

Oregon Hanford Cleanup Board

Mosier Senior Center, Mosier, Oregon

Monday, March 19, 2018

Members In Attendance:

Kristen McNall, Chair
Ted Taylor, Vice-Chair
Lori Brogoitti
Jurgen Hess
Steve March
John Howieson
Dave Ripma
Tom Roberts
Mecal Seppalainen
Dan Solitz
Brian Wolfe
Ken Niles, Oregon Dept of Energy

ODOE Staff:

Mark Reese
Dale Engstrom
Sara Lovtang
Jeff Burright

Tri-Party Agencies:

Delmar Noyes, DOE-Office of River Protection
Dieter Bohrmann, North Winds (ORP)
John Price, Washington Dept. of Ecology

Public

Arlene Burns, Mosier Mayor
Sharon Monteiro
Marylou Schnoes
Steve Castles
Lou Ann Wolfe

Administrative

Chair Kristen McNall opened the meeting at 2:02 p.m. She introduced Arlene Burns, the Mayor of Mosier, and welcomed Board members and guests.

Arlene welcomed the Board and indicated that Mosier has provided comments in the past on Hanford issues.

New Board member Jurgen Hess introduced himself. He is retired from the U.S. Forest Service and has been in the Hood River area for 31 years. Jurgen said that he has had both a love and worry about Hanford and the potential impact to the Columbia River. Jurgen is a photographer and has an on-line magazine that he publishes with his wife.

Kristen reminded the Board that this is the final Board meeting for both Dave Ripma and Mecal Seppalainen, whose second terms as Board members expired.

Ken Niles, Oregon Department of Energy, mentioned that this is also Dale Engstrom's last meeting, as he is retiring from ODOE this summer.

After introductions, the November Board meeting minutes were approved with minor changes suggested by Ted Taylor.

DOE-ORP Update

Delmar Noyes is the assistant manager for Waste Treatment Plant (WTP) start-up and commissioning. He provided an update on activities involving the U.S. Department of Energy's Office of River Protection (DOE-ORP).

Delmar said retrievals are now complete in the 16 tanks within C-Farm. The tank farms contractor is doing a final waste volume calculation on the waste remaining in each of the tanks. That will be submitted to the Washington Department of Ecology. Excess equipment is being removed from the tank farm. The next step will be working with Ecology on a closure plan for the tank farm.

DOE and Ecology also need to discuss closure plans for tank AY-102, the double-shell tank that was leaking from its inner tank and has since been emptied.

Work is underway to prepare for the next tank retrievals, which will be in the A and AX tank farms. Workers have been removing old equipment and installing new equipment to support the retrievals. Delmar said they are going to prepare multiple tanks at a time to be more work efficient and cost effective.

Preparation is underway to install two interim surface barriers to cover nine tanks and portions of three more over the SX Tank Farm.

Chemical vapor problems continue to be a concern and a major focus for DOE and its tank farm contractor. Washington River Protection Solutions continues to evaluate cartridge type respirators as an alternative to wearing SCBA's in some of the tank farms.

Ken asked Delmar the impacts of not yet having a budget for the current year. Delmar replied that with the continuing resolutions it makes it very hard to do long term planning and it's difficult for DOE to commit to training to begin new work.

Dan Solitz, Board, asked Delmar how many years are left on the Bechtel contract. Delmar said Bechtel has a completion contract, which means the contract goes forward until the whole WTP is built.

Kristen asked about what kind of improvements have been done for the tank vapor issues. Delmar explained that single-shell tank retrievals are done with SCBA gear, which adds a lot of worker physical stress. The exhaust stack has been made higher which may help with vapors.

Mecal asked if equipment like the crawlers are removed from the tanks after use. Delmar said that the crawlers are left in the tanks after retrieval is done because they are contaminated.

Dan asked whether DOE was considering building new tanks. Delmar said DOE believes the best approach to free up tank space is to treat the waste as quickly as possible.

Ecology Perspective on Tank Issues

John Price, Washington Department of Ecology, said DOE's change for cesium removal in the direct-feed low-activity waste (DF-LAW) stream is a challenge for Ecology from a permitting standpoint. He said Ecology is committed to doing everything they can to ensure that the permitting does not hold up the work.

The Washington State Attorney General filed suit on behalf of the tank farm workers and that is currently in mediation. Worker safety is an important concern for the State of Washington and Ecology is watching to see what the outcome of that will be because it does impact tank work.

Ecology is assessing the practicability of retrieving contaminated soil within and below the C Tank farm. DOE has indicated a desire to move forward with closure of the tank farm, but has not really addressed the contaminated soil.

Regarding Hanford, John said that the one thing that keeps him up at night is a lack of funding. Budget is the main limiting factor for the work that needs to be done. The Site needs \$3 billion or more annually for several years to catch up with work on the site. John added that delaying work in past years has had a significant impact and will have even more of an impact in the years ahead.

Ted asked if Ecology has considered the enforcement approach instead of a negotiation approach as far as DOE's budgets to try to compel them to direct more funding to Hanford. John said Ecology is considering that option, and the Tri-Party Agreement (TPA) does say that DOE cannot use lack of funds as a reason for not getting cleanup done. John added that the more immediate funding impacts are on the Richland side, rather than the tank waste treatment side.

Dan asked John about whether Ecology will require DOE to get every last drop of waste out of each tank. John said that the TPA has a target retrieval volume, and DOE must use up to three retrieval methods to meet that target.

John Howieson, Board, asked if DOE is still required to conduct a Performance Assessment for any remaining waste. John answered that DOE is required to do that. Ecology is particularly concerned about certain radionuclides if they remain in the environment. One is technetium and the other is iodine. Both have very long half-lives and remain mobile in the environment.

Direct Feed LAW

Delmar next provided the Board with an update on DF-LAW.

Delmar said DOE believes this is the best way to get the use of the investment that has been made in the waste treatment facilities, and to get started on near-term waste treatment.

DF-LAW will begin to treat the supernate, which poses the highest risk in terms of future tank leaks and takes up the most space in the double-shell tanks.

Delmar said adding DF-LAW adds another \$2 billion or so to the cost of constructing the tank waste treatment facilities.

DOE is changing direction on how it plans to remove cesium from the LAW feed. Preliminary design for the LAW pre-treatment system demonstrated that the time to get it designed and built would not support DOE's plans to get DF-LAW operating by 2022. The cost of the facility had also grown significantly. Delmar said DOE is now considering a tank-side process they are calling Tank Side Cesium Removal (TSCR).

Delmar said DF-LAW has a number of great advantages for the whole waste treatment mission.

- It enables the start of waste treatment in the near term
- It drives a cultural shift from construction to operations
- It gets about 75 percent of the Waste Treatment Plant facilities in operation
- It addresses liquids, the most mobile form of the tank waste
- It creates double-shell tank space
- And it provides valuable lessons to aid start-up and commissioning of the remaining portions of the WTP

Supernate will be staged in the AP tanks; sent to the TSCR for cesium removal; then on to the LAW melters. The cesium will be captured on ion-exchange columns and these will be stored for future disposition. Some waste byproducts will go to the Liquid Effluent Retention Facility. The immobilized glass will go to Hanford's Integrated Disposal Facility for eventual burial.

TSCR is considered a smaller, temporary process until the LAW pre-treatment facility is ready to go around 2027. TSCR will be about a \$420 million investment. It is based on a somewhat similar system that is being built for use at the Savannah River Site.

Delmar then walked the Board through a year-by-year schedule of getting DF-LAW operational.

In 2017, DOE began start-up operations for the laboratory and the balance of facilities (BOF). Seventy four of 200+ LAW systems have been turned over for commissioning. Construction continues of the LAW facility and the Effluent Management Facility.

In 2018, startup testing for the BOF systems will near completion, design of the TSCR will get underway, and construction of the LAW will be completed.

In 2019, startup for the LAW facility will begin and the TSCR design should be completed.

In 2020, construction of all facilities should be complete and commissioning should be well underway. TSCR should be fabricated and delivered to the site.

By 2021, all facilities should be ready to support DF-LAW operations.

Mecal asked Delmar what he thought was the hardest part of this process. Delmar said the Effluent Management Facility is critical, but not necessarily the hardest part. The hardest part will be the transition of culture from design and construction to operations. He said DOE and its contractors have been in a planning mode for a long time and now need to switch to operating this facility. It's going to be a challenge.

Kristen expressed concerns about the increased costs associated with the LAW pre-treatment system. Delmar said the maturation of the design caused both schedule and cost increases. The design for using elutable resin – where the cesium is flushed off the resin and sent back to the tanks – did greatly add to the cost.

Delmar said the intent is to empty a double shell tank so that it can be filled with supernate which has gone through the TSCR facility. That would give DOE one million gallons of feed waste available for the LAW melters. Without that waste being pre-staged, the TSCR by itself does not have sufficient capacity to feed both of the LAW melters. He added that the design is all conceptual at this point.

Dave Ripma, Board, said we have repeatedly been told that the tank wastes at Hanford are very different from the tank wastes at Savannah River. If that is the case, why is a system being designed for use at Savannah River also being planned for use at Hanford? Delmar said that the biggest difference is in the sludges, but the supernates are fairly similar.

Kristen asked how many tanks per year will be emptied with TSCR. Delmar said that approximately six-million gallons of double-shell tank equivalent over a ten year operating period would be gained. He said that for the first six months they expect to make 6 metric tons of glass a day. Then, over the next period, more than 21 metric tons of glass/day.

Mecal asked Delmar if it's cheaper and faster to begin DF-LAW operations than to build new tanks. Delmar said that today, DF-LAW would be less expensive because we are moving toward processing waste. He didn't disagree that there should be a discussion in the future about additional tanks, especially with the age of the tanks.

Jurgen suggested that perhaps some of the funding could come from the U.S. Defense budget, as Hanford helped in our nation's defense.

System Plan 8 and the Hanford Tank Mission

Jeff Burrigh, ODOE staff, presented the Board with an analysis of DOE-ORP's recent System Plan 8 document and how it fits within the broader context of the Hanford tank waste treatment mission. He aimed to focus the discussion on where we are with the tank system, how the pieces fit together, where we're going, and risks that lie ahead.

The vast majority of radioactive curies in Hanford's tank waste derive from cesium 137 and its daughter product barium 137m, and strontium 90 and its daughter product yttrium 90. There are many other radionuclides present in the tanks at much lower quantities proportionally. Non-radioactive constituents in the tanks are dominated by sodium and nitrate at 32 percent and 36 percent of the waste mass respectively, with the remainder comprising nitrite, carbonate, aluminum, and others.

The "product" of the tank waste treatment mission will be thousands of stainless steel canisters filled with glass made from the waste. The waste will be segregated between high-level waste (about 7,200 to 27,800 canisters to be produced and temporarily stored on site at Hanford prior to disposal in an offsite deep geologic repository); and LAW (58,000 to 96,000 canisters to be disposed on site). The LAW portion of the waste contains approximately 10 percent of the radioactivity and 90 percent of the volume, with the HLW portion representing the opposite ratio.

The System Plan documents a modeling exercise whose purpose is to project the future operation of the tank mission and optimize the retrieval and treatment (i.e., immobilization) of tank waste. The models that support the System Plan include models of facility operations, glass formulation, waste solubility, and a life cycle cost estimate. The System Plan predicts where, how, and when tank waste will move through the tank treatment system based on a number of possible "what if" management scenarios, including a Baseline Scenario that represents the current path.

The System Plan fits within a larger context of TPA milestone negotiation for the tank mission. The Tri-Parties are required to revise the System Plan every three years, and every six years the agencies may renegotiate several tank-related enforceable milestones based on a current understanding of the system. These milestones set the course for tank mission. Following the release of System Plan 8, DOE and Ecology began a milestone negotiation period, planned from January through the end of April 2018. The outcome of these negotiations may have a significant effect on the direction and duration of the mission.

Jeff displayed the following list of Oregon's objectives regarding the tank waste mission: 1) Prevent new releases of tank contents to environment; 2) Retain emergency capacity to respond to additional double-shell tank failure; 3) Meet obligations for single shell tank waste retrieval; 4) Complete treatment of all possible tank waste; and 5) Choose treatment and disposal pathways for generated and residual wastes that provide long-term protection of human health and the environment. Jeff asked the Board to review these objectives and provide feedback after the presentation if there are additional objectives that should guide the Oregon Department of Energy's approach to the tank mission.

Next, Jeff described the basic process flow for how waste progresses from the tanks, through pre-treatment and treatment, to eventual disposal. He noted that for DF-LAW (2023-2036), the solids filtration and cesium 137 removal steps are necessary to allow the tank waste, which is HLW by definition, to be classified under DOE authority as “Waste Incidental to Reprocessing” after the removal of “key radionuclides.” A waste must be re-classified as LAW so it can be disposed on-site at Hanford rather than in a deep geologic repository. Once the Pre-treatment facility is operational in 2036, it will accomplish the task of separating LAW from HLW. The process of vitrification will also produce radioactive offgases containing radionuclides such as technetium 99, which will be managed either by recycling them back into the melter feed or solidified into grout for disposal on site at the Integrated Disposal Facility.

Jeff displayed a series of figures that depicted the various facilities involved in the tank treatment system, then overlaid the figures with labels according to their current status. Some of the facilities are under construction, while others such as the Tank Waste Characterization and Staging (TWCS) facility, the Low Activity Waste Pretreatment System (LAWPS), and the Supplemental LAW Treatment facility have still yet to be fully designed. Jeff explained that the “Supplemental LAW” facility in the diagram refers to a still to-be-determined additional treatment capacity for LAW. The current WTP is expected to only have capacity to treat approximately 50 percent of the LAW in Hanford’s tanks, and DOE wanted to retain the option to evaluate technologies other than vitrification for the remainder of the waste. The selection of a Supplemental LAW treatment path is one of the milestones currently under negotiation between DOE and Ecology, and it is also the subject of an ongoing study by the National Academies of Sciences, Engineering and Medicine.

Next, Jeff displayed figures depicting the planned vs. current system for transferring waste from the tanks to the WTP. He noted that several components of this system are not operational, either because they have not yet been built or because there are issues with the transfer lines and receiving tanks in key transfer nodes.

The new Baseline Scenario estimate in System Plan 8 projects that with a planned start date of 2036 for the full WTP, the new completion date for retrieving all SSTs has slipped from the current milestone date of 2040 to 2056, and the new completion date for treating all tank waste has slipped from 2047 to 2063. He noted that the current milestones were developed back when the WTP was expected to be operational in 2019, so the end-date slippage is generally consistent with the delay of the WTP startup. Jeff stated that with our new understanding of the “longer road ahead,” there is a corresponding increase in risks such as additional tank failures, seismic events, and aging site infrastructure.

Next, Jeff showed the Board a series of graphs from the System Plan 8 Baseline Scenario, which visually illustrated the interconnected aspects of the retrieval and treatment system. The production of glass is dependent on the availability of both liquid and slurry feed wastes, which is dependent on the rate of single-shell tank retrievals, which depends both on the speed of the actual tank farm retrieval work and the availability of spare space in the double-shell tank system. Double-shell tank capacity remains highly utilized throughout most of the mission, as these tanks perform a “way station” function and also because they must manage the large amounts of water necessary to mobilize tank wastes through

transfer pipelines. This water is taken out of the system via the 242-A Evaporator, which will be an essential system component for the duration of the mission.

Jeff briefly went over the Baseline Scenario schedule to show the sequence of planned major activities and how they reflect spending priorities on site. Near-term priorities include closing the first tank farm (C Farm); meeting regulatory requirements for retrieving a number of tanks by 2024; fixing the cross-site waste transfer system; and commissioning DFLAW by 2023. He then showed a figure of projected mission costs from the System Plan, which showed that the necessary funding for the tank mission would exceed the DOE-ORP current funding levels by the 2020s, with a peak of \$3 Billion in annual funding needed for a few years around 2030, and sustained funding between \$2-3 Billion per year beyond 2030 through the remainder of the mission. The figure also shows the effect of escalation (i.e., inflation or the time-value of money), which makes these large figures even bigger and could extend the mission even longer. This slide generated much comment and conversation among the Board, and John Price from Ecology confirmed that this budget figure keeps him up at night.

Delmar added that the Baseline Scenario cost estimate does not include infrastructure replacements such as new double-shell tanks. From DOE's perspective it was important to issue the System Plan with the lifecycle cost estimates included because it's an important tool for communicating the magnitude of the tank mission. He said if you assume flat funding over time, eventually it doesn't cause any positive results. Another value of the figure is to show that not only does it cost money to build these facilities, but it will cost money to operate them.

Dan asked how much of the ORP budget is required to maintain "min-safe" conditions. Delmar estimates about \$300 million per year, but it fluctuates some.

Jeff then gave the Board a brief synopsis of the ten additional "What if scenarios" that were analyzed in the System Plan.

Ultimately, no scenario offered a "silver bullet" way to improve the tank mission, and the near-term budget limitations precluded the ability to pursue some of the alternatives that could shorten mission duration or reduce cost. He also noted that at the last Hanford Advisory Board (HAB) meeting, John Price from Ecology challenged the HAB to provide the TPA agencies with their preference about which scenarios they most and least prefer.

The presentation then turned to risks and vulnerabilities in the System Plan and the overall tank mission. First, the System Plan did not model the effects of unexpected infrastructure failures over the 45+ years of the mission. This includes the potential for additional double-shell tank failures, problems with the 242-A Evaporator (which is a single-point failure risk), and advanced corrosion of the single-shell tanks, making liquid-based waste retrievals infeasible. Additionally, several mission-related costs, such as the cost of disposal, the cost of responding to infrastructure failures, or the cost of new environmental releases, were not included in the analysis. This may skew the results and lead to sub-optimal decisions.

Jeff listed other tank mission-influencing risks, including: the unrealistic funding profile; the possibility that some unconsidered combination scenario could improve the System Plan results; the regulatory

and health risks associated with Scenario 4, which proposes to close 49 SSTs as-is without retrieval; tank vapor issues potentially slowing the rate of tank retrievals due to the inefficiencies of needing to use Self Contained Breathing Apparatus; and changes to the DF-LAW plan changing how the tank system operates in ways the System Plan did not analyze.

Next, Jeff gave special focus to the risk of additional double-shell tank failure. First he showed a diagram depicting how the new longer Baseline Scenario schedule proposes to extend the operation of the double-shell tanks for 27 to 64 years beyond their respective design lives. Next, he showed a photo of the bottom of tank AY-102 after it had been emptied, showing seven leak sites both along weld seams and in the center of steel plates. Jeff's interpretation of this photo was that it counters the previous conventional wisdom that construction flaws and a high initial weld rejection rate had been the primary contributors to the tank's failure. The final AY-102 Leak Assessment Report concluded that the tank had failed due to "service-induced pitting corrosion due to historic waste composition and operating conditions." Jeff explained that the tank had held waste water with relatively low pH for its first seven years, then held high-heat waste from tank C-106 in the 1990s, both of which contributed to accelerated corrosion. Furthermore, he noted that AY-102 at the time of failure was 41 years into its 40-year design life. He concluded with the idea that the leading contributors of tank failure going forward may be simply temperature, chemistry, and time.

The transfer of AY-102 to Tank AP-102 required a complicated series of waste transfers across multiple tanks, which ending up costing \$100 million and taking 2.4 years. Jeff then showed a slide describing how the integrity of AP-102's outer liner has recently come under suspicion by Ecology, due to the discovery of an area where greater than 70 percent thinning has occurred. This amount of thinning is located in an area of thicker steel, so Ecology is concerned because the majority of the outer liner's bottom is the same thickness as the amount that had corroded. Ecology is now requiring DOE to conduct additional investigation of AP-102 by September 2018.

Jeff turned the focus back toward the funding profile risk for the tank mission, this time showing that none of the scenarios evaluated in System Plan 8 can be accomplished with current level of ORP funding.

Next, Jeff reviewed the changes to the design of the LAW pre-treatment facility and the emergence of TSCR as a new technology for pre-treating waste during the DF-LAW period between 2023 and 2036. Because Delmar had discussed this topic in detail, Jeff focused on how the use of a non-elutable (i.e., non-reusable) ion exchange resin in TSCR and the redesigned LAWPS would create a new cesium-laden waste form with no current path for disposal. He noted that this waste would need to either be added to the HLW vitrification effort or shipped offsite to a deep geologic repository once one is available.

The presentation closed with a summary and next steps. Based on the findings of System Plan 8, the tank mission is a longer road no matter what we do. This affects risks both to the mission and the environment. Jeff advocated that a good decision should account for all system costs and risks, and he recommended that the agencies "stress test" any preferred management scenario to measure its resilience to risk. He stressed that while the System Plan offered some options to reduce mission duration, cost, or risk, there is inadequate budget to pursue them under the current funding paradigm.

For next steps, Jeff noted that the tank mission milestone negotiations are going on right now between DOE and Ecology, and both Oregon and the HAB have requested to be consulted before a final decision on the path forward is made. Also happening now is an analysis by the National Academy of Sciences regarding the best option for the Supplemental LAW treatment technology. A federal review group has been commissioned to spearhead the analysis, and the NAS is expected to complete its review in mid-2019. The outcome of this effort could affect the waste form that is chosen for nearly half of the LAW at Hanford (e.g., glass, grout, or others), so Oregon gave testimony to the NAS at a recent meeting in Richland. Another ongoing activity is the development of the TSCR treatment system and a redesign of the LAWPS facility, which Oregon will be keeping an eye on. Finally, DOE has contracted with the US Army Corps of Engineers to evaluate the effects of keeping the HLW and Pretreatment facilities in “preservation mode” for three to five years so they can focus funding on DFLAW.

Public comment

Sharon Monteiro, public, urged DOE to consider stainless steel for any new tanks. She feels strongly Oregon needs to ask the federal government to not use carbon steel, as Hanford has demonstrated that is not the right metal for the waste tanks.

Kristen adjourned the meeting at 5:52 p.m.

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ODOE staff

Mark Reese

Dale Engstrom

Sara Lovtang

Jeff Burright

Tri-Party Agencies:

Tom Teynor, DOE-RL

Mark French, DOE-RL

Rich Buel, DOE-RL

Jennifer Copeland, CH2M Hill Hanford

John Price, Washington Dept. of Ecology

Dave Einan, U.S. Environmental Protection Agency

Public

Lou Ann Wolfe

Sharon Monteiro

Administrative

Kristen opened the meeting at 8:45 a.m.

There was a brief discussion related to the Board's bylaws and how many Board members are necessary to have a quorum. The Board agreed not to change the bylaws, but agreed that all votes would be by a show of hands to ensure there are sufficient votes in favor of a motion.

Jeff was then invited to answer questions about his presentation on the previous day about System Plan 8.

Mecal suggested that the Hanford Advisory Board might be interested in seeing the presentation.

Kristen said she has noted that DOE is not always good at specifying their requirements. An example she pointed out to Jeff was the rationale for changing mesh of filter by 100-fold. She asked if Jeff knew the reason for the change

Jeff responded that the rationale DOE used was that it was a holdover from pre-treatment. Jeff said that Oregon hasn't seen the TSCR specifications, so he's still investigating that.

Jurgen commended Jeff on the presentation. He said since there likely won't be a significant increase in the DOE-ORP budget, he asked which scenario Jeff favored.

Jeff replied that all scenarios require an increase in costs. Jeff said that he has no good answer. He doesn't think any scenario would offset the budget problem.

Tom Roberts, Board, stated that he had heard a lot about cost, and cost-savings, and as a tax payer he appreciates that. This will cost a lot of money and there's no changing that. He'd prefer to push forward getting cleanup done sooner, knowing that it's going to cost more by delaying it. He felt that DOE should shift focus on getting it done rather than the cost.

Review of Activities/Events since November meeting

Ken provided the Board with an update of activities and events related to Hanford that had occurred since the last Board meeting.

First, he related that Anne M. White has been nominated by the President to lead the Environmental Management Division within DOE, replacing James Owendoff who had held the role in an acting capacity for over a year. Ms. White was previously an environmental consultant based in Michigan and possesses a Master's degree in Nuclear Engineering.

Ken noted some selected responses from Ms. White's testimony during two separate Senate confirmation hearings.

During her January hearing, Senator Maria Cantwell from Washington, who is a ranking member of the Energy and Natural Resources Committee, asked Ms. White focused questions related to Hanford. In answer to a question about respecting deadlines and commitments for cleanup, White responded, "We have a moral and legal obligation to live up to the commitments made in our agreements."

Ken said that during her second hearing before the Senate Armed Services Committee, Ms. White received one question from a Rhode Island Senator about Hanford, asking what she would do to speed up the cleanup. White responded, "One thing I'd like to consider when I'm looking at these problems is that there's a very long timescale involved in all things nuclear, so we need to make sure we make decisions that are timely, they are technically underpinned and cost underpinned." Ken remarked that it was difficult to understand what was meant by her statement.

In addition to spoken testimony, White was required to respond to written questions, some of which regarded Hanford directly. From her responses, Ken interpreted that White is in favor of the DF-Feed LAW program and that she perceives some urgency in making a decision about the treatment alternative for Supplemental LAW.

Ken and John Price from Ecology noted at this point that neither Oregon nor Washington perceive an urgency to make a Supplemental LAW decision because there is sufficient time before the decision is needed and they have other priorities at Hanford.

Next, Ken reported that because of a reorganization within DOE last December, the cleanup program now reports to the Undersecretary of Science, Paul Dabbar. Ken noted that Dabbar has background at Hanford and within the DOE complex, and he related that there is more information in the packet of materials provided to the Board.

Ken then briefly addressed the contamination spread that had been reported during the Plutonium Finishing Plant (PFP) demolition, pointing out a couple of developments that were unusual in terms of the Hanford cleanup. First was a joint letter from Ecology and EPA on January 9, which ordered a stop work until DOE had gotten a complete handle on why the spread of contamination occurred.

Ken said that he could not remember when this had been done before, and John confirmed that this joint letter was a first at Hanford. Following that, the Washington Department of Health also sent a letter to DOE that laid out their concerns with the contamination that occurred, the potential consequences of the spread of alpha radiation that occurred, and the potential harm to people that could result.

Ken said that Dave Einan had been hired to head the EPA office in Richland. As discussed at the November Board meeting, there had been a lot of concern about whether the new EPA Hanford manager would be based in Richland or Seattle. The HAB, ODOE, the Tri City Herald editorial board, and others all issued public support for the next EPA Hanford manager to be based locally in Richland. Dave Einan is based in Richland and will stay there, so that concern has been removed.

Ken then talked about the National Academy of Sciences committee meeting that was held in Richland from February 28-Mar 1. Their job is to evaluate an analysis done by experts contracted by DOE to look at technology alternatives for Supplemental LAW. As Ken perceived it, "There was a love-in for grout."

Ken gave testimony at the meeting on behalf of Oregon, where he stated that while DOE continues to assert that there have been new developments in grout that make it safer as a long-term waste form, Oregon has historically not shared these conclusions and has not yet seen satisfactory evidence to support DOE's claims.

Ken said that Alex Smith from Washington Ecology also gave a presentation at the NAS meeting, which included a focus on the history of how we got to where we are today and DOE's commitments to vitrify Hanford's waste.

Her comments included discussion of what the pitfalls have been with vitrification, why grout has been ruled out more than one time, and the commitment by the Federal Government in the 1990s to vitrify Hanford's waste in return for slowing down Hanford to focus on Savannah River's vitrification program.

Also related to Supplemental LAW, the US Government Accountability Office (GAO) put out a report in February and gave testimony in Congress last week about DOE's difficulties managing huge projects.

Part of the discussion related the GAO's belief that DOE could save tens of billions of dollars if it grouted the Supplemental LAW at Hanford.

Ken noted that this myth is not supported by consistent analysis, yet there are still organizations pushing it, and they're pushing pretty strong right now. In addition, the GAO report included a graph showing DOE spending on cleanup across the country in the last 6 years, while in the meantime the actual environmental liability has increased by over \$100 billion over that time.

Ken said that some of the reasons for this increasing liability included projects falling behind, accidents, and the fact that DOE keeps absorbing new cleanup sites from the National Nuclear Security Administration. Ken said he is concerned the GAO's focus on DOE liability will either push lawmakers toward a solution or a capitulation, because the situation is getting to the point that they can't keep doing what they have been doing.

Regarding the Hanford budget, Ken expressed that 2018 had been a tough year so far because Congress has yet to pass a budget for 2018, and as a result the Hanford cleanup has been based on continuing resolutions that cause cleanup activities to start and stop. Furthermore, this approach has flattened the site's budget.

Ken noted that if the President's latest budget for Hanford goes through, the cleanup will get even tougher. The 2018 DOE budget request for Hanford would cut funding for DOE Richland by 18 percent and cut the ORP budget by 4 percent. Ken stressed that both numbers need to go up, not down. He closed by saying that he has seen similar attempted cuts in the past, but Congressional leaders including Patty Murray have successfully fought to restore the cleanup funding before the final budget is passed.

Next, Ken pointed out a major update to the TPA milestone tracking document. Towards the back of the document, the major milestones associated with the Consent Decree between DOE and Ecology now have a new term "under analysis." This is because the U.S. Army Corps of Engineers is currently looking at the feasibility of whether DOE can stop work at the HLW and pre-treatment facilities for a period of time and still meet their milestone for hot commissioning of the facilities at the end.

Ken updated the Board that the decision for PUREX Tunnel 2 would be the same as with Tunnel 1 (i.e., grouting the tunnel). Ken talked with DOE Chief Engineer John Mara, and was convinced that grout was the superior choice. He noted that the grout formulation they intend to use is a temporary grout that can be cut into portions relatively easily if the future decision is to remove the contents of the tunnels.

Ken described a recent effort to send three gallons of tank waste to Texas for disposal. Waste was collected from archived laboratory samples and treated to remove cesium 137, after which it was sent to Perma-Fix Northwest in Richland to grout it for transport to the Waste Control Specialists Low Level Waste Disposal Facility in Texas.

Ken noted that after treatment, the waste met all qualifications for shallow burial. The purpose of this demonstration project was to show DOE's ability to dispose of some waste after removing the key radionuclides and demonstrated performance of the ion exchange resin for removing cesium. He

observed that this path for offsite waste disposal did not appear to be a direction DOE is really pushing on, and there was an initial plan to follow the 3-gallon demonstration with a 200-gallon version which as yet has not been pursued.

The 618-10 Burial Ground cleanup project has reached completion, aside from final re-vegetation. 618-10 was a burial ground that contained a variety of hot laboratory wastes, and over the course of 7-8 years over 500,000 tons of soil and debris had been removed from the disposal area and disposed in the Environmental Restoration Disposal Facility (ERDF) onsite.

For K East Reactor, DOE has begun preliminary work to see what's involved with cocooning the reactor. This work would involve cleaning out the inside of the facility, somehow isolating the reactor block, and allowing decay to occur.

Plans for the two K reactors (East and West) originally proposed a large enclosure to cover both. Ken noted that actual implementation is still years away due to funding limitations, but the preliminary work will begin sooner.

Ken introduced two comment letters that were included in the meeting information packet. The first letter related to the project to move the cesium/strontium capsules out of the pools in the WESF facility onto a dry storage pad. A recent draft milestone plan for this project had a completion date of 2025 for this activity, which Oregon thought was way too slow given that we had identified this as a major risk several years ago.

Ken said that as discussed at the November meeting, a 2017 document from the Energy Communities Alliance advocated for grouting Hanford tank waste and was shared with members of Congress. In response, Oregon wrote a letter to Senator Wyden that countered the ECA document. The letter was shared widely.

Since the release of System Plan 8, the TPA agencies are meeting regularly between now and the end of April to discuss new tank mission milestones. Oregon wrote a letter to DOE and Ecology requesting consultation during the negotiations, and Ken told the Board that he and Jeff had met with the agencies earlier that week.

Oregon and the HAB have also asked for some level of public discussion prior to the release of draft milestones. Ken explained that the reason for requesting early discussions is because when parties are working out difficult problems, attorneys tend to get involved and the language gets precise. Once language gets precise, it becomes harder to change it. Oregon's request was to engage the public before the language becomes locked in.

Plutonium Finishing Plant Status Update

Tom Teynor, DOE-RL, provided the Board with an update on the contamination spread from the PFP demolition. Tom walked the Board through information on PFP that is available on DOE's web site and is updated regularly.

Following the spread of contamination in December, Tom said that 281 employees requested bioassays. A total of 269 came back negative. Eleven were positive for internal contamination. Tom said DOE takes full responsibility.

Some employee owned and government vehicles also picked up contamination.

Tom showed the Board the various boundaries around the PFP area – including the access control boundary, and the radiological control boundary. The boundaries have been modified and strict reporting controls put in place to control access and egress.

Tom said that the National Institute for Occupational Safety and Health (NIOSH) came in to talk to employees as requested.

There has been considerable examination by DOE and others about what happened and why. An Expert Panel has been appointed to review and challenge the contractor's proposed approach to fully recovering from the spreads of contamination. Demolition activities in June 2017 resulted in the spread of airborne radioactive contamination outside of established control boundaries and exposure to nearby workers. A stop work order was issued. The contractor, CH2M Hill Hanford Plateau Remediation Company, completed a causal analysis and developed several corrective actions to prevent recurrence. In early November demolition resumed and continued until early December when there was another spread of airborne contamination and exposure to nearby workers.

During the week of December 11, crews finished demolishing the Plutonium Reclamation Facility (PRF), which was part of PFP. There weren't immediate indications of a contamination spread, as continuous air monitors did not alarm. There does not appear to be a single event that caused the contamination spread. However, the type of contamination found indicates the spread was most likely related to PRF demolition and was likely exacerbated by the high winds that started late on December 17.

Initial review shows that the contractor went too fast; that they diluted the fixative despite recommendations for the manufacturer that this not be done; and

Dan asked Tom to clarify the radioactive materials involved with the spread of contamination. Tom said that it was plutonium and americium. There was minimal cesium and strontium.

Mecal asked whether it is true that contamination was found as far as 10 miles away from PFP.

Tom said monitors at K-Reactor picked up something. They're not discounting the possibility it could have come from PFP, though it is more likely it was from some other legacy source.

Ken said a root cause evaluation report issued in early March by the contractor was very critical and identified 42 actions to address the event.

Demolition will not resume until DOE and its regulators are certain all the issues have been identified and corrected. Crews will continue to ship previously packaged waste containers to the Central Waste Complex.

K Basin Sludge Project

Mark French, DOE-RL, provided the Board with an update on the project to move highly radioactive sludge from the K-West reactor basin to interim storage within T Plant.

After having operated from 1955-1971, the K-Basins were later reactivated for storage of N-Reactor Fuel. When PUREX shut down in 1990, fuel processing was no longer an option for the 2,100 metric tons of spent fuel stored in the K-Basins. That spent fuel was later transferred between 2000 and 2004 to the Canister Storage Building.

After the spent fuel was moved, the sludge that remained from corrosion of the spent fuel was at the bottom of the basin. That sludge, much of which is highly radioactive, was vacuumed up and transferred into three engineered containers stored in the K-West Basin.

There is about 35 cubic yards total volume of sludge, which is currently characterized as transuranic waste. The radiation dose poses a challenge for the workers, as remote handling is required. There is also a concern about the potential build-up of hydrogen gas.

The project to move the sludge off the river had a number of problems. Eventually, a full size mock-up of the K-West basin was constructed. That allowed the workers to develop tools and techniques for removing the sludge in a safe environment, and finally began to move the project forward. A new facility was constructed next to the K-West Basin. This “annex” includes a transfer bay which will support transfer of the sludge into transport and storage containers, which will then be taken to T Plant for indefinite storage.

Workers have gone through a series of pre-operational testing and operational readiness reviews, which will continue for another month or so.

The current schedule shows sludge removal beginning in May, which will beat the TPA milestone of September 30 to begin that activity. Mark expects the sludge removal to be complete sometime in fiscal year 2019, again beating the TPA milestone of Dec 31, 2019.

Update on Tri-Party Agreement negotiations

John Price next provided the Board with an update on current and upcoming TPA negotiations.

John mentioned that Oregon and Washington have a Memorandum of Understanding, which provides a mechanism for Ecology to consult with Oregon confidentially about progress and strategy for various negotiations. Ecology is also open to Oregon suggestions for public meetings on proposed TPA revisions.

John said in addition to TPA changes in work schedules and milestones, the Tri-Parties are also looking to update certain other sections of the agreement. For example, Appendix H and Appendix I explain the

single-shell tank retrieval and closure process and were written in 1994. John said Ecology and DOE have learned a lot since then so it makes sense to update these appendices.

Draft TPA milestone changes related to transuranic waste are likely to be out for public comment in late summer or early fall. Existing milestones are focused on a few year period in the mid-to-late 2020s, based on the previous expected closure date of the Waste Isolation Pilot Plant (WIPP) of 2030. WIPP's closing has been pushed back to 2050. John said this additional time will likely be reflected in new proposed M-091 milestones. He indicated Oregon might be interested in requesting public meetings to consider the new proposed milestones.

Negotiations are also planned for the M-092 milestones. This involves three waste forms, the cesium-strontium capsules, bulk sodium, and 300-Area special waste.

Milestone 062-45 requires DOE and Ecology to initiate negotiations every six years, within six months of issuance of the last revision of the System Plan. These negotiations are underway, and involve a variety of milestones related to the tank waste mission. Public meetings will be conducted to solicit public comments on any new draft milestones that result from these negotiations.

Dan asked John what may happen if DOE and Ecology are unable to reach agreement on new tank milestones. John said Ecology could set its own milestones through a "Director's Determination," which DOE could then appeal through the Pollution Control Hearing Board or through Federal court.

Update from U.S. Environmental Protection Agency

Dave Einan was recently selected as the new EPA Hanford office manager. He introduced himself to the Board and discussed his perspective on the Hanford cleanup.

Dave shared his history as a third-generation Richland native who has been with the EPA for 28 ½ years working on Hanford issues. Previously he served as a senior project manager for EPA until beginning his new position on February 1, 2018.

Dave expressed his belief that the support of Oregon, the Hanford Advisory Board, the City of Richland, and the Tri-City Herald made a significant difference in the decision to keep the EPA position in Richland rather than Seattle, and he expressed his appreciation for the support for a local Hanford EPA presence.

Dave explained that the vacancy from his former position will most likely be filled from within EPA, as it cannot be filled from outside the Agency per current policy. He currently has nine people reporting to him, three of whom are in Richland, and he hopes to have another staff member in the Richland office when all is said and done.

Dave noted that the Hanford program is still feeling their way around the new requirement to have all decisions with cost implications over \$50 million signed by the EPA Administrator in Washington D.C. He offered the example of the 100-Area D and H Record of Decision, which is currently awaiting signature two years after it had undergone the public comment period.

Dave assured the Board that the transition from the previous EPA Hanford manager would not be a big change with regard to EPA priorities and its role at Hanford. He stated that EPA does not make decisions in a vacuum, and that public awareness and support of decisions would remain important.

Dave listed the lack of budget for cleanup activities and the effects of the contamination spread at PFP as major concerns.

Dave said they are still working on the 100-Area decisions, and they are implementing an action in the 300-Area that had previously been selected. He said that once these actions are complete, cleanup actions next to the Columbia River will be mostly complete, leading to a focus on the central plateau.

Dave expressed that he believes it is important to have decisions made and documented so that when budget is available they are ready to implement the decision.

Dave stressed that public involvement is still a priority at Hanford. He recognized that some of the constrictions of the TPA don't apply to Oregon, and that allows Oregon to be a unique and important voice in the Hanford cleanup.

Dan asked Dave how much local autonomy EPA has on deciding milestones. Dave replied that he wants decisions to be based on science and what's reasonable and appropriate. The reality is that what happened at PFP was bad, and EPA wants to avoid a repeat in the future. The PFP project will cost time and money to recover and complete, but DOE has to protect workers and get the job done. Dave noted that DOE's estimate for the funding necessary to complete its obligations was \$4.5 Billion per year for the next several years, but he expressed a view that we not going to get that amount of funding for Hanford, and it is uncertain whether DOE could responsibly spend that much. Therefore, it will be necessary to look at the budgets we do get and set priorities accordingly, though he noted that EPA sets its own priorities regionally.

Ken asked about EPA's perspective on a proposed milestone of 2025 for completing relocation of the cesium and strontium capsules. Dave responded that he could not speak to the basis for the slippage. His assumption was that it was budget-related and noted that the project was not proposing any ground-breaking science that may warrant delays

The Board asked Dave to characterize the amount of work load vs available staff. He responded that there is too much work and too few people. He did note however that cuts in this Administration are leading some EPA Headquarters staff to move into the Superfund program.

In response to the prompt, "What keeps you up at night regarding Hanford?," Dave listed the work load issues within his office and how the contamination spread at PFP had resulted in radiation doses to workers, some of whom were not radiation workers and had not signed on for that kind of risk.

Dave expanded this concern to include the upcoming remediation work at the 324 Building in the 300-Area immediately north of Richland and across the river from Franklin County, and he expressed his worry that if mistakes are made in this project then the public may potentially be exposed to radiation.

Finally, Dave also expressed worries about the Federal budget for both DOE and EPA affecting their ability to get the work done.

Board Business

The Board confirmed the next Oregon Hanford Cleanup Board meeting will be July 16 and 17 in Pendleton. Tom Roberts volunteered to help with logistical planning for the meeting and noted that he had already reserved the Sheriff's Office Justice Center in Pendleton for those dates.

Board Chair and Vice-Chair Election

On the results of a hand vote, Ted Taylor was elected the new Chair of the Board and Dan Solitz was elected Vice Chair. The results were 12 in favor, zero opposed, and zero abstentions.

Exiting Board Members

This meeting marked the final Board meeting for Dave Ripma and Mecal Seppalainen, who had both served on the Board for nine years. Staff and several Board members expressed their appreciation for the time, effort, and valuable contributions that Dave and Mecal made over the years. Staff provided a gift to each.

Mecal offered her final thoughts to the Board, charging them to not let DOE undermine public values and interests and to continually challenge the DOE representatives. She also urged the Board to push for new double-shell tanks and to try to get at least one person from DOE on board with the idea that new tanks are needed.

Dave said that it has been an honor to serve on this Board and also on the Energy Facility Siting Council. He appreciated all the hard work that ODOE staff put into the work on Hanford and he will miss being part of this Board.

Board members also expressed their thanks to Dale Engstrom from the Oregon Department of Energy, who is retiring at the end of June.

Public Comment

Sharon Monteiro briefly addressed the Board and thanked all the speakers for their information.

Kristen adjourned the meeting at 1:30 p.m.