HANFORD ADVISORY BOARD

A Site Specific Advisory Board, Chartered under the Federal Advisory Committee Act

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September 20, 2018

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Dear Mr. Vance, Mr. Shoop and Ms. Smith:

Background

The U.S. Department of Energy (DOE) has issued for public comment a proposal to reclassify High-Level Nuclear Waste remaining in C Farm tanks to be considered "low-level" waste. The legal definition of High-Level Nuclear Waste in the United States is based on its source versus level of risk or radioactivity. This proposal to reclassify this waste is in the Draft "Waste Incidental to Reprocessing" (WIR) Evaluation for Closure of Waste Management Area C (WMA C). To date, DOE has retrieved more than 1.7 million gallons of waste from the tanks in the C Farm (approximately 96 percent of the waste volume) and transferred this waste to double-shell tanks. This Draft WIR Evaluation represents DOE's first step toward a DOE proposal to permanently leave the estimated 4% of waste remaining overall in the 16 single-shell tanks in Hanford's C Tank Farm, with a cement grout added to the tanks.

This application of the WIR process is precedent setting and has the potential to establish the criteria for the closure of all of Hanford's tank farms. The complexity, technical nature, regulatory basis, and importance of this process has necessitated that this advice be organized by major categories to link each advice point to its related discussion.

Policy Basis

Under federal law (the Nuclear Waste Policy Act), High Level Nuclear Waste is expected to be permanently disposed in a deep geologic repository, which does not yet exist. Low-Level Waste, on the other hand, may be disposed near the surface.

The Draft WIR Evaluation seeks to provide the basis for a determination that any remaining residual waste in the retrieved tanks and ancillary structures in WMA C can be reclassified as low-level waste. This would be the first step in a regulatory process that DOE is pursuing to allow the filling of the tanks with a concrete-like grout and placing an engineered surface barrier above the tanks and their ancillary structures (e.g., transfer piping). In order for WA State to approve a cleanup permit plan using landfill closure, mixed wastes intended to be left in the tanks, pipelines, ancillary equipment and soil cannot be classified as HLW. RCRA requires any mixed waste classified as HLW to be vitrified to meet land disposal requirements. While "clean closure" would require removal of all mixed wastes, including the tanks, DOE seeks to use a "landfill closure" permit under RCRA, which in this case would allow approximately 4% of mixed waste to be left in the bottom of tanks under concrete with soil contamination left under moisture infiltration reducing caps in the tank farm.

After DOE first adopted DOE Order 435.1 allowing reclassification, a legal challenge was initiated in 2003. Subsequently, a U.S. District Court found that DOE lacked authority to reclassify tank wastes under the Nuclear Waste Policy Act, and under the language of its own Order. This court decision was reversed when the Appeals Court determined that the case was not "ripe," because DOE had not actually attempted to apply the Order to any particular tank wastes. DOE is now seeking to apply this authority to wastes in C Tank Farm.

The relevant sections of DOE Order 435.1 permits waste reclassification if three separate requirements for wastes are met:

- **remove key radionuclides** to the maximum extent that is **technically and economically practical**;
- meet safety requirements comparable to the performance objectives set out in 10 CFR Part 61, Subpart C, Performance Objectives; and
- manage, pursuant to DOE's authority under the Atomic Energy Act of 1954, as amended, and in accordance with the provisions of Chapter IV of this Manual, provided the waste will be **incorporated in a solid physical form** at a concentration that does not exceed the applicable **concentration limits for Class C low-level waste** as set out in 10 CFR 61.55, Waste Classification; or will meet alternative requirements for waste classification and characterization as DOE may authorize (*emphasis added*).

The Draft WIR evaluation asserts that all three DOE Order 435.1 requirements have been met regarding the C-Farm tanks. However, the determination of whether key radionuclides have been removed to, "the maximum extent technically and economically practical," is one which is subject to challenge and seems to conflict with the intent of the Hanford Federal Facility Agreement and Consent Order, (TPA). One primary issue is determining how much waste may remain in tanks and what constitutes removal to the extent practical.

In its formal statement in the Tank Closure and Waste Management EIS (TCWMEIS), Washington State Department of Ecology (Ecology) stated that it interpreted the TPA and state and federal hazardous waste laws as requiring removal of 99% of waste in the tanks, prior to a determination of impracticality for further retrieval. Yet, DOE seeks to proceed with reclassifying waste after retrieving only 96% from the C Farm Tanks (some tanks have >9% residual remaining) and not retrieving any high-level key radionuclides from discharges to the soil[1]. This draft WIR would allow leaving 4% or approximately 60,000 to 70,000 gallons of High Level Nuclear Waste in the C-Farm tanks and would reclassify this waste form from high-level to low-level waste.[2] It should be noted that retrieval of bulk waste may

1 USDOE estimates that approximately 70,315 gallons of waste remain in the C Farm Tanks. Tables 4-7, 4-8, with 5,500 gallons estimated remaining C-105 per USDOE June 18, 2018. There is a wide range of the amounts remaining in tanks with C-102 and C-112 having 20,500 gallons (6.5%) and 10,100 gallons (9.7%) respectively.

2 Draft WIR Evaluation, Tables 4-7, 4-8, with 5,500 gallons estimated remaining C-105 per USDOE June 18, 2018.

not satisfy the criteria for removal of key radionuclides from the mixture of wastes to be disposed.

In the TCWMEIS, Ecology noted that the "preferred alternative" adopted by DOE was 99% retrieval; and, the TCWMEIS model predicted that leaving more waste resulted in levels of contamination that could exceed groundwater protection standards for thousands of years. The Board seeks clarification regarding whether DOE intends to use this WIR process to abrogate the formal Record of Decision under which DOE adopted the preferred alternative of 99% retrieval.

This draft WIR determination addresses only radionuclides remaining in the residual waste in the tanks and their auxiliary structures in WMA C. Because the residual waste is mixed waste (radioactive and hazardous), WMA C must also meet Washington State's dangerous waste requirements for closure[3]. Pursuant to the Tri-Party Agreement, closure plans must be approved by Ecology and incorporated into the Hanford Site-Wide Dangerous Waste Permit before DOE can proceed with closing the tanks.

Pertaining to the third WIR criterion, because DOE is not processing the residual waste in grout, but instead filling the tank void space with grout, the HAB is concerned that the grout and waste will not be incorporated in a solid physical form as required by Order 435.1. The WIR evaluation for WMA C only seeks to reclassify the tank infrastructure and residual wastes in tanks and pipelines. It does not include the high-level waste that leaked from the tanks or was spilled into the soil. In the process of learning about the draft WIR evaluation for WMA C, it has now emerged that, without any public notice, in 2008 DOE adopted a WIR determination to reclassify high-level nuclear wastes at Hanford which leaked or were spilled from tanks into soil during waste transfers and operations. This prior WIR determination followed the citation process under DOE O 435.1, which involves a less rigorous analysis than the evaluation process being pursued for the WMA C tank residuals. DOE has not yet provided a clear and consistent response regarding whether this previous WIR determination applies to the waste that leaked and spilled from the C Tank Farm, nor whether DOE ever intends to conduct a separate WIR evaluation for the WMA C contaminated soils.

Advice: Policy Basis

The Board advises that DOE:

- Ensure its WIR evaluation and the tank farm closure process includes the following steps:
    - Work with Ecology to establish a comprehensive process for tank closure that integrates closure standards and cumulative impacts. The Board is concerned that making piecemeal decisions using the WIR processes may never meet closure standards to allow for full consideration of cumulative impacts.
    - Integrate the closure standards in the C-Farm closure plan with the development of the WIR evaluation in order to address closure requirements as defined by Washington State Department of Ecology.
    - Include the soils beneath WMA-C in the current WIR evaluation.
- Initiate a demonstration test prior to grouting that affirms tank residual waste meets the requirements of concentration limits of Class C low-level as set out in 10 CFR 61.55 and conforms to the exacting metrics of incorporation of waste into grout.
- Resolve how closure criteria established by the State of Washington are met when 9.7% of waste remains in a SST. DOE should provide clarification of the application of the

3 Washington Administrative Code [WAC] 173-303, "Dangerous Waste Regulations"

TPA Appendix H & I[4] in the determination of what waste can remain in the tanks.

Performance Assessment

The Board is concerned that the WIR is dependent on a Performance Assessment (PA) containing residual unmanaged uncertainties which may set a precedent for the closure of additional Hanford tank farms in the future.

At this point in time, the basis for the WIR evaluation rests mostly on the conclusions of the C-Farm PA which declares that all future seepage from C Farm residuals would be below drinking water standards for the next 10,000 years at specific monitoring points. The Board is concerned that the PA and the WIR fail to address the large inventory of Tc-99 and other contaminants of concern that moved laterally, in liquid form, through discharges from PUREX during processing years. The volumetric overload (millions of gallons) created a groundwater mound that accessed a stair-stepping gradient which transported Cobalt 60, Tc-99, Cesium and Nitrates among other contaminants of concern, along silt lenses, sandwiched between other geologically discrete layers. The modeling report (Figure 30), by Stan Sobczyk, 12/1/16 illustrates those thin-layered ancient lake beds under C-Farm. Current modeling efforts for Unplanned Releases (UPRs) and tank leaks analyze only vertical transport through the vadose zone, even though there is firm evidence of lateral flow, of Co-60, specifically, from C-Farm.

The C-Farm PA modeling has never accounted for liquid moving down slope from PUREX cribs towards C-Farm. Tank leaks and unplanned discharges may continue for many years. Additionally, the interaction of seepage from C-Farm or other nearby facilities with chemicals and radionuclides in the soil beneath C-Farm has not been considered. The tanks and the soil are inseparable as are the soils and groundwater. Groundwater remediation must be evaluated prior to a decision on tanks. DOE must address soil remediation, groundwater remediation and tank closure, in total, together (Composite Analysis).

The public was assured by Executive Assistant Secretary for EM, Ines Triay, that the PA would be vetted publicly, would be available for public comment and that DOE would share its response and decision(s) on the PA. The Board believes that the State of Washington and the public need adequate time to address the questions raised regarding the PA and have DOE resolve these questions prior to using the C-Farm PA to support the draft WIR evaluation.

Advice: Performance Assessment

The Board advises that DOE:

- Complete and update the Composite Analysis and address questions concerning the C-Farm PA prior to initiating the WIR evaluation and C-Farm closure.
- Complete the PA Maintenance Plan before proceeding with a WIR determination. The Maintenance Plan is part of the long-term "decision package" for a WIR decision required by DOE Order 435.1 and should be open for public review and comment. The Board advises DOE to engage the Board and other stakeholders in the development of the PA Maintenance Plan, to ensure that follow-on monitoring and assessments adequately address public uncertainties and concerns about the adequacy of the existing PA model.
- Given that remaining uncertainties persist in the PA model, DOE should not use the model results as a basis to determine that no significant risk reduction would result from additional waste retrieval from the WMA C tanks and pipelines.

4 Hanford Federal Facility Agreement and Consent Order

Cumulative Impact

In 2008, DOE executed a WIR determination for secondary wastes at Hanford, which included wastes that leak or spill from tanks into soil. This determination was developed and codified without knowledge of or participation by the Washington Department of Ecology, the original parties in the 2003 litigation, or the public. At the June 18, 2018 Public meeting for the WMA C WIR, a DOE Headquarters representative stated that the 2008 WIR was not intended to apply to past leaks, but to future leaks that occur during tank waste retrieval and treatment, however the language of the 2008 determination (last updated in 2017) does not include this specificity. DOE's current charge to the NRC is to review a WIR that excludes evaluation of the soils in Waste Management Area C.

WIR evaluations under 10 CFR 61.55 should include all media, including soils. Currently, with the transfer of HLW liquids out of the sixteen tanks, the highest impact from radionuclides and hazardous chemicals in WMA C may now reside in the soil columns under those tanks. Past practices included over-filling of tanks, leaks as material went through the cascading system and out unsealed joints[5] and because hoses were turned aside, and letting HLW liquid flow into the ground when tank space was at capacity and processing operations were deemed too important to stop[6]. Estimates are that 25,000 curies were leaked to the soil. The HAB questions the validity of a WIR process that excludes evaluation of radionuclide risks in the surrounding soil.

The Board is concerned that DOE's segmented approach does not consider the impacts from related decisions, such as DOE's stated intent to leave C-Farm soil contamination in place. A Composite Analysis is needed because the current approach does not evaluate or disclose the full range of impacts. The current approach of each singular evaluation may result in a determination of low risk when in fact, the total impacts may be significant. The Board questions the adequacy of utilization of the 2012 TWMCEIS to satisfy this requirement as Alternative 5 (the only EIS alternative that assumed less than 99% retrieval) shows that the groundwater maximum contamination limits will be exceeded at the Core Boundary. It seems to be insufficiently protective to meet the Order 435.1 requirements.

The Board is concerned that DOE has no plan to consider the cumulative impact of its related proposed actions/decisions to utilize the WIR process to both reclassify the high-level nuclear waste in C Farm Tanks and the waste discharged and leaked to soils.[7] National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) require the cumulative impact on human health to be considered, not just examining each individually to see if it meets DOE's standards. This applies to the chemical contamination releases as well as radionuclide releases. There is no consideration of those chemical releases and risk in the Draft WIR evaluation. The segmented approach of considering the risks from the related but separate DOE decisions may not meet the intent of NEPA or SEPA regulations. DOE has not laid out a public involvement process that will integrate still needed data for the PA into a comprehensive, site-wide closure vision.

Advice: Cumulative Impact

The Board advises that DOE:

- Enlarge the scope of the WIR evaluation to include the residual high-level nuclear waste in both C Farm Tanks and the surrounding soils which received historically documented liquid waste discharges.

5 RPP.ENV 33418 Rev.1, M.E. Johnson, J.G. Field, CH2MHill Hanford Group, March 2008

6 WHC-MR-0227, April 1991 J.L. Waite

7 USDOE's formally adopted plan guiding this WIR Evaluation for C Area states that USDOE-ORP has already issued a WIR by citation decision to reclassify the "soils contaminated by tank waste have already been classified as LLW by DOE-ORP using the WIR by citation process." RPP-Plan-47325 Rev. 0 (2010).

- Ensure that the ability for future removal of the HLW in the vadose zone, under the tanks and throughout the geologic strata of WMA C is not inhibited by closure of HLW tanks.
- Integrate the Composite Analysis into the WIR decision. The Composite Analysis is a key part of the "decision package" for WMA C and should be available for public review prior to a final WIR determination for WMA C tanks and residuals.
- Provide the public with the ability to review what NEPA analysis has been done and alternatives to waste reclassification as part of meeting NEPA obligations during this comment period.

NRC Evaluation

DOE has requested a technical peer review from the Nuclear Regulatory Commission (NRC) for an evaluation of radionuclide release modeling under the WIR for residuals in tanks. The NRC will review the Draft WIR Evaluation and provide a Technical Evaluation Report. DOE will consider NRC's technical review before deciding to issue a final WIR Evaluation. The Board recognizes that the NRC evaluation is advisory and only evaluates radionuclide migration from the tanks.

Advice: NRC Evaluation

The Board advises that DOE:

- Create a public comment opportunity to evaluate the NRC Technical Evaluation Report and provide input to the TPA Agencies, prior to DOE issuing the final WIR Evaluation.

Public Input

The closure process for Waste Management Area C has the potential to set precedent for all future Hanford tank farm closures. It will inform how much waste is left behind in all of its 177 tanks and throughout the geologic strata of the tank farms. A robust public involvement process is needed for the draft WIR evaluation and C-Farm Performance Assessment in order to assure that adequate and meaningful public comment are solicited and considered. The technical nature and complexity of this process necessitates clear and comprehensive public discussion and evaluation, which is best accomplished in person in public hearings around the region.

Advice: Public Input

The Board advises that DOE:

- Hold multiple regional public hearings in locations such as Seattle, Portland, Hood River, and the Tri-Cities to increase public understanding of the draft WIR evaluation process and ensure public discussion and comment opportunities.

In closing, the Board hopes to continue to work with the TPA Agencies on an ongoing basis to continue to exchange information as this critical tank closure process moves forward.

Sincerely,

Susan Leckband, Chair
Hanford Advisory Board

This advice represents HAB consensus for this specific topic. It should not be taken out of context to extrapolate Board agreement on other subject matters.

cc: Anne White, Assistant Secretary of Environmental Management, U.S. Department of Energy, Headquarters
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