

FINAL MEETING SUMMARY

**HANFORD ADVISORY BOARD
RIVER AND PLATEAU COMMITTEE MEETING
April 14, 2009
Richland, WA**

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This is only a summary of issues and actions in this meeting. It may not represent the fullness of ideas discussed or opinions given, and should not be used as a substitute for actual public involvement or public comment on any particular topic unless specifically identified as such.

Welcome and Introductions

Maynard Plahuta, River and Plateau (RAP) Committee Chair, welcomed the committee, introductions were made, and the committee adopted the March meeting summary.

Purgewater Management Alternatives

Briant Charbonneau, Department of Energy – Richland Operations Office (DOE-RL), provided an update on the purgewater management engineering evaluation/cost analysis (EE/CA), which has an upcoming public comment period.

Briant said A Tank, a modu-tank in the 200-East Area, was constructed in the early 1990s to treat purgewater. The tank has a steel frame with a double liner, and includes leak detection between the two liners. Two primary sources of purgewater are from extracting water from pipe casings during the sampling process and initial well drilling, which creates fine materials that are difficult to filter. If a hazardous substance is in purgewater it cannot be discharged to the ground like other groundwater, and an evaporation pond that evaporates the water and allows the fine elements to settle must be used. Briant said the one-acre pond that has been used to treat contaminated purgewater is now full of

sediment. DOE is currently discussing next steps. Briant said one option is a process to modify the effluent treatment facility (ETF), but this could create problems with filtering and other issues. He said this option would also require a new environmental assessment (EA) or environmental impact statement (EIS). Briant said the purgewater issue is impacting current drilling operations so an immediate path forward is needed.

A Tank is permitted under the Resource Conservation and Recovery Act (RCRA), and Briant said DOE would need to go through the permitting process again to build a new tank. The process to close A Tank will include letting the water evaporate, then putting a chemical on top of the pond to make sure the sediment does not become airborne. The current permit specifies that the sediment must always be wetted, so a new permit would be needed. Briant said all groundwater activities are now done under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. He said the best path forward would be to consider purgewater treatment a CERCLA activity. Since a great deal of well drilling is planned for the next couple of years, he said there is an urgent need to solve this issue.

Briant reviewed the projected amounts of purgewater volume for 2009-2014. He said the current estimated capacity is minimal, at 120 gallons, and will be insufficient for the treatment system envisioned in the 200-West Area for ZP-1 and UP-1. He said new contractors' evaluated well development and suggested minimizing the amount of flushing that takes place during initial development and changing the well screen to reduce the amount of purgewater. Briant said pump tests also have to be considered, which are needed to determine the amount of sediment in the first extracted volume. For ZP-1 these tests will take place at the ZP-1 treatment facility.

Briant then discussed the six alternatives reviewed in the EE/CA. The first alternative is a no action scenario. The second is to transport purgewater directly to a groundwater operable unit (OU) pump and treat facility. Briant said with the second alternative the sediments would still need to be treated, potentially in modular weir tanks, which would then need to be cleaned. The third option is to use modular storage units for purgewater management. Briant said modular storage is currently used, and he is unaware of any problems associated with this alternative. The fourth option evaluated is discharging purgewater at or near its source. He said this is done when purgewater has little or no contamination, but doing this with significantly contaminated water would create an additional waste site. Alternative five is to transport purgewater directly to the treated effluent disposal facility (TEDF), but this facility would require re-permitting and is scheduled to be decontaminated and decommissioned (D&D) this year.

The EE/CA will be submitted to regulators for review on April 28 and the public comment period on the document will take place from April 29 to May 29. Following the public comment period, approval of the action memo will take place June 12. Briant said DOE hopes to remove and treat the materials in the existing facility while working on establishing a new facility for purgewater treatment. He said DOE is also looking at techniques to minimize the amount of purgewater that is generated.

Regulator Perspectives

- Rick Bond, Washington State Department of Ecology (Ecology), said Ecology has been working with DOE on purgewater and there are still some issues in the EE/CA to resolve. He said Ecology thinks the preferred alternative (PA) will be to build a new modu-tank since this system has worked for 20 years. Overall, the contamination in the modu-tanks is fairly low and evaporation should not create additional issues. He said putting concrete under the modu-tank and permitting it as a tank should be prioritized so creating expensive monitoring wells will not be required.
- Dennis Faulk, Environmental Protection Agency (EPA), said additional capacity is needed quickly and rebuilding modu-tanks seems to be the best short-term solution. He said whether modu-tanks are the best long-term solution is still being discussed.

Committee Discussion

- Wade Riggsbee said industry protocols previously required defining the substance of aquifers and additional analysis of pump tests, but this was never done at Hanford. He commented that this is now being looked at as a set of issues.
- Dick Smith asked what the contents of the pond are and whether this material has been sampled. Briant said the pond is a composite of all the purgewater generated on site, and the closure process will go through a sampling protocol. The solids are primarily rock and dirt particles and the contents will go to the environmental restoration disposal facility (ERDF) for disposal.
- Shelley Cimon asked whether it would be possible for ERDF to be re-permitted. Briant said ERDF has steel sides, a liner, a collection space and an additional liner, and is currently permitted as a tank. There have been court battles over whether it is a tank or a surface impoundment and this would create an issue with re-permitting. Surface impoundments require monitoring wells while tanks do not. Rick said if ERDF had a concrete bottom it would be considered a tank and would not need monitoring wells.
- Pam Larsen asked whether DOE has plans to salvage equipment from TEDF since it is scheduled for D&D this year. Briant said usually before a D&D operation takes

place DOE makes an announcement to contractors that equipment is available, and often much of it is salvaged for direct re-use. Rick said the tanks in place at TEDF will remain.

- Dale Engstrom said the graph of forecasted purgewater volume shows that 5.5 million gallons will be produced. Since each tank holds 1 million gallons, he asked how this volume will be managed. Briant said this is being looked at and DOE is considering building multiple tanks at the existing facility.
- Shelley asked if DOE will announce a PA when the EE/CA is released. Briant said he believes DOE will announce a PA.
- Wade asked the difference between permitting modu-tanks under CERCLA requirements rather than RCRA requirements. Dennis said there is no trade-off caused by the change in permitting, as the tank would still have to meet all environmental protection requirements. He said when the Tri-Party Agreement (TPA) was written all actions were being completed under RCRA, and now all of the purgewater is being generated by CERCLA projects. He said the only difference would be the administrative process.
- Wade asked if monitoring requirements would be built in if the new tanks are permitted under CERCLA. Dennis said the modu-tanks have a leak-protection system in place. If this is a short-term solution, creating monitoring wells would be a burden, but he said if modu-tanks are going to be a long-term solution, it needs to be set up for long-term operations.
- Dirk Dunning asked whether other technological ideas, such as filters, are being considered in addition to building new modu-tanks. Briant said several different studies have been completed on these technologies. He said other technologies provide different purgewater solutions, but the modu-tanks are the most reliable and cost-effective solution.
- Shelley asked if it would be possible to create a cascade system that would allow the container that collects sediments to go directly into ERDF. Briant said DOE evaluated a similar modification to ERDF, but this was not the best solution due to timeliness and cost. He said portable weir systems are also available but these need to be purchased.
- Harold Heacock asked if the purgewater issue creates an immediate hazard or if it is primarily a regulatory issue. Dennis said it is both a hazard and a regulatory issue. Action must be taken on purgewater, and one option is to inject it back into the aquifer. Discharging purgewater to the surface would create additional waste sites. There are also regulatory considerations for putting contaminated sediments in one location where they can dry out. Harold asked if this solution is the best use of

available funding. Dennis said it is, given the situation, and collecting the sediment in one location makes sense.

- Dick asked what the sedimentation rate is in the modu-tank. Briant said it took 20 years to fill the tank halfway, but the volumes were different than projected volumes.
- Wade Riggsbee and Dale Engstrom offered to serve as issue managers for this topic. There will be further discussion at the May committee meeting regarding next steps for the committee and the potential need for advice at the June Board meeting. Briant felt that advice in early June would still be timely.

Overall Central Plateau (CP) Cleanup Completion Strategy

Matt McCormick, DOE-RL, provided an update on the completion strategy for the Central Plateau (CP) and discussions DOE is conducting with regulators on implementing a seventh record of decision (ROD) for the approximately 180 waste sites in the Outer Area of the CP. He said discussions with regulators are progressing well regarding reaching an agreement on completion levels, the waste sites that would be included in a seventh ROD, and what other interim decisions are needed for waste sites to which recovery act funding may be applied. Matt said the seventh ROD will eventually be issued to capture waste sites in the Outer Area.

Matt also addressed the completion of remediation decisions for the existing groundwater OUs in the CP. This would build off the ZP-1 ROD, first focusing on the West Area and coming to a remediation decision for uranium in an OU in the West Area. He said DOE is designing a system that will be flexible enough to treat all water and key contaminants coming from the East and West areas. Matt said DOE is still in discussions on how to handle plumes and the BP-5 operable unit in the East Area.

Matt said DOE has started discussions with regulators on the section of the Agreement in Principle (AIP) regarding coming up with a CP completion strategy for the Inner Area. Discussions have covered the key parameters and cleanup decision standards for the Inner Area and how to create an efficient decision-making process for waste sites, burial grounds and structures. He said DOE's next meeting with regulators should provide a better concept for how to complete the Inner Area's decision-making process to make sure it is comprehensive, complies with RCRA and CERCLA, and addresses deep vadose zone and transuranic (TRU) waste. He said DOE hopes to provide a bigger picture of what the entire Inner Area will look like after cleanup to the Hanford Advisory Board (HAB or Board) and the public. The draft completion strategy for the CP is a deliverable specified by the AIP that is due to regulators by the end of July and will cover compliance with RCRA and CERCLA, deep vadose zone considerations and folding in

the schedule of cleanup for waste sites adjacent to the CP.

Committee Discussion

- Maynard asked how many sites need to be addressed in the Outer Area of the CP. Matt said approximately 180 sites, including ponds and all the waste sites that are believed to require long-term waste-management activities. Maynard asked if these sites are well characterized. Matt said they are well characterized for the most part, but more sampling is needed to determine the breadth and depth of the sites. He said characterization is not as important for the initial decision on the CP since these sites will undergo remove, treat and dispose (RTD) activities.
- Shelley said she heard that additional orphan sites were found, and asked if there is any estimate on how many potential waste sites have not yet been discovered. John Price, Ecology, said the River Corridor contractor did a flyover of the site and collected some data for the outer area of the CP. He said there is the potential for discovering up to one or two dozen additional sites, but these are generally not substantial waste sites.
- Wade asked whether sampling plans developed for the S Ponds, Gable Mountain Ponds and B Ponds are directed at problems with contamination. He said at Gable Mountain ponds there have been problems with sagebrush and issues with not understanding uptake and transport when using herbicides have arisen. John said there are some exceptions for RTD, which include a couple of the ponds Wade mentioned. These ponds will require a different level of remedies. He said some supplemental characterization has been completed at B Pond and some other ponds, and as remedies are implemented it is likely that more sampling will take place.
- Pam said she thought the solution for Gable Mountain Pond was monitored natural attenuation (MNA), given that it contains strontium and cesium. John said after conducting additional supplemental characterization on a number of the ponds it was determined that removing some near-surface materials will provide an opportunity to protect natural vegetation.
- Dirk said one problem that has developed with herbicides is a resistance developed by shrubbery, and it does not appear that herbicides will be a long-term solution. John said the site is spending approximately \$1 million a year on biological control and the number of incidents is increasing. He said it is clear there is a benefit to excavating near-surface materials. Matt said DOE wants to protect the ecology without having to rely on herbicides as an institutional control (IC).
- Wade said Yakama Nation is mapping areas of the site where herbicides have been applied, and are currently digitizing and compiling these records. He said if applying

herbicides is stopped in the Outer Area it will be important to know where there may be long-term effects.

- Shelley asked how the HAB can weigh in on what DOE and the regulators are discussing regarding the CP. She asked whether the CP strategy will be completed by the time the HAB sees it. Matt said the Board's flow charts for waste site and groundwater remediation are referenced during the discussions. He said the process is iterative, and DOE and the regulators have just begun discussions. After the next meeting he will be able to provide a more detailed overall idea, and the Board could weigh in then. DOE will propose a strategy to regulators by the end of July.
- Wade said T and U Ponds need to be considered when looking at pond contamination. He said swamps, where process water from the plants was disposed of on the lowest adjacent point, also need to be addressed because there was contamination associated with those zones. Shelley commented that there were also ponds under some of the waste sites in SW-1 and SW-2.
- Maynard commented that it is encouraging that the regulators are working together.
- Wade said more coverage is needed since stimulus money is available, and a discussion with HAB members on funding and scheduling needs to take place due to the acceleration of these activities. He suggested looking at marketing additional funding for HAB involvement. Matt suggested looking at the work proposed for stimulus funds and then determining what HAB involvement will be needed.
- Matt will return at the May committee meeting for a more robust update on the plans for the outer area. The committee will discuss the potential need and appropriate timing for advice.

Outline - Plutonium Toxicity Tutorial (Joint topic with the Health, Safety and Environmental Protection Committee)

Debra McBaugh, Washington State Department of Health (WDOH), presented an outline of the Plutonium Toxicity Tutorial that she will present at the June Board meeting. This presentation is a variation of the plutonium presentation given by Debra, Jerry Yokel of Ecology, and Dr. Tony James of Washington State University (WSU) at the January RAP meeting.

Debra said she will first discuss radiation physics, covering the radiological and chemical nature of plutonium and the differences between alpha, beta and gamma radiation. She will cover the four ways that radioactive elements can be hazardous to human health and the relative hazards from ingestion, inhalation and direct exposure. The presentation will also discuss the persistence of radioactive materials in the environment, including a definition of an element's half life and graphs that depict the relative half lives of

plutonium, cobalt, cesium and strontium. Debra said uranium is not included in this due to the long length of its half life. The radiation physics section of the presentation will also cover drinking water standards for plutonium, radium and uranium, which were last set in 2000.

Following the radiation physics section of the presentation, Debra will discuss the chemical nature of plutonium and its unusual properties, including its seven allotropes, five oxidation states, highly reactive nature, density changes and self irradiation. She said it is difficult to predict how plutonium might spread and how fast, and will discuss the factors that influence its movement. The presentation will also include a slide that shows the number of lethal doses contained in five grams, which is approximately the size of a nickel coin, of a variety of poisons and radionuclides.

The third section of the Plutonium Toxicity Tutorial will discuss the factors that influenced worker standards for plutonium exposure, specifically radium dial painters. Statistics show that at a certain level of radium intake the incidence of cancer increases. Debra said the U.S. standard of 0.04 microcuries for plutonium exposure was based on the radium standard. This is a regulatory standard that limits workers' annual intake.

Regulator Perspectives

- Ginger Wireman, Ecology, suggested including whether radioactive isotopes can be filtered out of water during the section of the presentation that covers drinking water standards. She said since Richland's drinking water source is near the 300 Area and the groundwater is moving toward the Columbia River, it would be useful to know whether it is possible to filter these isotopes out of the drinking water. Debra said that may be too detailed for this presentation, and suggested a separate presentation that addresses sampling, the current levels of isotopes and treatment considerations.

Committee Discussion

- Referring to the graphs showing the relative ingestion, inhalation and exposure hazards, Dirk asked what the dose shown is relative to. Debra said the dose is radiation-based, and is relative to the annual intake limits, in microcuries. She said the goal of this is to demonstrate the difference between plutonium and other substances at Hanford.
- Gerry said it is important to explain the decay chain and how one form of a radionuclide that is not hazardous will decay to another form with a direct exposure hazard. He suggested acknowledging this at the bottom of the slides, or creating an individual slide that explains this.

- Pam suggested moving the slide that discusses drinking water standards ahead of the graphs that show ingestion, inhalation and direct exposure risks, as this would help provide context. Debra said she will move this slide and add a gram comparison for some of the other radionuclides.
- Harold suggested including an introductory page with definitions of terms such as half life and isotope.
- Gerry Pollet said it is important that the Plutonium Toxicity Tutorial be in the context of how plutonium affects cleanup at Hanford, and that the most relevant topics are groundwater contamination and drinking water standards. Dick said his hope for the presentation is that people who are not knowledgeable about plutonium gain an understanding of its properties and how it may impact cleanup decisions. Debra said her presentation could be a lead-in to issues like drinking water standards, and suggested the Board use the Plutonium Toxicity Tutorial to identify topics for future presentations.
- Dale said when discussing plutonium it is important to address whether it is treatable, and suggested a slide on the treatability of solid and dissolved plutonium particles.
- Gerry said whether other materials were disposed with plutonium is critical to predicting how it might spread, and suggested this be added to the “Plutonium in the Environment” slide in the chemical properties portion of the presentation.
- Dirk suggested adding document numbers to the “References” slide.
- The committee determined that the slide showing the lethal doses contained in a nickel coin should be deleted, as it creates confusion. Debra agreed.
- Dirk said other than the slide that covers plutonium in the environment, the section of the presentation on the chemical nature of plutonium deals with plutonium as a metal, which is no longer an issue at Hanford. He said he thinks this portion of the presentation is unnecessary. Harold said he thinks these slides demonstrate the complexity of plutonium.
- Gerry expressed concern that the Plutonium Toxicity Tutorial would be confusing, as it covers the limits of worker exposure but does not give background on the science behind cleanup requirements. He said the Environmental Protection Agency (EPA) is currently doing a formal review of plutonium cleanup levels for this reason. He said it needs to be clarified that worker exposure and cleanup levels require different risk assessments. The committee decided that this would be the first part of a two-part presentation on plutonium.
- Shelley said it is important to look at the issue programmatically and consider all of the work that informs the issue of plutonium, such as the work at laboratories and universities.

- Dick said worker exposure limits are separate from the limits for the general public, which relate to cleanup levels. He said this is an issue that also needs to be addressed.
- Dirk said plutonium is moving because of its complicated chemistry, and it is important to have an overview of this.
- Margery Swint asked if environmental standards were created at sites that have been cleaned up before Hanford, or if EPA will set new standards for the water and soil at Hanford. Pam said at Rocky Flats they use the standard of “soil action level.” Gerry said Rocky Flats is the only site that completed a ROD and did additional risk analyses. He said the Savannah River National Laboratory (SRNL) and Oak Ridge National Laboratory (ORNL) are not yet at this stage of cleanup.
- Debra will retool her presentation, based on committee feedback. Margery and Dick will coordinate with her on this. The need to follow up this presentation with more detailed presentations that address specific cleanup considerations will be addressed in subsequent meetings.

Environmental Restoration Disposal Facility (ERDF) Record of Decision (ROD) Amendment

Mark French, DOE-RL, gave an overview of excavation and remediation of the 618-1 burial ground, which he said had the same anticipated issues as 618-7. Excavation of 618-1 began in September 2008, and only half of the 30,000 cubic meters of materials anticipated at the site was found. He said remediation of this site went well and there are no lessons learned to report. Excavation of segments one, two and three are complete, and excavation of waste continues west of segment four and the adjacent surface sites. Excavation and load-out are expected to be completed by the end of April.

Mark then provided an update on the status of the amendment to the Environmental Restoration Disposal Facility (ERDF) ROD to allow for facility expansion. Mark said the plan to expand the ROD is to authorize an updated design for super cells nine and ten, and would include an administrative change that would not require completion of the environmental process each time the facility is expanded. The comment period for this proposal is currently underway and will end May 19.

Mark said the performance assessment is driven by DOE order 435.1A, and is meant to evaluate radionuclide releases and exposure to humans and develop waste acceptance criteria (WAC) that control radionuclide-specific inventories and concentrations. The purposes of a remedial investigation/feasibility study (RI/FS) include characterizing the site, determining the impacts to human health and the environment, and identifying and

evaluating appropriate remedies. The RI/FS for ERDF evaluated ten alternates using fate and transport modeling and was used to establish concentration limits for some radionuclides. A preliminary performance assessment analysis was completed in 1995, but it did not go through the peer review process to be approved and meet DOE order requirements. Mark said this work was incorporated into the ERDF WAC.

Mark provided a comparison of the performance assessment and RI/FS, and said the performance assessment uses a more rigorous model than the RI/FS, and said it will be updated after the completion of the Tank Closure and Waste Management Environmental Impact Statement (TC&WM EIS) to ensure a consistent modeling approach was used and to incorporate EPA maximum contaminant levels (MCLs). He said WAC uses the most conservative value.

ERDF operates within inventory limits, and Mark said these limits determine whether waste can be treated in the facility to reduce the mobility of radionuclides. Additionally, ERDF processes approximately 1.2 million gallons of leachate each year and the leachate collection system is working well. Mark said the interim cover over cells one and two will be expanded this summer. He said leachate monitoring, collection and treatment is tracked using different trends, and as more waste is added to ERDF more water is added as well.

Regulator Perspectives

- Dave Einan, EPA, said water is needed for dust control and compaction. Currently, technetium is the only of ERDF's inventory limits that is close to being reached, but he said this can be controlled because much of the waste going to ERDF does not have uranium or technetium.
- Dennis said anything that goes to the effluent treatment facility (ETF) also goes to ERDF. He asked whether this creates a system in which these materials are counted twice. Dave said there is double counting of some waste, but this is too small of an amount to have a significant impact on the total.
- Dennis said pump-and-treats are going to be one of the largest generators of technetium in the near term, and if this is an issue it is important to plan early. Mark said cells nine and ten will last until approximately 2020. Cells five and six are currently being filled, and cells seven and eight are just opening. He said it will take a long time to fill these cells, and this will remain the same unless a new performance assessment and analysis are completed.
- Dennis asked if the performance assessment is being delayed for the EIS. Mark said DOE wants to make sure it is using consistent information and modeling for the two

documents, but this does not mean they cannot start preliminary work for the performance assessment.

Committee Discussion

- Maynard asked when the 618-1 burial ground was used. John Darby, Washington Closure Hanford (WCH), said it was used from 1944-1950. He said 16 tons of uranium was recorded in these crucibles, but only about three were found.
- Dirk said the Hanford Annual Report showed that the concentration had increased to approximately 70 times the drinking water standard. He asked whether at ERDF these levels indicate that uranium is soluble. Dave said the risk assessment and performance assessment are designed to consider that things may fail. Dirk asked if these assessments will be modified to reflect geochemistry changes, and Dave confirmed they would.
- Pam said she was not aware there was an inventory limit for technetium, and this raises the importance of finding a solution for technetium. She said pump-and-treat operations and Department of Energy – Office of River Protection (DOE-ORP) operations will create a large amount of technetium that will not go to the Waste Treatment Plant (WTP). Pam commented that this is an important issue for technology needs for Hanford, and said it must be a problem at other sites. Dave said he does not know of any research, but has heard this is a problem at other sites. He said technetium behaves similarly to uranium for a period of time, but cannot be stabilized. Pam suggested that this is an important topic to discuss at the June 9 and 10 Technology Workshop.
- Shelley said many other waste streams will probably need to go into ERDF, and discussions about what constitutes closure and the future of the 100 Area, 200 Area and Inner Area are an important part of this. She said very successful discussions took place at the Future Sites Working Group and Tank Waste Task Force, and she hopes the HAB and the public will have a chance to contribute to this vision.
- Shelley asked whether the ROD amendment would allow other waste streams to come into ERDF without public input. Dave said this would not authorize any new waste streams, and all the amendment would do is authorize building new cells that are similar to existing cells. He said significant changes in the future would still be required to complete the environmental process, and he suggested adding this into the proposed plan so it is very clear.
- Dick asked if adding new cells would change the inventory limits. Dave said the limits on radionuclides would remain the same.

- Shelley asked if there are projections for what the inventories may be and whether there is a need to commit to another site. Mark said DOE has looked at the waste streams, especially immobilizing some of the radionuclides in technetium-99. He said the integrated disposal facility (IDF) is another option, and much of the tank farm and WTP waste will go to IDF.
- Dirk said Hanford soils are not able to deal with radionuclides such as technetium, iodine and uranium. He suggested it may be best that these go into an immobile form, such as deep disposal with the glass.
- Dirk said the cell capacity chart in Mark's presentation is helpful in seeing capacity limits, and he suggested that this would be helpful to see for technetium, uranium and carbon-14 in the future. The projections for these materials are uncertain, but he said it would provide an idea of whether there is adequate space to treat these materials. Dick suggested that it would be helpful to show cumulative volume.
- Dirk asked if there is an estimate for when the performance assessment will be done. Mark said it will take two years after the EIS is completed.
- Dick said the volumes associated with the super cells appear to be 25 percent greater than the combined cells. Mark said these have the same footprint and hold approximately the same amount. He said they are putting in remediation soil and will soon be putting in buildings and monoliths. Super cell nine will allow for flexibility of operation to remove material in the landfill and get it placed in a safe configuration, and this critical cell provides operational flexibility since much of the waste will be different from remediation soils.
- Dirk said currently technetium, uranium and carbon-14 seem to be the limiting materials from an inventory standpoint, and asked whether there are any other contaminants that may become a problem in the future. Dave said there are not.

Dirk, who is the issue manager for ERDF, reviewed the committee's draft advice. He said discussion during the previous RAP meeting focused on the future capacity of ERDF and whether the Board would want to endorse one or two cells. He said the draft advice recommends that as DOE and regulators complete their analyses they look at geology, hydrology and waste forms and how they move. The advice also addresses the issue of natural resource mitigation.

Regulator Perspectives on Draft Advice

- Dennis said the first paragraph of the advice could be revised to account for the fact that ERDF's long-term protection is based on how long the cap lasts. He said there is also a question of what needs to be done today, since the cap is a long-term solution.

Dirk said the performance assessment is needed and should be included in the advice.

- Dennis suggested that the first sentence of the advice include a note that recognizes earlier Board advice.

Committee Discussion on Draft Advice

- Pam said she does not want to see advice that is not supportive of the ERDF ROD amendment. She said cost-effective cleanup is a high priority, and she wants to be constructive in providing suggestions but not deter the path forward. Dirk agreed that DOE should continue with its path forward, but said there are issues that need to be addressed, such as uranium increasing in leachate, and completing the performance assessment provides protection.
- Pam asked whether it is certain that the cover and liner are going to fail. Dirk said the cover will ultimately have problems and will end up with leaks. He said this has occurred with any kind of cap or barrier anywhere in the world.
- Dale Engstrom said liners are generally proposed to last 20 to 50 years, so this is a system that is not going to remain as it is forever. He said a leak-detection system should be in place under the liner, and there should be a plan for what to do when the liner leaks. Dave said the system includes a primary liner, a membrane, a drainage layer, another membrane and then another drainage layer, which acts as leak detection. He said no analyses assume that the liner is there forever, which is why a well-maintained cap is needed. Dave said the best place for long-term monitoring is immediately under the cap to prevent water from getting into the material in the first place.
- Dick said it would be useful to know the concentrations in the leachate that would come from the cell once water is no longer being added at a high rate. Dirk said the performance assessment is needed as soon as possible to determine this.
- Harold expressed concern that the draft advice goes beyond the policy level and instructs DOE on the details of how to complete cleanup. Dirk said doing the performance assessment is a policy-level issue, and the advice aims to ensure that all of the important issues are considered during this process.
- Shelley said the advice should include estimates of the cumulative volumes of contaminants, such as technetium, that will need dispositioning, as this is needed for planning purposes. Dave said this almost gets beyond the scope of ERDF. Maynard said these materials are going to ERDF, and there is a need to make sure that facility is able to store them. Dennis said he thinks the question is whether it will be a problem in the long term, and, if so, how soon a decision will be made.

- Dirk said when ERDF was originally sited mitigation for its impacts were meant to be completed. He said it was determined that it would be necessary to include mitigation costs in the total cost of ERDF's future resource damage assessments.
- Shelley said she thinks this advice steps into tribal and national territory and goes beyond the Board's role. Dave said the natural resource mitigation issue was not addressed clearly in the draft proposed plan the trustees looked at, and the goal is to minimize the impacts as much as possible. He said where impacts cannot be minimized they will be mitigated with the proposed plans.
- Dirk said he wanted the advice to acknowledge that natural resource mitigation is important, but the Board is not trying to get involved in this issue. Pam suggested this portion of the advice be moved to the background section.
- Dick said systems like ERDF need to be continually run, and asked whether DOE is committed to operating the system forever. Owen Robertson, DOE-RL, said this is one issue that has not been addressed. The leachate collection operation is in place, but someone will always have to monitor ERDF.

Dirk, Dale and Shelley will work on revising the draft advice, and will bring it to the May committee meeting for additional discussion. The following ERDF Advice Concepts to address in the revisions were captured in flip chart notes taken by Susan Hayman:

1. Continue with amendment
2. Be protective in the future by completing a performance assessment
3. How cap performs – maintaining performance (PA)
4. What needs to be done today (PA)
5. Planning what to do when the system fails (e.g., liner in cap)
6. Estimate cumulative volumes of technetium-99 and uranium that will need disposition at ERDF (Amendments and operational)
7. Acknowledge specific criteria for success of mitigation to minimize habitat losses and avoid future resource damage assessment costs (Background)

ZP-1 Record of Decision (ROD)

Mark Byrnes, DOE-RL, provided an update on the ZP-1 ROD. He reviewed the 200-ZP-1 OU remedial design/remedial action (RD/RA) work plan, which is currently out for review. The primary contaminants of concern are carbon tetrachloride and technetium-99. Mark reviewed concentrations in the groundwater between 1990 and 2008, which show that the TXT-Y Tank Farm Area previously had high concentrations in part of the plume, but this is missing in the 2008 data. He said an interim pump-and-treat system has been in place since 1994, focusing on the upper 50 feet of the aquifer. Additionally, samples are collected from wells every 20 to 30 feet throughout the aquifer to determine where high

concentrations are located. Mark said since 1994 more than 11,000 kilograms of carbon tetrachloride have been removed using 15 extraction wells and five injection wells pumping water at 295 gallons per minute (GPM). Two additional extraction wells to remove technetium-99 are pumping at ETF.

Mark said the final ROD was signed September 30, 2008. The selected remedy includes pump-and-treat operations to remove 95 percent of the contaminant mass during the next 25 years, followed by MNA to achieve cleanup levels for the remaining portion of the cleanup. He said after 125 years the area would reach drinking water standards. Flow-path controls, which use injection water to slow the natural eastward flow of the groundwater, would also be installed. Mark said these ICs would prevent groundwater usage until cleanup levels have been achieved.

Remedial Action Objectives (RAOs) specified in the final ROD include:

- Return ZP-1 OU groundwater to beneficial use
- Apply ICs to prevent use of groundwater
- Protect Columbia River and ecological resources from degradation and other impacts

Mark reviewed the approximate locations of proposed extraction and injection wells. The first set of five wells would go through the center of the carbon tetrachloride plume. The initial set of injection wells would create a wall of water to hold the plume back, and other injection wells would be installed later. Mark said a multitude of aquifer tests will be performed in the first well, EW-1, to define transmissivity and other aquifer properties. The tests would include a slug test, borehole flow meter surveys, pump step-drawdown tests, a constant rate pump test and possibly a falling head test. He said tying this into the ZP-1 treatment facility to help deal with huge volumes of water is also being considered. CH2M Hill has brought in a water-welling expert to help develop wells the way a drinking-water well would be developed. He said the goal is to get to 150 GPM.

Mark said the 200-West Groundwater Treatment System Process Facility, which could treat 2,500 GPM of water, would be located one block south of T-Plant. He said this facility would be centrally located and has already gone through the clearance and approval process. With this system, water from each extraction well will be piped to a transfer building, where it will be collected in an equalization tank. The water will then be transferred to the central treatment facility via pipelines. Mark said transfer piping is a single-wall, high-density polyethylene wall that would be installed above grade. The lines will be inspected daily for leaks.

Mark reviewed a preliminary process flow diagram for the radiological treatment system. Wells that show elevated radiation will come into a pretreatment building through small bag filters and into resin columns. The water will then go into a main process facility, along with water from 90 percent of the wells that do not have radiological problems. The main process facility will include an equalization tank and a fluidized bed reactor, which is a bioreactor system to remove nitrate and other volatile organic chemicals (VOCs) and reduce hexavalent chromium to chromium-3. After going through the fluidized bed reactor, the water will go into an air-stripping tower. He said bioreactors should be able to take care of any VOCs that were not treated in the bioreactor. The water will then go to carbon canisters. Clean water would go to an equalization tank and then be shot into injection wells.

Mark reviewed the schedule for ZP-1. The site selection for the final remedy RD/RA work plan is currently out with EPA for review, and a functional design criteria document is complete and has been issued. He said injection and extraction well installation is ongoing through fiscal year (FY) 2014. Aquifer testing is also currently taking place. Design work is approaching 30 percent, and regulatory, permitting and safety documents will be started later in 2009. Construction of the final treatment facility is scheduled to begin in January 2010, and operations of the new facility will begin in December 2011 at the latest. Mark said long-term operations will go through 2037.

Regulator Perspectives

- Dennis asked whether a waste stream will come out of the bioreactor if it works properly. Mark said yes, the bioreactor will generate large volumes of sludge that will be sent to ERDF every few weeks. He said regeneration is not an option, and calculations are underway to determine how long the resin canisters can be maintained before concerns over exceeding ERDF WAC arise.
- Dennis asked if projections of how much technetium and uranium will be generated by this project had been calculated. Mark said he does not know the exact number, but he can follow up with these calculations.

Committee Discussion

- Shelley asked the distance between the injection wells and the mixing tank. Mark said there is approximately one mile between them.
- Dirk asked how the expansion and contraction of piping will be dealt with. Mark said the lines will be snaked to ensure movement in and out of the pipes.

- Shelley asked where the resin will go, and whether it will go on site. Mark said disposal options for resins are currently being considered. Currently off-site options as well as the cost of re-generating resins on site are being looked at. So far re-generating resins seems to be an expensive option, but this idea has not been discounted. He said the plan is to have enough granular activated carbon (GAC) on site.
- Shelley asked how quickly the GAC resin system will be loaded. Mark said currently approximately nine canisters, or several cubic yards of GAC, are used every four months, but pumping would take place at four to five times the current pumping rates while reducing the concentration.
- Harold asked if there is contamination in the soil above the groundwater. Mark said there is contamination above groundwater.
- Pam asked if what is inside the resins would be grouted if they are disposed of at ERDF. Mark said the resin that was recently used was put into boxes and grouted closed. Dirk said the resin would not be grouted, but it would be embedded into the grout.
- Pam asked whether the project is experiencing any challenges with the procurement needed for nuclear-quality equipment. Mark said long-lead items that will take approximately a year to procure have been identified, including the bioreactor, which will take 12 to 14 months. He said a two-phase setup is being considered, with the first treatment system going in then the next phase a couple of weeks later. He said procuring both treatment trains up front would allow the process to be expedited.
- Shelley asked how deep the wells are. Mark said the extraction wells go to the lower mud unit, then all the way to the basalt layer, and depth-discreet samples will be collected throughout the aquifer. He said 100-to 125-foot screens are expected to optimize the ability to identify the high-quality section of the plume, with the approval of Ecology and EPA.
- Shelley asked if the design will potentially impact procurement. Mark said the long-lead items are well understood, and the aspects of the project that come later in the design are easier to obtain. He said the bioreactors were the main procurement issue.
- Pam said the HAB needs to be briefed on this issue. Dennis said the Board may not need such a high level of detail, and suggested that the presentation include more specificity on what is needed to support the groundwater pump.

Committee Business

Future Topics

- Purgewater proposal update (May - 45 minutes)
- CP cleanup - Key issues that committee may want to address, focusing on the Inner Area (May - 1 hour)
- Follow up presentation on plutonium, and how it affects cleanup as well as worker and public safety
- ERDF Amendment Advice - Bring draft to meeting (May - 45 minutes)
- LTS - "Gap Analysis" (May - 90 minutes)
- River Corridor RODs (BC, K, N, DH, F IU2/IU6, 300)
- Agency perspectives on DH and K investigations
- PW 1,3,6 waste site RI/FS (Summer)
- Energy - Isotopes Park Initiative (Summer - update only)

Action Items / Commitments

- Issue managers Dale and Wade will track developments in the purgewater issue and bring it back to a RAP meeting.
- Dirk asked for electronic copy of the Inner/Outer Area map of CP. Matt will send it to Paula Call, DOE-ORP, and Paula will send it out to RAP.
- The Plutonium Toxicity Tutorial will be presented at the June Board meeting with a setup of more presentations to come that specifically address the effect it has on cleanup levels.
- Dirk requested cumulative inventory data and charts for technetium, uranium and carbon-14 in ERDF.
- Dirk will bring revised ERDF advice back to the committee in May.

Handouts

NOTE: Copies of meeting handouts can be obtained through the Hanford Advisory Board Administrator at (509) 942-1906, or tgilley@enviroissues.com

- Purgewater Management Engineering Evaluation/Cost Analysis (EE/CA), Briant Charbonneau, April 14, 2009.
- Plutonium: Facts, Figures, Hazards & Standards, Debra McBaugh, April 14, 2009.
- 618-1 Burial Ground Status, Mark French, April 14, 2009.
- ERDF Advice – RAP Issue Manager Draft 1, Dirk Dunning, April 14, 2009.
- Environmental Restoration Disposal Facility, Mark French, April 14, 2009.

Attendees

HAB Members and Alternates

Shelley Cimon	Pam Larsen	Wade Riggsbee
Dirk Dunning	Maynard Plahuta	Dick Smith
Dale Engstrom	Gerry Pollet	Gene Van Liew
Harold Heacock		

Others

Paula Call, DOE-RL	Rick Bond, Ecology	Janice Williams, CHPRC
Briant Charbonneau, DOE-RL	John Price, Ecology	Barb Wise, CHPRC
Mark French, DOE-RL	Ginger Wireman, Ecology	Tom Bailor, CTUIR
RD Hildebrant, DOE-RL	Craig Cameron, EPA	Susan Hayman, EnviroIssues
	Dennis Faulk, EPA	Molly Jensen, EnviroIssues
	Emy Laija, EPA	Peter Bengtson, WCH
	Rod Lobos, EPA	Mike Casbon, WCH
	Dave Einan, EPA	Paula Ciszak, WCH
		Bruce Corert, WCH
		John Darby, WCH
		Jack Donnelly, WCH
		Todd Nelson, WCH
		MG Peloquin, WCH
		Debra McBaugh, WDOH
		Mike Priddy, WDOH