



FINAL MEETING SUMMARY

**HANFORD ADVISORY BOARD
RIVER AND PLATEAU COMMITTEE**

*October 4, 2016
Richland, WA*

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

Opening

Pam Larsen, River and Plateau (RAP) committee chair, welcomed the committee and introductions were made. Committee members approved the August 2016 meeting summary.

Announcements

Ryan Orth, meeting facilitator, reminded committee members that the Tank Waste Committee (TWC) and Health, Safety, and Environmental Protection Committee (HSEP) are receiving a tour of the AP Tank Farm on October 5, 2016, followed by an afternoon TWC meeting.

Pam announced that Hanford Communities produced a presentation on the history of issues related to the changes made to the Consent Decree. The presentation will be available within the next two weeks.

PFP Update

The RAP committee received a brief update on the milestone change to remediate the Plutonium Finishing Plant (PFP) at the August 2016 RAP committee meeting. The new date of the milestone (M-083-00A) is September 30, 2017. Pam Larsen stated that challenging work continues at PFP and was interested to learn more about the demolition progress.

Agency Presentation

Tom Teynor, U.S. Department of Energy – Richland Operations Office (DOE-RL), provided the RAP committee with an overview of the PFP Closure Project, including end state graphics and demolition photos. Key points from Tom's presentation¹² include:

- PFP is undergoing a final internal hazard reduction and zone preparation for further demolition.
- On September 30, 2016, contractors completed an independent review of the readiness assessment. A corrective action plan is being developed and several corrective actions have been implemented already.
- The following are status updates related to the closure of the Plutonium Reclamation Facility (PRF or 236-Z):
 - Contaminated debris and spills have been removed from the floor
 - Grout was used to hold fixed contamination in place
 - Walls were cleaned with a high pressured fixative spray, known as BlueMax

Attachment 1: Plutonium Finishing Plant Closure Project (DOE-RL, 10/4/16)

Attachment 2: Plutonium Finishing Plant Closure Project [Supplemental Slides] (DOE-RL, 10/4/16)

- Workers are no longer required to wear a Level B suit due to the reduced area of high borne contamination
- PRF is expected to be demolished between October 2016 - February 2017
- The following are status updates to close the McCluskey Room (242-Z):
 - There is an opportunity for workers to begin demolishing the McCluskey room concurrently with the demolition of the canyon in PRF
 - All glove boxes have been removed from the facility
 - All tanks are isolated and will be removed during the first stage of demolition
 - Asbestos and contaminated piping were removed
 - The McCluskey Room is expected to be demolished in February 2017
- Ongoing work is currently happening to prepare the facilities for demolition. Preparation activities include:
 - Asbestos abatement
 - Removal of filter boxes
 - Removal of contaminated exhausters
 - Process vacuum piping and ventilation duct work
 - Ancillary building demolition
- DOE-RL works with the Pacific Northwest National Laboratory (PNNL) to review cleaning standards in open air spaces. Demolition will not start until building conditions comply with the air dispersion model, which estimates the contamination and emission levels for various demolition activities. The air dispersion limit must be at or below 25 nanocuries/gram.
- In order to protect workers and the environment, several activities are used including:
 - Workers wear real-time radiological monitoring devices
 - Fixatives, fogging and deluge sprays are used to control airborne hazards
 - Fixatives and ground maintenance are applied to avoid the spread of contamination
 - Contaminated debris is packaged and carried out expeditiously
 - Cleanup work is not performed in unfavorable weather conditions
 - A radiological buffer area is established, which takes into account an area where possible contamination may have spread due to wind dispersal

- Tom Rogers, Washington State Department of Health (DOH), explained that several air monitors are located near PFP. The baseline air sampler has been installed since 2010. Three additional air samplers were installed in April 2016. DOH collects the data from the samplers twice a month, which is the same periodicity schedule on which Mission Support Alliance (MSA), the DOE-RL contractor, collects air samples.
- The PFP demolition contractor, CH2M Hill Plateau Remediation Company (CHPRC), had coordinated with Washington River Protection Solutions (WRPS) and MSA to identify lessons learned at other cleanup sites at Hanford. CHPRC has given over 40 presentations to other cleanup crews to explain the PFP Closure Project and inform them of potential hazards and activities. A website was created for the public to track the demolition progress.
- The Main Processing Facility (234-5Z) and Ventilation Stack (291-Z) are expected to be ready for demolition beginning in March 2017, with a completion date in July 2017. Employees will be transitioned and the site will be demobilized between June and August 2017.
- Some of the challenges with the demolition of PFP include:
 - Concerns about open air demolition
 - Workforce transition and skills mix
 - Discovery of unexpected contamination
 - Aging infrastructure

Agency Perspective

Stephanie Schleif, Washington State Department of Ecology (Ecology), noted concerns with the project. First, the demolition schedule needs to meet the new milestone. Secondly, all remaining waste sites will need to be properly identified and placed into a correct operable unit for final remediation. It is to be determined whether the operable units will be regulated by Ecology or the Environmental Protection Agency (EPA).

Committee Questions and Responses³

Note: This section reflects individual questions, comments, and agency responses, as well as a synthesis where there were similar questions or comments.

Q. Will BlueMask be used in the demolition process of the McCluskey Room?

R. [DOE-RL] No, BlueMask will not be necessary because conditions in the McCluskey Room are not as severe as in PRF.

Q. Will debris from demolition be disposed of at the Environmental Restoration and Disposal Facility (ERDF)?

R. [DOE-RL] Where the waste ends up will depend on its characterization. Most of the debris is characterized as low-level waste and will be placed into ERDF. Transuranic (TRU) waste will be packaged for the Waste Isolation Pilot Plant (WIPP).

Q. Is there limited access to the radiological buffer area?

R. [DOE-RL] Anyone who enters the radiological buffer area is surveyed for contamination before leaving the area.

Q. Can you identify where the underground vaults are?

R. [DOE-RL] There are no underground vaults.

Q. Will the facility's basement be grouted?

R. [DOE-RL] The facility does not have a basement. There are trenches and they will be treated with grout.

Q. What amount of TRU waste from PFP will be shipped to WIPP?

R. [DOE-RL] I am uncertain of the volume of TRU waste that has been identified. TRU waste will be placed into WIPP-certified containers and held at the Central Waste Complex until they can be sent to WIPP.

Q. What are the pressure points for meeting the milestone?

R. [DOE-RL] Progress is monitored on a weekly basis, along with field execution meetings. DOE-RL has monthly meetings with Ecology and EPA to discuss the demolition progress and any changes. We are aiming to have the facilities removed and the sites stabilized to turn over to a regulating agency by July 2017.

The RAP Committee thanked Tom for his presentation and Stephanie and Tom for their agency perspectives. Tom suggested to share an overview of the PFP Closure Project with the Hanford Advisory Board (HAB or Board) in December. The Committee requested that Tom return to the RAP committee in January 2017 to provide a progress update.

Groundwater Year-End Update

Dale Engstrom, issue manager, provided an overview of groundwater remediation at Hanford. Dale noted that there have been several success stories, including the remediation at sites 100-D, 100-H, and 100-K. Another success is the 200 West Pump-and-Treat Facility that began operations in 2012 and is expected to treat 25 billion gallons of water during the facility's operating lifetime. Concerns about groundwater that remain include the range of coverage of the apatite barrier and the use of polyphosphate to capture uranium in the 300 Area.

Agency Presentation

Jim Hanson, DOE-RL, provided several updates to the groundwater treatment system at Hanford. Jim examined the status of four operable units, the 100-NR-2 permeable reactive barrier installation and performance, and an overview of activities that occurred within the last few years at the 200 West Pump-and-Treat Facility. Key points from Jim's presentation⁴ include:

- Since beginning operations, all pumps have increased the capacity in which they pump and treat water.
- A new resin, SRI-700, was applied to increase the capacity of the pumps. The new resin has a longer life expectancy than former resins that were used.
- Most of the pumps are treating hexavalent chromium [Cr(VI)].
- The 200 West facility is treating nitrate, technetium-99, carbon tetrachloride, and uranium.
- In order to protect the Columbia River, the threshold is less than 10 micrograms/liter of Cr(VI). The drinking water standard is less than 48 micrograms/liter.

100-HR-3 groundwater operable unit, which includes 100-D and 100-H systems:

- Since 2010, the size of the Cr(VI) plume has decreased, minimizing the impact of contamination to the Columbia River. More injection and extraction wells have been installed and the amount of contaminated water treated on an annual basis continues to increase. Some Cr(VI) has been removed by digging the contaminant out in areas where continual sources of contamination existed.

100-KR-4 groundwater operable unit, which includes 100-KR-4, 100-KX, and 100-KW systems:

- Cr(VI) plume concentrations were not as high in the 100-K area as they were in 100-D. A few new injection and extraction wells have been installed since 2010. Even without the addition of many wells, the annual amount of treated water continues to increase over time.
- The largest decrease in Cr(VI) concentration occurred at 100-KW within the last five years.
- The size of the Cr(VI) plume at the 116-K-2 Trench area has reduced in size since 2010. There are culturally sensitive areas near the trench that serve as a factor for placing new wells.
- The Cr(VI) plume at 100-KE has backed away from the shore of the Columbia River due to installation of new wells near the shore. Concentrations of Cr(VI) have decreased exponentially since 2008. In 2016, samples were pulled from three wells in 100-KE that indicated the concentration of Cr(VI) is below the aquatic standard.

Attachment 4: Groundwater Cleanup Update (DOE-RL, 10/4/16)

- At 100-KW, remediation included digging 50 feet below the surface to remove Cr(VI). In tandem, a more aggressive pumping scheme was implemented, which has contributed to a significant reduction in the size of the plume in the last five years. All wells have been temporarily disabled to see if a dispersion of Cr(VI) occurs. Observations show an increase in Cr(VI) concentration (150 micrograms/liter), indicating that there may be residual contamination in the area. DOE-RL plans to keep the wells deactivated until March 2017 and continue observations.

100-NR-2 Permeable Reactive Barrier (PRB) installation and performance:

- Calcium-citrate-phosphate solution forms a mineral barrier called apatite. The apatite is injected into groundwater to bond with Strontium-90 (Sr-90), which stabilizes the Sr-90 in place, preventing migration of the contaminant into the Columbia River.
- 162 injection wells were constructed to inject the apatite. This provides a 762-meter-long barrier along the River's shoreline.
- Three segments of the injection wells have been treated with the apatite:
 - Central barrier (91 meters treated by injection into sixteen wells)
 - Upriver extension (110 meters treated by injection into twenty-four wells)
 - Downriver extension (110 meters treated by injection into twenty-four wells)
- The current remedial investigation will evaluate and recommend how to proceed with the remaining segments. Remaining segments to treat with the apatite include:
 - Upriver segment (50 meters treated by injection into eleven wells)
 - Downriver segment (400 meters treated by injection into eighty-seven wells)
- The optimal time to inject the apatite is when the water table is higher, typically during spring or early summer. A high water table improves the placement of apatite in the vadose zone.
- Establishing a pre-injection baseline will help to evaluate the barrier performance monitoring.

300-FF-5 groundwater operable unit:

- Treatment of the 300-FF-5 operable unit includes the injection of a phosphate solution (PO₄) into the vadose zone to form minerals that sequester uranium. The injection will occur in two sequential stages.
- Stage A was implemented in a 0.75-acre area that contained high residual uranium contamination.
- At three different locations, the preliminary results of Stage A display concentrations of uranium decreasing after the PO₄ solution was injected. The uranium concentration remains below the

cleanup level of 300 parts per billion (ppb). Monitoring will continue to determine how effective the treatment is over time.

- Lessons learned from Stage A will be applied to Stage B. Stage B is in the planning phase and will address sequestration of uranium in forty-eight wells across 2.25 acres.
- Stage B plans to have a tighter grid of wells in order to increase the distribution of PO₄. The injection of the phosphate solution is expected to occur in August 2017.

200 West Pump-and-Treat

- The 200 West Pump-and-Treat began operations in 2012 and is expected to continue performing through 2037, as identified in the Record of Decision (ROD).
- The extraction and injection wells system costs approximately \$250 million.
- In order to reduce high costs of building a second pump-and-treat system in the 200 East Area, a pipeline was installed to ship contaminated materials from three wells in 200 East to the 200 West Pump-and-Treat Facility.
- A perched water unit was identified above the water table near operable unit 200-DV-1.
- The 200 West Pump-and-Treat is more robust than initially identified. The system is expected to increase the pumping capacity by enhancements such as membrane bioreactor cassettes and fluidized bioreactor upgrades.
 - Membrane bioreactors treat nitrate. Nitrate is used as an indicator for how well other chemicals of concern are treated.
- The goals are to optimize the existing remediation well network and increase groundwater treatment from the northern portion of the 200 East Area by installing a second well to capture contaminations such as technetium-99.

Agency Perspective

Dib Goswami, Ecology, reinforced the early success of the 200 West Pump-and-Treat Facility. He encouraged DOE-RL to maximize the system as much as possible to treat other contaminants. Preventing Sr-90 from entering the Columbia River was part of the milestone package. Thus far, the Sr-90 treatment is performing well with a 90% reduction of Sr-90 in the treated groundwater.

Committee Questions and Responses³

Note: This section reflects individual questions, comments, and agency responses, as well as a synthesis where there were similar questions or comments.

Q. Does the capacity of the pump-and-treat system vary seasonally?

R. [DOE-RL] Yes, wells in close proximity to the Columbia River experience a decline in water volume between September and December when the water table is lower. The system is built to switch to other wells in areas that are producing more water, in order to maintain a consistent amount of water throughout the year.

Q. Since the concentration of Cr(VI) has increased after the wells were temporarily shut off, will contaminants in the 100-KW Operable Unit be removed by digging the material up?

R. [DOE-RL] We anticipated there to be a rebound in Cr(VI) but we wanted to see how the system would perform. In areas like 100-D and 100-H, 85 foot digs were conducted under interim remediation to remove contaminants. The results show a reduction in Cr(VI) concentrations from 750 ppb to 100 ppb in some places. This will be further addressed in the Remedial Investigation / Feasibility Study (RI/FS).

Q. Is there enough apatite material to inject into the wells?

R. [DOE-RL] I am unsure if we have the apatite in stock. There are a few other issues we are currently addressing in order to move forward with this treatment method.

Q. Has there been boring of the sampling apatite to observe whether or not it works?

R. [DOE-RL] Yes, there were leaching samples, lab testing, and a treatability study performed before the project moved to full scale. The study-scale testing provided understanding in determining the effectiveness of the apatite. It was not a project assigned to me, so I do not have further specifics to provide.

Q. Does the PO₄ solution flush out uranium from groundwater or does it capture it?

R. [DOE-RL] The PO₄ solution is a chemical formula that binds with the uranium to make it less mobile.

Q. Is there a regeneration in the membrane bioreactors if they failed to work?

R. [DOE-RL] The membrane bioreactors do have regeneration in the six cassettes that can handle up to 2,500 gallons per minute.

Q. Do you expect to see a 1:1 correlation between the amount of phosphate in groundwater and the corresponding decline in uranium? What conditions, if any, could reverse the binding of phosphate compounds to uranium?

R. [DOE-RL] I do not believe that the planning has been established to the level of correlation you inquire about. There are alkaline conditions in groundwater that are not expected to fluctuate much. If the pH of the groundwater changed, then that may cause the phosphate solution to not bind with uranium, but a pH change is not expected.

Q. Have other contaminants been identified in the 100 area operable units?

R. [DOE-RL] Low levels of Sr-90 were identified in the 100-H Area. There is a higher concentration of Sr-90 in the 100-K Area. A couple of boreholes were placed in 100-K and the information obtained from the boreholes will be implemented into the RI/FS process, in order to determine the impact of the final remedy.

Q. Will deep-well drilling for drinking water be an option in twenty-five years from now? Is DOE-RL comfortable with that?

R. [DOE-RL] The goal of treating groundwater is to return it to a state for beneficial use, such as drinking water or agricultural use.

R. [EPA] Part of the ZP-1 Remedy for these sites includes long-term monitoring. Deep-well drilling will not occur on the Hanford Site for decades. Uranium is unique because it does not pose a risk to human health.

C. I hope to see an additional expansion on the apatite barrier. This project is going well so far and it should be optimized. There is a system in place and known locations of contaminants have been identified that should be removed.

R. [DOE-RL] There are differences between 100 and 200 Areas that need to be taken into account when treating contaminated areas.

The RAP committee thanked Jim for his presentation and Dib and Emy for their agency perspectives.

Washington Closure Hanford Debrief, Successes, and Challenges

Pam Larsen credited Washington Closure Hanford (WCH) for completing cleanup activities across 220 square miles along the river corridor. WCH's eleven-year contract ended in September 2016.

Agency Presentation

Scott Sax, President of WCH, provided RAP committee members with an overview of the progress WCH made along the river corridor and the challenges learned. Key points from Scott's presentation⁵ include:

- WCH cleaned 575 waste sites two years ahead of schedule and \$300 million under budget.
- WCH completed all but two projects identified within their scope.
- WCH is proud to have met all Tri-Party Agency (TPA) milestones and was ranked number one in safety throughout the DOE complex.
- WCH received an international award, Project of the Year, from a local chapter of the Project Management Institute.
- Workers faced risks and hazards including chemical leaks, discovery of unexpected waste sites, construction hazards, and unexploded ordnance. WCH worked with the United States Army to dispose of the unexploded ordnance, which provided training for the Army and cost-savings for WCH.
- The following are successes in project performance for the various cleanup efforts WCH performed at multiple locations on the Hanford Site:

300 Area:

- Cleaned 109 waste sites and demolished 173 facilities.
- WCH did not complete cleanup activities at the 324 Building. 324 Building remediation will be performed by CHPRC.

100 B/C Reactor Area:

- Removed 2.5 million tons of waste across 120 acres
- Revegetated the cleanup sites with bunchgrasses and native plant species
- Used contouring to help shape the land to assist natural flora and fauna to thrive
- Used borrow pits to transfer soil, in an effort to save costs and time

Attachment 5: Washington Closure Hanford: Cleanup Progress Along the River Corridor (WCH, 10/4/16)

100-N Reactor Area:

- 726,000 tons of clean material was used to backfill 98 remediated waste sites
- Revegetated the area with approximately 78,000 shrubs
- Consulted with Tribes and agency regulators to protect and restore the Columbia River

100-D Reactor Area:

- Removed 60,000 tons of chromium-contaminated soil and disposed at ERDF
- Removed what is believed to be Hanford's primary source of chromium contaminant to the Columbia River

100-H Reactor Area:

- Remediated 55 waste sites
- Shipped approximately 742,000 tons of contaminated material to ERDF
- WCH finalized one of two reactors for cocooning

100-F Reactor Area:

- 650,000 tons of contaminated material from 55 waste sites was transported away from the Columbia River
- One of the first reactors at Hanford to be remediated. The reactor requires monitoring every five years as the core continues to decay. In approximately 75 years, workers will be able to demolish the reactor and face a lower risk of contamination.

ERDF:

- In the last eleven years, 12 million tons of low-level waste has been disposed at ERDF
- Workers drove over 18 million miles without an accident
 - The current record is 854 trucks delivering waste to ERDF in one day
- WCH completed the vertical expansion of ERDF without injury to workers

618- Burial Ground:

- WCH identified methods to limit the spread of contamination when they augered over 80 vertical pipe units.
- WCH removed drums with uranium chips covered in oil and concrete drums with hot waste during cleanup. WCH did not identify any TRU waste.

- WCH was not able to complete cleanup of 618-10 Burial Ground before their contract ended. CHPRC will continue cleanup activities and remediation of the site.

324 Building:

- Contaminated soil was discovered underneath B-Cell before demolition activities began in 2010
- WCH designed a system to remotely excavate contaminated flooring and to grout A, C, and D cells
- CHPRC will continue remediating the 324 Building
- WCH placed 95% of their workforce into their next job and in their desired field of work before the contract ended
- WCH identified challenges with cleanup work and workplace culture throughout their contract. Some of those challenges include:
 - Changing the culture from a bias for acceptance to a bias for action
 - Improve safety culture
 - Improve trust between the workforce, customers, and regulators
 - Implement and streamline regulatory closure processes
 - Stabilize and secure consistent project funding
 - Streamline the development of solutions to technical issues and the discovery of unknown site issues
 - Develop and retain qualified Closure staffing
 - Learn to celebrate success in a negative environment
- Scott noted that he was proud of his employees because they ranked safety very high and performed innovative and cost-saving solutions throughout the extent of the contract. He stated WCH provided a good momentum to continue cleanup efforts at Hanford and is hopeful that CHPRC will capture that momentum and build upon it.

Committee Questions and Responses³

Note: This section reflects individual questions, comments, and agency responses, as well as a synthesis where there were similar questions or comments.

Q. Can you discuss what workers found at one of the reactor sites that used to be a farm?

R. [WCH] Several animal carcasses were found during remediation. The animals were wrapped tightly in plastic and partially biodegraded when discovered. It was interesting to examine them and decide a path forward on disposal. The carcasses were sent to ERDF.

Q. How much chromium was removed from the 100-D Reactor?

R. [WCH] Approximately 240,000 tons of chromium was removed from 100-D Reactor.

Q. Was there a possibility of water fowl picking up contamination near the wetland restoration area?

R. [WCH] Leaving standing water and ponds was not preferred. The material in the borrow pit was fresh groundwater. Ducks and geese are currently nesting in the borrow pit.

Q. Could you provide more details about how the vertical pipe units were augured safely at 618-10 Burial Ground?

R. [WCH] An overcasing was placed around the vertical pipe unit and workers removed one scoop of dirt at a time. The risk of exposure to the environment was when workers scooped the dirt out and mixed it into a steel can with grout. WCH ensured that waste was contained throughout the augering process.

Q. What are some characterization differences between Burial Grounds 618-10 and 618-11?

R. [WCH] There are fewer vertical pipe units at 618-11, which should be fairly easy to remove. WCH believes that digging up waste drums will be easier than the digs at 618-10. 618-11 has caissons, which is a big culvert and offset tube to keep radiation from leaking out. Removing caissons can be very difficult. There are reports for the full characterization of 618-10 and 618-11 Burial Grounds.

C. It makes greater sense for one contractor to remove the vertical pipe units and the caissons.

R. [WCH] WCH offered multiple times to remove or remediate other items. WCH has shared their successful technology with other firms and have turned over a large percentage of our workforce to CHPRC to continue remediation.

Q. What plumes were identified under 618-10 Burial Ground?

R. [WCH] A potential uranium plume exists under 618-10 Burial Ground. Another waste site, 316-4 is in close proximity to 618-10 and could be the source of the plume. WCH dug down to the native rock but the site needs to be remediated before the plume can be sampled.

The RAP Committee thanked Scott for his presentation and several members noted they are interested in observing the transition of work from WCH to CHPRC.

PW 1/3/6 Central Plateau Plutonium Sites

Dale Engstrom, issue manager, referred to HAB advice #247 on the use of an observational approach to locate the source of mass contamination at the PW 1/3/6 Operable Units on the Central Plateau. Since then, RAP committee members have discussed new ideas about americium and other daughter products of plutonium at Central Plateau sites. Originally, the RAP committee was supposed to receive a presentation from PNNL. Instead, the RAP committee discussed some technical information about the movement of daughter products. For reference, RAP committee members reviewed former presentations delivered to the HAB by J.D. Dowell in December 2011 titled, “Impact of HAB and Public Input on Record of Decision for Remediation of 200-CW-5, 200-PW-1, 200-PW-6 Operable Units” and “Plutonium Mobility in the Subsurface at the Hanford Site”. The meeting summary from December 2011 RAP Committee meeting was also provided⁶.

Vince Panesko, issue manager, referred to Bechtel documents that were dated in 2010 and 2011 that stated more research was necessary to identify what forms of americium and plutonium exist in the soil at PW 1/3/6. He expressed interest in learning what new information has been gathered since 2011. Referring to the documents, Vince suggested that DOE-RL lacks a long-term management plan to address remediation of the mobility of plutonium daughter products.

Agency Perspective

Kris Holmes, DOE-RL, provided clarification about the change in the meeting’s agenda. Kris stated that DOE-RL does support PNNL providing a presentation to the RAP committee, but DOE-RL did not have adequate time to review the presentation. She noted that the presentation “Plutonium and Americium Geochemistry at Hanford” will be updated to reflect the most current information and will be ready for presentation at the next RAP committee meeting.

Attachment 6: Impact of HAB and Public Input on Record of Decision for Remediation of 200-CW-5, 200-PW-1, 200-PW-3, 200-PW-6 Operable Units (DOE-RL, 12/7/11)

Committee Questions and Responses³

Note: This section reflects individual questions, comments, and agency responses, as well as a synthesis where there were similar questions or comments.

C. It is in the best interest of the HAB to affirm the Board's position on future remediation efforts at these sites. Several agencies have stated that plutonium is not going to move, but the mobility of americium and plutonium are some of the largest risks on the Site.

C. It is interesting that several of these contaminated sites are listed in documents as "fixed", when there is a lack of scientific information to support that determination. Similar to what Bechtel recommended in 2011, agencies need to take samples and perform various tests in order to make that determination. The plutonium in this environment does not behave as one would expect because of the high concentration of nitrate.

C. It is important to listen to the experts, especially when they say they need more data to analyze before drawing a conclusion. There is TRU waste at depths of 120 feet or more at some sites. At this point, there is not adequate knowledge about what state waste is in to make a decision about the correct remediation pathway.

C. My experience and perspective is that americium is much more dangerous than plutonium if it becomes mobile.

C. In 2012, some plutonium was found to act like a polymer. One of the Bechtel reports stated that plutonium, phosphate, and silicon were discovered together. It is a widespread issue to not have waste streams accurately characterized.

C. It is upsetting that a PNNL employee is not present at the meeting to provide new information to us. It is unacceptable that a particular PNNL employee is the only individual who can present on this topic.

R. [DOE-RL] The man who is scheduled to give the presentation is best known for his work that he dedicated years to learning about the geochemistry of plutonium and americium at Hanford. He is retired now and we are working to accommodate his schedule. This particular topic and request for a presentation occurred quickly and DOE-RL did not have enough time to go through the review process to have him present today.

C. [EPA] PW 1/3/6 is one of the most categorized sites at Hanford. The decision to remediate this area has already been made. The current Remedial Design/Remedial Action (RD/RA) Work Plan is in place to help answer some of the questions that are being generated in this discussion.

R. I believe that some of the decisions in the RD/RA are faulty. For example, we know now that Plutonium-242 decays into Americium-241 and becomes mobile.

R. [EPA] The mobility of Americium-241 is dependent on groundwater flow. The agencies understand groundwater flow at this site very well.

Attachment 3: Transcribed flipchart notes

Q. Does DOE-RL follow Order 435.1, radioactive waste management, and provide a performance assessment?

R. [EPA] No, that is a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process.

Q. Did EPA assess how DOE-RL arrived at the conclusion at how much TRU waste to leave in the ground?

R. [EPA] EPA evaluated the risk of direct exposure of 15 feet at PW 1/3/6. The contamination exists at 20 feet or lower. EPA also evaluated threats to groundwater. The RI/FS provides explanation on how contamination from these sites will not affect groundwater and will not enter the Columbia River. EPA arrived at this assessment by calculating the average rainfall in the Central Plateau, depth of contamination and groundwater flow.

Q. What about 1,000 years from now? Does EPA remain confident?

R. [EPA] EPA did evaluate 100 and 500-year floods in the area. Even in extreme flooding cases, it would not affect the Central Plateau. EPA assessed climate change in as many scenarios as possible to determine the path forward.

C. There seems to be possible plutonium that exists in the bottom of trenches. There was a long bargaining session between the TPA agencies to arrive to the decisions made today. While plutonium is relatively immobile, plutonium daughter products can become more mobile and will quickly threaten the contamination of groundwater. I understand that a decision for remediation has been made and it is difficult to change the path forward now.

Q. Will crews begin working at PW 1/3/6 when PFP demolition is complete in 2017?

R. [EPA] EPA would like to see crews finish cleanup at PFP and then move over to begin remediation of PW 1/3/6. DOE-RL has certain processes that prevent a fluid transition.

Q. What agency pays for the characterization? Does the characterization of waste include transporting the waste?

R. [EPA] All cleanup work at Hanford comes from the DOE-RL budget. DOE funds transporting waste from Hanford to WIPP.

Q. Why are there no specifics in the Work Plan about the decision to not dig deeper?

R. [EPA] EPA had this same criticism to DOE-RL and expressed that criticism at the August 2016 RAP Committee meeting. EPA has instructed DOE-RL to have their criteria processes determined before any backfilling takes place.

C. Why did EPA not demand DOE-RL to use an observational approach, if EPA had reservations about DOE-RL's approach and desire to find and remove sources of mass contamination?

R. [EPA] EPA cannot make a unilateral decision like that. All of the TPA agencies are involved in the decision-making process. There is not a reduction in risk to removing additional soil due to its depth from the surface and relationship to groundwater. Under CERCLA, EPA cannot instruct DOE-RL to remove additional soil. During the public comment period, EPA received many comments requesting that DOE-RL dig deeper, which helped to gain leverage in advising DOE-RL to dig deeper.

C. There is no proven documentation that says there is not a reduction in risk to remove additional soil. If studies showed plutonium daughter products moving, that would indicate additional risks. With this new information, EPA would have more leverage with DOE-RL to perform a Record of Decision amendment.

C. An individual from the Nez Pearce Tribe asked EPA to perform a reverse sensitivity study, in order to assess how much water can be poured on the surface before reaching groundwater. That study was never completed. If those concerns were addressed, perhaps the Tribe would feel more comfortable with the approach that is being taken.

C. Chemistry and movement of daughter products is one part of this topic. From an agency standpoint, there are no risk drivers to force deeper digs. This is where the CERCLA process leads the agency astray.

C. There is another project that has potential to raise the groundwater level at Hanford a considerable amount, the Blackrock Reservoir.

R. Blackrock Reservoir is on hold for right now. The decisions the TPA agencies take today will impact people in the area for thousands of years. There are conflicting ideas about how much will or will not be impacted to groundwater.

Q. How much plutonium exists at the PW 1/3/6 sites?

R. [EPA] EPA has done those calculations and I can provide you with that information.

R. 100-300 kilograms of plutonium is present in the PW 1/3/6 area.

R. Old records indicate 27 kilograms. New records estimated that 150 kilograms of plutonium moved into the cribs. 58 kilograms of plutonium was removed from 216-Z-9 Crib in 2012.

C. Plutonium was found at depths of 60, 120 and 140 feet in the soil. What was not identified was how wide the contamination hot spot was and how far it traveled horizontally in the soil.

R. [EPA] PW 1/3/6 is the most characterized site at Hanford. There are figures in the RD/RA Work Plan that have been recently updated and speak to the identified plutonium.

C. Maybe the plutonium and associated daughter products do not need to be dug out. Perhaps there are other techniques or technologies to implement, like pump-and-treat.

R. [EPA] There is a massive pump-and-treat system in the 200 West Area that captures water from below the PW 1/3/6 site.

Q. What has changed from the time the ROD was created to the identified need for more money to perform this cleanup work?

R. [EPA] The decision process for remediation has not changed. EPA gave DOE-RL a delay to the Work Plan because EPA thought that DOE-RL would finish other projects on the river corridor first. There are materials that are necessary for remediation that were not identified in the ROD but considered during the design process. EPA asked the same question to DOE-RL – why have costs risen? Specifics for removal, treatment, and disposal are further defined during the design process. This is not an uncommon discovery or process for cleanup sites at Hanford.

Q. How will DOE-RL integrate the results of the Tank Farm Performance Assessment and the Tank Closure and Waste Management Environmental Impact Study with PW 1/3/6?

C. Hanford does not need more publicity about potential groundwater contamination. Hanford is located in sensitive wine-growing area, which is essential for economic development. DOE-RL should consider the effects to tourism and the local economy.

Q. Is plutonium captured at the 200 West Pump-and-Treat?

R. [EPA] EPA will need to check that 200 West Pump-and-Treat System workers are sampling for plutonium and confirm that they are not finding any in the groundwater.

C. Please check for americium too.

RAP committee members thanked Kris and Emy for their insights and perspectives on the Central Plateau plutonium sites. Issue managers will continue to collect questions and comments from committee members and requested to emphasize questions with appropriate context⁷. PNNL will provide a briefing on the geochemistry of plutonium and americium to the RAP committee in November or January.

Critical Infrastructure Issue Framing

Jan Catrell, RAP committee vice-chair, noted that infrastructure at the Hanford Site is aging and conversations about critical infrastructure cut across several committees. Each committee has different interests in particular infrastructure. Jan encouraged committee members to generate a list of questions and topics related to infrastructure that are of particular interest to the RAP committee.

Attachment 7: PW 1/3/6 Issue Manager Framing Questions (10/4/16; Issue managers: Dale Engstrom, Vince Panesko, Shelley Cimon)

Committee Questions and Responses³

Note: This section reflects individual questions, comments, and agency responses, as well as a synthesis where there were similar questions or comments.

C. Sewer, water and roads are critical infrastructure.

C. Improved coordination between contractors and agencies on infrastructure related to electricity.

Q. Is MSA required to maintain or report aging infrastructure?

R. Environmental monitoring is performed by MSA.

C. There has been a greater emphasis on infrastructure from the DOE-Emergency Management Complex. It would be interesting to request a briefing from MSA to see how infrastructure needs are analyzed and decided upon from a budget perspective.

C. Water for fire protection and response are critical infrastructure.

C. The Health, Safety, and Environmental Protection Committee met with DOE-RL and learned that it is a balance for what infrastructure is selected for repair or replacement.

Q. What is the functional criteria for the lifetime or lifecycle of infrastructure?

C. Steve Pfaff, U.S. Department of Energy – Office of River Protection (DOE-ORP), has been discussing the development of the Low-Activity Waste Pretreatment System (LAWPS) and the amount of infrastructure necessary to run the facility, including new pipes and power. We should examine this topic in a way that involves LAWPS with other infrastructure updates.

Q. Is air monitoring considered a part of infrastructure?

R. [DOH] The Department of Health is the authority on air monitoring for the State of Washington. There are several facilities that are required to provide a plan by which their radioactive emissions are treated with particulate. DOH is thinking about what future monitoring programs will look like in the Central Plateau area and how the state will provide the appropriate levels of institutional controls.

Q. Does DOH have the regulatory authority to tell DOE-RL to not turn off electricity in a certain area?

R. [DOH] If that area has an air monitoring system, DOE-RL is not allowed to shut electricity off.

C. [DOE-RL] DOE-RL are responsible for Site-wide services and has the responsibility to implement projects that benefit both DOE-RL and DOE-ORP. Doug Shoop, Manager of Hanford Richland Operations Office, is committed to prioritizing infrastructure by 2019 to support work at both DOE field offices. Mr. Shoop will provide more information at the Board meeting in December.

The RAP committee decided to wait until the Tank Waste Committee held a similar discussion on the topic of critical infrastructure on the following day, October 5. The topic of critical infrastructure may be suitable for a joint committee discussion or committee of the whole.

324 Building Issue Framing

Pam Larsen, RAP committee chair, explained that CHPRC is the new contractor for remediating the 324 Building. She noted that CHPRC built a model of the contaminated B-Cell and CHPRC has been practicing removal methods. Pam also stated that there is large support to see this site remediated from delegates in Washington D.C.

Committee Questions and Responses³

Note: This section reflects individual questions, comments, and agency responses, as well as a synthesis where there were similar questions or comments.

C. The RAP committee should ask for a status update, specifically about funding and budgets.

R. The committee should also put together questions about the remediation design, structural stability of the 324 Building, and over-casing the material that comes out of B-Cell.

C. The HAB should reinforce that DOE-RL not change the date of the milestone.

R. [DOE-RL] For reference, remote excavation is to be complete by 2019 and demolition should be complete by 2021.

C. [EPA] EPA is waiting to be briefed on this topic. Until the TPA agencies are fully aware of the content CHPRC is providing, they will not be able to present at a RAP committee meeting.

RAP committee members noted to revisit this topic as a future agenda item. The RAP committee will request CHPRC to provide a presentation on their plan to remediate the 324 Building after the TPA agencies are briefed.

Committee Business

*RAP 3-Month Work Plan*³⁸

The RAP committee anticipates a full-day meeting in November to discuss the following topics:

- PFP update
- 618-10 Burial Ground progress update
- 300-FF-5 Rev. 0
- WA-1 Work Plan
- SW-2 Burial Grounds
- Site-wide permit update; Rev. 8C and Rev. 9

The RAP committee is tentatively planning to hold a committee meeting in January 2017 to discuss the Waste Encapsulation Storage Facility, K-Basin sludge, updates to PFP, PW 1/3/6 geochemistry, and updates on the Site-wide permits Rev. 8C and Rev. 9.

The RAP committee anticipates meeting in February 2017 to resume discussions on critical infrastructure and the 324 Building.

Attachment 3: Transcribed flipchart notes

Attachment 8: RAP 3-Month Work Plan

Attachments

Attachment 1: Plutonium Finishing Plant Closure Project (DOE-RL, 10/4/16)

Attachment 2: Plutonium Finishing Plant Closure Project [Supplemental Slides] (DOE-RL, 10/4/16)

Attachment 3: Transcribed flipchart notes

Attachment 4: Groundwater Cleanup Update (DOE-RL, 10/4/16)

Attachment 5: Washington Closure Hanford: Cleanup Progress Along the River Corridor (WCH, 10/4/16)

Attachment 6: Impact of HAB and Public Input on Record of Decision for Remediation of 200-CW-5, 200-PW-1, 200-PW-3, 200-PW-6 Operable Units (DOE-RL, 12/7/11)

Attachment 7: PW 1/3/6 Issue Manager Framing Questions (10/4/16; Issue managers: Dale Engstrom, Vince Panesko, Shelley Cimon)

Attachment 8: RAP 3-Month Work Plan

Attendees

Board members and alternates:

David Bernhard (phone)	Steve Hudson	Alex Nazarali
Don Bouchey	Alex Klementiev	Vince Panesko
Jan Catrell	Mike Korenko	Dan Seares (phone)
Shelley Cimon	Pam Larsen	Gene Van Liew
Dale Engstrom (phone)	Liz Mattson (phone)	Jean Vanni
		Helen Wheatley

Others:

Alex Teimouri, DOE-EM	Dib Goswami, Ecology (phone)	Theresa Bergman, CHPRC
Jim Hanson, DOE-RL	Stephanie Schleif, Ecology	Jen Copeland, CHPRC
Kris Holmes, DOE-RL	Emy Laija, EPA	Bruce Ford, CHPRC
Glenn Konzek, DOE-RL	Crystal Mathey, WDOH	Samantha Herman, EnviroIssues
Kyle Rankin, DOE-RL	Tom Rogers, WDOH	Ryan Orth, EnviroIssues
Tom Teynor, DOE-RL		Jennifer Colborn, MSA
		Patrick Conrad, MSA
		Shintaro Ito, PNNL
		Chuck Johnson, Oregon and Washington Physicians for Social Responsibility
		Scott Sax, WCH