*

2. NEPA deficiencies:

a. Article III of the Treaty should be treated as equivalent to a statutory requirement so far as human health and development of an alternative that meets the Yakama Nation's rights and needs. The Yakama Nation should be able to examine the EIS and evaluate how it is going to affect their rights and their culture without reliance on institutional controls. It would be unreasonable under NEPA if such an alternative were to be excluded. *523-3*

b. The Draft EIS lacks sufficient detailed analysis – for example, it makes arbitrary and speculative assumptions about offsite waste characteristics. *523-4*

c. DOE must comply with NEPA regulations regarding incomplete or unavailable information, i.e., it must either explicitly state that such information is lacking, or obtain the information and include it in a revised EIS. *523-5*

d. There is inadequate analysis and evaluation of mitigation measures, and what DOE will do if such measures cannot be accomplished. NEPA regulations require that alternatives either avoid or minimize adverse impacts, or provide means to mitigate adverse impacts. *523-6*

e. On February 18, 2010, the Council on Environmental Quality (CEQ) released draft NEPA guidance on consideration of the effects of climate change and greenhouse gas (GHG) emissions. The draft guidance indicates that climate change effects should be considered in the analysis of projects that are designed for long-term utility and located in areas that are considered vulnerable to specific effects of climate change within the project's timeframe. The Yakama Nation encourages DOE to use CEQ's draft guidance to evaluate impacts from climate change in the revised EIS, particularly in consideration of the sensitivity, location, and timeframe of the proposed actions. *523-7*

3. Land disposal of mixed transuranic and/or mixed low-level waste violates the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6924(b)-(m). See Opinion, *Washington v. Chu,* 9th Circuit No. 06-35227 (March 10, 2009). Any alternative that provides for importation of such waste into the Hanford Site for shallow land burial is therefore unlawful, is not a reasonable action, and must not be considered by DOE in the revised EIS. *523-8*

2

523-2 DOE recognizes that some tribes have treaty-protected and other federally recognized rights to resources and resource interests located within reservation boundaries and outside reservation and jurisdictional boundaries. DOE will, to the extent of its authority, protect and promote these treaty and trust resources and resource interests and related concerns in these areas.

523-3 Chapter 8 identifies and discusses the laws and legal requirements that are potentially applicable to the proposed actions and alternatives, as well as the permits and approvals DOE must obtain from Federal, state, and local agencies. In Sections 8.1.7 and 8.3, DOE identifies the consultations and coordination that DOE has undertaken with American Indian tribes and would need to continue for the purpose of implementing the proposed actions and alternatives. The Yakama Tribe and other Hanford-area tribes have had the opportunity to provide, and have provided, extensive input to the *TC & WM EIS* preparation process and analysis. Chapter 8, Section 8.3, and Appendix C, Section C.3, of this *TC & WM EIS* identify the process for tribal interaction and the primary occasions for DOE's interactions with the tribes on the subject of the *TC & WM EIS* preparation process. In addition, Chapter 8 of this *Final TC & WM EIS* includes a description of the outcomes of the meetings with the tribes, and a new appendix, Appendix W, describes the tribal perspective as provided by the Hanford-area tribes, as well as copies of the treaties. The alternatives presented in this *TC & WM EIS* were developed under NEPA (42 U.S.C. 4321 et seq.) to address the essential components of DOE's three sets of proposed actions (tank closure, FFTF decommissioning, and waste management) and to provide an understanding of the differences among the potential environmental impacts of the range of reasonable alternatives. Consistent with CEQ guidance, this EIS analyzes the range of reasonable alternatives that covers the full spectrum of potential combinations. The alternatives considered by DOE in this EIS are "reasonable" in the sense that they are practical or feasible from a technical and economic standpoint and meet the agency's purposes and needs. Potential conflicts with laws and regulations do not necessarily cause an alternative to be unreasonable; however, to implement an alternative (if it is selected), additional mitigation commitments may be required.

523-4 DOE believes that the offsite waste inventory and waste characterization estimates analyzed represent the best-available data to support this EIS. As noted in Appendix D, conservative assumptions were employed to support the EIS analyses. The impacts of the offsite waste in terms of radiological risk are

Commentor No. 523 (cont'd): Harry Smiskin, Chairman, Tribal Council, Confederated Tribes and Bands of the Yakama Nation

To adequately address the comments submitted by Yakama Nation and others, the revisions to the Draft EIS will be extensive. Therefore, we respectfully request that DOE prepares a Revised Draft EIS and issue it for public comment. A Revised Draft EIS which satisfies NEPA requirements is needed to support informed decision making regarding the proposed actions. *523-9*

Sincerely,

Harry Smiskin, Chairman,
Yakama Tribal Council

cc/enc: Moses Squeochs, General Council Chairman
Donald Isadore, Jr., Yakama Tribal Council
Warren Spencer, Jr., Yakama Tribal Council
Lavina Washines, Yakama Tribal Council
Sam Jim, Sr., Yakama Tribal Council
Phil Rigdon, Director, Department of Natural Resources
Russell Jim, ERWM Manager
Tom Zeilman, Attorney

presented in the Summary, Section S.5.5.3, and Chapter 2, Section 2.10, Key Environmental Findings. These sections discuss the radiological risk differences between including and not including offsite waste disposal at IDF-East. Ecology's foreword to the draft EIS included its views and positions concerning DOE's analysis in the document and has been updated in this final EIS.

523-5 Throughout this EIS, DOE identified where information was lacking or inadequate. DOE also explicitly stated the assumptions that were made in conducting the *TC & WM EIS* analyses, as well as the uncertainties associated with both these assumptions and the analysis results. DOE's analyses conservatively account for the reasonably foreseeable range of potential impacts and uncertainties are discussed in accordance with NEPA requirements (incomplete and unavailable information requirements in CEQ NEPA regulations – 40 CFR 1502.22).

523-6 The NEPA evaluation process is conducted early in agency planning, when details of the proposed project are not yet well enough defined for specific mitigation measures to be developed. Chapter 7, Sections 7.1 and 7.5, discuss potential mitigation measures that could be used to avoid or reduce adverse environmental impacts associated with implementation of the alternatives. DOE has incorporated several mitigation measures into the alternatives proposed in this *TC & WM EIS* to prevent or reduce the short- and long-term environmental impacts. Some mitigation measures were incorporated into all of the alternatives, and some represent variations in one or more of the elements or technologies used to construct the alternatives (e.g., various tank waste retrieval benchmarks, sulfate removal, technetium removal, treatment of all tank waste as HLW, clean closure options).

In response to comments received on the *Draft TC & WM EIS* concerning potential long-term impacts on groundwater resources, additional sensitivity analyses were performed and are included in this final EIS. The additional analyses evaluate potential impacts if certain remediation activities are conducted at some of the more prominent waste sites on the Central Plateau and along the river corridor. Furthermore, sensitivity analyses that evaluate improvements in IDF performance (e.g., infiltration rates) and in secondary- and supplemental-waste-form performance (e.g., release rates) were performed and are included in this final EIS. Chapter 7, Section 7.5, was added to discuss and summarize these results. Following completion of this *Final TC & WM EIS* and its associated ROD, DOE would be required to prepare a mitigation action plan that explains mitigation commitments expressed in the ROD. This mitigation action plan

Commentor No. 523 (cont'd): Harry Smiskin, Chairman, Tribal Council, Confederated Tribes and Bands of the Yakama Nation

would be prepared before DOE would implement any *TC & WM EIS* alternative actions that are the subject of a mitigation commitment expressed in the ROD.

523-7 DOE is aware of the draft CEQ guidance on climate change (Sutley 2010) and has taken it into consideration in this EIS. DOE has reviewed and revised, as necessary, its analyses on the effects of climate change on various resources at Hanford and the possible effects on environmental impacts of the *TC & WM EIS* alternatives. As described in Chapter 6, Section 6.3.4, DOE has reviewed climate studies that forecast general trends in Hanford regional climate change. However, there are no reliable methodologies for projections of specific future climate changes in the Hanford region, and thus such changes have not been quantified in this EIS. To account for this uncertainty, Appendix O, Section O.6.2, describes the effects of enhanced infiltration such as that which may occur during a wetter climate. In the *Draft TC & WM EIS*, Appendix V focused on the potential impacts of a rising water table from a proposed Black Rock Reservoir. Following the retraction of this proposal, the focus of Appendix V was changed in this final EIS to analysis of potential impacts of infiltration increases resulting from climate change under three different scenarios. Appendix V includes sensitivity analyses of potential impacts at Hanford that could result from climate changes that may increase model boundary recharge parameters and the rise of the groundwater table. Additional qualitative discussion of the potential effects of climate change on human health, erosion, water resources, air quality, ecological resources, and environmental justice has been added to Chapter 6 of this final EIS. Additional discussion of the types of regional climate change that could be expected has also been added to Chapter 6, Section 6.5.2, Global Climate Change. The potential impacts of the alternatives on climate change are addressed in Chapter 6, Section 6.5.2, and Appendix G, Section G.5, of this *TC & WM EIS*.

523-8 On March 10, 2009, the U.S. Court of Appeals for the Ninth Circuit affirmed a lower court ruling that a Federal hazardous waste exemption does not apply to mixed TRU waste stored at Hanford (*State of Washington v. Chu*, 558 F.3d 1036 (9th Cir. 2009)). DOE had argued that amendments made in 1996 to the WIPP Land Withdrawal Act of 1992 exempted mixed TRU waste from RCRA storage requirements and land disposal restrictions, if the waste had been designated by DOE for disposal at WIPP, regardless of where it is located in the United States. The appeals court disagreed, finding that "Congress has clearly required that the designation exemption be applied only to wastes at WIPP." As a result, Hanford mixed TRU waste is subject to storage and land disposal prohibitions under

Washington's state law, which acts in lieu of the Federal RCRA regulations. Although this ruling did not apply to MLLW, which is not disposed of at WIPP, appropriate treatment to meet applicable Land Disposal Restriction treatment standards is (or would be) performed before disposal at Hanford. The purpose of this *TC & WM EIS* is to analyze the potential impacts of DOE's proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. The proposed disposal includes LLW and MLLW, not mixed TRU waste.

523-9 DOE has satisfied NEPA requirements by responding to public comments on the draft EIS in this CRD and by making changes to the draft EIS where appropriate and necessary. Subsequent to the issuance of the *Draft TC & WM EIS*, DOE prepared an SA to analyze 14 topics it identified where it is unclear whether updated, modified, or expanded information warrants preparation of a supplemental or new draft EIS. DOE concluded, based on analyses in the SA, that the updated, modified, or expanded information developed subsequent to the publication of the *Draft TC & WM EIS* does not constitute significant new circumstances or information relevant to environmental concerns and bearing on the proposed action(s) in the *Draft TC & WM EIS* or their impacts. Further, DOE has not made substantial changes in the proposed action(s) that are relevant to environmental concerns. Therefore, in accordance with CEQ regulations (40 CFR 1502.9(c)) and DOE regulations (10 CFR 1021.314(c)), DOE determined that a supplemental or new *Draft TC & WM EIS* is not required. See Chapter 1, Section 1.8.2, for more information. The Yakama Nation, along with other Hanford-area tribes, has had the opportunity to provide, and has provided, extensive input to the *TC & WM EIS* preparation process and analysis. Chapter 8 and Appendix C of this *TC & WM EIS* identify the process for tribal interaction and the primary occasions for DOE's interactions with the tribes on the subject of the *TC & WM EIS* preparation process. In addition, Chapter 8 of this *Final TC & WM EIS* includes a description of the outcomes of the meetings with the tribes; a new appendix, Appendix W, describes the tribal perspective as provided by the Hanford-area tribes.

Commentor No. 524: Lois Irwin and Ward Irwin

2969 74th Ave, Southeast
Mercer Island, WA 98040
April 30, 2010

Mary Beth Burandt
Office of River Protection
PO Box 1178
Richland, WA 99352

Attention DOE Draft

Dear Ms. Burandt,

In regard to the Hanford nuclear facility on the Columbia River, please note the following points in regard to cleanup of the hazardous waste on its site.

1. Send no more waste to Hanford – especially greater than Class C until the waste treatment plant is fully functioning. 524-1

2. Please clean up the single cleaned tanks to 99.9% 524-2

3. Have the single hole tanks cleaned up before 2030.

Respectfully submitted,
Lois J. Irwin
Ward J. Irwin

524-1 Regarding the commentor's concern about the inclusion of GTCC LLW in this *TC & WM EIS*, DOE has included information from the *Draft GTCC EIS* in the *Final TC & WM EIS* cumulative impacts analysis. For a more comprehensive discussion on GTCC LLW, see Sections 2.1 and 2.12 of this CRD.

524-2 The impacts of different levels of tank waste retrieval and of different types of SST system closure are addressed in the *TC & WM EIS* analyses. Tank Closure Alternatives 4, 6A, and 6B evaluate 99.9 percent retrieval of the tank waste and clean closure of all or part of the SST system. Decisions made by DOE on the proposed actions will be based on a number of factors, including health and safety, environmental, economic, and technical considerations; agency statutory missions; and national policy considerations. The decisions on the selected course of action and supporting rationale will be documented in a ROD issued no sooner than 30 days after the EPA Notice of Availability for this *Final TC & WM EIS* is published in the *Federal Register*.

Commentor Number 525 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 508.

Commentor Number 526 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 498.

Commentor Number 527 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 523.

Commentor Number 528 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 480.

Commentor Number 529 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 467.

Commentor Number 530 is not included in this Comment-Response Document because it is a duplicate of Commentor Number 503.

Commentor No. 531: Diane Janes

U. S. DOE
must remove the
tanks & clean the
soil.

Diane Janes
6834 SW Burlingame Ave
Portland OR 97219

531-1	**531-1**	Comment noted.

Commentor No. 532: Robert Alvarez, Institute for Policy Studies

PLUTONIUM WASTES FROM THE U.S. NUCLEAR WEAPONS COMPLEX

by

Robert Alvarez*

May 25, 2010

Summary

A preliminary estimate based on waste characterization data indicates that from 1944 to 2009 approximately 11,655 kg of plutonium-239 were discarded at U.S. nuclear weapon production facilities. This is nearly three times more than the U.S. Department of Energy's (DOE) last official estimate of waste losses (3,919 kg) made in 1996.

- There are about 2,624 kg in high-level radioactive waste tanks and bins.
- About 7,431 kg of plutonium are in solid waste, which DOE plans to dispose at the Waste Isolation Pilot Project (WIPP) a geological repository in New Mexico for transuranic wastes. About half is emplaced.
- About 1,610 kg of plutonium were buried prior to 1970 at several DOE sites and are not planned for disposal in WIPP.

This dramatic increase is due to disposal of process residues originally set aside for weapons, understatement of production losses, and improvements in waste characterization data.

The Hanford site in Washington State is responsible for about one third of DOE's plutonium-contaminated wastes (3,796 kg), – more than any site in the U.S. nuclear weapons complex. DOE considers hundreds of kilograms of plutonium buried before 1970 to be permanently disposed at Hanford, despite evidence of significant deep subsurface migration and contamination of ground water that enters the Columbia River. Moreover, DOE researchers recently indicated that plutonium could migrate in groundwater and potentially render the near shore of the Columbia uninhabitable in less than 1,000 years. DOE should remove as much buried plutonium as possible at Hanford for geologic disposal, as it is doing at the Idaho National Laboratory.

*Senior Scholar, Institute for Policy Studies, Washington, D.C.

532-1

532-1 Appendix S of this *TC & WM EIS* explains the process used to develop the inventory data set for the cumulative impact analyses completed for this EIS. All disposal sites for which an inventory was identified and considered a potential contributor to cumulative impacts on groundwater are included in the inventory listing provided in Appendix S and, therefore, were modeled—including the sites noted in the commentor's paper. The inventories listed in Appendix S represent the radionuclide inventories (measured in curies) and chemical inventories (measured in kilograms), including total uranium, that were identified for those sites and for those constituents that were screened (described in Section S.3.6 as COPCs, i.e., those constituents that control groundwater impacts). The source cited in this final EIS for the information listed in the Appendix S tables is SAIC 2011, which is a more extensive database of the inventory information used by DOE to accomplish the screening and identify the COPCs. These COPCs, as well as other constituents determined not to be COPCs, particularly other volatile organic chemicals, can be found in this source documentation for the sites noted. As explained in Appendix S, the inventories for the sites were identified using the most recent information available. As stated in Table S–5, the liquid inventories were obtained from (1) SIM, Rev. 1 (Corbin et al. 2005); (2) *Radionuclide Inventories of Liquid Waste Disposal Sites on the Hanford Site* (Diediker 1999); (3) the *Hanford Site Waste Management Units Report* (DOE 1987); (4) technical baseline reports; (5) the latest version of WIDS; or (6) other sources.

DOE notes that one of the sources identified in this screening process is a large contributor to plutonium contamination in the groundwater. This source, a reverse well, resulted in direct injection of waste streams into the aquifer. Information regarding this reverse well and the potential behaviors of the contaminants (i.e., plutonium) is discussed in Appendix U of this *Final TC & WM EIS*.

Regarding the status of groundwater contamination and remediation at Hanford, groundwater remediation activities, as required under RCRA, CERCLA, and/or the TPA, are in various stages of assessment, risk-based end-state development, corrective action, and/or active remediation. For a more comprehensive discussion of remediation at Hanford, see Section 2.3 of this CRD.

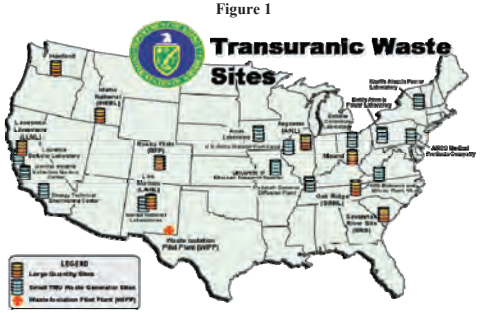
Commentor No. 532 (cont'd): Robert Alvarez, Institute for Policy Studies

2

Introduction

The production and fabrication of plutonium primarily for nuclear weapons generated a class of wastes known as transuranics that are contaminated with radioactive elements heavier than uranium on the periodic chart (i.e. plutonium, americium, curium and neptunium). Transuranic Waste (TRU) waste is defined by the U.S. Environmental Protection Agency (40 CFR 91) as having a concentration greater than 100 nanocuries of alpha-emitting transuranic isotopes per gram, with half-lives greater than twenty years. Prior to the early 1970's TRU wastes were disposed as low-level radioactive wastes directly into the ground. However, due to the hazards of plutonium in particular, the Atomic Energy Commission (DOE's predecessor) concluded in 1970 that disposal of these wastes in a geologic repository designed to contain wastes for at least 10,000 years was necessary to protect the human environment. There are 21 DOE sites that generated TRU wastes. (See figure1.)

Figure 1



Plutonium-239 is of greatest concern because of its high concentration and long half life of 24,100 years. With a specific activity about 200,000 times greater than uranium, plutonium-239 emits alpha particles as its principal form of radiation. Over time, americium-241 a decay product, builds up and gives off hazardous external penetrating radiation.

If a large amount is inhaled, it can cause lung damage, fibrosis and even death. Alpha particles travel a very short distance within living tissue and repeatedly strike nearby cells creating potential damage. Tens of micrograms if inhaled can lead to cancer.[1] Particles less than a few microns in diameter can penetrate deep in the lungs and lymph nodes, and can also be deposited from the bloodstream in the liver, bone surface and other organs. Over the past several years, a significantly higher incidence of cancer has been reported among workers following exposure to plutonium.[2]

The behavior of plutonium in the environment is far from certain and has been found to migrate at greater distances than assumed.[3] As noted by S.S. Hecker, former Director of Los Alamos

532-1 cont'd

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Commentor No. 532 (cont'd): Robert Alvarez, Institute for Policy Studies

National Laboratory, it is "one of the most challenging applications of modern chemistry because of the inherent complexity of plutonium and the corresponding complexity of the natural environment."[4]

Since 1970, TRU wastes were placed in retrievable containers to allow for deep disposal. The U.S. Congress authorized the design and construction of the Waste Isolation Pilot Project (WIPP) in near Carlsbad, New Mexico in 1980 (P.L. 96-164) to dispose of TRU waste generated for military purposes. The bedded salt formations at WIPP were chosen because of their long-term stability and self-sealing properties. The WIPP facility is located 2,160 feet underground and has an authorized disposal capacity of 175,000 cubic meters. According to recent waste characterization data DOE estimates that 83,050 cubic meters of TRU wastes containing 7,431kg of plutonium 239 are anticipated for disposal at WIPP.[5] About half has already been emplaced. [6]

Accounting for Plutonium*

Between 1944 and 1994, the U.S. produced and acquired a total of 111,400 kg of plutonium-239. About 93 percent came from government production reactors and the rest from foreign sources and U.S. commercial reactors. [7] DOE accounts for plutonium by reconciling the amount in the "actual" inventory set aside for government requirements and "removals" including material expended in war, weapons testing, transmutation, inventory discrepancies, and waste losses. In its last official estimate in 1996, DOE reported total amount of plutonium "removed" and no longer available for use was 12, 000 kg, including 3,919 kg lost to waste. [8]

Based on more recent waste characterization data[9 10 11 12 13 14 15 16 17 18 19], approximately 11,519 kg, about 10 percent of the total amount of Pu-239 produced at U.S. sites has gone into waste streams (See Table 1). Five DOE sites are responsible for about ninety-nine percent of these wastes. (See Table 1) This large increase appears to be due to disposal of production residues, understatement of production losses, and better waste characterization.

During the Cold War residual plutonium from production processes were stored and recovered, if this proved less costly than making new supplies in production reactors. With the end of nuclear weapons production, DOE no longer needed these residues and discarded them as waste. At DOE's Rocky Flats plant some 3,000 kg of plutonium in residues are disposed at WIPP. [20]

Environmental compliance agreements led to more rigorous characterization of waste streams, which found understated waste losses. For instance, because of refinements in waste characterization, the inventory of plutonium in Hanford high-level radioactive waste tanks is more than twice than declared in 1996. [21]

*This paper does not address about 6,130 kg of plutonium-239 contained in DOE spent reactor fuel, [22] and 61,500 kg of plutonium removed from weapons stocks,[23] mostly from dismantled weapons and weapons components (~80 percent) and other production processes. About 41.8 metric tons is expected to be processed so it can be mixed with uranium for fabrication into mixed oxide fuel for use in commercial nuclear power plants and subsequently disposed. Disposition plans for 5 tons of "non-pit" plutonium include mixing with defense high-level wastes to be vitrified or direct disposal in WIPP. There are several thousand more kilograms, which may be declared excess from retired weapons [24] and from the recent arms reduction agreement between the U.S. and Russia. [25]

532-1 cont'd

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Commentor No. 532 (cont'd): Robert Alvarez, Institute for Policy Studies

4

Table 1 Plutonium in Waste Inventory

Site	Description	DOE/Plutonium: The First 50 Years 1996(a) Kg Pu-239	DOE/ Waste Data (1981-2009) Kg Pu-239
Rocky Flats	Solid waste packaged in containers (now emplaced in WIPP)	47	3,597(b)
Hanford	High-level waste in tanks farms,	455	1,109 (c)
Hanford	Solid wastes	875	2,282 (b) (d) (e)
Hanford	Liquid wastes	192	405(e) (f)
Los Alamos National Laboratory	Solid waste (post 1970)	610	750 (b)
LANL (Pre-1970)[26]			450 (g)
Idaho National Engineering Laboratory (INEL)	Solid wastes	1,106	1,299 (b) (h)
INL	Calcined HLW in bins	72	774 (i)
INL	Solutions stored in Tanks farms	8	8 (a)
Savannah River Site (SRS)	Liquids in high-level waste tanks,	575	733 (j)
SRS	solid waste	193	182 (b)
Other DOE Sites	Solid wastes	59	76 (b)
TOTAL		**3,919**	**11, 665**

(a).DOE/DP-0137(1996),(b) DOE/TRU-09-3425 (2009),(c) TWINS (2003), (d) WHC-SD-WM-ES-325 (1995), (d).PNNL-11800 (1998), (e) RHO-LD-114 (1981) (f) DOE-RL-2007-27,(g) DOE/EM-00-0384 (2000) (h) IC P/EXT-04-00253 (2004),(i) DOE/EIS-0287(2002), (j) SRS HLW 2005,

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This revised estimate of discarded plutonium adds about 8,300 kilograms more to the total inventory in DOE's 1996 declaration. This may be due to errors in the estimates of plutonium in wastes, which may not yet be formally incorporated into DOE's material control and accountancy system. It could also be due to accounting for inventory differences, which according to DOE, " is the difference between the quantity of nuclear material held according to accounting books and the quantity measured by a physical inventory." Prior to the late 1960's, DOE did not have a well-established mass balance system, based on predictive reactor codes allowing for more accurate estimates of production. Also, the agency's material measurement technologies "were less accurate than today." [27]

Discarded Plutonium at Hanford

The Hanford Engineering Works was one of the world's largest plutonium production centers. Uranium metal fuel, using either natural (0.71wt% U-235) or low enriched uranium (primarily 0.95 or 1.25wt % U-235), was clad into uranium fuel elements sent to the Hanford 100-Area for irradiation in nine production reactors. Spent reactor fuel was discharged into basins of water to allow for reduction in heat and decay of short-lived radionuclides before being sent for chemical separation of nuclear materials. Irradiated fuel ruptures and corrosion led to residual plutonium in storage basins and contamination of the nearby environment.[28] [29]

Plutonium was extracted from 98,892 MTU (metric tons uranium) of spent fuel[30] using four chemical separations plants.[31] [32] Additional amounts of plutonium came from offsite sources from other processing facilities and foreign providers. [33] About 70 percent of the irradiated fuel was processed at the PUREX facility, which operated from 1956 to 1972 and 1981 to 1989. [34] After chemical separation, liquid reprocessing waste containing residual amounts of plutonium and other actinides were primarily transferred to high-level radioactive waste tanks. [35] Plutonium was also discharged to cribs trenches and ponds. [36]

Beginning in 1949, separated plutonium nitrate from the reprocessing plants was sent to the Plutonium Finishing Plant (PFP) where plutonium was purified into metal and oxides.[37] PFP had several waste streams including gaseous effluents that were filtered and exhausted. Liquid wastes were discharged into unlined soil disposal sites until 1973, when they were sent via a transfer line to high-level waste tanks. (See Figures 2 and 3) [38]

According to DOE's 1996 official estimate, about 2 percent of the total plutonium produced at Hanford went into waste streams (approximately 1,348 kg). [39] Since then waste characterization data indicates that more than five percent of the plutonium produced at Hanford went into waste streams. Moreover, Hanford is responsible for about one third of plutonium wastes (3,796 kg), more than any DOE site. (See Table 1)

Of this amount about 2,687 kg of plutonium in liquid and solid wastes were discharged, stored or buried in soil. Lesser amounts were deposited in reactor basin residues. An additional 1,109 kg of residual plutonium mostly from reprocessing plants were discharged into high-level radioactive waste tanks.[40] The department plans to remove and convert most of the plutonium mixed with high-level radioactive wastes into glass logs for geological disposal.

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About 1,811 kg of buried plutonium are planned for disposal in WIPP and 876 kg of plutonium was discharged or buried into the ground prior to 1970. [41] Approximately 405 kg were discharged as liquids into soil and an underground settling tank. [42 43]

Figure 2. Plutonium Production At Hanford

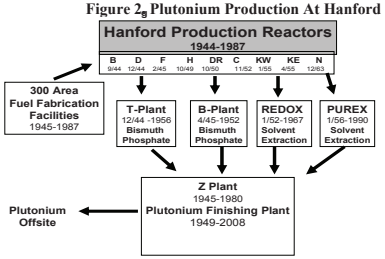
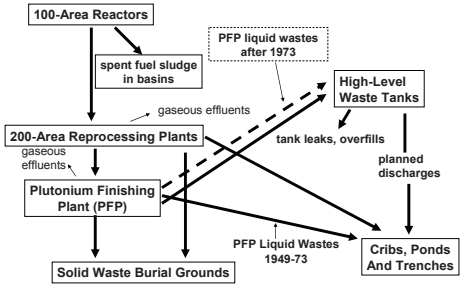


Figure 3. Plutonium Waste Streams At Hanford



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Prior to 1970, approximately, 371 kilograms of plutonium in solid wastes were dumped in containers such as cardboard boxes to unlined trenches mostly associated with the PFP.[44] Between the mid 1960's and 1980, 100 kg plutonium was disposed in a similar fashion in a commercial radioactive waste landfill located in the Hanford 200-East area.[45] More than 60 percent of the total estimated volume (138,000 cubic meters) of pre-1970 TRU wastes at DOE sites is buried at Hanford.[46]

As a result of processing large amounts of plutonium, normal operating losses at PFP are the highest at Hanford. Recent data suggests that transuranic waste discharges to soil in the PFP zone were comparable if not greater than similar discharges from the reprocessing plants into Hanford's high-level waste tanks.[47] One reason is that production records understated plutonium losses. In 2001, researchers at Hanford concluded, "the ability to measure the plutonium content of waste streams was vastly inferior compared to the ability to measure plutonium in the primary feed and product streams."[48]

A case in point is 216-Z-9 Crib. This soil disposal site, roughly the size of a volleyball court (30'x60') operated from July 1955 to June 1962 and received approximately one million gallons (4.6E+06 L) of organic and aqueous plutonium discharges from the Hanford RECUPLEX facility -- a scrap recovery operation in the PFP zone. During its operation this facility processed about 8,700 kilograms of plutonium. [49] (The plant was closed after a criticality accident in April, 1962 that resulted in high exposures to workers.[50]) Although processing records indicated that approximately 27 kilograms were discarded into the crib, samples taken in the years following its closure indicated that the site may have contained as much as 150 kg of plutonium, with a soil concentration as high as 34.5 grams per liter. [51] This was enough to possibly set off a nuclear criticality event prompted by water intrusion that could have resulted in near lethal doses to workers.[52] By the late 1970s, 58 kilograms of plutonium were removed from the top 30 centimeters of soil using remote equipment. [53]

Leaving Buried Plutonium Behind

According to the Government Accountability Office, "DOE has long considered pre-1970s buried wastes permanently disposed." [54] At Hanford DOE plans to complete cleanup of about 4 percent of the total acreage containing buried plutonium by 2025 at an estimated cost of $320 million.[55] This cleanup will result in the shallow land disposal of hundreds of kilograms of plutonium wastes generated prior to 1970. DOE officials view the long-term stewardship efforts, which are likely to rely heavily on land control, site surveillance, monitoring, maintenance, record keeping, and related activities, as inherently low cost. Federal institutional controls require that disposal of radioactive wastes at DOE sites must pose less than a 1 in 10,000 chance of exceeding EPA drinking water standards over a 10,000 year time frame.[56]

In 2000, the National Academy of Science challenged this assumption and concluded that: "**Institutional controls will fail** [emphasis added]. Past experience with such measures suggests, however, that failures are likely to occur, possibly in the near term, and that humans and environmental resources will be put at risk as a result. "[57]

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A recent estimate by the DOE underscores the Academy's concern and indicates that plutonium in groundwater from dump sites at Hanford could reach the near shore of the Columbia River in less than 1,000 years at concentrations 283 times greater than the federal drinking water standard. [58] This suggests that buried plutonium at Hanford could render the site's near shore line uninhabitable.

Currently, plutonium vadose zone contamination at Hanford is relatively uniform and exceeds the 100 nCi/g level set for geological disposal at depths greater than 100 feet. Deep vadose zone contamination at Hanford appears to be orders of magnitude greater than at DOE's Idaho site, which has a greater concentration of buried TRU wastes. [59] [60](See figure 3) Migration beneath Hanford disposal sites has been enhanced by solvents, acids and concentrated salts.[61] Moreover, plutonium has migrated to groundwater beneath the Hanford site. [62]These borehole measurements raise questions about DOE's site model that assumes strict vertical migration and does not account for preferential movement of contaminants, as has been documented at Hanford plutonium waste disposal sites. [63] (See Figure 3)

Because of environmental compliance requirements at the Idaho National Laboratory, DOE is beginning to remove pre-1970 TRU wastes for geologic disposal. Beginning in the 1950's plutonium-contaminated wastes was shipped from the DOE's Rocky Flats plant, which made plutonium weapons components, for burial at INL. After a major fire in August 1969 at Rocky Flats resulted in burial of an unprecedented amount of plutonium-239[64], the state of Idaho resisted further disposal and demanded removal of these wastes from the site. Idaho's opposition contributed to DOE's decision to establish the WIPP repository and to require TRU wastes generated after 1970 to be retrievably stored. In 1995, Idaho entered into an agreement with DOE, and the Environmental Protection Agency which required the removal of high-level radioactive wastes, spent reactor fuel and transuranic wastes from the state by 2035. DOE refused to remove transuranic wastes buried at INL prior to 1970 until the Federal District Court in Idaho ruled in favor of the state July 2008.[65] Currently, it appears that DOE plans to remove about 871 kg[66] of an estimated 1,155 kg buried prior to 1970.[67]

No such regulatory requirement has been incorporated in the environmental compliance agreement at Hanford. [68] DOE should be required to remove and process buried plutonium disposed prior to 1970 for geological disposal at WIPP, as is the case at the Idaho National Laboratory. While it may not be possible to remove deep subsurface concentrations, the technology to remove the major preponderance of these wastes from near surface soil was successfully demonstrated at Hanford thirty years ago. To meet waste acceptance criteria, the amount of pre-1970 buried plutonium that would have to be processed (~876 kg Pu-239) would result in about 5,000 to 10,000 drums containing approximately 1,000-2000 cubic meters to be emplaced in WIPP.[69] If the estimated life-cycle cost of $10,000 per 55-gallon drum of TRU waste at the DOE's Idaho site [70] is used at Hanford, this would result in an expense of approximately $50 to $100 million. There are likely to be larger costs at Hanford, because of requirements to protect workers, remote equipment and deep migration of plutonium.

As DOE embarks on its effort to cleanup up its most contaminated area in the Central Plateau at Hanford, it is becoming clear that plutonium-contaminated waste poses one of the most serious risks to the human environment for years to come. Even though the costs of removal and

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disposal of buried plutonium at WIPP are high, the costs of leaving it behind at Hanford are incalculable.

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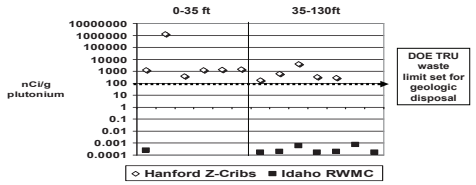
Figure 4. Subsurface Contamination at the DOEs Hanford and Idaho Sites



ources: EGG-ER-10456 Rev. 03
tp://www.hanford.gov/cpr/gpp/data/gpl.cfm

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[31] They include: the T-Plant and B Plant using Bismuth Phosphate (BiP04) Process (1944–1956), the REDOX facility (1952–1967); and (3) the PUREX plant (1956–1972, 1983–1990
[32] Lesser amounts of nuclear materials such as tritium, neptunium-237, plutonium-238, americium-241 and uranium-233 were also produced at Hanford.

[33] DOE/DP-0137
[34] Separation of plutonium at PUREX was halted in 1972, restarted in 1982, and permanently ended in 1989.
[35] HNF-8069.

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Commentor No. 532 (cont'd): Robert Alvarez, Institute for Policy Studies

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[37] HNF-8069, P. 4-5 "The primary chemicals were nitric acid, sodium hydroxide, carbon tetrachloride, aluminum nitrate, tri-butyl phosphate, and calcium, and a number of lesser chemicals also were used."
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http://www.hanford.gov/?page=81
[69] Each 55 gallon container would contain 87.5 to 175 grams of Pu-239 in a volume of 0.2123763495 m3. To dilute 876 kilograms of plutonium to meet the WIPP Waste Acceptance Criteria, this would result in ~5,000- 10,000 55-gallon containers or 1,000m3 to 2,000 m3 in volume.

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Commentor No. 533: Madeline Smith

From: madeline marie smith [mailto:msmith28@uoregon.edu]
Sent: Monday, June 28, 2010 5:01 PM
To: TPA Change Packages
Subject: Re: Hanford

Paula Call, USDOE
P.O. Box 550, A7-75
Richland, WA 99352
June 28,2019

To those concerned for nuclear safety:

I leave it to other concerned citizens to point out the inadequacies of the current plans which fail to completely clean up the nuclear waste stored at Hanford.

On May 1,2010, I wrote Mary Beth Burandy, Document Manager, an e-mail commenting on Draft TC and WM EIS. (see attachment.)

In it, I recommended a climate change EIS; dry casking, at each nuclear facility in the United States; and no vitrification at Hanford until all nuclear waste was removed from the ground and safely stored. *533-1*

This e-mail concerns transportation of all nuclear waste to Hanford and factors in the amount of human error that continues to plague existing nuclear facilities.

Human error has been in the news due to the one mile beneath the sea oil rig disaster which has been extensively reported in the news since oil has been spouting from the hole it made.

On PBS Newshour on May 31, 2010, Bill Nye, former host of “The Science Guy” made the following comments, “there’s almost a million oil wells around the world. There’s a few thousand oil rigs. And this is the kind of disaster that could happen anywhere.”

He adds,” And there are backup systems, but the backup systems weren’t inspected. The backup systems were not regulated.”

“And, when things go wrong, it’s potentially troublesome. Now there’s one more thing. We have tens of thousands of coal -fired power plants around the world. We have thousands and thousands of oil and gas-fired power plants. We have about 400,434 nuclear power plants.” (Emphasis is mine.)

533-1 Carbon dioxide control and global and regional climate change are not within the scope of this EIS. This *TC & WM EIS* addresses proposed actions to retrieve and treat the Hanford tank waste; close the Hanford SST system; store and/or dispose of the waste generated from these tank waste activities; decommission FFTF; and expand or upgrade waste management capabilities to support ongoing and planned waste management activities for on- and offsite waste to facilitate cleanup at Hanford and other DOE sites. This EIS does address impacts of the alternatives on global climate change and the potential impacts of regional climate change on activities at Hanford (see Chapter 6, Section 6.5.2, Global Climate Change).

Commentor No. 533 (cont'd): Madeline Smith

BP is included in," the industry had no blowout technology" and "they didn't have a backup plan".

The absolute lack of a backup plan is a major reason to cancel plans to transport nuclear waste from facilities all over the United States to Hanford.

That Hanford also has no backup plan for the likely disaster of a highway accident is made clear from the National Highway Traffic Administration 2002 report, Traffic Safety Facts 2001: A Compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimate System.

I searched for risk factor statistics regarding the types of vehicles, specifically trucks, which were involved in accidents, but couldn't find them. But risk factors were listed for drivers operating a motor vehicle: 1.alcohol, 2.cell phones, 3.gender, 4.young drivers, 5. senior drivers, 6.speed, 7.location. From this list, it's clear that potentially, any type vehicle can collide with any other type vehicle. *533-2*

This is a potentially dangerous situation for which the Highway Traffic Safety Administration has no recommended backup plan. Accidents are handled locally with whatever resources a local government has. It's not likely that they have the funds to purchase the special equipment to handle a nuclear spill.

Therefore, for safety's sake, the best immediate plan is for each nuclear site to dry cask it's own nuclear waste, and delay building any new nuclear facilities until all the old nuclear wastes are safely stored.

We must always factor in human error. In Walking a Nuclear Tightrope: Unlearned Lessons of Year-plus Reactor Outages by David Lochbaum published by the Union of Concerned Scientists in 2006, are graphs of average lengths of outages and their costs, (pages 5,15,17, 20) and also three pages of specific information about each outage in columns which are headed: name of reactor, owner, location, day commercial operation began, outage dates, reactor age at the start of outage, outage length, NRC region, reactor type, and outage category. (pages 8,9,10) *533-3*

From the study of all the specific cases listed on those three pages, Lochbaum made the following observations: problems are not spotted soon enough, the public is being ignored, corrective action programs are not adequately assessed, problems are allowed to recur, perception (not reality) guide safety decisions, owners are not made aware of non-hardwire problems, programmatic breakdowns are not confined to

533-2 As discussed in this *Final TC & WM EIS*, Chapter 3, Section 3.2.10.5, Emergency Preparedness, DOE uses DOE Order 151.1C, *Comprehensive Emergency Management System*, as a basis to establish a comprehensive emergency management program that provides detailed, hazard-specific planning and preparedness measures to minimize the health impacts of accidents involving loss of control over radioactive material or toxic chemicals. DOE contractors are responsible for maintaining emergency plans and response procedures for all facilities, operations, and activities under their jurisdiction and for implementing those plans and procedures during emergencies. Plans and procedures are reviewed and approved by DOE in accordance with DOE Order 151.1C. The Transportation Emergency Preparedness Program was established by DOE to ensure its operating contractors and state, tribal, and local emergency responders are prepared to respond promptly, efficiently, and effectively to accidents involving DOE shipments of radioactive material. The following assistance is provided: emergency planning and guidance; training material development and delivery; emergency drills and exercises; centralized emergency notification; support to emergency responders (radiological surveys, technical assistance, and public information); and post-incident assessment (along with other agencies).

Another resource for emergency responders is the National Council of Radiation Protection Report Number 161, *Management of Persons Contaminated with Radionuclides*. This report provides guidance to those who may be called to respond to radionuclide contamination incidents to provide medical care and those who perform radiation-safety functions. For radioactive material shipments that exceed highway route controlled-quantity limits, the carrier must operate vehicles only over preferred routes and notify affected states and tribes regarding when these shipments will occur. For DOE shipments, DOE uses a satellite tracking and communications system to track shipments during transport; this system would be used to immediately report an incident. In addition, for all accidents, the U.S. Department of Homeland Security is responsible for establishing policies for and coordinating civil emergency management, planning, and interaction with Federal Executive agencies that have emergency response functions in the event of a transportation incident.

Guidelines for response actions are outlined in the *National Response Framework* (FEMA 2008a) in the event a transportation incident involving nuclear material occurs. The U.S. Department of Homeland Security would use the Federal Emergency Management Agency, an organization within the U.S. Department of Homeland Security, to coordinate Federal and state

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one plant, better communication is needed inside the NRC, not all poor performers have had a year-plus outage. (pages 21 to 26).

It is the failure to look reality in the face that worries me the most. "The public health risks and financial stakes of a 'surprise' nuclear disaster are too high to allow false perceptions to continue guiding nuclear safety decisions." (page 25) ***533-3 cont'd***

It is time to stop ignoring the concerns of clear thinking citizens and do what is best for the continued survival of us and our planet. We must learn how to keep human error minimal, stop taking risks that bring irreversible climate change ever closer. ***533-1 cont'd***

Madeline Smith
594 West 11 Ave.
Eugene, OR. 97401
or: e-mail: msmith28@uoregon.edu
or:xxx-xxx-xxxx

participation in developing emergency response plans and to be responsible for development and maintenance of the *Nuclear/Radiological Incident Annex* (FEMA 2008b) to the *National Response Framework*. The *Nuclear/Radiological Incident Annex* and *National Response Framework* describe the policies, situations, concepts of operations, and responsibilities of the Federal departments and agencies governing the immediate response to and short-term recovery activities for incidents involving release of radioactive materials to address the consequences of the event. In addition, truck drivers who transport radioactive or hazardous materials are required by Federal (49 CFR 383) and state regulations to be technically qualified and experienced and to have completed training in hazardous and radioactive materials transportation. This training, awareness of the cargo risk, and strict compliance with transportation regulations have reduced the likelihood of accidents to well below the national accident rates for all commercial trucks.

Regarding the commentor's concern about the transport of LLW and MLLW from other DOE sites to Hanford for disposal, DOE will be deferring the decision on sending LLW or MLLW from other DOE sites to Hanford for disposal (with some limited specific exceptions), at least until the WTP is operational, subject to appropriate NEPA review. For a more comprehensive discussion on the transport and disposal of offsite waste, see Section 2.1 of this CRD.

533-3 DOE notes that the report cited in the comment deals with lessons learned from operations at nuclear power reactors regulated by NRC. As indicated in Chapter 8 of this *TC & WM EIS*, DOE has an extensive system of standards and requirements to ensure safe operation of DOE facilities. "Nuclear Safety Management" (10 CFR 830) specifically requires that DOE safety programs be designed to detect and prevent safety and quality problems, identify the root causes, prevent recurrence of the problems, and provide timely information to the rest of the DOE community on lessons that were learned.

Commentor No. 534: Stuart Harris, Director, Department of Science and Engineering, Confederated Tribes of the Umatilla Indian Reservation

Confederated Tribes *of the*
Umatilla Indian Reservation
Department of Science & Engineering

46411 Timine Way • Pendleton, OR 97801
(541) 429-7040 • fax (541) 429-7040
info@ctuir.com • www.umatilla.nsn.us

April 30, 2010

Mr. Dave Brockman, Manager
Richland Operations Office
U.S. Department of Energy
P.O Box 550-A7-75
Richland, WA 99352

Re: Proposed Tri-Party Agreement changes to Hanford Central Plateau Waste Sites, Facilities and Groundwater cleanup

Dear Mr. Brockman:

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) appreciate the opportunity to comment on the Tri-Party Agreement changes. The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) have a vital interest in the current and future condition of Hanford, the Hanford Reach, and Hanford-affected lands and resources. The USDOE's Hanford site was developed on land ceded by the CTUIR under the 1855 Treaty with the United States. The CTUIR reserved rights to this land and retained and reserved the perpetual rights to hunt, fish, gather, pasture livestock, and pursue other activities throughout the region, including the area in and around Hanford. The Hanford site contains critical and unique shrub steppe habitat, and the Hanford Reach is the last free-flowing segment of the Columbia River and is home of the last remaining naturally spawning fall Chinook.

Through nuclear weapons production activities, it has taken less than one lifetime to contaminate and thereby permanently affect the ability of CTUIR to safely use the Hanford Nuclear Reservation Area and its resources. The Hanford cleanup is the largest cleanup effort in the world. Yet according to the Central Plateau Cleanup Completion Strategy: "Currently no feasible technology exists to cleanup some of the contamination in the deep vadose zone that might threaten the groundwater." CTUIR assumes that the current proposed changes represent the best current thinking about how to proceed with cleanup. Since the Tri-Parties have already reached agreement, the CTUIR is only providing a few comments.

1. The CTUIR notes that DOE/RL expects the groundwater to reach drinking water standards with a century, more or less, while the TC&WM EIS shows that this will essentially never occur. The reality, therefore, lies somewhere between 'safe to drink' and 'lethal forever.' The TC&WM EIS was charged with developing the newest and best Hanford GW/VZ model, with peer review

534-1

Treaty June 9, 1855 - Cayuse, Umatilla and Walla Walla Tribes

534-1 The *Draft TC & WM EIS* results suggest that complete removal of flux from the vadose zone over approximately the next 100 years would result in continued exceedances of benchmark standards in groundwater at the Core Zone Boundary for key COPCs from tank farm sources for several hundred years into the future (cf. Alternative 6A, Option Case, Clean Closure with Removal of Cribs and Trenches). In other words, concentrations at the Core Zone Boundary retain a signature of the operational (high discharge) period for a significant length of time into the future. The *Draft TC & WM EIS* also suggests that, under foreseeable combinations of waste-form performance, infiltration, and inventories, exceedances of benchmark standards for key COPCs from the IDF(s) may be expected over a period ranging from several thousand to 10,000 years into the future. Both of these results are for situations where no mitigation measures were included in the modeling. DOE is of the view that mitigation measures may be necessary to address groundwater contamination issues at the site, both for tank-farm-related and non-tank-farm-related sources. Such mitigation measures could include, but are not limited to, reduction of flux from the deep vadose zone into the aquifer, groundwater pump-and-treat systems, and development and deployment of improved waste forms.

Under NEPA, this *TC & WM EIS* is required to present decisionmakers with an estimate of impacts that allows for informed judgment regarding the tradeoffs among the alternatives. For example, the *TWRS EIS* (DOE and Ecology 1996) demonstrated that retrieving and treating waste from the SST system was preferable in terms of NEPA values to leaving that waste in place. It is also clear under NEPA that even the most preferable alternative may benefit from additional mitigation measures. In response to this and similar comments, Chapter 7, Section 7.5, of this *Final TC & WM EIS* contains additional analyses regarding potential mitigation measures. DOE's expectation is that these mitigation measures will be further developed during the assessment and permitting process as individual tank farms are closed.

Commentor No. 534 (cont'd): Stuart Harris, Director, Department of Science and Engineering, Confederated Tribes of the Umatilla Indian Reservation

and configuration control, so the CTUIR have to conclude that reality is closer to the 'lethal forever' condition. We urge the Tri-Parties to sort this out, because no more final decisions can be reached until this uncertainty is reduced to tolerable levels. 534-1 cont'd

2. The CTUIR want to reiterate the importance of cleanup of the groundwater and the protection of the Columbia River. Therefore, it is important to continue developing the technology and a strategy to cleanup the deep vadose zone contamination.

3. The CTUIR would like to see the outline of the Lifecycle Report as soon as it is available. The lifecycle report could become a very important guidance document that contains cost projections, schedules, endstate descriptions, and a variety of restoration, stewardship, and environmental justice goals. Or, it could be bland and uninformative.

4. In the TPA changes, the language that states, "reaching mutually agreeable alternatives and end states" seems to have been removed. Instead, the language simply offers to discuss issues with Tribal Nations. The CTUIR want to maintain an active role in decision-making according to the DOE Indian Policy and Framework. Therefore, the language should acknowledge that Government to Government protocols exist and will be followed.

5. The CTUIR are concerned about the Modification P-07-09-02. The language shifts the responsibility of writing RODs from EPA and Ecology to DOE. While the regulatory agencies retain a concurrence role, it leaves the selection of final remedies and the establishment of remedial goals up to DOE. Because DOE steadfastly refuses to acknowledge on-site Treaty rights, refuses to use the CTUIR exposure scenario as a baseline scenario, and refuses to set cleanup goals to protect Tribal health, this will become a significant focus of the NRDA process.

If you have any questions, please feel free to contact myself or Dr. Barbara Harper of my staff.

Sincerely,

Stuart Harris, Director
Department of Science & Engineering

cc:
Shirley Olinger, Manager, DOE/ORP
Dave Brockman, Manager, DOE/RL
Jane Hedges, Washington State Department of Ecology
Dennis Faulk, U.S. Environmental Protection Agency
Gabriel Bohnee, Nez Perce Tribe
Russell Jim, Yakama Nation
Ken Niles, ODOE
file

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