1. Meeting Agenda

2. Hanford Site Map

3. March Meeting Minutes

4. Oregon Correspondence / HAB Advice

5. Cleanup News / Progress

6. Tank Waste

7. Manhattan Project Natl. Park

8. Waste Incidental to Reprocessing

9. Additional Info

10. TPA Upcoming Milestones

11. Travel Reimbursement Form

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OREGON HANFORD CLEANUP BOARD
MEETING AGENDA

Monday, July 16, 2018

Umatilla County Sheriff Office
4700 NW Pioneer Place
Pendleton, Oregon

1 p.m. Administrative
- Greetings and introductions, including introduction of new Board member
- Approval of March meeting minutes (Tab # 3 of briefing book)
- Public comment opportunities at Board meetings (Chair)
- Review of WIPP tour (Tom Roberts and Mark Reese)

1:30 p.m. Review of Activities/Events Since March Meeting (Tabs # 4, 5 & 9)
(Ken Niles, Oregon Department of Energy)
Purpose: To review relevant Hanford and Board-related events/activities during the past four months.

1:50 p.m. Public Comment/Question Opportunity

2 p.m. Hanford Risks/Key Project Updates (Tab # 5)
(Doug Shoop, U.S. Department of Energy, Richland Operations Office)
Purpose: To provide the Board with information about risks identified following the partial collapse of the PUREX tunnel, as well as updates on key projects underway by the DOE-Richland Office, including efforts to move highly radioactive sludge from the K West Basin and resuming demolition of the Plutonium Finishing Plant.

3 p.m. Break

3:15 p.m. Manhattan Project National Park
(Becky Burghart, National Park Service)
Purpose: To provide the Board with an update on the development of the Hanford portion of the Manhattan Project National Park.

4:15 p.m. Management & Disposal of U.S. Department of Energy Spent Nuclear Fuel (Tab #7)
(Bret Leslie, U.S. Nuclear Waste Technical Review Board)
Purpose: To provide the Board with information about the spent nuclear fuel inventory at the Hanford Site.

5:15 p.m. Public Comment/Adjourn for the Day

Tuesday, July 17, 2018

8:30 a.m. Administrative
- Greetings and introductions

8:40 a.m. Public Comment/Question Opportunity

8:50 a.m. First Foods
(Teara Farrow Furman, CTUIR)
Purpose: To provide the Board with information about tribal culture associated with "First Foods"

9:45 a.m. Break

10 a.m. DOE-ORP Update (Tab #6)
(Brian Harkins, U.S. Department of Energy, Office of River Protection)
Purpose: To provide the Board with an update on the Office of River Protection's activities, including current Tri-Party Agreement negotiations, tank retrievals, Waste Treatment Plant construction and efforts to move forward with Direct-Feed Low Activity Waste).

11 a.m. Update on Tank-Related Negotiations
(Alex Smith, Washington Department of Ecology)
Purpose: To provide the Board with the status of Tri-Party Agreement negotiations related to tank waste treatment milestones.

11:15 a.m. Lunch

11:45 a.m. Draft C Farm Waste Incidental to Reprocessing Determination (Tab #8)
(_____, U.S. Department of Energy, Office of River Protection, Jeff Burright, Oregon Department of Energy)
Purpose: To provide the Board with a briefing on a current comment period related to a Waste Incidental to Reprocessing determination for the C Tank Farm.

12:30 p.m. Board Business
(Board and Staff)
- Discuss action (if any) based on discussion at this meeting
- Confirm date and location of the next Board meeting

Public Comment/Adjourn

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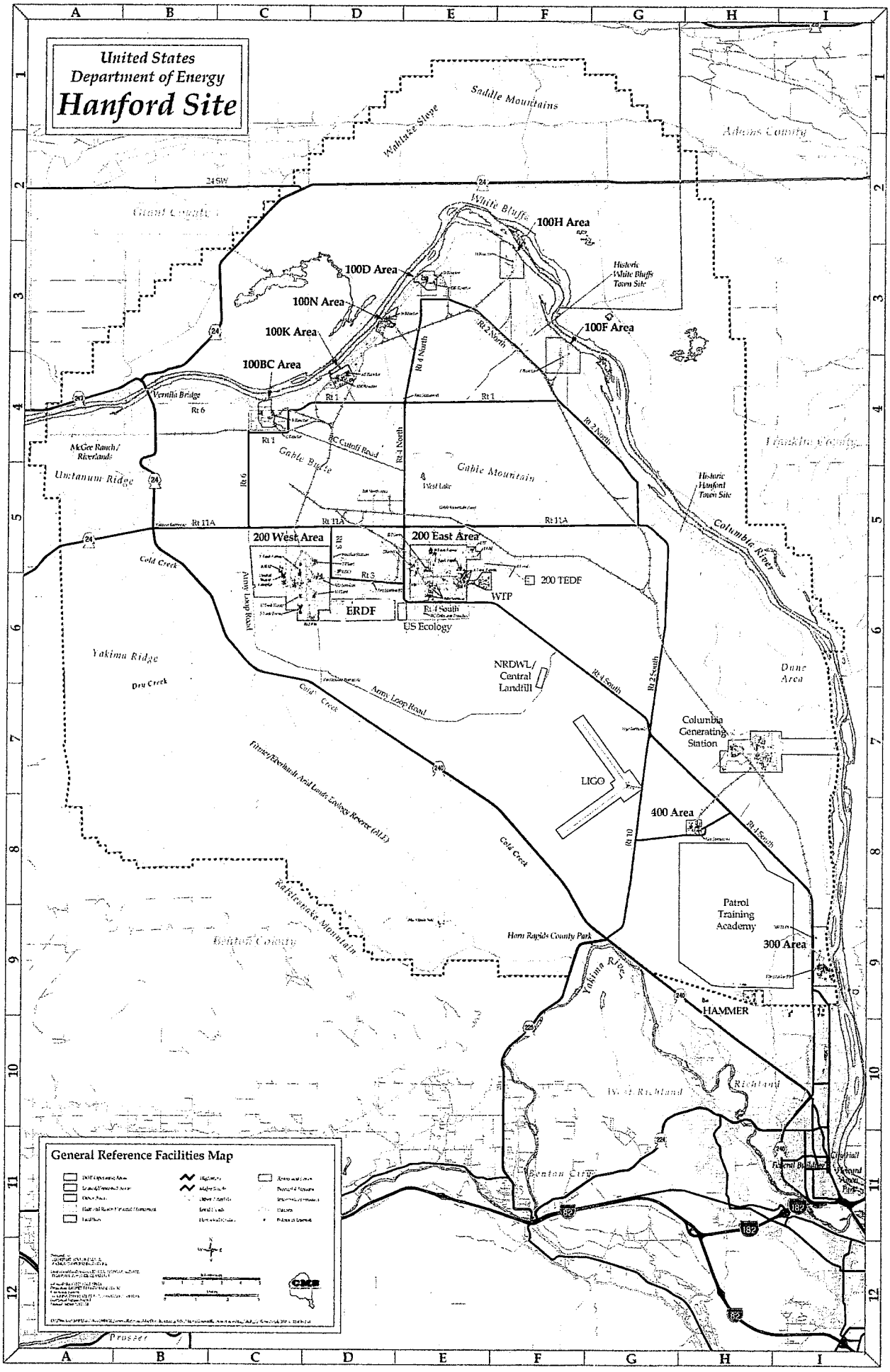
United States
Department of Energy
Hanford Site
Saddle Mountains
Wahluke Slope
Adams County
White Bluffs
100H Area
100D Area
100N Area
100K Area
100BC Area
100F Area
Historic White Bluffs Town Site
Vernita Bridge
Rt 6
Rt 1
Rt 4 North
Rt 2 North
BC Cutoff Road
McGee Ranch/ Riverlands
Umtanum Ridge
Gable Butte
Gable Mountain
West Lake
Historic Hanford Town Site
Rt 11A
200 West Area
200 East Area
Rt 3
Rt 5
Rt 4 South
Cold Creek
Army Loop Road
ERDF
US Ecology
200 TEDF
WTP
Columbia River
Franklin County
Yakima Ridge
Dry Creek
NRDWL/
Central
Landfill
Rt 2 South
Dune Area
Columbia Generating Station
LIGO
400 Area
Rt 10
Rt 1 South
Fitzner/Eberhardt Arid Lands Ecology Reserve (ALE)
Rattlesnake Mountain
Benton County
Horn Rapids County Park
Patrol Training Academy
300 Area
Yakima River
HAMMER
West Richland
Richland
Benton City
Prosser
General Reference Facilities Map

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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 Burright, 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.

Oregon Hanford Cleanup Board

Mosier Senior Center, Mosier, Oregon

Tuesday, March 20, 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

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 a 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.

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Oregon
Kate Brown, Governor

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July 2, 2018

Alex Smith
Nuclear Waste Program Manager
Washington Department of Ecology
3100 Port of Benton Boulevard
Richland, WA 99354

Dave Einan
Manager, Hanford Project Office
U.S. Environmental Protection Agency
825 Jadwin Ave, Suite 210
Richland, WA 99352

Doug Shoop,
Manager, Richland Field Office
U.S. Department of Energy
PO Box 550, MSIN H5-20
Richland, WA 99352

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

I want to express my disappointment in proposed Tri-Party Agreement (TPA) milestones related to moving Hanford's cesium and strontium capsules to dry storage. In January of this year, the Oregon Department of Energy strongly urged the Tri-Party agencies not to delay movement of Hanford's cesium and strontium capsules to dry storage until 2025 (as the completion date). Our comments were in response to an *agreement in principle* on draft milestones for the cesium and strontium capsules. Now, the public is being asked to formally comment on that same proposed 2025 milestone.

In our January letter, we again outlined the concerns we first raised in 2013 that the concrete walls of the Waste Encapsulation Storage Facility pools may have suffered a loss of structural integrity due to high radiation exposure. Similar concerns are identified in great detail in several DOE contractor documents. Since 2013, in a variety of forums, the U.S. Department of Energy and its regulators have indicated repeatedly that moving the cesium and strontium capsules to dry storage is a high priority. No one has really challenged that the risk from a basin failure could potentially be significant.

The notice for this comment period says that the TPA agencies will consider all comments submitted before the proposed changes are incorporated into the TPA. I recognize that our

January comments were prior to the formal comment period. However, given that they had no discernible effect, it's hard to believe any public comments at this point will influence these proposed milestones. I hope to be proven wrong.

I'd like to believe that Oregon and the public are able on occasion to influence cleanup decisions and priorities at Hanford. The Federal Register notice of May 18, 2018 of an amended Record of Decision for the cesium and strontium capsules credits the State of Oregon and the Yakama Nation for raising this issue, which directly led to consideration of dry storage of the capsules. We appreciate that acknowledgement, but hoped our January arguments against delays to 2025 would have been sufficiently compelling to affect a change.

We recognize that budget limitations are likely the main reason for the delay and acknowledge that there are many competing priorities. We simply believe this should be one of the highest spending priorities at Hanford and again encourage the Tri-Parties to elevate this project so that this risk is alleviated well before 2025.

Should you wish to discuss our comments, please contact me at 503-378-4906.

Sincerely,

Ken Niles
Assistant Director for Nuclear Safety

C.c. Matt Johnson, Confederated Tribes of the Umatilla Indian Reservation
Rose Longoria, Yakama Indian Nation
Jack Bell, Nez Perce Tribe
Oregon Hanford Cleanup Board
Susan Leckband, Hanford Advisory Board

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June 25, 2018

Brian Vance
Manager, Office of River Protection
U.S. Department of Energy
PO Box 450, MSIN H6-60
Richland, WA 99352

Dear Mr. Vance:

I officially request a 60 day extension to the comment deadline on the *Draft Waste Incidental to Reprocessing (Draft WIR) Evaluation for Closure of Waste Management Area C.* The importance and ultimate impact of the decisions that are being made require deliberate and thorough consideration by not just the State of Oregon, but by all affected parties.

I appreciate that the U.S. Department of Energy initially offered an extended comment period for this document. However, the 96 day period is not sufficient, for the following reasons:

- The documents themselves, the Draft WIR and the supporting *Performance Assessment of Waste Management Area C,* are lengthy (312 and 1,023 pages respectively), technically complex, and require extensive study and analysis. Due to other pressing issues at Hanford, my small technical staff is not able to devote all of its time to this review.
- As this is the first Hanford tank farm to go through the WIR process, this will be a precedent-setting action with potentially irreversible impacts well into the future.
- Because there was previous litigation challenging DOE's processes to reclassify waste, and Oregon was involved in that litigation, our comments will need legal and high-level policy review, which adds to the time we need to finalize comments. (This does not mean that we will necessarily engage in future litigation on this issue).
- Our staff has been promised an explanation from DOE's Office of River Protection and DOE Headquarters staff regarding the legal and regulatory basis for soils contaminated by past tank leaks. This briefing with DOE-ORP is tentatively scheduled for early August and will likely affect our final comments and our internal review schedule.
- The U.S. Nuclear Regulatory Commission is producing a Technical Evaluation Report of the WIR and associated Performance Assessment analyses, which is expected to be completed in March 2019. NRC will issue its first Request for Additional Information to DOE in the September timeframe. These actions by the NRC are critical inputs to public understanding of the WIR decision being proposed and may result in a revision to the WIR Evaluation and the Performance Assessment. Because DOE will offer no other opportunity for public comment between this draft WIR Evaluation and the final WIR determination, ideally the public comment period should extend until after the NRC report has been issued, or another comment period should be initiated for any revisions to the WIR evaluation. A 60 day extension to the comment

period would at least allow us to understand what information the NRC has found to be lacking in the draft documents.

In addition, there really is no urgency, as Hanford regulators have indicated that tank farm closure is not a priority at this time.

Thank you for your consideration of this request.

Sincerely,

Ken Niles
Assistant Director for Nuclear Safety

Cc: Alex Smith, Washington Department of Ecology
Doug Shoop, U.S. Department of Energy
Dave Einan, U.S. Environmental Protection Agency
Matt Johnson, Confederated Tribes of the Umatilla Indian Reservation
Rose Longoria, Yakama Nation
Jack Bell, Nez Perce Tribe
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April 17, 2018

Ourania Kosti
Nuclear and Radiation Studies Board
National Academies of Sciences, Engineering and Medicine
500 5th Street, NW
Washington D.C. 20001

Dear Ms. Kosti:

Thank you for the opportunity to provide input to the National Academies of Sciences, Engineering, and Medicine on its independent assessment of technology development efforts within the U.S. Department of Energy's (DOE) Office of Environmental Management.

The State of Oregon has participated in the Hanford Site cleanup since it began. Our primary concern is to help ensure that cleanup decisions are protective of the Columbia River now and into the future.

We have often seen the need for and advocated on behalf of the development of new technologies at Hanford. We won't attempt to review the full record of technology development that has occurred during the almost 30 years of the Hanford Site cleanup. We'll leave that to DOE and others.

We would, however, like to highlight some of what we consider to be successes in technology development at Hanford. We will also provide a cautionary note about less successful technology development, and some of the reasons it was unsuccessful. Finally, we would like to offer our recommendations for areas needing new technology.

The direction from Congress requires the Academies to assess technologies that could "reduce the long-term costs," and "accelerate schedules." However, more than cost and schedule have to be considered in the scope of what is necessary to accomplish a lasting and protective cleanup at Hanford. While we recognize there is considerable work to be done at Hanford and a definite need for the development of new technologies, whether they result in cost or schedule savings is less urgent a question than whether they protect people and the environment – *that* is and must remain our priority.

The development of new technologies to retrieve waste from Hanford's single-shell tanks was in many ways highly successful. DOE has a number of different technologies available now to retrieve sludge and saltcake from the single-shell tanks, including the Mobile Arm Retrieval System, the Foldtrak, enhanced reach sluicing systems, and other technologies. The development of these "tools" was absolutely necessary to be able to retrieve wastes at a rate that will be necessary to feed the Waste Treatment Plant. Yet, it did not come quickly or inexpensively. The development of this retrieval technology spanned a good decade and cost tens of millions of dollars. Retrieval of the 16 tanks in Hanford's C Tank farm took more than a decade at a cost of many hundreds of millions of dollars. We are hopeful this

investment will make the next tank farm retrievals cheaper, faster, and better than before – the rare trifecta.

We are also impressed with some of the technology development that has occurred in terms of groundwater cleanup. The apatite barrier in the N Area has proven its effectiveness to bind strontium to the soil (though we're still waiting for it to be fully installed). The use of an underground chemical barrier to change Chrome-VI to Chrome-III has also been relatively effective. We've also seen considerable improvement through the years in the effectiveness of the resins in the pump-and-treat facilities to retain chromium – though some of that development has come through the suppliers of the resin, rather than something that was done at Hanford.

We are encouraged by DOE's research into advanced glass formulas in an effort to increase the waste loading per canister and maintain long-term performance. Success in this arena could potentially save DOE billions of dollars by reducing the mission duration, reducing ultimate disposal costs, and supplanting the need for a supplemental low-activity waste treatment capability.

At times, we've seen a reluctance by DOE to make use of existing technology if it hasn't previously been used at Hanford. As early as 1986, Oregon advocated for use of slant well drilling beneath Hanford's tank farms to better understand what happened to the waste that leaked from the tanks. The first slant well was not drilled until 2000. That well, beneath the SX tank farm, provided extensive information about contaminants leaked from the tanks. We expect this information will also prove useful as DOE attempts to achieve final closure of the tank farms.

Long-term effectiveness needs to be a key consideration in the development and deployment of any new technologies at Hanford. DOE and its contractors have been investigating soil desiccation at Hanford – drying an area in the subsurface to stop the further migration of contaminants. Though short-term results have been somewhat promising, we question the ability to ensure such a technique can be effective over a long period of time. Re-wetting seems likely to occur at some point.

Not surprisingly, there have been some failures in technology development at Hanford. What seemed like good ideas didn't necessarily pan out, and after a few years of investment, those technologies were abandoned – at least as far as Hanford. Examples include in-situ vitrification of contaminated soil and the installation of a physical wall into the ground to stop contaminated groundwater from migrating into the Columbia River.

More troublesome have been those attempts that were not quickly abandoned – that dragged on and sucked money away from the cleanup. Examples here include bulk vitrification, which was investigated for nearly a decade at a cost of tens if not hundreds of millions of dollars, and the consideration of grout for much of Hanford's tank waste, which was seemingly abandoned more than two decades ago, but once again has been revived.

From our perspective, the pursuit of a new technology most benefits the Hanford cleanup when it leads to a final and lasting reduction of long-term risk. Technologies that actually remove waste from the environment pay long-term dividends by reducing the total cost of natural resource injury under CERCLA. They also reduce uncertainties related to contaminant fate and transport and the cumulative risk of multiple contaminant sources, which are critical both for ensuring the long-term performance of onsite disposal areas and for validating that cleanup has truly been accomplished.

This pursuit of the "new shiny thing" does carry some risks. We are wary when new technologies may lead to long project delays and diversions of a limited site budget away from direct cleanup. If a new technology can be tested in such a way that the costs won't divert cleanup funds and there is a reasonable expectation that the consequences of failure won't lead to a new injury, we are open to taking a risk and seeing what we learn.

We do see the need for technology development to address the following at Hanford:

- Remediation of wastes in the deep vadose zone, including leaked tank wastes in and beneath the tank farms and wastes from cribs and other liquid discharge points (other than traditional excavation).
- Targeted retrieval of concentrated wastes within the solid waste burial grounds (other than traditional excavation).
- Integrity assessment and enhancement of the outer shells of the double shell tanks. We are seeing indications that moisture in the vadose zone may threaten the ability of the tanks to resist natural corrosion processes for the duration of the tank waste treatment mission, which is now estimated to stretch into the 2060s or beyond.
- Making a more durable cap. Most waste site caps have a life expectancy measured in decades; Hanford's wastes will clearly pose a risk far longer than that. Though Oregon is not supportive of wide-spread use of caps at Hanford, we do recognize the need for caps in some locations.
- The capability for characterizing and packaging remote-handled transuranic waste. Dealing with Hanford's remote-handled transuranic waste has been repeatedly been put off due to the lack of a facility or capability to safely characterize and package this waste.

Since cleanup began at Hanford and elsewhere around the DOE complex, DOE has not consistently been willing to invest meaningful funds towards technology development. We hope your assessment will spur new interest and funding toward finding new technologies to help the cleanup at Hanford and elsewhere in the DOE complex.

If you have questions about our comments, please contact me at ken.niles@oregon.gov, or at 503-378-4906.

Sincerely,

Ken Niles
Assistant Director for Nuclear Safety

Cc: Doug Shoop, U.S. Department of Energy, Richland Office
Brian Vance, U.S. Department of Energy, Office of River Protection
Alex Smith, Washington Department of Ecology
Dave Einan, U.S. Environmental Protection Agency
Matt Johnson, Confederated Tribes of the Umatilla Indian Reservation
Rose Longoria, Yakama Nation
Jack Bell, Nez Perce Tribe
Oregon Hanford Cleanup Board
Susan Leckband, Hanford Advisory Board

HAB
Hanford Advisory Board

HANFORD ADVISORY BOARD

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

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June 7, 2018

Doug Shoop, Manager
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P.O. Box 550 (A7-75
Richland, WA 99352

Dave Einan, Manager
U.S. Environmental Protection Agency
825 Jadwin Avenue, Suite 210 (A1-43)
Richland, WA 99352

Dear Mr. Shoop and Mr. Einan:

Background

The production of plutonium and other nuclear materials at the B and C reactors near the Columbia River left behind large volumes of waste, including radionuclides and hexavalent chromium. The B reactor is now part of the Manhattan Project National Historic Park, while the shoreline is one of the more accessible areas of Hanford Reach National Monument. Contaminated groundwater enters the Columbia River along the shoreline.

The Hanford Advisory Board (HAB, Board) recognizes that substantial interim decision work has been done at 100-B/C to remove large concentrations of hexavalent chromium particularly through the two "big digs" (completed in 2014) that took place near C-Reactor. The removal of that mass of chromium reduced the need for long-term groundwater treatment in the 100-B/C area. It was a good start.

The results from the 100-B/C Remedial Investigation demonstrated that the 100-B/C clean-up work is not yet done. There are highly contaminated soils near the Columbia River shoreline for which Institutional Controls are proposed for up to a hundred years or more. Additional remediation is required to fulfill the Tri-Party Agencies' (TPA) commitment to "stop chromium from getting to the Columbia River." Allowing a plume of groundwater with elevated chromium values to continue to enter the Columbia River for a period of 60 years would defy the TPA commitments. Right now, the chromium contaminated water enters the river over a shoreline length of approximately 1800 meters. DOE's Proposed Plan estimates that it will take 187 years for contamination near the B-Reactor spent fuel basin to naturally attenuate to levels that would not require Institutional Controls. However, if the shallower sources were removed to the 15-foot limit, Institutional Control (IC) requirements would fall to 39 years. The Hanford site has multiple precedents for successful removal of spent fuel basins and surrounding contaminated soil.

The HAB has provided past advice (HAB advice 278, Bullet 2, and HAB Advice 290, bullet 2) asserting that institutional controls for cleanup projects for a duration exceeding 100 years is unreasonable. The removal of soil contamination has been tested and shown to be

implementable, where long-term ICs are neither proven nor shown to be sustainable for the periods of time proposed.

For example, there are two deeper contaminated soil sites, 116-B-11 and 116-C-1 that are close to the river. Site 116-B-11, which is contaminated with Strontium-90 and Cesium-137, will require ICs until the year 2247. Leaving such contaminated material behind does not conform to the HAB vision of "how clean is clean enough."

Washington Model Toxics Control Act (MTCA) regulation establishes an aquatic water standard that requires corrective action when chromium levels of groundwater entering surface waters exceed 10 µg/L in order to protect fish and other aquatic organisms. The Chromium levels in groundwater currently exceed MTCA standards. The HAB supports the proposed idea of using the 100-K Pump-and-Treat facility to treat contaminated water extracted from the 100-B/C system as a reasonable addition to the alternatives that will be selected for the Proposed Plan.

	Water Standard	µg/L	Reference
	MCLG[1] (EPA)	100 (Cr)[2]	40 CFR-141.51; CWA, sect. 303(c)
	MTCA[3] Cleanup Level for Groundwater	48 (Cr)[4]	WAC 173-340-900, Table 720-1
	WAC Surface Water Standard	10 (Cr VI)	WAC 173-201A-240, Table 240
Year	Maximum Cr Value – Aquifer Tube	Maximum Cr Value – Well	
2016	58 µg/L (C6230)	55 µg/L (199-B3-47)	
2017	39 µg/L (06-M)	50 µg/L (199-B3-47)	

Water standards and latest hexavalent chromium values.

In addition to reducing the amount of chromium in groundwater in a shorter period of time, the 100-B/C pump-and-treat system would be capable of preventing contaminated water from reaching the river through flow control, by pushing or drawing the chromium contaminated water away from the shore until cleanup of the groundwater is accomplished. In RAP committee briefings, EPA stated that the alternatives that included pump and treat would cost approximately $100 million more (including both capital cost and operations and maintenance), and some of this cost was in updates to the 100-K facility since the pump and treat will need to operate for 40 years. The Proposed Plan estimates total pump and treat capital costs for upgrades at $31 million including installation and refurbishment (tables 10-5, 10-6, and 10-7).

DOE's Preferred Alternative (Alternative Two) does little to remove the remaining mass of contaminants identified in the Remedial Investigation/Feasibility Study in a timely manner. Alternative Two relies primarily on Institutional Controls and Monitored Natural Attenuation to keep people and aquatic organisms from harm. The Preferred Alternative leaves long-lived radiological contamination deeper than 15 feet in the ground that has the potential to harm human health and the environment for thousands of years. For example, in the Proposed Plan, 100-B-14:1, located in the river-shore uplands area, will require 12,110 years of ICs for

1 Maximum Contaminant Level Goal
2 Total Chromium
3 Model Toxics Control Act
4 Total Chromium

draft Proposed Plan, a majority of the mass of contamination will be removed, eliminating the need for ICs.

The Board would like to see a separation of the consideration of soil remediation options within the Proposed Plan from the alternatives proposed for groundwater remediation as two separate selection processes. Of the 6 alternatives in the 100-B/C Proposed Plan, each is a combination of a groundwater and a soil remediation component. The combinations offered do not provide an instance that pairs the HAB's preferred strategies of Pump and Treat for groundwater with Remove, Treat, and Dispose (RTD) for soil contamination. The HAB finds that the best proposed alternative combines portions of Alternative Three and Alternative Five.

Proposed Cleanup Plans are supposed to be based on preventing risks due to the highest exposure reasonably expected to occur (known as "reasonable maximum exposure scenarios"). However, the B-C Area Proposed Plan fails to consider the likelihood of intensive public demand to use areas along the Columbia River adjoining (or included in) the Hanford Reach National Monument and the new national historic park, or of tribal uses of lands and resources along the River pursuant to Treaty and National Historic Preservation Act rights. The Plan fails to realistically consider the likely failure of institutional controls to prevent long-term access to these sites, particularly since such institutional controls have repeatedly failed within a few years at other high-profile Superfund sites.

Advice

The Board advises the TPA Agencies to consider the following when finalizing the RI/FS and developing the Proposed Plan:

- Institutional Control periods lasting more than 100 years are not reasonable. (HAB advice 278, Bullet 2, and HAB Advice 290, bullet 2). The HAB advises that all Proposed Plan Alternatives proposed and chosen should establish completion dates within decades but never more than a 100-year time frame. For sites immediately adjacent to the river, institutional control periods should be much shorter.

- The use of Institutional Controls for over 100 years should not be considered highly "implementable." Similar institutional controls have repeatedly failed within a few years at other high-profile Superfund sites. Remedies which remove contamination have been successfully used across the Hanford Site and are more implementable.

- The HAB supports a reduction of the remaining mass of contamination identified in the RI/FS process to bring 100-B/C into a safe state within a reasonable time scale. In order to sufficiently reduce contamination at 100-BC Area, DOE needs to conduct additional cleanup at waste sites where the RI/FS process has identified considerable contamination, but where the Preferred Alternative proposes to leave quantities of contamination in place, with some of these in the deep soils (greater than 15 feet bgs).

- Contaminated pipelines identified in the 100-B/C RI/FS and Proposed Plan should be removed.

- Consider groundwater remediation separately from soil remediation in the presentation of alternatives in this and future proposed plans. The Agencies and the public should be able to separately support one option for soil and another for ground water, rather than having to choose from combined alternatives. Combining remediation methods to be used confounds the selection process.

- Create or select an alternative that includes the implementation of a 100-B/C Pump-and-Treat system. The HAB agrees with the concept of using a repurposed and renovated 100-K treatment facility as this appears to be a reasonable and cost-effective solution to remove chromium from the 100-B/C groundwater and to decrease the flow of hexavalent chromium-bearing groundwater flow into the Columbia River currently at levels above cleanup MTCA standards.

- Reject the Preferred Alternative offered and instead opt for a new alternative, with pump-and-treat added to address contaminated groundwater. The revised alternative is recommended to include added RTD sites that will reduce the time of Institutional Controls to a monitoring period of less than 100-years.

- Reject Alternative Two on the grounds that Alternatives Three and Five each present a better overall balance of criteria in the Comparative Analysis. Alternative Two, DOE's Preferred Alternative, does not protect humans against the risks of foreseeable failure of very long-term institutional controls at sites along the river or within a national park. Alternative Two would not protect the river environment or groundwater. The Board reiterates Advice 268 that stated: "The Board advises the TPA Agencies to choose alternatives that meet the goal of unrestricted use along the river corridor."

- Hold public meetings around the region on the Proposed Plan and Alternatives.

- Use of Tribal exposure scenarios for the reasonable maximum risk evaluation.

- Conduct a survey of the 100-B/C area for traditional cultural properties (TCPS), as required by federal law, prior to issuing a revised plan or making decisions.

Sincerely,

Susan Leckband

Susan Leckband, Chair
Hanford Advisory Board

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

cc: Anne White, Assistant Secretary of Environmental Management, U.S. Department of Energy, Headquarters
Dave Borak, Designated Federal Officer, U.S. Department of Energy Office of Environmental Management
Alex Smith, Manager, Washington State Department of Ecology
James Lynch, Deputy Designated Federal Officer, U.S. Department of Energy, Office of River Protection and Richland Operations Office
The Confederated Tribes of the Umatilla Indian Reservation
The Confederated Tribes and Bands of The Yakama Nation
The Nez Perce Tribe
The Oregon and Washington Delegations

HANFORD ADVISORY BOARD

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

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June 7, 2018

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3100 Port of Benton Blvd.
Richland, WA 99354

Dave Einan, Manager
U.S. Environmental Protection Agency
825 Jadwin Avenue, Suite 210 (A1-43)
Richland, WA 99352

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

Background

The Hanford Advisory Board (HAB, Board) has significant concerns about the future of Hanford's cleanup funding. A compliant budget for the Hanford Site would require $3.4 billion for Fiscal Year (FY) 2019, however the President's budget falls short at $2.2 billion. Every budgetary shortfall away from a compliant budget adds years to the cleanup mission; increases risks to the environment, public, and workforce; and significantly increases the total cost of Hanford cleanup. The Board has consistently advised the local U.S. Department of Energy (DOE) offices to request compliant funding levels to prevent these delays, additional risks, and increased costs. A compliant budget provides the level of funding that meets all Tri Party agreements and obligations.

Budgets are an expression of values. DOE's budget proposals need to place appropriate value on protecting the Columbia River, the health of people who rely on the Columbia River, and the health and safety of the workforce – particularly in regard to tank emissions and preventing additional contamination following the exposures from the spread of plutonium in 2017.

DOE Hanford field offices have not shared proposed project level budgets for FY2020 for review and comment by regulators, the HAB or public even though this is required by the Tri-Party Agreement (TPA). This lack of disclosure undermines public support for cleanup funding and informed comment on priorities.

DOE is legally obligated to meet milestones as defined in the TPA and in the Consent Decree. The Board believes it is incumbent on DOE Headquarters (DOE-HQ) not only to request but to defend the level of funding necessary to meet all applicable legal requirements, including TPA schedules.

The President's Budget request for DOE Richland Operations Office (DOE-RL) FY2019 is $747 million. The legally compliant budget for FY2019 is $1.385 billion. DOE-RL has indicated in the past that the amount of funding required to maintain Hanford's aging facilities, site infrastructure, and surveillance is approximately $600 million per year. The President's proposed budget would therefore provide only about $147 million for actual cleanup – more than $600 million less than is legally required.

Compliance budgets are crucial to the residents and stakeholders affected across the Northwest region. These budget shortfalls will clearly result in major cleanup delays, increasing risks to the Columbia River, endangering Hanford workers, and risking major failures of aging confinement systems that pose serious risk to human and environmental safety. Annual budget shortfalls also significantly increase the total cost of Hanford cleanup. Thus, the funding levels proposed would impact health, public and tribal access to the River Corridor, and the river environment for hundreds of years.

The Board is concerned that two high priority projects would not move forward with the President's FY2019 budget proposal. These projects include removal of cesium and strontium (Cs/Sr) capsules from water storage to dry cask storage, and removal of highly contaminated soil underneath the 324 Building.

The HAB is also concerned as to whether DOE-RL will have the funding to properly respond to the serious contamination spread during the demolition of the Plutonium Finishing Plant (PFP).

In addition to the severe FY2019 proposed DOE-RL budget cuts, the Board is also concerned about inadequate funding proposed for the DOE Office of River Protection (DOE-ORP). The compliance budget for DOE-ORP in FY2019 is $2.1 billion. The President's budget cuts that by $660 million. The President's budget cuts to DOE-ORP in FY2019 could impact funding for engineered vapor controls, worker health investments and removal of waste from aging tanks, and efforts to immobilize Hanford's tank waste in glass.

The HAB has identified FY2020 budget priorities to most expeditiously advance Hanford cleanup activities and to minimize further risks to the environment and to the safety of Hanford workers and the public. In doing so, the HAB is in no way diminishing the imperative for DOE-RL and DOE-ORP to accomplish all identified tasks leading to the cleanup commitments for Hanford.

Advice

- The HAB advises DOE-RL and DOE-ORP to provide more detailed budget information including project baseline summary numbers, budget control points, analytical building blocks, and integrated priority lists for both Hanford field offices to the HAB and its regulators as it develops its annual budget submittal to Office of Management and Budget (OMB). This detailed information allows the Board, the public, and regulators to more effectively weigh in on budget priorities. The submission to DOE-HQ and review should not occur until after the public and regulators have had at least 30 days to review and comment on proposed project level and activity level funding proposed for FY2020.

- The HAB advises the following priorities be fully funded to maintain compliance with the Tri-Party Agreement in FY2020 and beyond. The following items are not listed in any specific order.

  - **River Corridor cleanup activity**, including the funds necessary to implement remedies in FY2020 which, as urged by the Board in other advice, should include removal of significant soil contamination and groundwater cleanup actions to protect the Columbia River and health of people using the shorelines.

  - **Construction of the DFLAW related facilities**, supporting hot commissioning by December 31, 2023.

  - **Expanded Public Involvement**, including activities that provide information and gather public input. These activities include full funding of the HAB, and regional meetings that effectively inform and solicit input from the public in Hanford cleanup decision making.

  - **Expanded Groundwater Pump & Treat Program**, including continued funding for operation of existing facilities.

  - **Worker Health and Safety Programs**, including engineered vapor control programs.

  - **Single Shell Tank (SST) Retrievals**.

  - **324 Building Disposition**, to eliminate the extremely high radioactive soil contamination beneath that structure, and initiate demolition of the building and surrounding facilities.

  - **Cs/Sr Capsule Relocation and Storage**, involving preparation of equipment and facilities necessary to move the Waste Encapsulation and Storage Facility's Cs/Sr capsules to long-term dry cask storage. Increased funding is necessary to remove this hazard sooner than the current draft milestone of 2025.

  - **Completion of the 100 N Chemical Reaction Barrier (Apatite Barrier)**, to prevent strontium from migrating to the Columbia River.

  - **100 B/C Cleanup**, including preparation and implementation of groundwater pump-and-treat and soil remove-treat-dispose (RTD) activities.

  - **Design and Construction of the Waste Treatment Plant (WTP)**, supporting Hot Start of the Waste Treatment Plant by December 31, 2033.

  - **Upgrade Hanford Site infrastructure to support the cleanup effort**, including those facilities and services supporting security, fire, utilities, communication, transportation, emergency preparedness, cross-site tank waste transfer capability, etc.

  - **Sludge off the River**, focusing on movement and storage of K Basin sludge to the T-Plant canyon, and addressing disposition of contaminated K Basin facilities/equipment.

- **Plutonium Finishing Plant (PFP) Actions**, including post-demolition stabilization to prevent further spread of contamination. PFP characterization to support transfer to 200-WA-1 Operable Unit of remaining subsurface structures and soil remediation.

- **Safe storage of Hanford tank waste**, including planning for new tank waste storage capacity to assure environmental protection until robust plans for tank waste treatment can be implemented.

Sincerely,

Susan Leckband

Susan Leckband, Chair
Hanford Advisory Board

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

cc: Anne White, Assistant Secretary of Environmental Management, U.S. Department of Energy, Headquarters
Dave Borak, Designated Federal Officer, U.S. Department of Energy Office of Environmental Management
James Lynch, Deputy Designated Federal Officer, U.S. Department of Energy, Office of River Protection and Richland Operations Office
The Oregon and Washington Delegations

5

DEPARTMENT OF
ECOLOGY
State of Washington

EPA
United States
Environmental Protection
Agency

June 26, 2018

By certified mail

Mr. Doug S. Shoop, Manager
Richland Operations Office
United States Department of Energy
PO Box 550, MSIN: A7-50
Richland, Washington 99352

Re: Items Needed to Lift the Washington State Department of Ecology (Ecology) and the United States Environmental Protection Agency (EPA) Creation of Danger Stop Work Pursuant to Article XXXII of the *Hanford Federal Facility Agreement and Consent Order* (HFFACO)

References: See page 3

Dear Mr. Shoop:

On January 9, 2018, Ecology and EPA issued a letter to the United States Department of Energy – Richland Operations Office (USDOE-RL) invoking HFFACO Article XXXII ("Creation of Danger"). The letter ordered all work to stop at Plutonium Finishing Plant (PFP) until Ecology and EPA notify USDOE-RL of the regulatory agencies' determination that corrective actions taken and proposed are sufficient to allow the remaining work at PFP to continue and that work may resume.

As part of the invocation of Article XXXII of the HFFACO, Ecology and EPA requested information from USDOE-RL regarding the circumstances that created the danger at PFP. However, after evaluation of the information received, Ecology and EPA determined that additional information was needed in order to evaluate whether the Creation of Danger event at PFP has been adequately addressed, a prerequisite to lifting the stop work order. This information request was provided to USDOE-RL in an email sent on May 21, 2018 (Enclosure).

As stated in the enclosure, prior to the restart of PFP demolition, Ecology and EPA need to receive items one through five. Once those items are received and our reviews are complete, Ecology and EPA will lift the stop work order under Article XXXII for the Low-Risk Demolition as defined under Reference 2.

Ecology and EPA would like to continue working collaboratively with USDOE-RL in project manager meetings to address any questions or concerns that our agencies may have regarding the enclosed requests.

We note that the revised air model (Pacific Northwest National Laboratory [PNNL] documents PNNL-27464 and PNNL-27456) relies on a number of assumptions about the controls that will be in place and how the remaining demolition work will be performed.

We also note that for the higher risk work, the air model predicts that detectable levels of contamination will escape the controlled boundary. Given this, Ecology and EPA have two additional conditions:

1. The Removal Action Work Plan (RAWP) shall be amended to state that the assumptions in PNNL documents PNNL-27464 and PNNL-27456 will be adhered to, and any deviations must be approved in advance by Ecology; and
2. Any radioactive airborne or surface contamination found outside controlled areas at or above model predictions, posted levels, or EPA environmental levels will be immediately reported to Ecology and EPA, so they can evaluate whether to invoke a stop work and an assessment of the effectiveness of corrective actions documented in a Root Cause Evaluation Report. If Ecology and EPA invoke a stop work, USDOE-RL shall identify what additional measures (beyond those documented in the Root Cause Evaluation Report) can be implemented to prevent any further contamination outside the controlled boundary. The RAWP shall also be amended to include the provisions of this paragraph.

Prior to the lifting the stop work order for the High Risk Demolition, Ecology and EPA require a briefing from USDOE-RL that includes:

1. An evaluation of the effectiveness of the corrective actions that have been implemented in the Resumption of Work Plan.
2. A high risk work package.
3. The lessons learned from the completion of the Low-Risk Demolition.

After this briefing is completed, Ecology and EPA will evaluate whether to lift the Article XXXII Stop work for the High Risk Demolition.

Our priority continues to be for the remaining work at PFP to be completed in a safe manner for both the workers and the environment.

If you have questions regarding this order, please contact Jim McAuley, Radiation Program Manager for EPA, at mcauley.jim@epa.gov or (206) 553-1987, or Stephanie Schleif, Facility Transition Project Manager for Ecology, at stephanie.schleif@ecy.wa.gov or (509) 372-7929.

Sincerely,

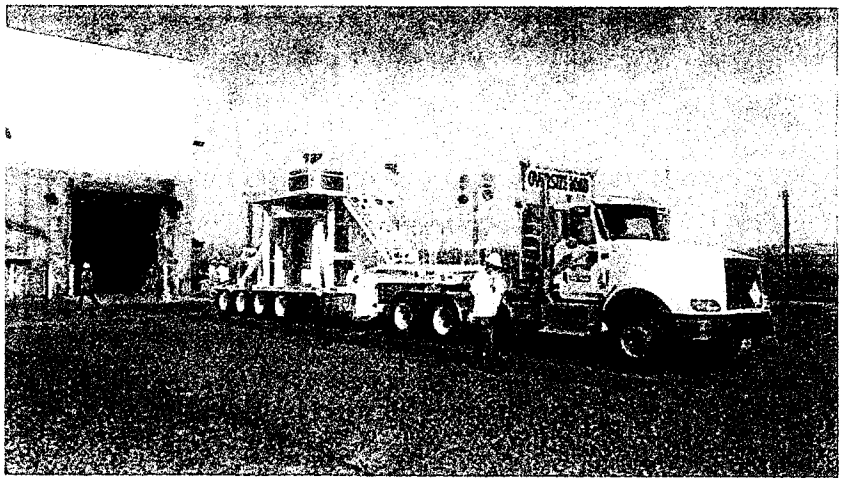
Alexandra K. Smith
Program Manager
Nuclear Waste Program
Washington State Department of Ecology

David Einan
Manager
Hanford Project
United States Environmental Protection Agency

Enclosure

By certified mail
cc: See page 3

Tri-City Herald



The first shipment of highly radioactive sludge left an annex at the Hanford nuclear reservation's K West Reactor Basin, which is near the Columbia River, at about 10:30 a.m. Monday. It was taken to central Hanford for storage away from the river. Courtesy Department of Energy

This radioactive waste at Hanford has waited 9 years for this moment. We're safer for it, DOE says

BY ANNETTE CARY

acary@tricityherald.com

June 25, 2018 12:55 PM

RICHLAND, WA

The first shipment of highly radioactive sludge was trucked across the Hanford nuclear reservation to a safer storage location Monday morning.

The 15-minute drive was the culmination of nine years of preparations, equipment development and training to remove sludge from underwater containers at the K West Reactor Basin, just 400 yards from the Columbia River.

The Department of Energy and contractor CH2M Hill Plateau Remediation Co. expect up to 23 more trips to be required over the next year to move all sludge from underwater containers to dry storage at T Plant in the center of the Hanford Site.

The containers will be stored in below-ground cells there until they can be prepared for disposal. The cells were once a part of the process to remove plutonium from irradiated fuel at T Plant.

The sludge is highly radioactive because it contains particles of deteriorated irradiated fuel that was not processed at the end of the Cold War to remove plutonium for the nation's weapons program.

The first container of highly radioactive sludge from the K West Reactor Basin made a 15-minute trip to central Hanford Monday morning.

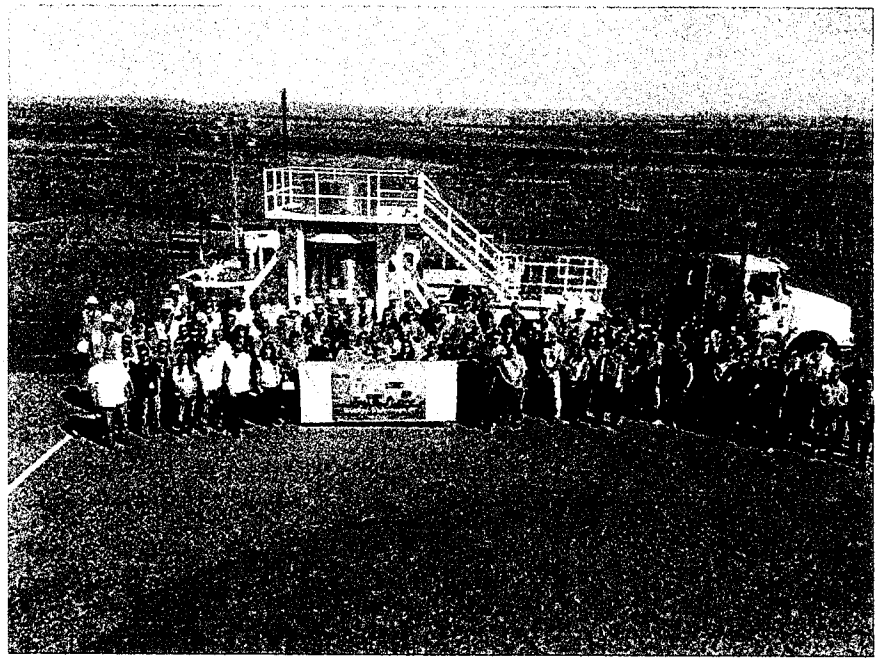
Courtesy Department of Energy

Instead, the fuel was stored in water-filled cooling basins attached to the K West and K East reactors near the river. Before the fuel was removed in 2004, it corroded underwater, and fuel corrosion particles, metal fragments and dirt combined to form sludge.

About 950 cubic feet of sludge accumulated in the basins, with all the sludge collected and transferred to underwater containers in the K West Basin before preparations began to move it to dry storage.

On June 12, workers started the process of transferring multiple batches of sludge into the container that was trucked within a shipping cask for storage at T Plant on Monday.

DOE has a legal deadline to have all the sludge moved to T Plant by the end of 2019 and then must have a treatment and packaging plan for disposal of the sludge selected by 2022.



Hanford workers commemorated the first shipment Monday morning of highly radioactive sludge from underwater storage near the Columbia River to safer dry storage in central Hanford. Courtesy Department of Energy

Tri-City Herald

Hanford contractor with 1,500 workers may get multi-million dollar extension

BY ANNETTE CARY

acary@tricityherald.com

June 21, 2018

RICHLAND, WA

Plans are being made to extend one of Hanford's largest contracts for up to a year, the Department of Energy said on Thursday.

CH2M Hill Plateau Remediation Co., now owned by Jacobs Engineering Group, holds a 10-year environmental cleanup contract that expires Sept. 30.

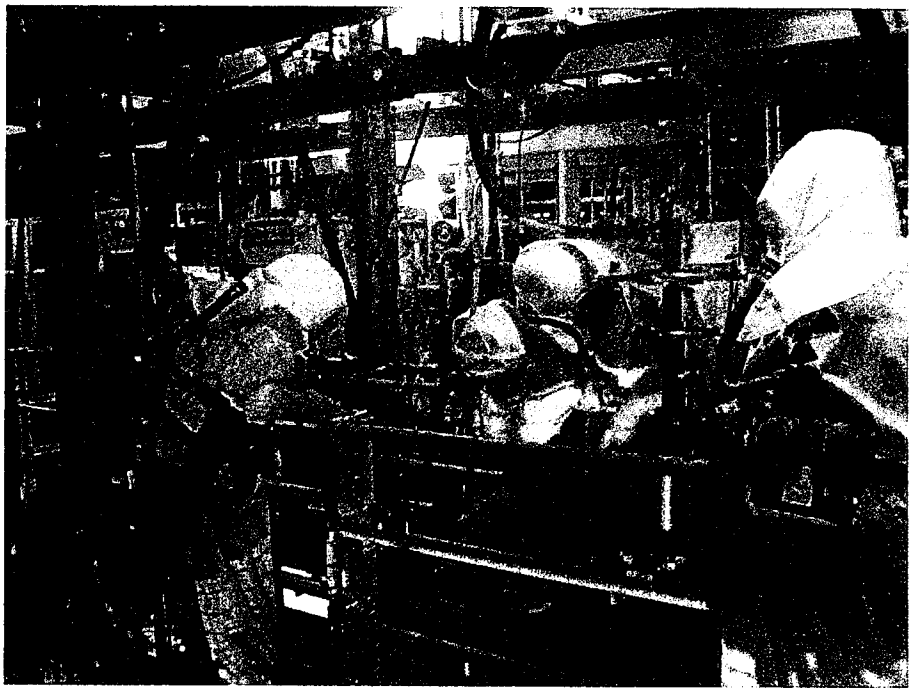
The current contract is valued at an estimated $5.8 billion, including $1.3 billion of economic stimulus work under the Obama administration. No estimate for the value of the anticipated extension has been released.

DOE announced on April 19 that it planned to issue a draft request for bids for the new Central Plateau Cleanup Contract between May 4 and June 3, but has yet to release the draft.

The new contract would replace the expiring contract held by CH2M, which employs about 1,500 workers, not including employees of its subcontractors.

DOE has yet to extend CH2M's contract, announcing only its intent to extend the contract with its expiration little more than three months away.

"Extensive advance planning for the follow-on procurement has been on-going for several years" and the proposed contract extension would allow work to continue until the new contract is awarded, DOE said in its announcement.



CH2M Hill Plateau Remediation Co. employees work with radioactive waste in a pool beneath the grating they are standing on at a Hanford nuclear reservation K Basin.

Courtesy Department of Energy

The new contract is expected to be similar to the cleanup work now assigned to CH2M, which covers some remaining cleanup work along the Columbia River and central Hanford cleanup, except the work related to 177 underground waste storage tanks.

Hanford is extensively contaminated from the past production of plutonium for the nation's nuclear weapons program.

In addition, DOE had proposed that the new contract would cover closing underground waste storage tanks as work to retrieve radioactive waste from each tank farm is completed. DOE is making plans to close its first tank farm, the C Tank Farm with 16 tanks.

However, after the DOE contract plan was announced in April, the U.S. Senate released its Hanford spending bill report for fiscal 2019.

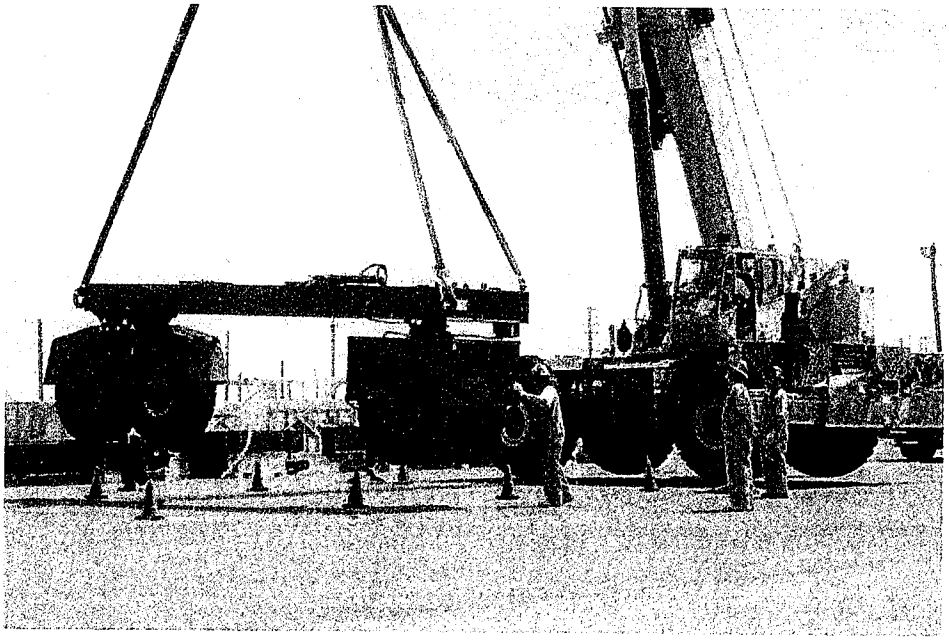
The bill report would prohibit DOE from using money from the Richland Operations Office, which would be responsible for the new contract, to pay for any work in the Hanford tank farms.

The announcement made by DOE on Thursday about its plan to extend CH2M's contract, lists the possible work that CH2M could do from Oct. 1 of this year through Sept. 30, 2019.

Key work includes finishing demolition of the Plutonium Finishing Plant down to its foundation. Demolition is currently halted after a spread of radioactive particles during demolition last year.

CH2M also could finish shipping radioactive sludge from underwater containers in the K West Reactor Basin near the Columbia River to dry storage in the center of the Hanford site.

The first shipment to T Plant in central Hanford could be made as soon as next week, after work began last week to fill the first storage container.



Equipment shipped from the West Valley Demolition Project in New York will be reused at Hanford to transport nearly 2,000 radioactive cesium and strontium capsules to dry storage. Preparations are being made by CH2M Hill Plateau Remediation Co.

Courtesy Department of Energy

CH2M would continue preparations to remove radioactive cesium and strontium capsules from underwater storage in a concrete basin that could be at risk in a severe earthquake. It also would continue treatment of contaminated groundwater.

In early April, DOE made a similar announcement about a contract extension for its Hanford tank farm contract, Washington River Protection Solutions, a limited liability company owned by AECOM and SNC-Lavalin's Atkins business..

DOE said it had plans to extend the current contract, valued at $7.1 billion over a decade, for up to a year. It expires at the end of September without the extension.

DOE already has released a draft request for bids for a contract valued at up to $4 billion for a 10-year Mission Essential Services Contract.

Similar work is now done by Mission Support Alliance, which holds a contract that expires May 25, 2019.

Tri-City Herald

Technology could stop skyrocketing Hanford costs. It could also go wrong

BY ANNETTE CARY

acary@tricityherald.com

April 29, 2018

RICHLAND, WA

Some of the most challenging environmental cleanup at the Hanford nuclear reservation will be difficult to do — and do well — without technology that does not yet exist., a National Academy of Sciences panel heard when it asked for input on technology needs.

But the development of new technology must not come at the expense of ongoing work to clean up the contaminated site, cautioned groups invited to provide testimony to the panel looking at science and technology needs across the Department of Energy complex.

The panel is conducting an independent assessment after Congress ordered the study in the fiscal 2017 DOE appropriations bill.

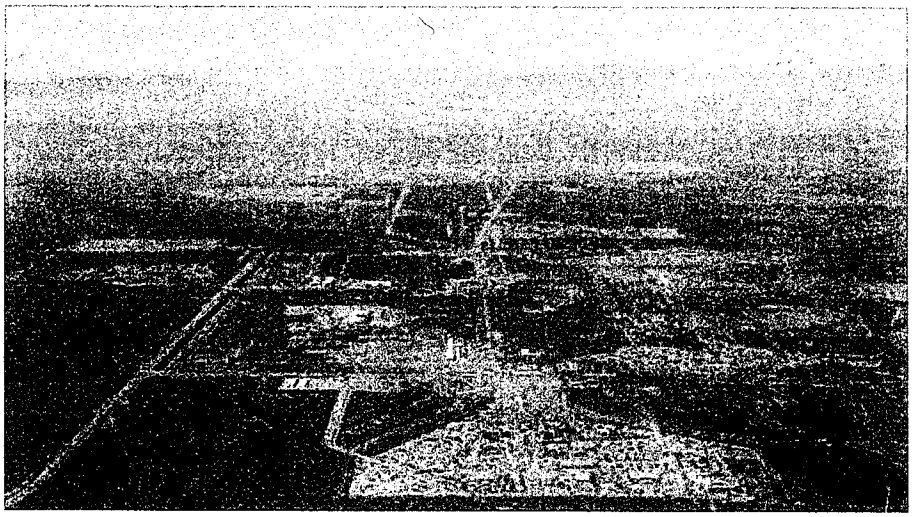
The panel visited Hanford last week, collecting verbal and written comments from local, state and tribal representatives with interests in cleaning up the massively contaminated site once used to produce plutonium for the nation's nuclear weapons program.

Environmental cleanup of DOE sites is the country's third largest liability, said Pam Larsen, executive direct of the Hanford Communities, a coalition of local governments.

Only Social Security and Medicare and Medicaid represent higher liabilities than the $235 billion costs of cleanup yet to be completed, said Alex Smith, nuclear waste program manager for the Washington state Department of Ecology, a Hanford regulator.

Costs of remaining cleanup at Hanford are $150 billion, according to a new DOE estimate.

" It sort of feels in some ways like we are at a tipping point at Hanford where the costs are just starting to eclipse anybody's palatability of paying for that treatment and that cleanup," Smith said.



A National Academy of Sciences panel heard from Hanford-area interests that new technologies could help empty the underground waste storage tanks in central Hanford more quickly.

Department of Energy File

Advances in science and technology may provide options to clean up all DOE sites more swiftly, inexpensively, safely and effectively, Larsen said.

But technology development needs to focus on projects with a reasonable expectation of providing lasting and thorough cleanup, the academy heard repeatedly from speakers.

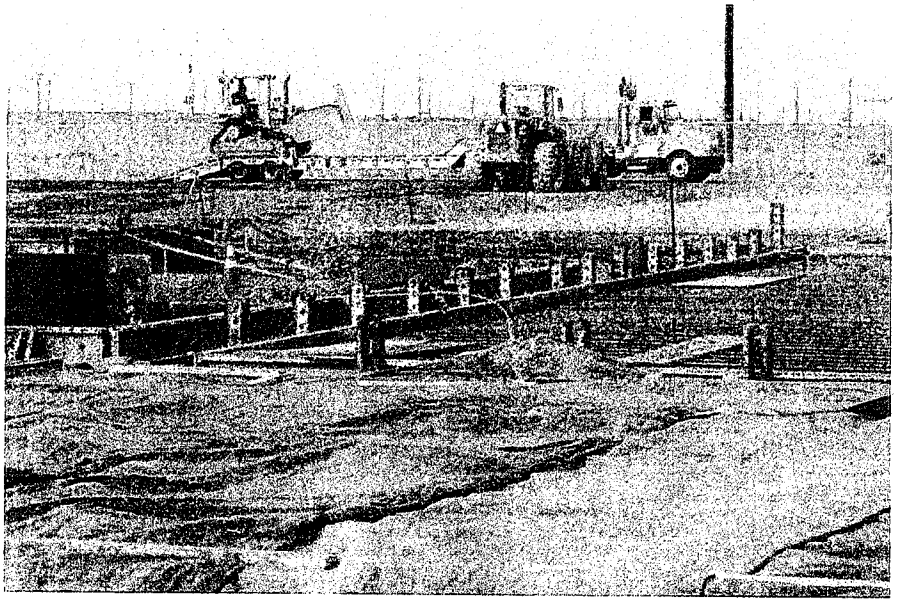
They have some experience in technology projects that start out with great promise, only to fizzle out — what Ken Niles called the next "new shiny thing."

Niles, the Oregon Department of Energy assistant director for nuclear safety, wrote in a letter to the panel, "We are wary when new technologies may lead to long project delays and diversions of a limited site budget away from direct cleanup."

The study is being conducted as new ways have been proposed to treat some of the 56 million gallons of radioactive waste stored in underground tanks and prepare it for permanent disposal.

The $17 billion vitrification plant under construction was not planned to have the capacity to glassify all of Hanford's tank waste in a reasonable time..

Previous attempts to find new ways to deal with tank waste were among technology development efforts notable for dragging on and sucking money away from cleanup work, Niles said.



Construction started on a bulk vitrification pilot plant at Hanford in 2005, but the technology was not picked to treat Hanford waste.

Tri-City Herald File

"Examples here include bulk vitrification, which was investigated for nearly a decade at a cost of tens, if not hundreds of millions of dollars, and the consideration of grout for much of Hanford's tank waste, which was seemingly abandoned more than two decades ago, but once again has been revived," he said.

There is a place for innovation in determining what to do with the 40 to 50 percent of the low-activity radioactive tank waste that the vitrification plant may not be able to deal with, Alex said.

But the state believes vitrification is the best for keeping certain radioactive contaminants from leaching out of treated waste forms and contaminating the groundwater, she said.

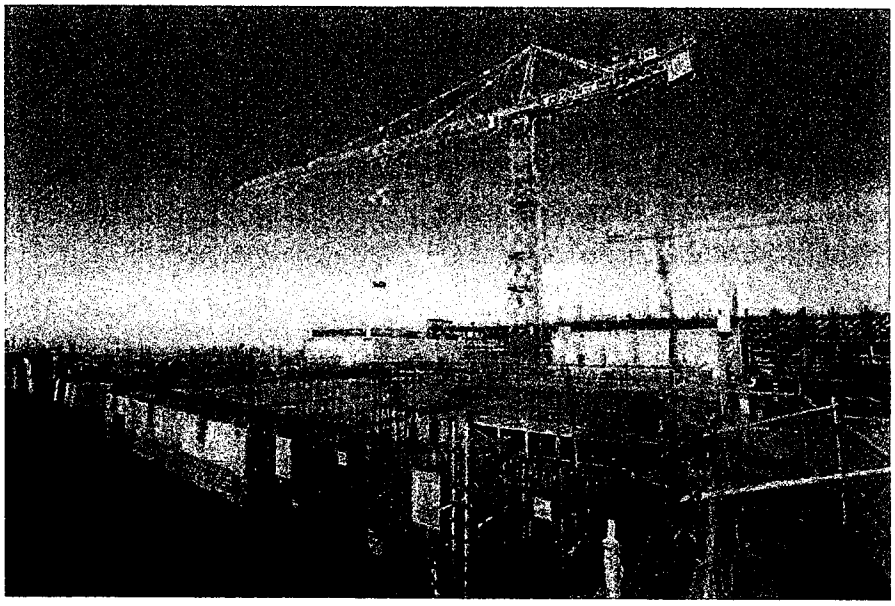
There is no shortage of other projects that need better technology.

On the state's wish list is better technology to retrieve radioactive waste from Hanford's enclosed, underground tanks, including waste that ranges from sludge to hardened saltcake.

DOE has emptied just 17 of its 149 single-shell tanks of waste after about 19 years of work.

Several of the groups that responded to the National Academy of Science panel said technology to clean up radioactive and chemical contamination in soil deep underground needs to be developed.

"It's very hard to get at," Smith said.



The Hanford vitrification plant under construction was not planned to be large enough to treat all 56 million gallons of radioactive tank waste at the nuclear reservation in a reasonable time.

Courtesy Bechtel National

The contamination is at risk of polluting groundwater that moves toward the Columbia River, which cuts through the Hanford nuclear reservation.

An estimated 1 million gallons of waste have leaked or spilled from Hanford's waste storage tanks, and 440 billion gallons of contaminated liquid was dumped into the ground as Hanford worked to meet the nation's World War II and Cold War demand for plutonium.

Attention also needs to be given to earthen caps planned to be placed over some sites where contaminants will remain at Hanford, the panel heard. The engineered caps will be used to keep precipitation from infiltrating and carrying contamination deeper into the soil toward groundwater.

"Most waste site caps have a life expectancy measured in decades," Niles said. "Hanford's wastes will clearly pose a risk far longer than that."

Before 2000, about 4 percent of DOE's cleanup budget was invested in research and development, Smith said.

But that has not been sustained. In 2014, the budget for technology development was only $13 million, or about 0.2 percent of the cleanup budget, Larsen said.

The fiscal 2018 cleanup budget increases that to $35 million, but $15 million is already designated for specific projects, she said.

"We hope your assessment will spur new interest and funding toward finding new technologies to help the cleanup at Hanford and elsewhere in the DOE complex," Niles said in his letter to the National Academy of Sciences panel.

The panel expects to have a report ready in January.

Tri-City Herald

A year after a radioactive tunnel collapsed, is Hanford safer?

BY ANNETTE CARY

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May 05, 2018

RICHLAND, WA

The partial collapse of a radioactive waste storage tunnel at Hanford a year ago was not unexpected.

It was a matter of "when", not "if", some Hanford nuclear reservation observers had speculated as other projects took higher priority.

Hanford watchers said at the time it was a wake-up call. But whether the call has made a difference is up for debate.

The local news you need to start your day

In the year that followed the tunnel collapse on May 9, 42 workers inhaled or ingested airborne plutonium or other particles of radioactive material.

Those exposures, which occurred during demolition of the highly contaminated Plutonium Finishing Plant, and the collapse of the tunnel were the result of DOE not taking risk seriously enough, said Tom Carpenter, executive director of Hanford Challenge.

Other Hanford watchers say the collapse was the result of limited money to address the most serious risks at the site, as aging facilities — some of them built during World War II — deteriorate.

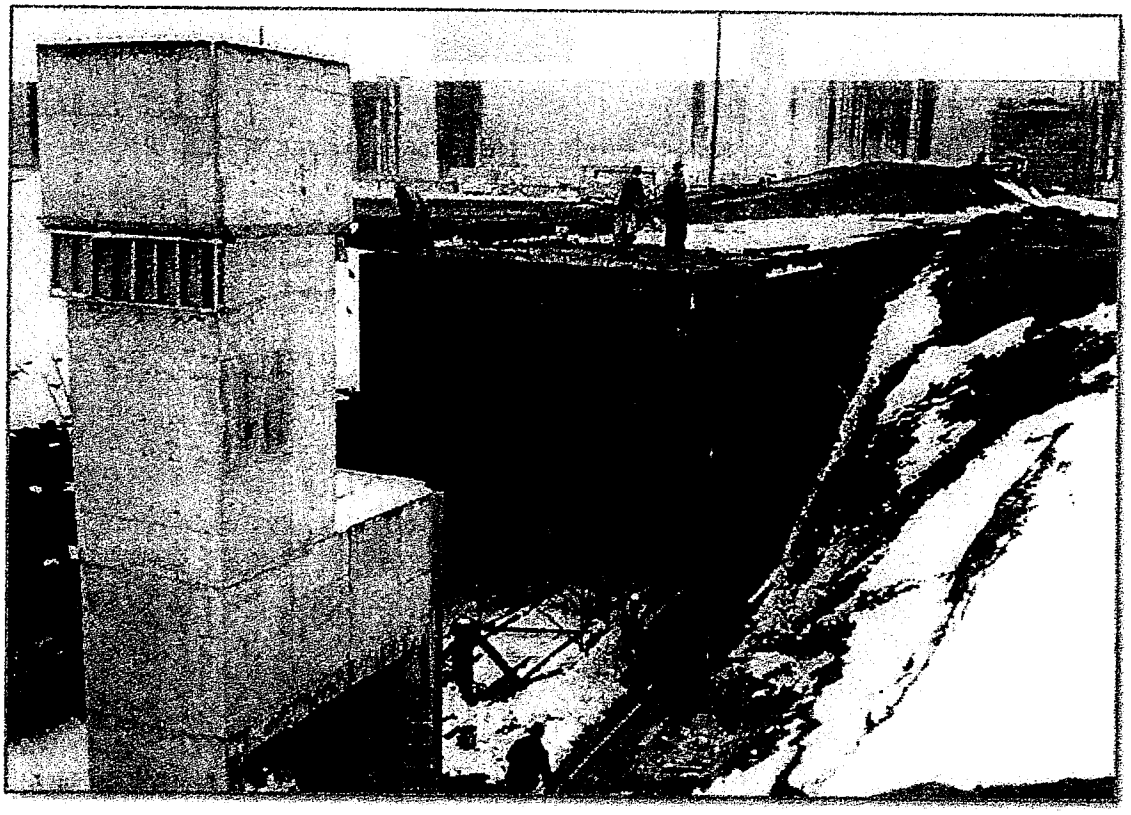
A fortunate turn

In some ways, the Department of Energy got lucky.

When a gaping hole in the top of the older of the two PUREX plant tunnels was discovered, thousands of workers were ordered to take cover indoors.

They remained inside office trailers and other structures with ventilation systems shut down and windows closed, told not to eat or drink, and waited to learn how bad the emergency was.

Franklin and Benton counties activated their emergency operations centers, and many in the Tri-Cities anxiously waited to hear if loved ones at Hanford were OK and whether the local communities were at risk.



The first tunnel at the Hanford PUREX plant was built of Douglas fir timbers coated with creosote. The flat roof partially collapsed May 9, 2017.

Courtesy Department of Energy

Fortunately, the eight feet of soil that topped the wooden roof of the tunnel fell in, covering the highly radioactive equipment stored beneath the hole.

No airborne radioactive waste particles were detected, and no worker was injured.

The bigger risks

The Hanford Site, employing more than 9,000 permanent workers and additional subcontract workers, remained essentially shut down for three or four days after the partial tunnel collapse, said David Reeploeg, vice president for federal programs for the Tri-City Development Council.

That was despite no spread of contamination. But a worse incident could leave the site shut down not for a few days, but for a few months or a few years, he said.

"I worry that Hanford management tends to be dismissive of these types of risk," Carpenter said. "A large contamination event could be game over for Hanford."

For example, a spread of contamination across the tank farms would make it difficult for workers to get into the area to do the constant monitoring needed to keep waste in the tanks stable.

He questions whether DOE is ready for an event like the collapse of the top of an underground tank, since it was unaware of the imminent collapse of the waste storage tunnel and did not manage demolition of the Plutonium Finishing Plant to prevent the airborne spread of radioactive particles.

An analysis of the airborne spread of contamination during demolition in December showed that there were warning signs that workers could be at risk, but they were overlooked.

There are limits

As much as $2.5 billion a year is spent on environmental cleanup of Hanford, which was used from World War II through the Cold War to produce plutonium for the nation's nuclear weapons project.

Decades of work remain, as a new DOE estimate puts the cost of cleanup yet to be done at $150 billion.

If there was a positive to the partial collapse of the tunnel, it is the realization that nature has its own time limit for the cleanup, said Ron Skinnarland, the waste

management section manager for the Washington state Department of Ecology. And unlike DOE, it doesn't grant extensions.

Old structures will continue to deteriorate, and the containers of radioactive waste — buried temporarily until permanent disposal could be arranged — will disintegrate and fall apart.

"There is a new sense of awareness that there is a cost and risk that increases if you delay the work," Skinnarland said.

Improvements made

Since the collapse, DOE's Office of Environmental Management assembled a team to assess similar risk at all of the nation's nuclear cleanup sites' high-hazard excess facilities.

It determined that overall, the sites are appropriately managing risks, according to DOE.

In addition, the two Hanford DOE offices — one responsible for the 56 million gallons of radioactive waste held in underground tanks, the other for all other cleanup — have been working with site regulators to come up with a list of priorities that cross both offices.

It's a joint look that would not have been likely two years ago, said Alex Smith, nuclear waste program manager for the Washington state Department of Ecology.

"To have a site wide list of all projects and evaluate them comprehensively makes a lot of sense," Reeploeg said.

The result could be changes in legal deadlines to move some projects forward in the schedule and delay others.

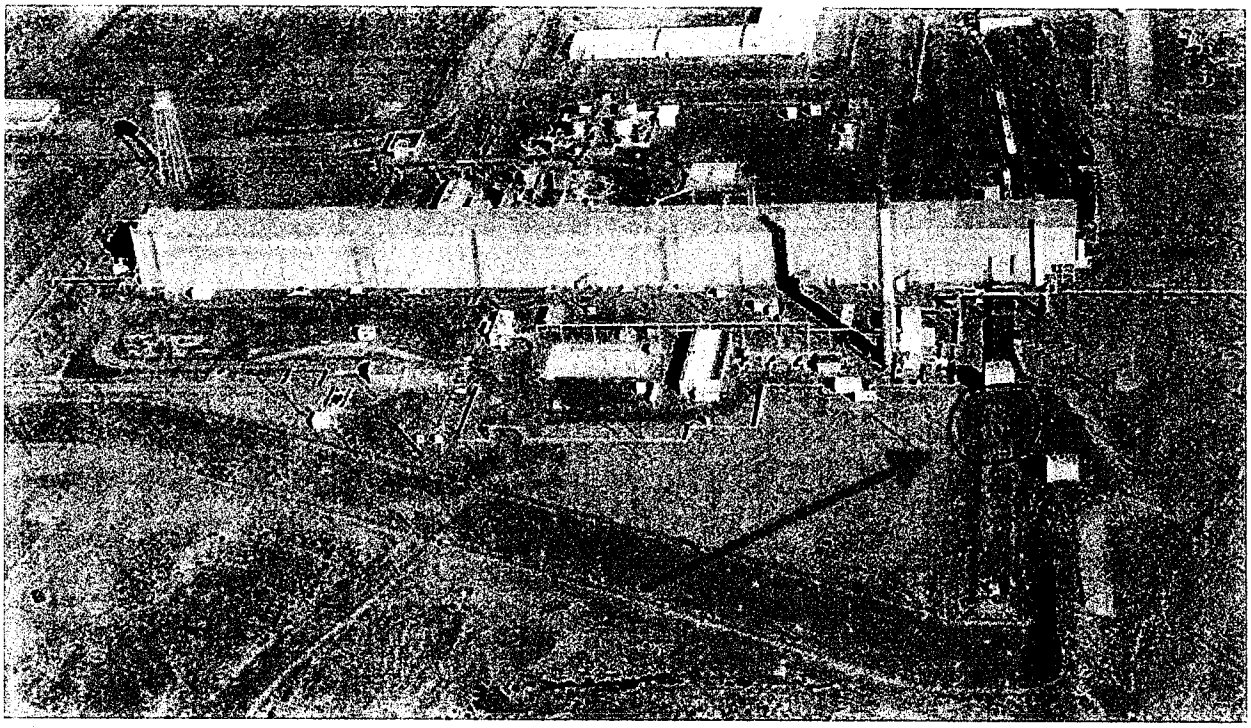
"It's a continual job for us to evaluate risk and work on those things that we feel are the more imminent risks," said Doug Shoop, manager of the DOE Hanford Richland Operations Office.

That's where it gets tricky.

Weighing the risks

"At Hanford, there are 50 things you could do, and they are doing one or two at a time," Skinnarland said.

Other projects took priority over cleanup of the PUREX tunnels.



This aerial photo shows the waste disposal tunnel near the PUREX plant before it collapsed at the Hanford nuclear reservation. The blue circle indicates the location of the breach, which has since been filled.

Courtesy Department of Energy

The Hanford Advisory Board had told DOE and its regulators in early 2016 that they needed to hurry up and investigate whether the PUREX tunnels pose a high risk.

The 62-year-old tunnel that partially collapsed was built of timbers, which officials knew were deteriorating from the radiation from eight rail cars loaded with highly contaminated, failed equipment from the PUREX processing plant. The plant was used to chemically separate plutonium from uranium fuel irradiated in Hanford's reactors.

A second tunnel, holding 28 rail cars of highly radioactive contamination, was built in 1964 of concrete and steel. But it also is at risk of collapse, according to a structural analysis done since the problem with the first tunnel.

DOE and its regulators, the Department of Ecology and the Environmental Protection Agency, said in the report they were planning to assess both tunnels, with the first step in the process to be completed by September 2017. That turned out to be four months after the first tunnel partially collapsed.

The Consortium for Risk Evaluation with Stakeholder Participation, a multi-university group, also had raised the issue of the tunnels in an update in September 2015 on a risk review project commissioned by DOE.

A collapse of the storage tunnels, perhaps as the result of an earthquake, could expose people within 100 yards to radiation, it said.

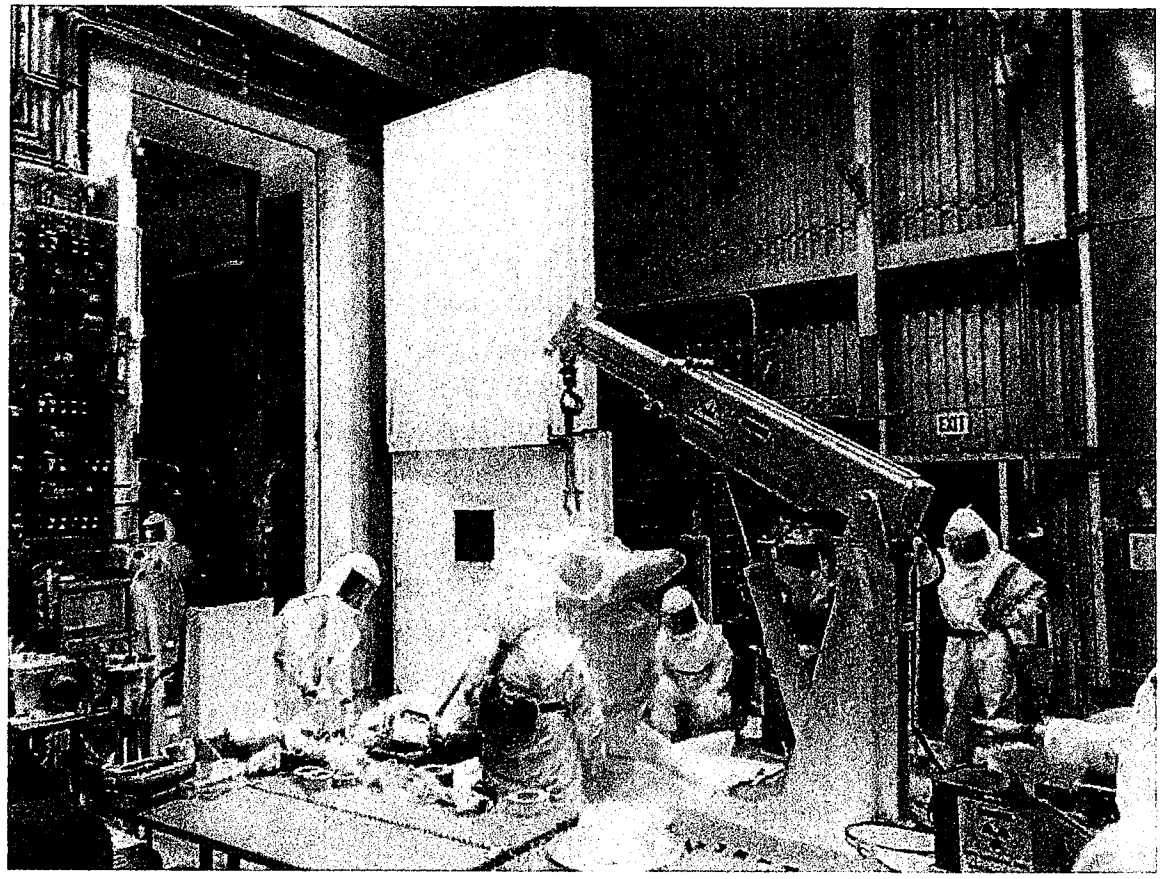
But the tunnels "weren't really considered to be the big risk. There are a lot of them out there," Reeploeg said.

To-do list

Higher priorities for the DOE Hanford Richland Operations Office, which is in charge of evaluating the tunnels, included ongoing work to get radioactive sludge out of underwater storage near the Columbia River.

Transferring the sludge to central Hanford is close to starting and "will be tremendously important for risk reduction," Shoop said.

The public has demanded cleanup of contaminated groundwater flowing underground toward the Columbia River. DOE has responded by pumping up 18 billion gallons of water and stripping away radioactive and hazardous chemical pollution.



Workers at Hanford's 324 Building remove waste items from the building in preparation for work to dig up a spill of highly radioactive waste beneath the building.

Courtesy Department of Energy

Other high priority projects over the last year have included:

- Tearing down the Plutonium Finishing Plant, considered one of the most hazardous demolition projects across the DOE complex.

- Preparing to remove stored capsules of radioactive material from an aging concrete pool in central Hanford.

- Preparing to dig up a spill of radioactive waste beneath the 324 Building near the Columbia River. The spilled material is so radioactive it would be lethal on contact within two minutes.

The challenge in evaluating risks is that some high risk incidents are not very likely to happen, but others that are lower risk are more certain to happen, Reeploeg said.

"So where do you spend your resources?" he said.

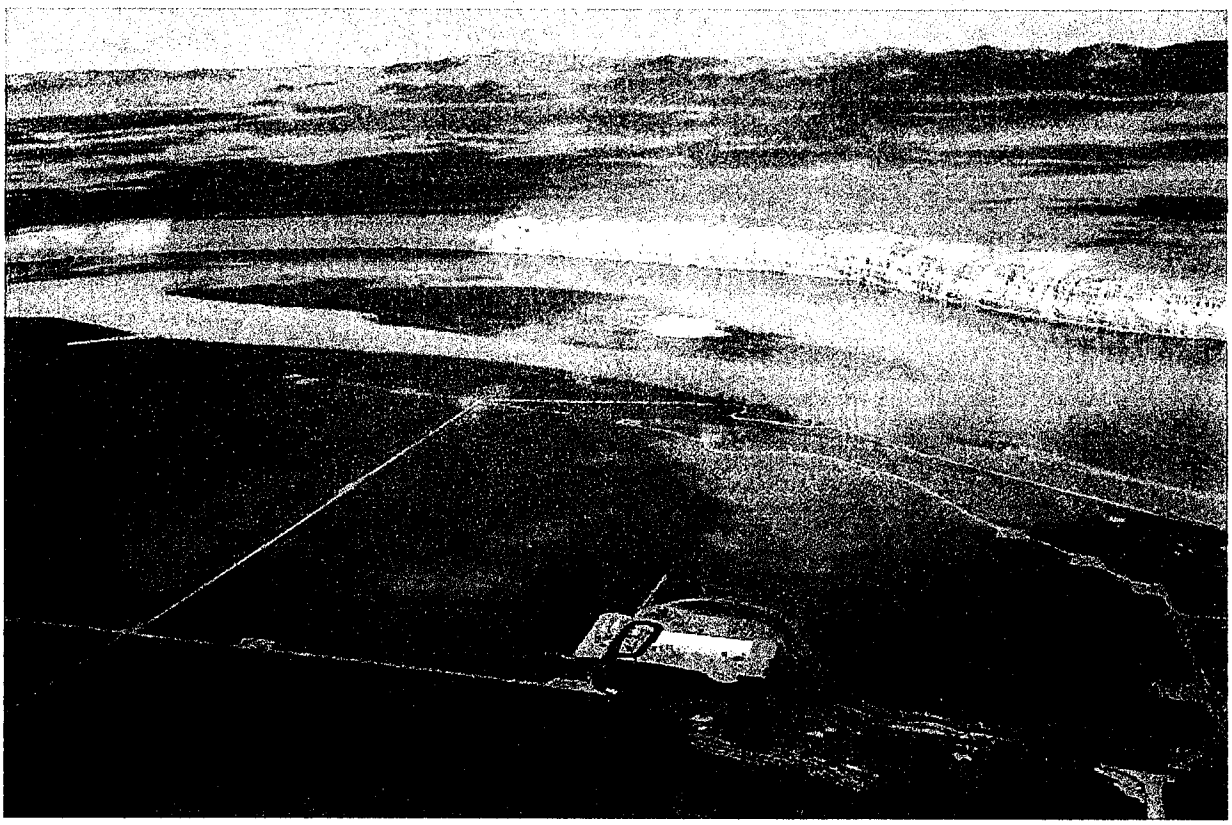
Dramatically increased budgets for Hanford do not appear likely.

In that way, the tunnel collapse was not a wake-up call.

Finding the money

The Trump administration proposed cutting budgets for the Richland Operations Office in two budget requests to Congress after the tunnel incident.

Even if budgets remain flat, eventually just the basic work of operating the nuclear reservation and maintaining safety and security will eclipse the budget, Smith said.



The Columbia River runs through the Hanford nuclear reservation and is at risk if contamination at the site is not cleaned up.

Courtesy Department of Energy

About $1 billion is needed annually for basic activities, ranging from operating utilities to maintenance, before any cleanup work is done, Reeploeg said.

In Congress, a strong Washington state delegation has convinced its colleagues to come through with more money for Hanford than proposed by both the Obama and Trump administrations in recent years.

But as other sites are cleaned up across the nation, obtaining strong budgets will only become more difficult. Washington state will have fewer allies in Congress focused on nuclear weapons site cleanup.

In Washington, D.C., much of the attention on Hanford goes to the work of the DOE Hanford Office of River Protection, with 56 million gallons of radioactive waste stored in underground tanks and the $17 billion vitrification plant being built to treat the waste.

"The tanks are a huge risk," Smith said.

Some 67 of 149 single shell tanks have leaked or spilled waste. And the newer, double-shell tanks are outliving their planned design life, with one of 28 already taken out of service after it sprang a leak between its shells.

"It's like the PUREX tunnels. You are just kind of counting on nothing bad happening," Skinnarland said.

Some radioactive elements are long-lived and move through the ground readily with moisture to threaten the groundwater and then the Columbia River.

Carpenter, of Hanford Challenge, is most worried about Hanford waste in underground tanks, and capsules of radioactive cesium and strontium stored in a concrete pool at the Waste Encapsulation and Storage Facility.

Although the capsules are being moved to dry storage, the project is expected to take a few years.

In the meantime, the capsules are at risk of overheating and rupturing if a severe earthquake causes the pool to lose cooling water, Carpenter said.

That or a collapse of a waste storage tank could spread contamination, he said. The events have a low-risk of happening, but a high impact.

The Plutonium Reclamation Facility at Hanford's Plutonium Finishing Plant is shown before the last of the highly contaminated facility came down Dec. 15. During demolition of the plant over the last year, 42 workers inhaled or ingested radioactive particles.

Courtesy Department of Energy

"All the work we do at Hanford is risky," Shoop said. "Fundamentally, we're cleaning up the Hanford Site because there is risk to the public and the environment.

"It's a continual job for us to evaluate risk and work on those things that we feel are more imminent risks."

As for the tunnels, the older tunnel has been filled with concrete-like grout to prevent a further collapse, and DOE is making plans to do the same with the second tunnel, if regulators agree.

Tri-City Herald

$2.3B Hanford spending bill pushes for cheaper nuclear waste treatment

BY ANNETTE CARY

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May 16, 2018

RICHLAND, WA

The U.S. House is proposing spending more money next fiscal year at Hanford than requested by the Trump administration, including paying for a tank waste demonstration project.

Supporters of a proposal to encapsulate some waste in concrete-like grout rather than treating it at the site's vitrification plant could save billions of dollars.

The House Appropriations Committee voted Wednesday to send a spending proposal to the full House that includes $2.3 billion for the Hanford nuclear reservation in fiscal 2019. Money for safeguards and security will be added to that total.

It is nearly $247 million more than the administration's request to Congress in February, according to information from the staff of Rep. Dan Newhouse, R-Wash.

"As this bill moves to the entire House, I will continue advocating for the federal government to fulfill its obligation to the people of Central Washington to complete this cleanup job while ensuring safety for workers," Newhouse said.

Spending would be lower than the current Hanford nuclear reservation budget.

In March, the U.S. House and Senate approved a spending bill for the fiscal year that started Oct. 1, 2017, of about $2.4 billion.

The administration's request for fiscal 2019 included increases at some Department of Energy environmental cleanup sites.

But the increases were at the expense of important cleanup activities at Hanford, the Idaho Site and the Oak Ridge National Laboratory, the House bill report said.

"The committee's recommendation continues to fund a balanced approach that sustains the momentum of ongoing cleanup activities more consistently across all DOE cleanup site," the bill report said.

The blue drum holds three gallons of Hanford radioactive tank waste as it was being shipped off the nuclear reservation for treatment and disposal.

Courtesy Washington River Protection Solutions

The House budget would add about $42 million to the amount requested by the Trump administration for the next fiscal year for the Office of River Protection for a total budget of almost $1.5 billion.

The Hanford office is responsible for the 56 million gallons of radioactive waste in underground tanks and the $17 billion vitrification plant being built to glassify the waste. It is left from the past production of plutonium for the nation's nuclear weapons program.

The House budget for the Richland Operations Office, which is responsible for all other environmental cleanup at Hanford and operating the site, would be $863 million. That's $205 million more than requested by the Trump administration.

The total does not include safeguards and security spending, which was not available on Wednesday.

Grouting test project

The bill report did not break down spending for specific Hanford projects.

But it did say that $15 million of the budget should be used for the next phase of a demonstration project of grouting Hanford tank waste.

The project "is important to lay the foundation for future DOE decisions regarding the potential for treating, stabilizing and disposing of Hanford LAW (low activity waste) in a form other than glass," said a report in September by the Energy Communities Alliance, a nationwide coalition of local governments affected by Department of Energy projects.

If the project is successful, it could speed up the closure of Hanford's waste storage tanks, reducing cleanup costs by billions of dollars and resulting in decades of schedule improvement, the report said.

Last year the project, called the Test Bed Initiative, tried grouting three gallons of Hanford waste and sending it off site for disposal at a Texas waste disposal facility built to accept low level radioactive waste from federal projects.

The grouting was done just off the Hanford nuclear reservation at Perma-Fix Environmental Solutions in Richland.

The next phase would grout 2,000 gallons of waste. A third phase, which the $15 million would not cover, would grout 100,000 gallons or more of the tank waste.

The Washington State Department of Ecology, a Hanford regulator, said after the first three gallons of waste were treated it still expects all Hanford tank waste to be turned into glass at the Hanford vitrification plant.

It also said that if the grouting were further tested the state permit for Perma-Fix likely would need to be changed and that the process would require public input.

Grouting would only be considered for waste in the tanks that is low activity radioactive waste. All high-level radioactive waste would be vitrified.

However, the majority of tank waste is low activity radioactive waste and to vitrify all of it in a reasonable time, the vitrification plant would likely need to be expanded.

DOE's focus now should remain on getting the vitrification plant operating to start treating waste, according to the Department of Ecology. A decision on how the additional waste would be treated does not need to be made for another 15 years, it said.

The treated low activity tank waste had been planned to be disposed of at a Hanford landfill, which requires Department of Ecology approval, before Waste Control Specialists developed the Texas disposal site.

More bill requirements

The House bill report also directs DOE to continue work on the parts of the vitrification plant that will handle high level waste.

DOE has been ordered by a federal court to start vitrifying low activity waste by 2023, with full operation of the plant and treatment of high level waste is not required until 2036. Technical issues related to high level waste have halted engineering and construction on some parts of the plant.

If DOE wants to place two large facilities that will handle high level waste in "preservation mode" for an extended period of time, DOE must first notify Congress, the bill report said.

The bill language also directs DOE to have an independent assessment done of determine the full extent of quality assurance problems in vitrification plant buildings.

A Government Accountability Office report in April said DOE had not shown the plant has the quality needed to operate safely when it begins treating radioactive waste.

Tri-City Herald

New Hanford cleanup deadlines proposed. Critics call the delay risky

BY ANNETTE CARY

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May 23, 2018

RICHLAND, WA

The Department of Energy would have until 2025 to remove radioactive material from underwater storage in a Hanford basin at risk in a severe earthquake, under proposed new legal deadlines.

The state of Oregon told the Department of Energy and its regulators months ago when the agencies began discussing the date that it was "greatly concerned." The proposal was released for public comment this week.

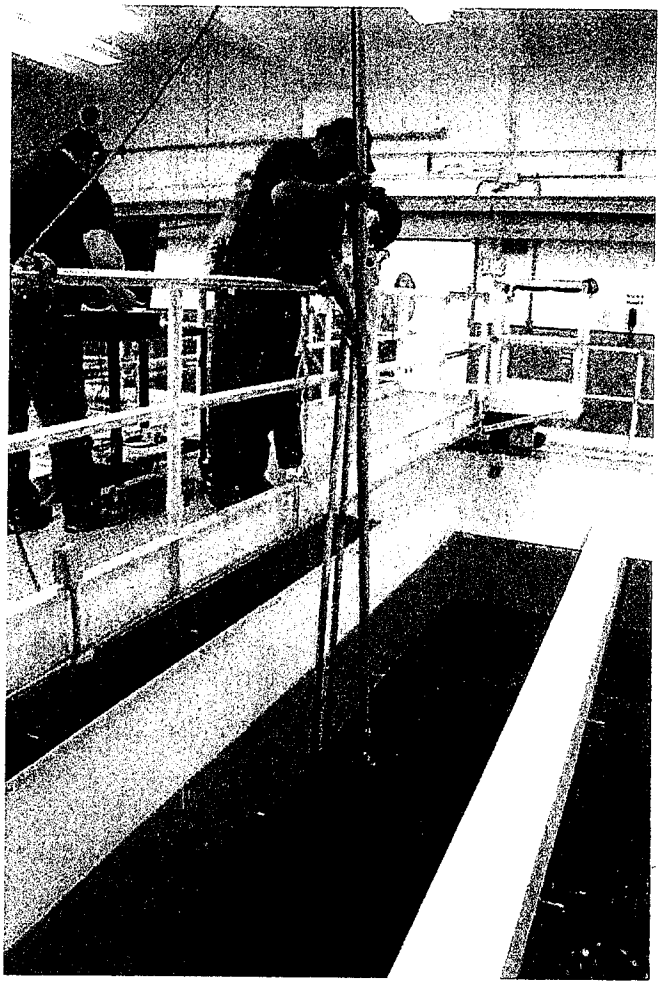
The work could and should be done sooner to prevent a possible failure of capsules holding radioactive cesium and strontium, according to Oregon officials. The capsules hold about a third of the radioactivity of all of the waste at the Hanford nuclear reservation.

The proposed deadline is one of several changes proposed in the Tri-Party Agreement by its three parties — the Department of Energy, the Environmental Protection Agency and the Washington state Department of Ecology.

The new deadlines would cover both the cesium and strontium capsules and also sodium contaminated with radioactive material, most of it from the liquid sodium-cooled Fast Flux Test Facility reactor at Hanford.

In 2014 the DOE Office of Inspector General warned that the 1,936 capsules — each about 22 inches long — should be moved to dry storage as soon as possible because of the risk that the walls of the pool where they are stored could be damaged in a bad earthquake.

DOE already had been considering moving the capsules to dry storage for more than a decade.



CH2M HILL workers, inside the Waste Encapsulation and Storage Facility, rearrange highly radioactive capsules to distribute heat generated by the radioactive material in the capsules.

Courtesy Department of Energy

The Office of the Inspector General and others, including Oregon officials, have raised concerns that radiation from the capsules may have weakened the concrete walls of the pool over four decades.

Thirteen feet of water in the pool at the Waste Encapsulation and Storage Facility in central Hanford provides cooling for the capsules and shields workers from radiation.

If cooling is lost and the capsules break, radiation could make the building too hazardous for workers to enter, according to a 2000 report by former contractor Fluor Hanford that looked at a possible worst-case scenario.

The waste was removed from Hanford's underground waste storage tanks from 1974 to 1985 to reduce the heat generated in the tanks, which hold high level radioactive waste from the past production of plutonium for the nation's nuclear weapons program.

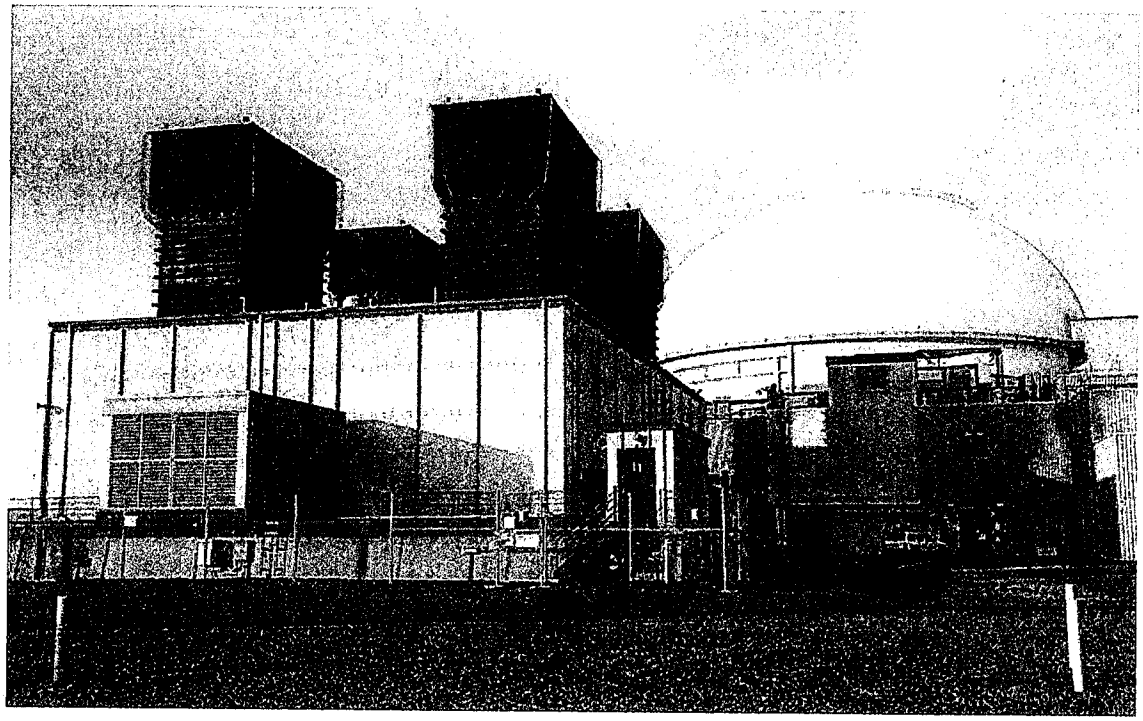
DOE is planning to package the capsules in a system that includes stainless steel containers and then put them into a steel-lined concrete cask for storage on an outdoor pad in central Hanford.

"Needless to say, we were quite disappointed to see a proposed interim milestone in which the transfer of the cesium and strontium capsules to a new interim safe storage facility would not be completed until Aug. 31, 2025," said Ken Niles, assistant director for nuclear safety for the Oregon Department of Energy in a letter to the Tri-Party agencies during talks on the proposed deadline.

"That is more than seven and a half years from now and more than 12 years since we raised our concerns to DOE and its regulators," Niles said.

The project is relatively straightforward and DOE has extensive experience handling the capsules, Niles said. At one time they were loaned out for industrial or research use.

DOE asked for the 2025 deadline based on how much funding it expected to be available in the 2020-25 time frame, according to the Department of Ecology.



Sodium used at the Fast Flux Test Facility at Hanford will be converted and used at the Hanford vitrification's Pretreatment Facility.

Tri-City Herald File

The proposed changes to the Tri-Party Agreement also address the final disposition of the cesium and strontium capsules, creating a new milestone.

The proposal would set a deadline of the end of 2047 to have facilities in place to prepare for final disposition of the cesium and strontium capsules.

No decision has been made on what will happen to the capsules beyond dry storage, but one option is to open the capsules and treat the cesium and strontium at the Hanford vitrification plant to prepare them for permanent disposal.

Or the capsules could be sent directly to a national repository for disposal, once the nation has one for high level radioactive waste.

Both options would likely require a new facility, whether to empty the capsules or to prepare them for shipment.

The 2047 deadline was picked to make sure a plan was in place while the vitrification plant is still operational in case that option is selected.

The 2047 deadline also would apply to facilities needed to process bulk sodium, with an interim deadline of the end of 2026 for a conceptual design for a sodium reaction facility to be submitted by DOE to the Department of Ecology.

A decision already has been made to convert Hanford's stored sodium into aqueous sodium hydroxide that will be needed when the vitrification plant's Pretreatment Facility begins operating in 2033.

The chemical will be used at the Pretreatment Facility to neutralize acids and dissolve certain metals.

DOE has determined that it will be safer to store the bulk sodium until it is needed than to convert it earlier to a much larger volume of aqueous sodium hydroxide.

The sodium comes not only from the Fast Flux Test Facility, which has been shut down, but also from shipments to Hanford in the 1960s and 1970s from other projects.

The public may submit comments on the proposed Tri-Party Agreement deadlines until July 6. Comments may be sent to TPA@RL.gov or to Rich Buel DOE-RL; P.O. Box 550, H5-20; Richland WA 99352.

No public hearing is scheduled, but if there is enough public interest the Tri-Party Agreement agencies will consider scheduling one.

To learn more, go to Hanford.gov and look on the event calendar under any day through the comment period.

Tri-City Herald

Senate's Hanford cleanup budget rejects Trump's cuts

BY ANNETTE CARY

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May 24, 2018

RICHLAND, WA

The U.S. Senate has proposed a Hanford budget that is $315 million higher than proposed by the Trump administration.

It would restore all but $25 million of the cuts to current spending that were proposed by the administration.

"I'm so glad that once again, the Senate has rejected the White House's attempt to shirk its responsibility to the Tri-Cities community," said Sen. Patty Murray, D-Wash., who led Senate efforts on spending for Hanford as a senior member of the Senate Appropriations Committee.

"Cleaning up Hanford is a complex, long-term project that requires significant resources," she said.

The spending bill passed out of the Senate Appropriations Committee on Thursday also includes important funding for Pacific Northwest National Laboratory and the Manhattan Project National Historical Park at Hanford.

It next goes to the full Senate for consideration.

The Senate spending bill for the next fiscal year would provide $2.4 billion for the Hanford nuclear reservation, not including money for safeguards and security.

The House spending bill for Hanford, as passed out of committee would set the Hanford fiscal 2019 budget at about $2.3 billion, not including money for safeguards and security.

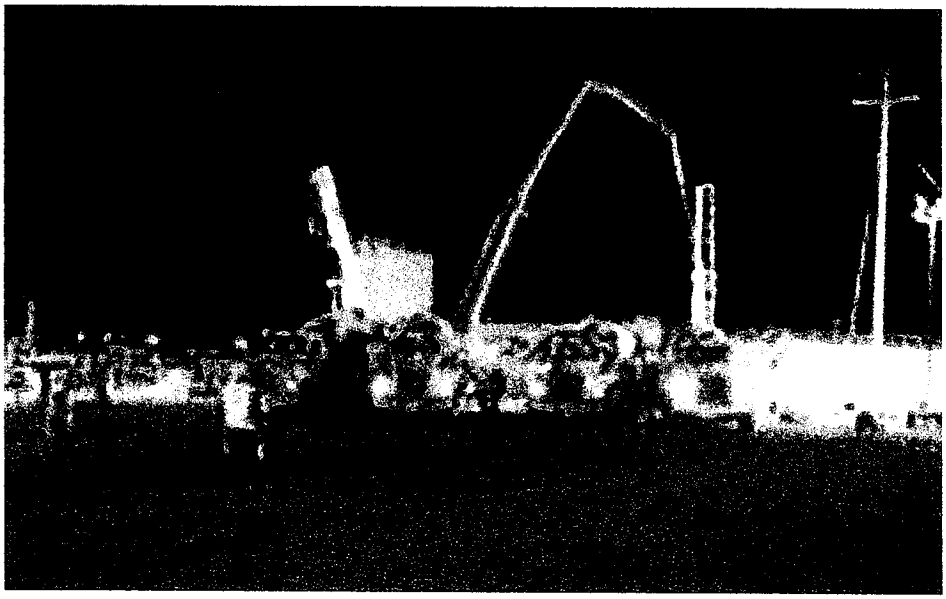
It includes $247 million more than the administration's request, compared to the Senate proposal's increase of $315 million.

Close to two-thirds of the money in the Senate budget proposal would go to Hanford's Office of River Protection, which would receive nearly $1.6 billion.

It would be $135 million more than the administration's request.

The Office of River Protection is responsible for 56 million gallons of radioactive waste in underground tanks and the $17 billion vitrification plant being built to treat the waste for disposal. The waste is left from the past production of plutonium for the nation's nuclear weapons program.

The proposed Senate budget is just slightly higher than current spending at the Office of River Protection. However, it includes a significant increase for work at the tank farms.



Cement trucks deliver grout to a pumper truck as the older of the PUREX plant waste storage tunnels was filled with grout in fall 2017 after it had partially collapsed. The second tunnel also is expected to be stabilized by filling it with cement-like grout.

Courtesy Department of Energy

Richland Operations Office

The Richland Operations Office would receive $838 million under the Senate budget, up $180 million from the administration's proposal but about $25 million below current spending.

The Senate bill report said the administration's proposal would not keep environmental cleanup on track to meet legally binding deadlines in future years and would threaten "high-risk cleanup projects near the city of Richland, Wash., and the economically and environmentally important Columbia River."

The Richland Operations Office is responsible for most cleanup other than the waste storage tanks. Its work includes tearing down contaminated buildings, digging up waste sites and debris burial grounds, and treating polluted groundwater.

That office also runs the site, providing services from road maintenance to information technology services.

Significant progress has been made by the Richland Operations Office, the bill report said.

But additional money is needed to clean up the highly radioactive spill beneath the 324 Building just north of Richland and to stabilize the longer of the two PUREX plant waste storage tunnels, among other projects.

Although no money was specifically allocated for DOE's Hanford Workforce Engagement Center in Richland, the bill language instructed DOE to support it. The center opened this spring to guide ill Hanford workers or their survivors to programs that could help them.

Office of River Protection

The money proposed for the Office of River Protection would include an increase of $53 million for work at the Hanford tank farms over current spending, bringing the tank farm budget to $772 million.

That would be $94 million more than requested by the administration.

The increase would be available to meet federal court-ordered deadlines for emptying leak-prone single-shell tanks, doing maintenance and repairs that have been delayed, and adding waste transfer lines.

The bill also provides $75 million for work on parts of the vitrification plant handling high-level radioactive waste.

It indicates the Appropriation Committee's rejection of any attempt to put those parts of the plant in an extended preservation mode while DOE focuses on meeting a 2023 court-ordered deadline to start treating low-activity radioactive waste.

All parts of the plant are not required to be operating together until 2036.

The bill language makes clear that the Senate Appropriations Committee recommends no money for the Test Bed Initiative, a pilot project to test incorporating low-activity radioactive tank waste within concrete-like grout rather than vitrifying it, or turning it into a glass form.

The Washington state Department of Ecology, a Hanford regulator, has said it expects tank waste to be turned into a stable glass form that research has shown to be protective of the environment.

Tri-City Herald

Billions of Hanford dollars will stay separate under defense bill

BY ANNETTE CARY

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May 30, 2018

RICHLAND, WA

The Department of Energy's two Hanford offices would remain separate at least through 2024 under the defense spending authorization act approved by the U.S. House.

The offices oversee the work of more than 9,000 workers cleaning up the radiological and chemical contamination left at the nuclear reservation from the past production of plutonium for the nation's nuclear weapons program.

In 1998, former Rep. Doc Hastings, R-Wash., created the DOE Hanford Office of River Protection to bring focused attention to one of the nuclear reservation's most complex issues — 56 million gallons of radioactive waste held in underground tanks, some of them leaking or prone to leaks.

The office's responsibilities include the $17 billion vitrification plant that has been under construction since 2002. It's meant to provide a way to contain the waste in a stable glass form for disposal.

Other environmental cleanup work and the operation of the site — including utilities, roadwork and information technology — are the responsibility of the DOE Hanford Richland Operations Office.

Rep. Dan Newhouse, R-Wash., inserted an amendment in the defense authorization bill for 2019 that would continue to keep the offices separate until at least 2024.

The provision for separate offices was last renewed in 2011, also as part of the defense authorization bill.

Hanford officials have been combining some functions of the offices in recent years, such as a joint chief financial officer and some legal, security and infrastructure employees.

In addition, Richland Operations Office employees were moved starting in 2016 from the Federal Building in Richland to Stevens Center complex — where Office of River Protection employees work — to bring the two offices' employees closer together.

Officials said in 2016 that DOE would be well-positioned if the two offices were recombined.

With much of the cleanup done along the Columbia River, much of the future cleanup work for both offices will be in the 75 square miles in the center of the 580-square-mile site.

Newhouse said that reauthorizing the Office of River Protection would help "keep federal cleanup efforts stable."

The two offices receive separate funding, helping boost Hanford cleanup spending as money is split among the nation's nuclear weapons cleanup sites.

Washington's congressional delegation has fought to keep increases for the Office of River Protection from being paid for with decreases from the Richland Operations Office.

In the last administration funding request, a budget of $747 million was proposed for the Richland Operations Office and $1.4 billion for the Office of River Protection Office for fiscal 2019.

Tri-City Herald

Despite spread of radioactive contamination, Hanford contractor earns $10 million

BY ANNETTE CARY

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May 21, 2018

RICHLAND, WA

A Hanford environmental cleanup contractor has earned $9.9 million in incentive pay from the Department of Energy for its work at the nuclear reservation.

It would have been more had radioactive contamination not spread during demolition of the site's Plutonium Finishing Plant.

CH2M Hill Plateau Remediation Co., owned by Jacobs Engineering Group, is responsible for much of the Hanford nuclear reservation cleanup, except the site's waste storage tanks and the vitrification plant being built to treat the waste.

The company has about 1,500 employees.

CH2M received 89 percent of the possible $11 million incentive pay for fiscal year 2017. Costs for the actual work are paid separately by DOE.

Most of the $11 million available fee — 73 percent of it or just over $8 million— could be earned by completing specific projects.

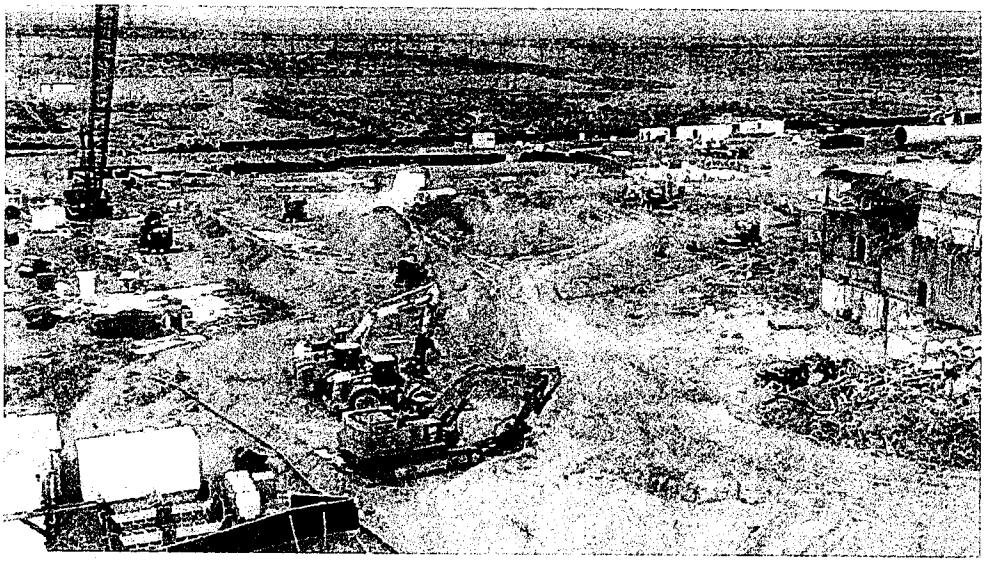
CH2M did well on that, earning almost $8 million, or 99 percent of the fee available.

The remaining $3 million was based on a subjective review by federal officials.

That's where CH2M lost available pay, earning 64 percent of the pay available, or just over $1.9 million.

A one-page summary released by DOE on Monday said the pay determination addressed the spread of contamination at the Plutonium Finishing Plant.

In June, 350 workers at the highly radioactively contaminated plant were ordered to take cover indoors when a monitor detected low levels of airborne radioactive particles.



Part of the Plutonium Finishing Plant, right, still needs to be demolished. A truck sprays dirt piles, upper center, on demolition debris and a couple of short stub walls that remain from the plant's Plutonium Reclamation Facility. Demolition of the reclamation facility may have led to the December spread of radioactive contamination at the plant.

Courtesy Department of Energy

Tests of the workers found that 31 had inhaled or ingested small amounts of radioactive material.

In addition, the Washington state Department of Health detected very low levels of airborne contamination at the Rattlesnake Barricade just off public Highway 240.

The amount of plutonium was below levels considered a risk to human health, but the fact that radioactive particles were found three miles from the plant concerned state officials assigned to protect the public.

The pay determination summary said DOE also considered that actions taken by CH2M after the June event did not prevent another occurrence.

In December another spread of contamination occurred, and 11 workers were found to have ingested or inhaled small amounts of radioactive contamination.

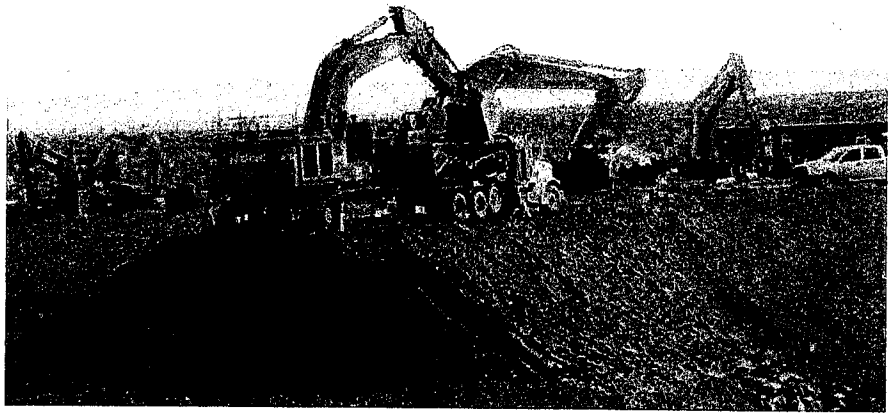
"Otherwise, performance was adequate with a few areas where improvements were needed," the summary said.

DOE did not release information about how much of the loss of slightly more than $1 million in pay was due to the contamination spread.

Many of the other areas in which improvement is needed involved paperwork.

They included the quality of proposals to change work plans, accounting for depreciation, keeping up with subcontractor audits and analyzing changes from planned costs and schedules. DOE also said vehicle safety needed improvement.

CH2M completed work on all 21 projects considered in the pay determination on time, except for one.



Contaminated soil at Hanford's 618-10 Burial Ground is loaded into containers to be taken to a central Hanford landfill. The soil was near vertically buried pipes filled with waste that have been cleaned up.

David Martin Courtesy DOE

Successful performance included treating 2.2 billion gallons of groundwater contaminated with chemical or radioactive material and finishing cleanup of the 618-10 waste burial ground just north of Richland.

It also made progress on preparations to remove radioactive sludge from underwater containers in the K West Reactor Basin to dry storage in central Hanford, the summary said.

CH2M did not have the roof of the defunct REDOX processing plant replaced by July 31, a project meant to stabilize the contaminated building until it can be torn down.

The unusually snowy start to 2017 delayed roofing work, but it has since been completed.

Any pay that CH2M could earn for having the Plutonium Finishing Plant torn down to the ground will be determined when the project is completed. Much of the plant has been demolished, but work has been stopped since December.

The 89 percent of pay CH2M earned for fiscal 2017 compares to 92 percent of the incentive pay it earned for work the previous year.

In fiscal 2016, CH2M did not do as well in completing projects on time, missing deadlines on three of 27 of them. But it received 87 percent of the pay available in DOE's subjective review, compared to just 64 percent for fiscal 2017.

The CH2M president at Hanford, Ty Blackford, released a brief statement on Monday thanking workers for their commitment to reducing risk at Hanford.

6

Tri-City Herald

A mosaic of images were fitted together to show the interior of the inner shell of Hanford Tank AY-102 after waste was removed to learn more about why the inner shell was leaking. Radioactive waste held in the tank is suspected of corroding the bottom of the inner shell and leaking into the space between the tank's shells. Courtesy Department of Energy

HTTPS://WWW.TRI-CITYHERALD.COM/NEWS/LOCAL/HANFORD/ARTICLE214069424.HTML

More Hanford nuclear waste tanks at risk of leaking

BY ANNETTE CARY

acary@tricityherald.com

July 01, 2018

RICHLAND, WA

More of Hanford's newest waste storage tanks could be at risk of developing leaks, according to a new evaluation.

Tank farm contractor Washington River Protection Solutions compared the chemistry of the waste in the nuclear reservation's oldest double-shell tank, which was discovered to be leaking, to the waste in the nuclear reservation's other double-shell tanks.

The evaluation's conclusion and other findings about the condition of the Hanford Site's double-shell tanks suggest a need to build more waste storage tanks for 56 million gallons of waste, according to the Washington Department of Ecology.

"We need to start doing something, the sooner the better," said Steve Lowe, Ecology's double-shell tank lead engineer. "Cleanup depends on it."

He characterized three of the double-shell tanks that still hold waste as having "very high risk factors" for corrosion, based on information in the new study.

But the finding doesn't mean the three tanks are leaking or will leak, said Jeremy Johnson, deputy DOE project director for the Hanford tank farms, at a recent Hanford Advisory Board committee meeting.

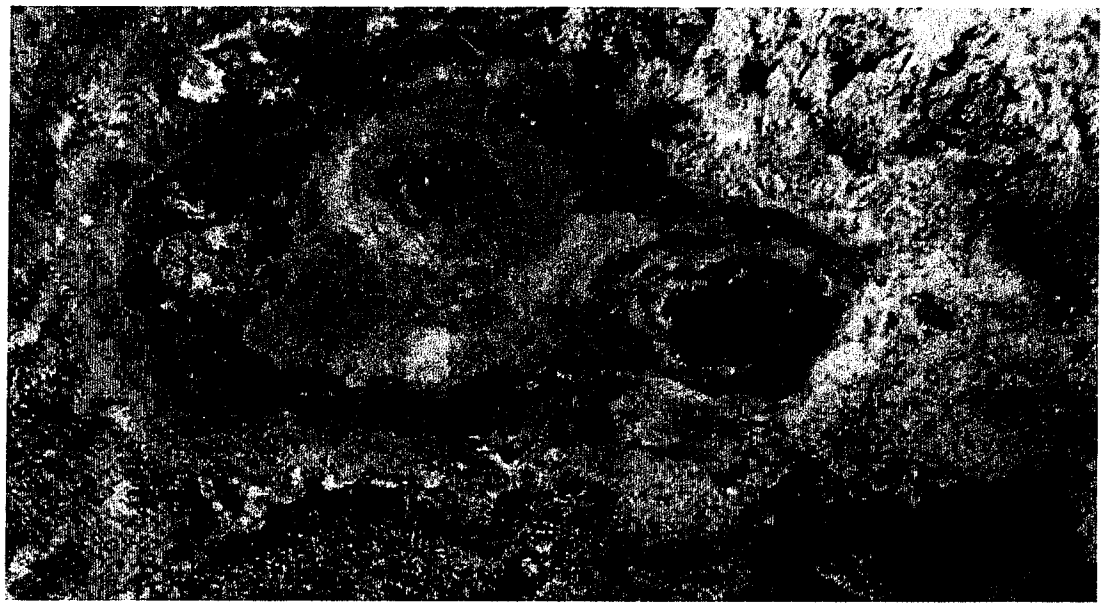
The Department of Energy is emptying the radioactive and hazardous chemical waste from 149 leak-prone single-shell tanks into 28 newer double-shell tanks for storage until the waste can be treated for disposal. The waste is left from the past production of plutonium for the nation's nuclear weapons program.

But the first of the double-shell tanks — Tank AY-102, which dates to 1971 — has been taken out of service and emptied after developing a slow leak from its inner shell into the space between its shells.

Corrosion risks identified

Initially, officials suspected the leak was caused by construction problems, including welds that had to be reworked as many as four times.

But an inspection in 2017, after most of the waste was retrieved from the tank, found widespread pitting on the bottom of the inner shell, allowing waste to seep through. The finding pointed to a corrosion problem.



Pitting is shown in the bottom of the inner shell of Hanford Tank AY-102, which was emptied of radioactive waste after the waste was discovered to be leaking into the space between its shells.

Courtesy Department of Energy

Now the new study finds three other of the double-shell tanks — AY-101, AZ-101 and AZ-102 — have held waste with similar chemistry to what's suspected of corroding the bottom of the inner shell of Tank AY-102.

Among the issues with the three tanks, as well as the tank that leaked and has been emptied, is a history of holding waste that generates high heat, which could accelerate corrosion.

The waste chemistry is one of three potential problems in the 27 remaining double-shell tanks that Johnson discussed with advisory board committee members.

Two of the tanks with possible waste chemistry issues also have spots with thinning in a ring around the wall of the inner shell. The ring is where condensate, or water from ventilation systems in the tank farms, was added and interacted with the air before it mixed into the rest of the waste.

In addition, ultrasonic testing has found thinning of the steel in the bottom of the outer shell of nine of 11 of the double-shell tanks checked.

In one spot of Tank AP-102, the steel bottom of the shell had thinned up to 70 percent, according to DOE.

Experts don't know enough about the issue yet to tell if the thinning is recent or definitely say what caused it.

However, DOE suspects that moisture may be infiltrating and corroding the outside of the tank where it sits underground on a concrete foundation. The foundation has drains to a sump system.

DOE has relied on an independent Tank Integrity Expert Panel, which met last week, to provide recommendations on the Hanford tanks.

The panel has "found areas of interest in time to take action before they become a problem," Johnson said.

Ecology raises concerns

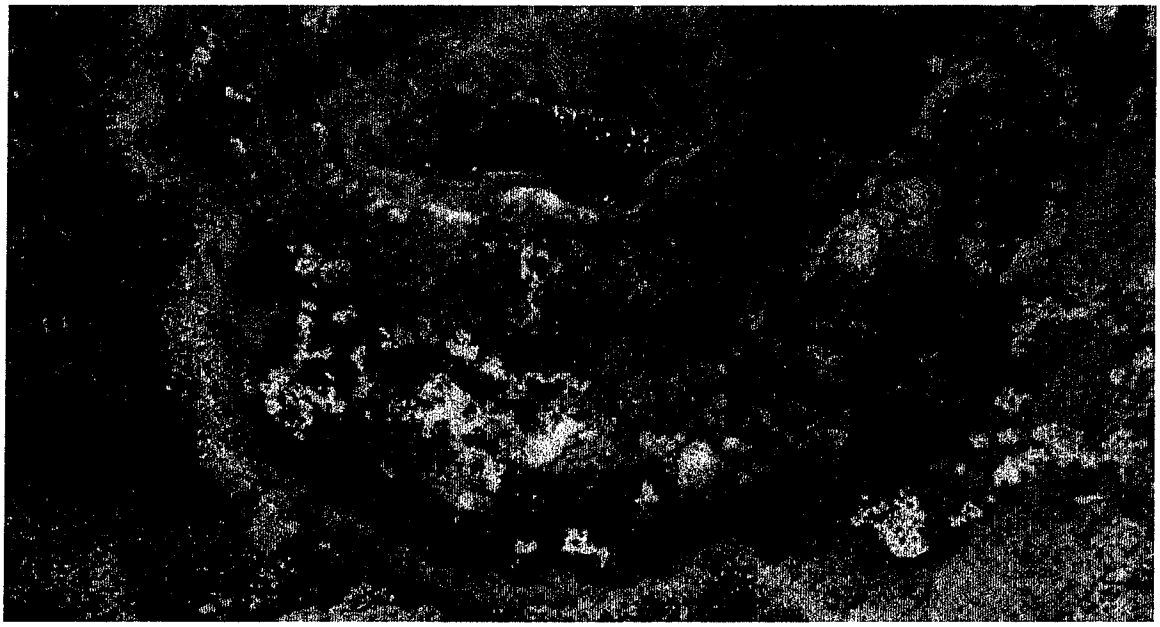
But the state is concerned that double-shell tank space already is in short supply, with several of the tanks at risk.

Every double-shell tank that fails will take two out of use — the one that failed and the one that is filled with waste from the failed tank, Lowe said. Double-shell tanks have a capacity of at least 1 million gallons.

DOE has said that once the vitrification plant starts turning low-activity radioactive waste into a stable glass form, as soon as 2021, about 12 million gallons of space will be freed up during the following decade in the double-shell tanks to empty more single-shell tanks.

But by the time the vitrification plant starts treating waste, the oldest of the double shell tanks will already be 50 years old. And some of the tanks will remain in service as the plant operates for another 40 years, Ecology officials pointed out.

One of the tanks identified as at high risk for corrosion, Tank AZ-101, holds waste that is expected to be treated as high-level radioactive waste, according to Ecology officials. The waste is expected to remain in the tank until 2036, when the vit plant is expected to be fully operational.



Pitting is shown in the bottom of the inner shell of Hanford Tank AY-102, which was emptied of radioactive waste after the waste was discovered to be leaking into the space between its shells.

Courtesy Department of Energy

The Tank Integrity Expert Panel discussed the new study on tanks at risk of corrosion this week, and members said they were concerned that it underestimated risk, according to the Department of Ecology's account of the meeting.

The study did not consider that multiple risks, such as waste that generates high temperatures and waste with certain chemistry, could be synergistic, creating faster corrosion than predicted, according to Ecology.

DOE taking action

DOE and its tank farm contractor are taking steps both to prevent further deterioration and to learn more.

A chemistry-control program for the double shell tanks will be revised, DOE said. Core samples will be collected to analyze the waste at the bottom of the three most at-risk tanks.

To prevent pitting in a ring around tanks from ventilation system condensate, the liquid now will be treated elsewhere at the nuclear reservation, rather than going into the tanks.

DOE also is evaluating ways to prevent moisture from collecting under outer shells and is considering whether corrosion inhibitor could be added.

New robots small enough to be used in the ventilation spaces between the bottoms of the two shells are being developed and could be used later this year to learn more about the condition of the tanks.

There also is a possibility that some repairs could be made on the outer shell.

Tri-City Herald

2 gallons of radioactive nuclear waste done. 56M gallons to go

BY ANNETTE CARY

acary@tricityherald.com

May 15, 2018

http://www.tri-cityherald.com/news/local/hanford/article211071854.html

RICHLAND, WA

Researchers in Richland have done what the $17 billion vitrification plant at Hanford is intended to do — turn radioactive waste into a solid glass form.

Over about 24 hours last month researchers ran a laboratory-sized plant, dripping a radioactive waste mixture into a miniature melter inside the Pacific Northwest National Laboratory's Radiochemical Processing Laboratory.

When they were done, they had 20 pounds of glass encasing actual Hanford waste.

"It's a big deal," said Dawn Wellman, sector manager for environmental health and remediation at the national lab in Richland. "At a scaled version we have done what they will do at full scale at Hanford."

The vitrification plant — or Waste Treatment Plant — at the Hanford nuclear reservation has been under construction since 2002, with a court-ordered deadline of 2023 to start treating some of the 56 million gallons of radioactive waste in underground tanks.

Much of the waste, which is left from the past production of plutonium for the nation's nuclear weapons program, is planned to be vitrified, or turned into a solid glass form for disposal.

In the past about a cup of waste at a time has been vitrified — but not in a way that really mimics the system to be used at the plant.

Will Eaton, vitrification task lead at PNNL in Richland, holds a sample of non-radioactive glass from the laboratory-scale melter recently successfully used to vitrify low-activity waste from underground storage tanks at Hanford.

Bob Brawdy Tri-City Herald

Scientists have not been able to determine in earlier tests how the plant's process would control the chemistry of the mixture, which determines how well waste is contained within the mixture as vitrification progresses from liquid waste to molten glass.

"This is the first time low-activity Hanford tank waste has been vitrified in a continuous process, very similar to the treatment process that will be used at Hanford, rather than as a single batch," said Albert Kruger, a Hanford Department of Energy glass scientist.

Results of the demonstration will be used to help DOE and its tank farm contractor, Washington River Protection Solutions, make plans for operating the vitrification plant. They commissioned the tests from PNNL, an expert in the vitrification field.

The Richland national lab developed liquid-fed ceramic waste melter technology in the 1970s that has become the standard for waste vitrification in the United States and internationally.

At Hanford, DOE's plan is to separate some low-activity radioactive waste from the site's underground tanks, leaving high-level radioactive waste for later treatment at the vitrification plant.

Hanford tank-farm contractor Washington River Protection Solutions delivered liquid waste to the PNNL lab, which is in the Hanford 300 Area just north of Richland.

The waste came from Tank AP-105, one of the site's double-shell tanks in the group called the AP Tank Farm. The initial waste to be treated at the vitrification plant under construction is expected to come from that tank farm.

PNNL staff used the hot cells in its Hanford lab to pretreat the waste, with workers operating equipment from outside the hot cells to work with the waste as they looked through thick, leaded windows.

Low activity radioactive waste is primarily liquid, but solids and radioactive cesium in the liquids are designated as high level radioactive waste and must be removed if the waste is treated as low activity waste.

Workers used the same systems that will be used to prepare waste for the vitrification plant — a filtration system to remove solids and an ion exchange system to remove cesium.

With the worst of the radioactive materials removed, the waste then could be handled in laboratory fume hoods.

Two gallons of waste were mixed with one gallon of glass forming chemicals and then the liquid mixture was slowly dripped into a foot-tall steel container within a furnace. Liquid from the condensation was collected in an off-gas system, just as it will be at the vitrification plant.

About 9 a.m. on April 11, the test system was turned on, with the first waste fed into the melter system by late afternoon.

"We fed nice and constantly. It was a great run," said Will Eaton, who led the test for PNNL.

The furnace heated the mixture to 2,100 degrees Fahrenheit, just as the melters at the vit plant are planned to do.

By about 9:30 a.m. the next morning, researchers had their 20 pounds of glass.

When cooled, it was shiny, black and opaque with low activity radioactive waste encased inside.

"This is kind of the confirmation that the real waste, which we don't know that much about because we only take little samples of a huge tank, actually works the way we think it will work," Eaton said.

Now researchers are performing analytic work on the glass, learning more about its chemistry.

And they are planning another vitrification test.

This test will use a sample from different AP Tank Farm tank, AP-107. The composition of waste varies among Hanford tanks.

"Being able to run real tank waste . . . through these tests provides valuable input for validating and refining our approach to the treatment of low-activity waste," said Kris Colosi, the tank farm contractor project manager. "It's another important step toward the removal and disposal of a large portion of Hanford's tank waste."

Tri-City Herald

This plan shows how Hanford's $17B nuclear plant can start up safely

BY ANNETTE CARY

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May 31, 2018

RICHLAND, WA

Hanford officials can start thinking about how they will train workers for the start up the site's $17 billion vitrification plant.

Bechtel National nuclear safety engineers have finished a 7,000-page document that outlines the potential hazards of treating low-activity radioactive waste and what's needed to control the dangers.

It took three years to complete.

The safety plan will play an important part in training, qualifying and preparing the workforce, said Brian Reilly, the Bechtel National director for the project.

The Documented Safety Analysis, a federal requirement for Department of Energy nuclear facilities, is intended to protect the public, workers and the environment.

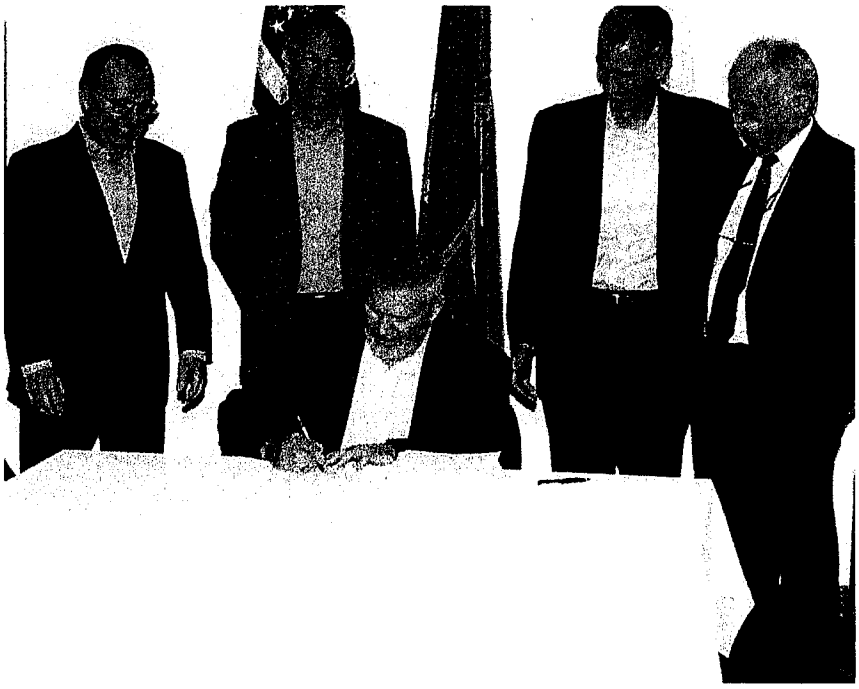
The plan is a contract requirement for Bechtel National. Its successful completion makes Bechtel eligible for up to $6.65 million in incentive pay from the Department of Energy.

DOE has conducted an independent evaluation of the plan and given its approval.

"This is the start of the transition that we'll make . . . to an operating nuclear facility," said Brian Vance, manager of the Department of Energy Office of River Protection. "That's not been done at Hanford for a very, very long time."

DOE has a federal court-enforced deadline to start turning low-activity radioactive waste into a stable glass form for disposal by 2023.

The Hanford nuclear reservation has 56 million gallons of radioactive waste left from the past production of plutonium for the nation's nuclear weapons program.



Ben Harp, the Department of Energy Office of River Protection deputy manager, signs a Safety Evaluation Report which recommended approval of the Hanford vitrification plant's safety analysis. From left are Brian Reilly, Bechtel National project director; Rob Hastings, ORP assistant manager for technical and regulatory support; Brian Vance, ORP manager; and Alan Dobson, Bechtel National area manager for nuclear safety.

Courtesy Bechtel National

The entire plant, including treatment of high-level radioactive tank waste, is not required to be fully operating until 2036.

The initial treatment of low-activity waste will provide operating experience at the plant and help to free up limited space in 27 newer double-shell tanks. The space is needed to hold more waste emptied from 149 leak-prone single-shell tanks until that waste can be treated.

The vitrification plant project is on schedule to move the Low Activity Waste Facility from a construction phase to start up this summer, Reilly said.

In the start-up phase the facility systems are tested.

After that, procedures will be developed, the workforce will be trained and qualified, and the plant will be prepared to bring the plant on line.

The Documented Safety Analysis provides the safety guidance needed for those steps.

"It really is a significant milestone in the progression to making glass," Reilly said.

Construction on the vitrification plant, which includes four major facilities and about 20 support facilities, started in 2002.

Two of the major facilities, the Analytical Laboratory and the Low Activity Waste Facility, will be needed for the initial waste treatment. Construction of the laboratory also is largely complete.

The Low Activity Waste Facility has a footprint about the size of one and a half football fields and is about seven stories high.

Its key components are two 300-ton melters. A mixture of low-activity radioactive waste and glass-forming materials will be poured into the melters and heated to 2,100-degrees Fahrenheit.

The glass mixture then will be poured into stainless steel containers.

Containers of vitrified high level radioactive waste are required by federal law to be disposed of in a federal repository. But the containers of low activity waste are planned to be buried in a lined landfill at Hanford.

Annette Cary; 509-582-1533; @HanfordNews

ENR
Engineering News-Record

GAO and DOE Spar on Hanford Waste Megaproject's Lingering QA Issues

May 2 2018

Mary B. Powers

Many previously identified problems continue to plague the complex waste treatment plant being built to immobilize much of the 54 million gallons of radioactive and chemical waste stored at the U.S. Energy Dept.'s Hanford site in Washington state, prompting government investigators to recommend stopping work on the $17-billion project, underway since 2002, when those problems recur. The U.S. Government Accountability Office also recommends that quality assurance (QA) officers be independent from management responsible for cost and schedule to avoid conflicts of interest.

The Waste Treatment and Immobilization plant has faced persistent QA issues that have delayed the project and tripled its cost, GAO said in its April report to a U.S. Senate committee. It looked at on-site DOE actions to identify, address and prevent recurrences. DOE and design-build contractor Bechtel implemented a "managed improvement plan" in 2014 to ensure the plant could operate in compliance with DOE safety and quality mandates. But GAO said a number of requirements—including those for QA in structures, systems and components for plant operation—have not yet been implemented.

A 2015 DOE Inspector General report said Bechtel had procured $4 billion in parts and materials but took so long to identify problems that it could not recover costs for nearly half the 1,400 items. A 2016 internal agency report found construction and supplier deficiencies, engineering errors and maintenance issues. "DOE may face future rework that could increase costs and schedules," GAO said. Ann White, DOE's assistant secretary for environmental management, agreed that Bechtel must fully identify problems in plant structures and stop work when they recur. She said the current quality-assurance program is independent, but it will be reassessed to confirm independence from cost and schedule influences.

U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

EM Update | Vol. 10, Issue 17 | May 1, 2018

Hanford Waste Treatment Plant Hands Over First Facility for Commissioning

Hanford Waste Treatment and Immobilization Plant workers review procedures as they prepare for the transfer of the Non-radioactive Liquid Waste Disposal System building to commissioning.

RICHLAND, Wash. – The EM Office of River Protection's (ORP) Waste Treatment and Immobilization Plant (WTP) passed a major landmark last month toward completion when the

first building was transferred to plant management for commissioning, the last step before beginning vitrification of Hanford tank waste.

While dozens of systems have been turned over from construction to startup across the project, the handover of the Non-Radioactive Liquid Waste Disposal System (NLD) marks the first transfer of an entire building for commissioning.

"This occasion reinforces the progress being made at WTP and progress toward successfully demonstrating hot commissioning by 2022," said Brian Reilly, WTP project director for ORP contractor Bechtel National, Inc.

The NLD system consists of sumps, pumps, pipes, valves, and instruments, and a 540,000-gallon tank, all of which are designed to collect non-radioactive, non-hazardous effluent from the Low-Activity Waste (LAW) Facility, Analytical Laboratory, and other ancillary support facilities.

NLD is one of many facilities required to achieve EM's Direct Feed Low-Activity Waste approach to feed waste directly from the Hanford tank farms to the LAW Facility in advance of the court-ordered milestone date of 2023.

"We are continuing to make the shift from construction to startup on many of our systems and facilities," said Delmar Noyes, ORP assistant manager for WTP startup and commissioning. "The transfer of the NLD system to commissioning is another great example of that."

-Contributor: Staci West

U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

EM Update | Vol. 10, Issue 16 | April 24, 2018

Powering Up to Support Tank Waste Treatment at Hanford

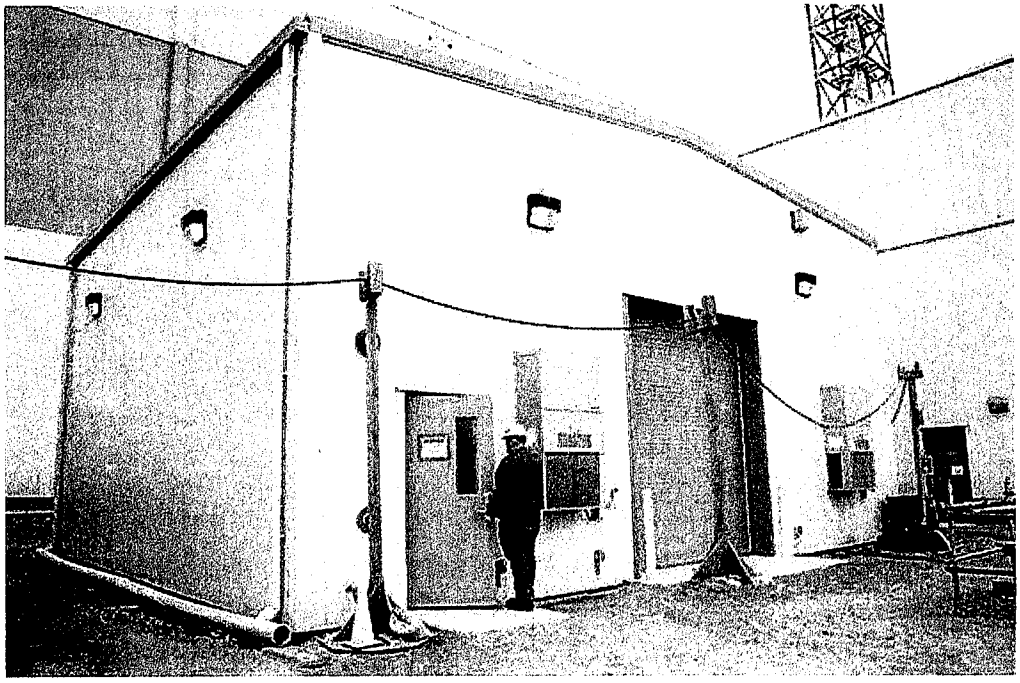
An employee with EM Office of River Protection contractor Bechtel National, Inc. checks an electrical panel in Low-Activity Switchgear Building 24.

RICHLAND, Wash. – Startup activities at the EM Office of River Protection's (ORP) Waste Treatment and Immobilization Plant (WTP) received a boost when permanent power was supplied to the Low-Activity Waste (LAW) Facility's switchgear building last month.

ORP contractor Bechtel National, Inc. (BNI) energized the main LAW Facility switchgear and transformers. Electrical power will be sent sequentially to the lower voltage motor control centers and panels throughout the facility as startup testing of electrical systems occurs over the next several months.

The LAW Facility is key to achieving the Direct Feed Low-Activity Waste (DFLAW) approach to tank waste treatment in advance of the court-ordered milestone date of 2023.

"Providing permanent power to the facility is a significant accomplishment and marks a change in methodology at the LAW Facility," said Roy Tyrie, WTP startup director for BNI. "It's symbolic of a change from construction to startup and kicks off a waterfall of startup work in the LAW, including testing the permanent plant equipment in the facility."



Permanent electrical power energizes the Low-Activity Waste (LAW) Facility's switchgear building. Electrical power will be sent to lower voltage motor control centers and panels in the LAW Facility as startup testing of electrical systems occurs over the next several months.

The LAW Facility is on track to reach physical plant completion in 2018. When fully operational, the facility will annually produce approximately 1,100 containers of vitrified low-activity waste from Hanford's underground storage tanks.

"ORP is encouraged by continued progress at WTP," said Wahed Abdul, ORP federal project director for low-activity waste. "Energization of the LAW Facility is one more key step toward beginning treatment of Hanford's tank waste."

-Contributor: Ian Klei

Tri-City Herald

Feds bash Hanford nuclear waste plant troubles, question DOE priorities

BY ANNETTE CARY
acary@tricityherald.com

April 24, 2018

RICHLAND, WA
Problems first identified six years ago continue the plague the multi-billion-dollar Hanford vitrification plant, according to federal investigators with the Government Accountability Office.

The Department of Energy and its contractor have not shown that the plant has the quality needed to operate safely when it starts treating some of the nation's deadliest nuclear waste.

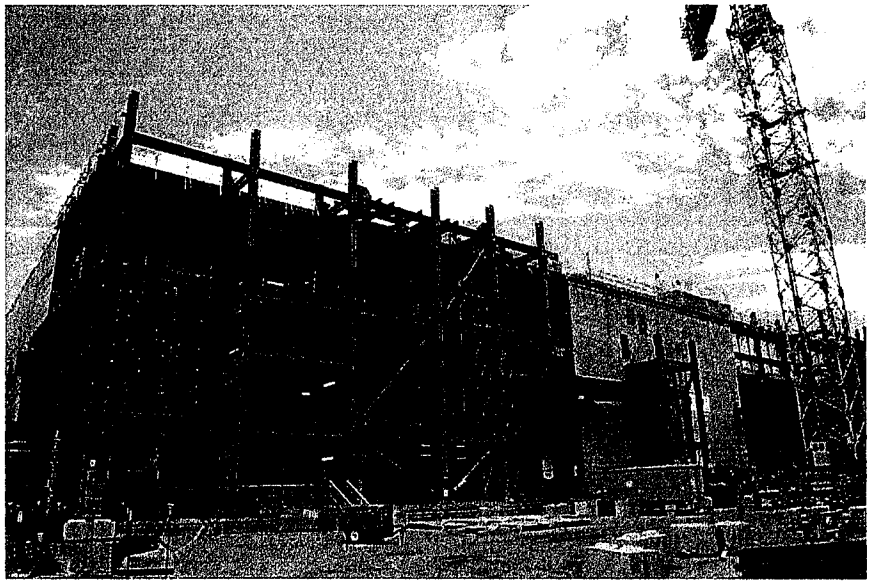
The contractor, Bechtel National, has not fully completed planned corrections, and the corrections it has made have not prevented continuing quality assurance problems, the GAO said.

The $17 billion plant has been under construction since 2002 to turn up to 56 million gallons of radioactive waste into a stable glass form for disposal. The waste is left from the past production of plutonium for the nation's nuclear weapons program.

Its quality assurance program is intended to make sure that equipment, materials, workmanship and systems have the high quality — and quality that is verified through stringent recordkeeping — to make certain the plant will operate safely.

The GAO said that the Hanford DOE office responsible for the plant, the Office of River Protection (ORP), is under pressure to get part of the plant operating.

If serious quality assurance problems are identified, they could threaten the ability of ORP to meet cost and schedule targets, the report said.



Construction continues at the High Level Waste Facility at Hanford's vitrification plant. It will not be needed for initial operations required to start by 2023.

Courtesy Bechtel National

Two ORP quality assurance experts said that both local DOE management and Bechtel place cost and schedule performance above identifying and resolving quality tracking issues.

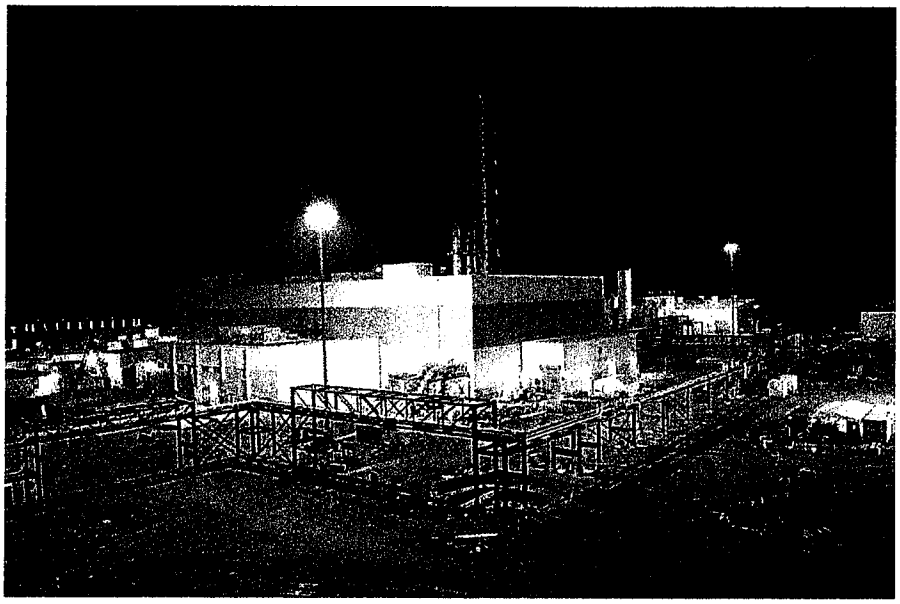
"One quality assurance expert specified that ORP's culture does not encourage staff to identify quality assurance problems or ineffective corrective measures," the GAO report said.

"This expert said that people who discover problems are not rewarded," it said. "Rather, their findings are met with resistance, which has created a culture where quality assurance staff are hesitant to identify quality assurance problems or problems with corrective measures."

The expert compared the plant to the Zimmer Power Plant, a plant in Ohio that was never licensed because of unresolved quality assurance problems and a focus on schedule over construction quality, the report said.

The GAO recommended that ORP should revise its organizational structure so the quality assurance function is independent of its upper management.

In a written response to the GAO, Anne White, the new DOE assistant secretary for environmental management, said that the current ORP quality assurance reporting relationship meets all established requirements.



The Low Activity Waste Facility at the Hanford vitrification plant is required to begin treating low activity radioactive waste by 2023.

Courtesy Bechtel National

But White did concede that the report identifies some instances in which independence of quality assurance could be strengthened.

Stop-work orders recommended

In another of the three recommendations in the report, the GAO said the energy secretary should direct ORP to use its authority to stop work in areas in which quality assurance problems are recurring.

Work should not restart until the office's experts can verify the problems are corrected and will not recur, the report said.

In December 2012 the ORP vitrification plant engineering division recommended that all activities affecting engineering design, construction, and installation of components be stopped because it could not be verified that completed work met quality and safety requirements for handling nuclear waste, the GAO report said.

Stopping work would help DOE avoid future nuclear safety and quality compromises and substantial rework, according to the engineering division.

Instead of stopping all work, ORP management halted only the work on facilities with the most significant technical challenges.

ORP conducted a comprehensive audit the next year, which resulted in the office having Bechtel begin implementing a management improvement plan to be completed by April 2016.

Bechtel gave a rough estimate in 2014 that the improvement plan would cost more than $1 billion to implement, but the costs of the plan's initiatives have not been tracked, the GAO report said.

Although Bechtel reported that implementation of the plan was complete, in fact all corrective measures were not finished, according to information the GAO said it received.

ORP is not scheduled to finish its verification of Bechtel's implementation of the management improvement plan until at least the end of this year.

But ORP officials told GAO investigators that they had not stopped work because they thought the program is generally adequate.

"DOE may face future rework that could increase costs and schedule delays" because the stop-work option has not been used as verification continues, the GAO report said.

Many of the issues cited in the report were complex and required a significant number of corrective actions to resolve, White wrote in her response.

"In all cases, ORP staff has reviewed and evaluated the contractor's compensatory actions and determined that a work stoppage was not warranted," she said.

Full review recommended

The GAO recommended that ORP direct Bechtel to determine the full extent of problems at the vitrification plant.

ORP previously has directed Bechtel to perform evaluations for a number of weaknesses in its quality assurance programs, but it has taken longer than expected, White said.

The GAO report found that Bechtel had not identified all quality assurance problems in structures, systems and components that were completed and installed before the 2012 work stoppage.

The majority of ORP quality assurance experts said they expected rework will be needed at the plant on some pre-2012 work.

But when problems are found through limited sampling of those plant components, a broader look is not ordered, the GAO report said.

ORP quality assurance experts also said that previously identified quality problems are recurring, including in areas where Bechtel had made corrections, the GAO said..

They included purchasing items and services that did not meet requirements or perform as specified, including software, the GAO said.

Bechtel also had not established an adequate maintenance program to prevent damage and deterioration, particularly for parts of the plant where operations will be delayed, the report said. The entire plant is not required to be fully operating until 2036.

DOE now is required to start operating part of the plant to start turning some low-activity radioactive waste into a stable glass form for disposal in 2023. Construction on parts of the plant that will handle high-level radioactive waste have been stopped since 2012.

There have been problems related to the delay in construction with components stored outside and affected by water, sand or animals. There also was a significant water leak at one of the large processing buildings in 2016, the GAO report said.

Bechtel has notified DOE that it will submit a proposal to change its contract to account for the increased cost of long-term maintenance of facilities and systems that will not be needed when low-activity waste treatment starts.

Bechtel had no comment, other than to point out the DOE response to the report.

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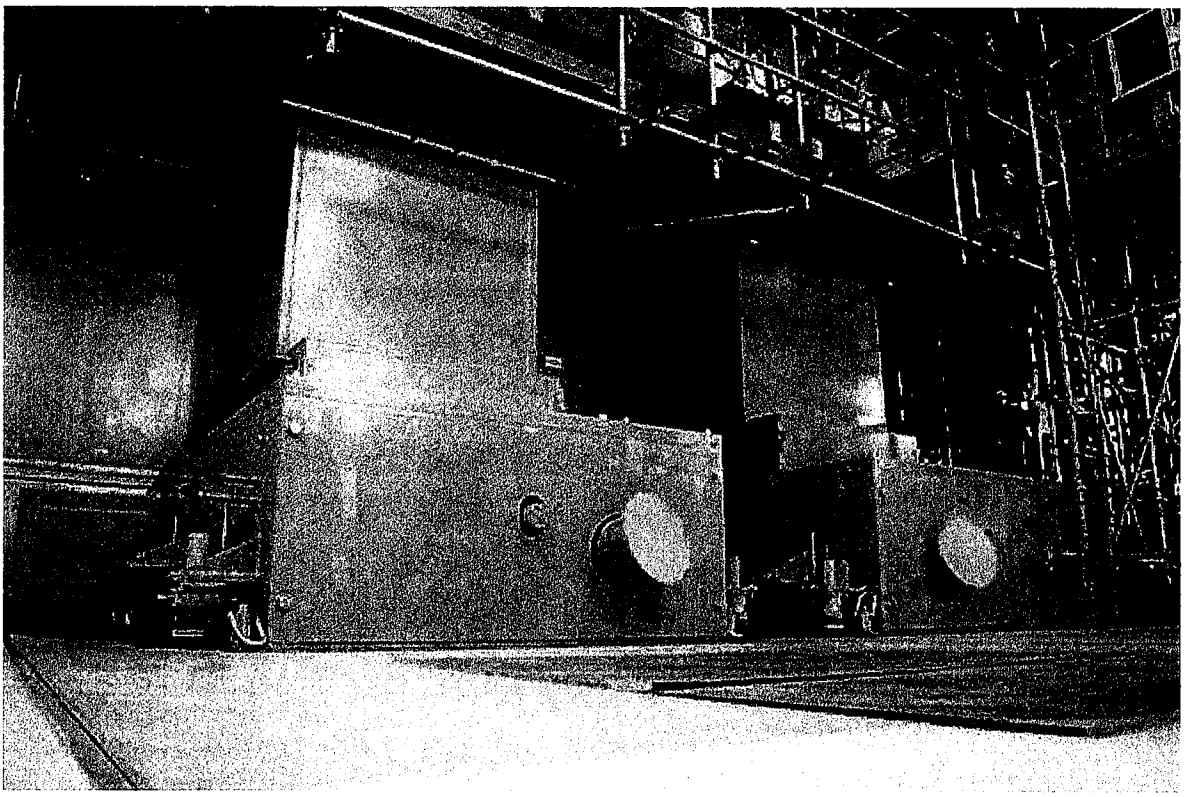
U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

EM Update | Vol. 10, Issue 13 | April 3, 2018

Hanford WTP Contractor Receives 'Satisfactory' Rating for 2017 Performance



The assembly of two 300-ton nuclear waste melters was completed last year at the Low-Activity Waste (LAW) facility of Hanford's Waste Treatment and Immobilization Plant. The melter assembly highlighted key progress at the LAW Facility, which is integral to DOE's Direct Feed Low-Activity Waste approach.

RICHLAND, Wash. – EM's Office of River Protection (ORP) has given Bechtel National (BNI), the contractor for the Hanford Waste Treatment and Immobilization Plant (WTP), an overall "satisfactory" rating for its performance in 2017, according to a recently released award fee

scorecard. While BNI achieved some key performance milestones during the performance period, the scorecard also outlines several areas for improvement.

This is the first award fee determination conducted under the revised contract completed in late 2016 for the WTP Low-Activity Waste (LAW) Facility, Balance of Facilities, and Analytical Laboratory (LAB) work scope.

Within the revised contract, ORP increased the number of performance milestones and realigned award fee, which decreased the total annual award fee available as compared to previous years. BNI will receive about 48 percent of the available award fee, or $3.8 million out of nearly $7.9 million available. In 2016, BNI earned 71 percent of the available fee, or approximately $7.24 million out of an available $10.2 million.

The WTP is intended to process the radioactive waste stored in underground tanks at the Hanford Site through vitrification, which involves combining the tank waste with glass-forming materials and then heating the mixture to 2,100 degrees Fahrenheit. The material is then poured into stainless steel containers, where it cools to a solid glass form for long-term storage.

ORP is focused on achieving the Direct Feed Low-Activity Waste (DFLAW) approach to tank waste treatment as soon as December 2021. DFLAW will use the WTP LAW, LAB, and other ancillary support facilities. These sections of WTP are closer to completion than the two other main sections of WTP — the High-Level Waste (HLW) and Pretreatment facilities.

The scorecard notes that BNI achieved four "construction complete" milestones for the LAW Facility; met EM safety goals for the WTP construction site; and collaborated with ORP to complete the preliminary documented safety analysis to allow construction to resume on the HLW Facility.

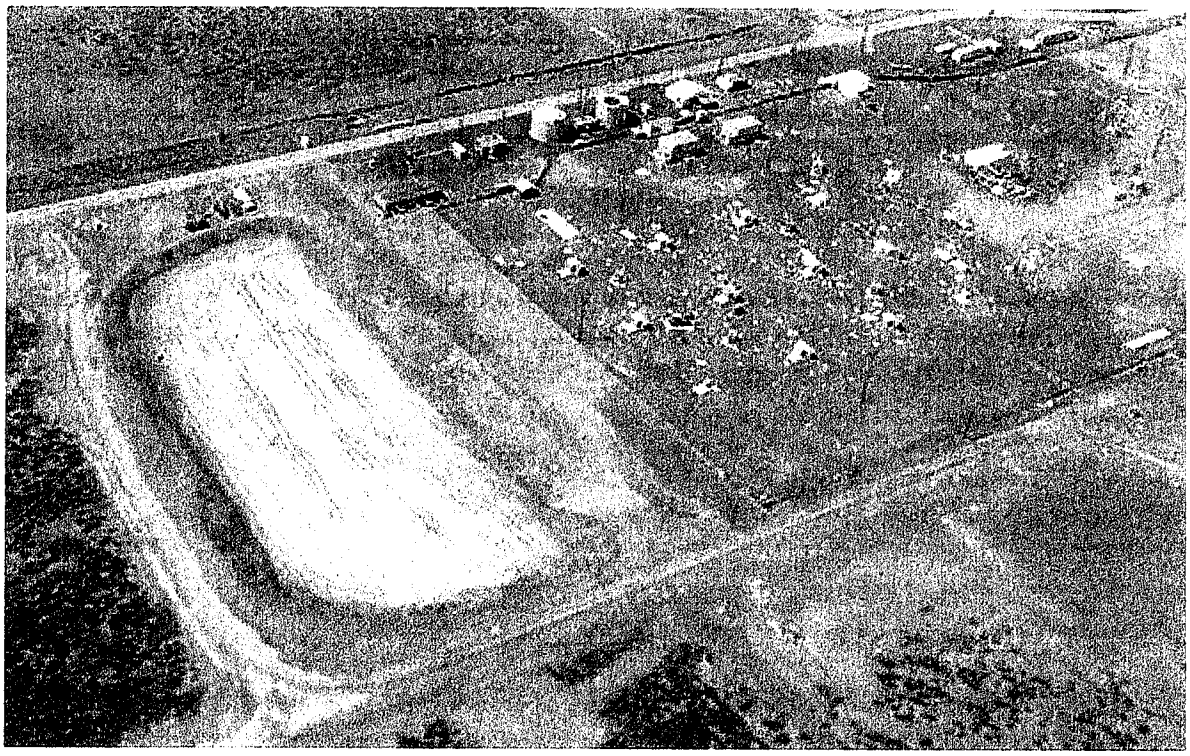
An area of improvement, according to the scorecard, focuses on concerns about BNI's ability to achieve contract milestones related to initial operations.

Each year, EM releases information relating to contractor fee payments — earned by completing the work called for in the contracts — to further transparency in its cleanup program.

The full 2017 award fee scorecard is available here.

-Contributor: Dieter Bohrmann

Hanford Crews Complete First Work Phase for Protective Barrier System



Workers recently finished the SX Farm evapotranspiration basin, shown in light brown. It will collect and evaporate water drained from new interim surface barriers to be installed later this spring over Hanford's SX Tank Farm, shown at the right.

RICHLAND, Wash. – Workers recently finished the first phase of constructing a new protective barrier system for one of Hanford's underground tank waste storage farms.

EM's Office of River Protection (ORP) and contractor Washington River Protection Solutions (WRPS) finished work on a lined evapotranspiration basin — roughly the size of two-and-a-half football fields — to collect and evaporate water drained from new high-density, modified asphalt surface barriers to be installed later this spring over SX Tank Farm.

The interim barriers will help prevent rain and snow melt from intruding into the 15 underground tanks or percolating into the soil and driving existing contaminants closer to groundwater. The barriers are temporary structures to remain in place until a final closure decision is made for the tank farm.

Crews excavated approximately 28,000 cubic yards of earth for the basin, south of SX Farm. They placed a series of drain pipes on a special liner in the basin floor and covered them with

three feet of backfill that was hydroseeded to grow a customized mix of native plants and grasses to help evaporate the water. Hydroseeding is a planting process that uses a slurry of seed and mulch as an alternative to the traditional process of broadcasting or sowing dry seed. WRPS's Environmental Protection group identified plants with relatively shallow root structures that won't extend deep enough to damage the liner.

Another major element of the project was the placement of nearly 800 linear feet of storm water collection piping.

Working with engineering drawings from the 1950s and '60s was a challenge, according to WRPS Construction Manager Jeremey White.

"We found things were close, but not quite where they were supposed to be," he said.

The team used ground-penetrating radar to help locate buried utility lines of all types — electrical, raw water, instrument/dry air, and drain lines. Once lines were found, the team determined the best route for weaving the large 18-inch drainage pipe through the maze of abandoned-in-place and in-service lines.

Advanced planning helped workers to avoid cutting in-service lines, but extensive cutting and capping of abandoned lines was required, with all the necessary safety precautions.

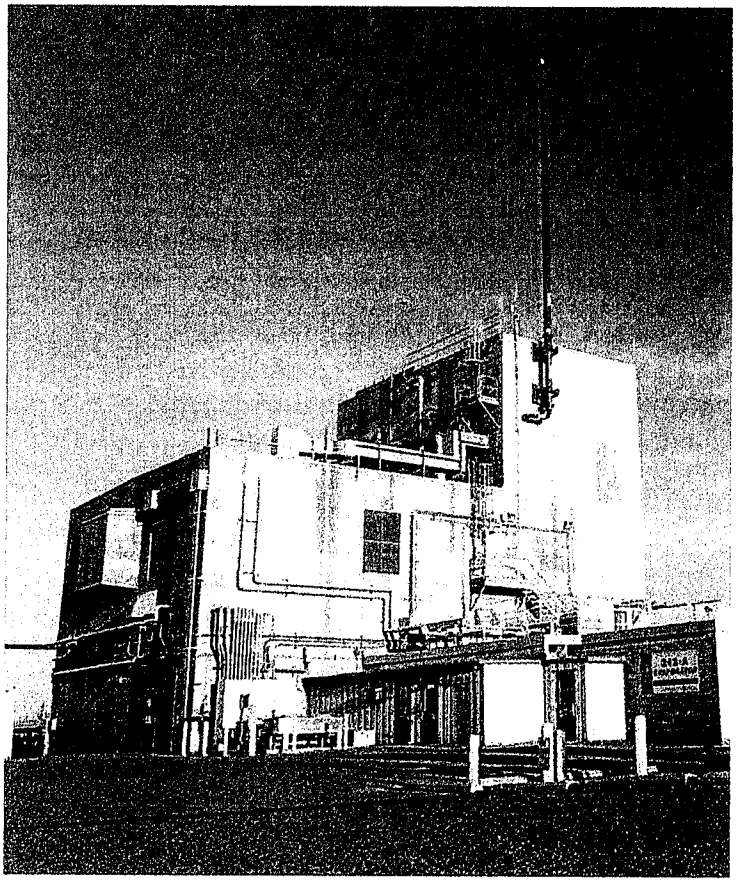
"We were prepared to deal with high contamination, asbestos, and airborne radioactivity," White said.

Workers installed three catch basins, three stormwater vaults, and a wastewater separator. The vaults, designed to handle output from a 100-year flood, weighed nearly six tons each.

"This has been a huge undertaking, and the team has done a great job in overcoming many obstacles as we continue to make progress on this project," ORP Tank Closure Manager Jan Bovier said.

-Contributor: Jerry Holloway

Hanford Completes First 2018 Tank Waste Reduction Campaign



The 242-A Evaporator operations are critical to tank waste management at the Hanford Site.

RICHLAND, Wash. – EM's Office of River Protection and tank operations contractor Washington River Protection Solutions (WRPS) completed the first tank waste volume reduction campaign of the year earlier this month, creating an estimated 166,000 gallons of valuable double-shell tank storage space.

During the 15-day campaign, approximately 900,000 gallons of liquid waste from feed tank AW-102 was transferred to the 242-A Evaporator where it was heated to a boil under a vacuum. Vapor from the boiling waste was collected, condensed, filtered, and sent for later treatment and disposal at the Effluent Treatment Facility (ETF), resulting in the 166,000-gallon tank waste volume reduction. The remaining concentrated waste was transferred back to a double-shell tank.

"The 242-A team responded to a number of required partial shutdown evolutions during this campaign," said Jim Foster, WRPS manager of 242-A/AW/ETF operations. "The professionalism,

abilities, and knowledge of all crews being able to successfully respond to these evolutions is a testament to their dedication and training."

Since the last evaporator campaign in September 2017, crews completed improvements to the facility, including installation of new air conditioning in the evaporator control room, an effluent sampling station, and an upgraded continuous air monitor.

"Evaporator operations are critical to successful tank waste management at the Hanford Site," said Paul Hernandez, ORP 242-A Evaporator program manager. "By reducing the volume of waste stored in double-shell tanks, the process allows the continued transfer of waste from older single-shell tanks into newer double-shell tanks until it can be sent to the Waste Treatment and Immobilization Plant for vitrification."

A second evaporator campaign is planned for June. The evaporator has removed more than 85 million gallons of liquid from Hanford's tank waste since beginning operation in 1977.

-Contributor: Jerry Holloway

Tri-City Herald

2 gallons of radioactive nuclear waste done. 56M gallons to go

BY ANNETTE CARY

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May 15, 2018

http://www.tri-cityherald.com/news/local/hanford/article211071854.html

RICHLAND, WA

Researchers in Richland have done what the $17 billion vitrification plant at Hanford is intended to do — turn radioactive waste into a solid glass form.

Over about 24 hours last month researchers ran a laboratory-sized plant, dripping a radioactive waste mixture into a miniature melter inside the Pacific Northwest National Laboratory's Radiochemical Processing Laboratory.

When they were done, they had 20 pounds of glass encasing actual Hanford waste.

"It's a big deal," said Dawn Wellman, sector manager for environmental health and remediation at the national lab in Richland. "At a scaled version we have done what they will do at full scale at Hanford."

The vitrification plant — or Waste Treatment Plant — at the Hanford nuclear reservation has been under construction since 2002, with a court-ordered deadline of 2023 to start treating some of the 56 million gallons of radioactive waste in underground tanks.

Much of the waste, which is left from the past production of plutonium for the nation's nuclear weapons program, is planned to be vitrified, or turned into a solid glass form for disposal.

In the past about a cup of waste at a time has been vitrified — but not in a way that really mimics the system to be used at the plant.

Will Eaton, vitrification task lead at PNNL in Richland, holds a sample of non-radioactive glass from the laboratory-scale melter recently successfully used to vitrify low-activity waste from underground storage tanks at Hanford.

Bob Brawdy Tri-City Herald

Scientists have not been able to determine in earlier tests how the plant's process would control the chemistry of the mixture, which determines how well waste is contained within the mixture as vitrification progresses from liquid waste to molten glass.

"This is the first time low-activity Hanford tank waste has been vitrified in a continuous process, very similar to the treatment process that will be used at Hanford, rather than as a single batch," said Albert Kruger, a Hanford Department of Energy glass scientist.

Results of the demonstration will be used to help DOE and its tank farm contractor, Washington River Protection Solutions, make plans for operating the vitrification plant. They commissioned the tests from PNNL, an expert in the vitrification field.

The Richland national lab developed liquid-fed ceramic waste melter technology in the 1970s that has become the standard for waste vitrification in the United States and internationally.

At Hanford, DOE's plan is to separate some low-activity radioactive waste from the site's underground tanks, leaving high-level radioactive waste for later treatment at the vitrification plant.

Hanford tank-farm contractor Washington River Protection Solutions delivered liquid waste to the PNNL lab, which is in the Hanford 300 Area just north of Richland.

The waste came from Tank AP-105, one of the site's double-shell tanks in the group called the AP Tank Farm. The initial waste to be treated at the vitrification plant under construction is expected to come from that tank farm.

PNNL staff used the hot cells in its Hanford lab to pretreat the waste, with workers operating equipment from outside the hot cells to work with the waste as they looked through thick, leaded windows.

Low activity radioactive waste is primarily liquid, but solids and radioactive cesium in the liquids are designated as high level radioactive waste and must be removed if the waste is treated as low activity waste.

Workers used the same systems that will be used to prepare waste for the vitrification plant — a filtration system to remove solids and an ion exchange system to remove cesium.

With the worst of the radioactive materials removed, the waste then could be handled in laboratory fume hoods.

Two gallons of waste were mixed with one gallon of glass forming chemicals and then the liquid mixture was slowly dripped into a foot-tall steel container within a furnace. Liquid from the condensation was collected in an off-gas system, just as it will be at the vitrification plant.

About 9 a.m. on April 11, the test system was turned on, with the first waste fed into the melter system by late afternoon.

"We fed nice and constantly. It was a great run," said Will Eaton, who led the test for PNNL.

The furnace heated the mixture to 2,100 degrees Fahrenheit, just as the melters at the vit plant are planned to do.

By about 9:30 a.m. the next morning, researchers had their 20 pounds of glass.

When cooled, it was shiny, black and opaque with low activity radioactive waste encased inside.

"This is kind of the confirmation that the real waste, which we don't know that much about because we only take little samples of a huge tank, actually works the way we think it will work," Eaton said.

Now researchers are performing analytic work on the glass, learning more about its chemistry.

And they are planning another vitrification test.

This test will use a sample from different AP Tank Farm tank, AP-107. The composition of waste varies among Hanford tanks.

"Being able to run real tank waste . . . through these tests provides valuable input for validating and refining our approach to the treatment of low-activity waste," said Kris Colosi, the tank farm contractor project manager. "It's another important step toward the removal and disposal of a large portion of Hanford's tank waste."

Tri-City Herald

This plan shows how Hanford's $17B nuclear plant can start up safely

BY ANNETTE CARY

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May 31, 2018

RICHLAND, WA

Hanford officials can start thinking about how they will train workers for the start up the site's $17 billion vitrification plant.

Bechtel National nuclear safety engineers have finished a 7,000-page document that outlines the potential hazards of treating low-activity radioactive waste and what's needed to control the dangers.

It took three years to complete.

The safety plan will play an important part in training, qualifying and preparing the workforce, said Brian Reilly, the Bechtel National director for the project.

The Documented Safety Analysis, a federal requirement for Department of Energy nuclear facilities, is intended to protect the public, workers and the environment.

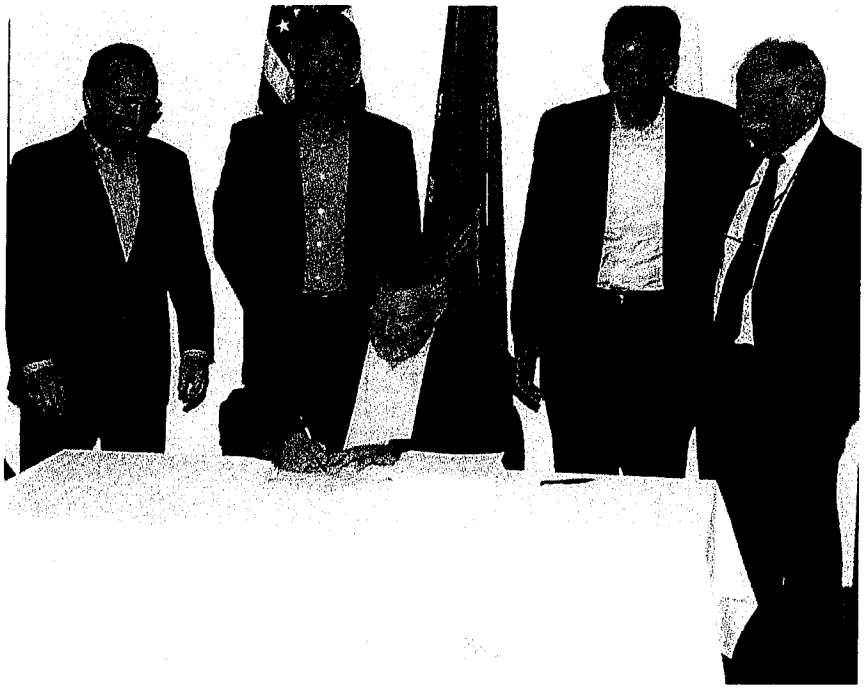
The plan is a contract requirement for Bechtel National. Its successful completion makes Bechtel eligible for up to $6.65 million in incentive pay from the Department of Energy.

DOE has conducted an independent evaluation of the plan and given its approval.

"This is the start of the transition that we'll make . . . to an operating nuclear facility," said Brian Vance, manager of the Department of Energy Office of River Protection. "That's not been done at Hanford for a very, very long time."

DOE has a federal court-enforced deadline to start turning low-activity radioactive waste into a stable glass form for disposal by 2023.

The Hanford nuclear reservation has 56 million gallons of radioactive waste left from the past production of plutonium for the nation's nuclear weapons program.



Ben Harp, the Department of Energy Office of River Protection deputy manager, signs a Safety Evaluation Report which recommended approval of the Hanford vitrification plant's safety analysis. From left are Brian Reilly, Bechtel National project director; Rob Hastings, ORP assistant manager for technical and regulatory support; Brian Vance, ORP manager; and Alan Dobson, Bechtel National area manager for nuclear safety.

Courtesy Bechtel National

The entire plant, including treatment of high-level radioactive tank waste, is not required to be fully operating until 2036.

The initial treatment of low-activity waste will provide operating experience at the plant and help to free up limited space in 27 newer double-shell tanks. The space is needed to hold more waste emptied from 149 leak-prone single-shell tanks until that waste can be treated.

The vitrification plant project is on schedule to move the Low Activity Waste Facility from a construction phase to start up this summer, Reilly said.

In the start-up phase the facility systems are tested.

After that, procedures will be developed, the workforce will be trained and qualified, and the plant will be prepared to bring the plant on line.

The Documented Safety Analysis provides the safety guidance needed for those steps.

"It really is a significant milestone in the progression to making glass," Reilly said.

Construction on the vitrification plant, which includes four major facilities and about 20 support facilities, started in 2002.

Two of the major facilities, the Analytical Laboratory and the Low Activity Waste Facility, will be needed for the initial waste treatment. Construction of the laboratory also is largely complete.

The Low Activity Waste Facility has a footprint about the size of one and a half football fields and is about seven stories high.

Its key components are two 300-ton melters. A mixture of low-activity radioactive waste and glass-forming materials will be poured into the melters and heated to 2,100-degrees Fahrenheit.

The glass mixture then will be poured into stainless steel containers.

Containers of vitrified high level radioactive waste are required by federal law to be disposed of in a federal repository. But the containers of low activity waste are planned to be buried in a lined landfill at Hanford.

Annette Cary; 509-582-1533; @HanfordNews

ENR
Engineering News-Record

GAO and DOE Spar on Hanford Waste Megaproject's Lingering QA Issues

May 2, 2018

Mary B. Powers

Many previously identified problems continue to plague the complex waste treatment plant being built to immobilize much of the 54 million gallons of radioactive and chemical waste stored at the U.S. Energy Dept.'s Hanford site in Washington state, prompting government investigators to recommend stopping work on the $17-billion project, underway since 2002, when those problems recur. The U.S. Government Accountability Office also recommends that quality assurance (QA) officers be independent from management responsible for cost and schedule to avoid conflicts of interest.

The Waste Treatment and Immobilization plant has faced persistent QA issues that have delayed the project and tripled its cost, GAO said in its April report to a U.S. Senate committee. It looked at on-site DOE actions to identify, address and prevent recurrences. DOE and design-build contractor Bechtel implemented a "managed improvement plan" in 2014 to ensure the plant could operate in compliance with DOE safety and quality mandates. But GAO said a number of requirements—including those for QA in structures, systems and components for plant operation—have not yet been implemented.

A 2015 DOE Inspector General report said Bechtel had procured $4 billion in parts and materials but took so long to identify problems that it could not recover costs for nearly half the 1,400 items. A 2016 internal agency report found construction and supplier deficiencies, engineering errors and maintenance issues. "DOE may face future rework that could increase costs and schedules," GAO said. Ann White, DOE's assistant secretary for environmental management, agreed that Bechtel must fully identify problems in plant structures and stop work when they recur. She said the current quality-assurance program is independent, but it will be reassessed to confirm independence from cost and schedule influences.

U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

EM Update | Vol. 10, Issue 17 | May 1, 2018

Hanford Waste Treatment Plant Hands Over First Facility for Commissioning

Hanford Waste Treatment and Immobilization Plant workers review procedures as they prepare for the transfer of the Non-radioactive Liquid Waste Disposal System building to commissioning.

RICHLAND, Wash. – The EM Office of River Protection's (ORP) Waste Treatment and Immobilization Plant (WTP) passed a major landmark last month toward completion when the

first building was transferred to plant management for commissioning, the last step before beginning vitrification of Hanford tank waste.

While dozens of systems have been turned over from construction to startup across the project, the handover of the Non-Radioactive Liquid Waste Disposal System (NLD) marks the first transfer of an entire building for commissioning.

"This occasion reinforces the progress being made at WTP and progress toward successfully demonstrating hot commissioning by 2022," said Brian Reilly, WTP project director for ORP contractor Bechtel National, Inc.

The NLD system consists of sumps, pumps, pipes, valves, and instruments, and a 540,000-gallon tank, all of which are designed to collect non-radioactive, non-hazardous effluent from the Low-Activity Waste (LAW) Facility, Analytical Laboratory, and other ancillary support facilities.

NLD is one of many facilities required to achieve EM's Direct Feed Low-Activity Waste approach to feed waste directly from the Hanford tank farms to the LAW Facility in advance of the court-ordered milestone date of 2023.

"We are continuing to make the shift from construction to startup on many of our systems and facilities," said Delmar Noyes, ORP assistant manager for WTP startup and commissioning. "The transfer of the NLD system to commissioning is another great example of that."

-Contributor: Staci West

U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

EM Update | Vol. 10, Issue 16 | April 24, 2018

Powering Up to Support Tank Waste Treatment at Hanford

An employee with EM Office of River Protection contractor Bechtel National, Inc. checks an electrical panel in Low-Activity Switchgear Building 24.

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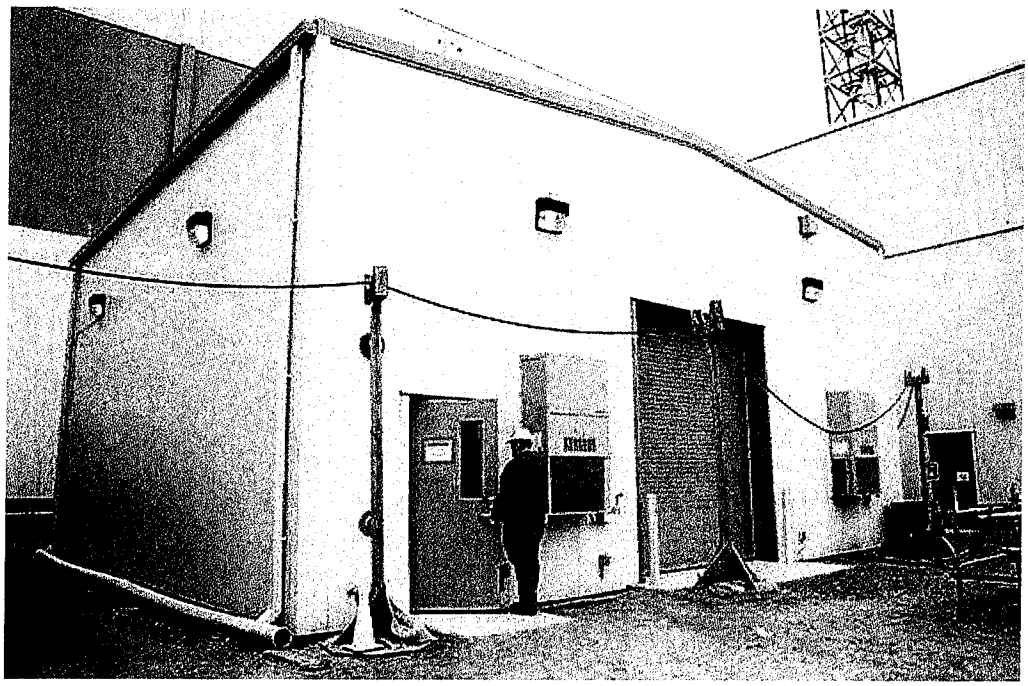
"Providing permanent power to the facility is a significant accomplishment and marks a change in methodology at the LAW Facility," said Roy Tyrie, WTP startup director for BNI. "It's symbolic of a change from construction to startup and kicks off a waterfall of startup work in the LAW, including testing the permanent plant equipment in the facility."



Permanent electrical power energizes the Low-Activity Waste (LAW) Facility's switchgear building. Electrical power will be sent to lower voltage motor control centers and panels in the LAW Facility as startup testing of electrical systems occurs over the next several months.

The LAW Facility is on track to reach physical plant completion in 2018. When fully operational, the facility will annually produce approximately 1,100 containers of vitrified low-activity waste from Hanford's underground storage tanks.

"ORP is encouraged by continued progress at WTP," said Wahed Abdul, ORP federal project director for low-activity waste. "Energization of the LAW Facility is one more key step toward beginning treatment of Hanford's tank waste."

-Contributor: Ian Klei

Tri-City Herald

Feds bash Hanford nuclear waste plant troubles, question DOE priorities

BY ANNETTE CARY
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April 24, 2018

RICHLAND, WA
Problems first identified six years ago continue the plague the multi-billion-dollar Hanford vitrification plant, according to federal investigators with the Government Accountability Office.

The Department of Energy and its contractor have not shown that the plant has the quality needed to operate safely when it starts treating some of the nation's deadliest nuclear waste.

The contractor, Bechtel National, has not fully completed planned corrections, and the corrections it has made have not prevented continuing quality assurance problems, the GAO said.

The $17 billion plant has been under construction since 2002 to turn up to 56 million gallons of radioactive waste into a stable glass form for disposal. The waste is left from the past production of plutonium for the nation's nuclear weapons program.

Its quality assurance program is intended to make sure that equipment, materials, workmanship and systems have the high quality — and quality that is verified through stringent recordkeeping — to make certain the plant will operate safely.

The GAO said that the Hanford DOE office responsible for the plant, the Office of River Protection (ORP), is under pressure to get part of the plant operating.

If serious quality assurance problems are identified, they could threaten the ability of ORP to meet cost and schedule targets, the report said.

Construction continues at the High Level Waste Facility at Hanford's vitrification plant. It will not be needed for initial operations required to start by 2023.

Courtesy Bechtel National

Two ORP quality assurance experts said that both local DOE management and Bechtel place cost and schedule performance above identifying and resolving quality tracking issues.

"One quality assurance expert specified that ORP's culture does not encourage staff to identify quality assurance problems or ineffective corrective measures," the GAO report said.

"This expert said that people who discover problems are not rewarded," it said. "Rather, their findings are met with resistance, which has created a culture where quality assurance staff are hesitant to identify quality assurance problems or problems with corrective measures."

The expert compared the plant to the Zimmer Power Plant, a plant in Ohio that was never licensed because of unresolved quality assurance problems and a focus on schedule over construction quality, the report said.

The GAO recommended that ORP should revise its organizational structure so the quality assurance function is independent of its upper management.

In a written response to the GAO, Anne White, the new DOE assistant secretary for environmental management, said that the current ORP quality assurance reporting relationship meets all established requirements.

The Low Activity Waste Facility at the Hanford vitrification plant is required to begin treating low activity radioactive waste by 2023.

Courtesy Bechtel National

But White did concede that the report identifies some instances in which independence of quality assurance could be strengthened.

Stop-work orders recommended

In another of the three recommendations in the report, the GAO said the energy secretary should direct ORP to use its authority to stop work in areas in which quality assurance problems are recurring.

Work should not restart until the office's experts can verify the problems are corrected and will not recur, the report said.

In December 2012 the ORP vitrification plant engineering division recommended that all activities affecting engineering design, construction, and installation of components be stopped because it could not be verified that completed work met quality and safety requirements for handling nuclear waste, the GAO report said.

Stopping work would help DOE avoid future nuclear safety and quality compromises and substantial rework, according to the engineering division.

Instead of stopping all work, ORP management halted only the work on facilities with the most significant technical challenges.

ORP conducted a comprehensive audit the next year, which resulted in the office having Bechtel begin implementing a management improvement plan to be completed by April 2016.

Bechtel gave a rough estimate in 2014 that the improvement plan would cost more than $1 billion to implement, but the costs of the plan's initiatives have not been tracked, the GAO report said.

Although Bechtel reported that implementation of the plan was complete, in fact all corrective measures were not finished, according to information the GAO said it received.

ORP is not scheduled to finish its verification of Bechtel's implementation of the management improvement plan until at least the end of this year.

But ORP officials told GAO investigators that they had not stopped work because they thought the program is generally adequate.

"DOE may face future rework that could increase costs and schedule delays" because the stop-work option has not been used as verification continues, the GAO report said.

Many of the issues cited in the report were complex and required a significant number of corrective actions to resolve, White wrote in her response.

"In all cases, ORP staff has reviewed and evaluated the contractor's compensatory actions and determined that a work stoppage was not warranted," she said.

Full review recommended

The GAO recommended that ORP direct Bechtel to determine the full extent of problems at the vitrification plant.

ORP previously has directed Bechtel to perform evaluations for a number of weaknesses in its quality assurance programs, but it has taken longer than expected, White said.

The GAO report found that Bechtel had not identified all quality assurance problems in structures, systems and components that were completed and installed before the 2012 work stoppage.

The majority of ORP quality assurance experts said they expected rework will be needed at the plant on some pre-2012 work.

But when problems are found through limited sampling of those plant components, a broader look is not ordered, the GAO report said.

ORP quality assurance experts also said that previously identified quality problems are recurring, including in areas where Bechtel had made corrections, the GAO said..

They included purchasing items and services that did not meet requirements or perform as specified, including software, the GAO said.

Bechtel also had not established an adequate maintenance program to prevent damage and deterioration, particularly for parts of the plant where operations will be delayed, the report said. The entire plant is not required to be fully operating until 2036.

DOE now is required to start operating part of the plant to start turning some low-activity radioactive waste into a stable glass form for disposal in 2023. Construction on parts of the plant that will handle high-level radioactive waste have been stopped since 2012.

There have been problems related to the delay in construction with components stored outside and affected by water, sand or animals. There also was a significant water leak at one of the large processing buildings in 2016, the GAO report said.

Bechtel has notified DOE that it will submit a proposal to change its contract to account for the increased cost of long-term maintenance of facilities and systems that will not be needed when low-activity waste treatment starts.

Bechtel had no comment, other than to point out the DOE response to the report.

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U.S. DEPARTMENT OF ENERGY | OFFICE OF ENVIRONMENTAL MANAGEMENT

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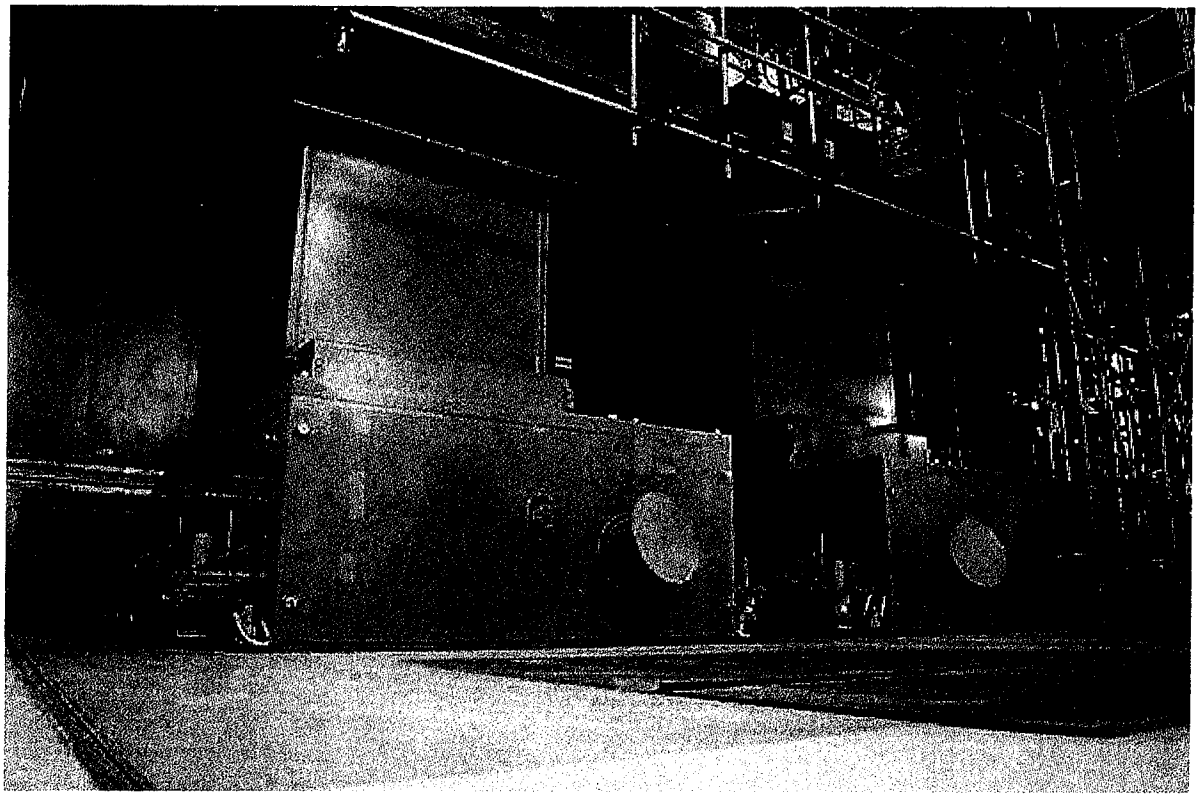
Hanford WTP Contractor Receives 'Satisfactory' Rating for 2017 Performance



The assembly of two 300-ton nuclear waste melters was completed last year at the Low-Activity Waste (LAW) facility of Hanford's Waste Treatment and Immobilization Plant. The melter assembly highlighted key progress at the LAW Facility, which is integral to DOE's Direct Feed Low-Activity Waste approach.

RICHLAND, Wash. – EM's Office of River Protection (ORP) has given Bechtel National (BNI), the contractor for the Hanford Waste Treatment and Immobilization Plant (WTP), an overall "satisfactory" rating for its performance in 2017, according to a recently released award fee

scorecard. While BNI achieved some key performance milestones during the performance period, the scorecard also outlines several areas for improvement.

This is the first award fee determination conducted under the revised contract completed in late 2016 for the WTP Low-Activity Waste (LAW) Facility, Balance of Facilities, and Analytical Laboratory (LAB) work scope.

Within the revised contract, ORP increased the number of performance milestones and realigned award fee, which decreased the total annual award fee available as compared to previous years. BNI will receive about 48 percent of the available award fee, or $3.8 million out of nearly $7.9 million available. In 2016, BNI earned 71 percent of the available fee, or approximately $7.24 million out of an available $10.2 million.

The WTP is intended to process the radioactive waste stored in underground tanks at the Hanford Site through vitrification, which involves combining the tank waste with glass-forming materials and then heating the mixture to 2,100 degrees Fahrenheit. The material is then poured into stainless steel containers, where it cools to a solid glass form for long-term storage.

ORP is focused on achieving the Direct Feed Low-Activity Waste (DFLAW) approach to tank waste treatment as soon as December 2021. DFLAW will use the WTP LAW, LAB, and other ancillary support facilities. These sections of WTP are closer to completion than the two other main sections of WTP — the High-Level Waste (HLW) and Pretreatment facilities.

The scorecard notes that BNI achieved four "construction complete" milestones for the LAW Facility; met EM safety goals for the WTP construction site; and collaborated with ORP to complete the preliminary documented safety analysis to allow construction to resume on the HLW Facility.

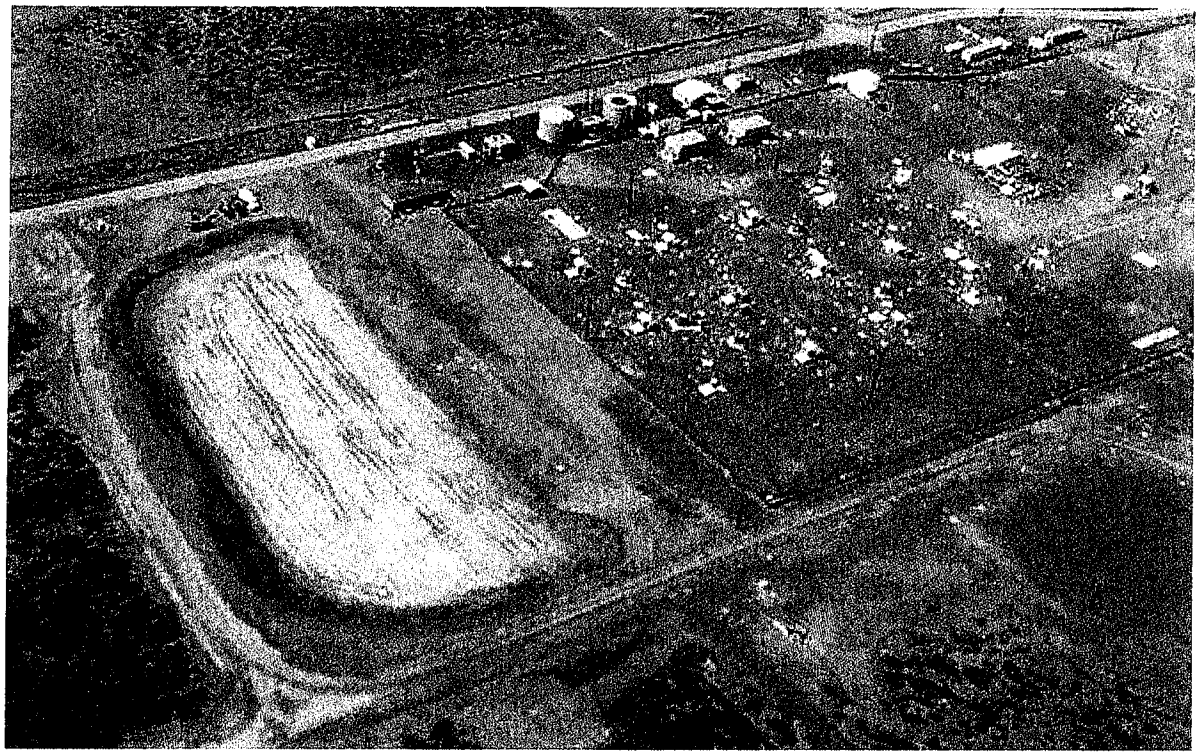
An area of improvement, according to the scorecard, focuses on concerns about BNI's ability to achieve contract milestones related to initial operations.

Each year, EM releases information relating to contractor fee payments — earned by completing the work called for in the contracts — to further transparency in its cleanup program.

The full 2017 award fee scorecard is available here.

-Contributor: Dieter Bohrmann

Hanford Crews Complete First Work Phase for Protective Barrier System



Workers recently finished the SX Farm evapotranspiration basin, shown in light brown. It will collect and evaporate water drained from new interim surface barriers to be installed later this spring over Hanford's SX Tank Farm, shown at the right.

RICHLAND, Wash. – Workers recently finished the first phase of constructing a new protective barrier system for one of Hanford's underground tank waste storage farms.

EM's Office of River Protection (ORP) and contractor Washington River Protection Solutions (WRPS) finished work on a lined evapotranspiration basin — roughly the size of two-and-a-half football fields — to collect and evaporate water drained from new high-density, modified asphalt surface barriers to be installed later this spring over SX Tank Farm.

The interim barriers will help prevent rain and snow melt from intruding into the 15 underground tanks or percolating into the soil and driving existing contaminants closer to groundwater. The barriers are temporary structures to remain in place until a final closure decision is made for the tank farm.

Crews excavated approximately 28,000 cubic yards of earth for the basin, south of SX Farm. They placed a series of drain pipes on a special liner in the basin floor and covered them with

three feet of backfill that was hydroseeded to grow a customized mix of native plants and grasses to help evaporate the water. Hydroseeding is a planting process that uses a slurry of seed and mulch as an alternative to the traditional process of broadcasting or sowing dry seed. WRPS's Environmental Protection group identified plants with relatively shallow root structures that won't extend deep enough to damage the liner.

Another major element of the project was the placement of nearly 800 linear feet of storm water collection piping.

Working with engineering drawings from the 1950s and '60s was a challenge, according to WRPS Construction Manager Jeremey White.

"We found things were close, but not quite where they were supposed to be," he said.

The team used ground-penetrating radar to help locate buried utility lines of all types — electrical, raw water, instrument/dry air, and drain lines. Once lines were found, the team determined the best route for weaving the large 18-inch drainage pipe through the maze of abandoned-in-place and in-service lines.

Advanced planning helped workers to avoid cutting in-service lines, but extensive cutting and capping of abandoned lines was required, with all the necessary safety precautions.

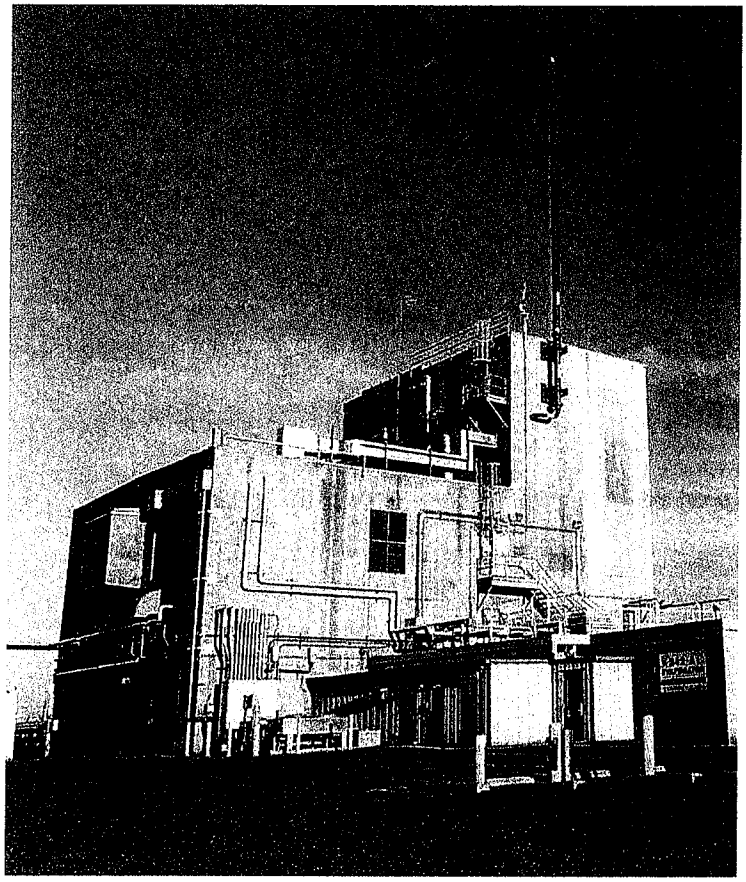
"We were prepared to deal with high contamination, asbestos, and airborne radioactivity," White said.

Workers installed three catch basins, three stormwater vaults, and a wastewater separator. The vaults, designed to handle output from a 100-year flood, weighed nearly six tons each.

"This has been a huge undertaking, and the team has done a great job in overcoming many obstacles as we continue to make progress on this project," ORP Tank Closure Manager Jan Bovier said.

-Contributor: Jerry Holloway

Hanford Completes First 2018 Tank Waste Reduction Campaign



The 242-A Evaporator operations are critical to tank waste management at the Hanford Site.

RICHLAND, Wash. – EM's Office of River Protection and tank operations contractor Washington River Protection Solutions (WRPS) completed the first tank waste volume reduction campaign of the year earlier this month, creating an estimated 166,000 gallons of valuable double-shell tank storage space.

During the 15-day campaign, approximately 900,000 gallons of liquid waste from feed tank AW-102 was transferred to the 242-A Evaporator where it was heated to a boil under a vacuum. Vapor from the boiling waste was collected, condensed, filtered, and sent for later treatment and disposal at the Effluent Treatment Facility (ETF), resulting in the 166,000-gallon tank waste volume reduction. The remaining concentrated waste was transferred back to a double-shell tank.

"The 242-A team responded to a number of required partial shutdown evolutions during this campaign," said Jim Foster, WRPS manager of 242-A/AW/ETF operations. "The professionalism,

abilities, and knowledge of all crews being able to successfully respond to these evolutions is a testament to their dedication and training."

Since the last evaporator campaign in September 2017, crews completed improvements to the facility, including installation of new air conditioning in the evaporator control room, an effluent sampling station, and an upgraded continuous air monitor.

"Evaporator operations are critical to successful tank waste management at the Hanford Site," said Paul Hernandez, ORP 242-A Evaporator program manager. "By reducing the volume of waste stored in double-shell tanks, the process allows the continued transfer of waste from older single-shell tanks into newer double-shell tanks until it can be sent to the Waste Treatment and Immobilization Plant for vitrification."

A second evaporator campaign is planned for June. The evaporator has removed more than 85 million gallons of liquid from Hanford's tank waste since beginning operation in 1977.

-Contributor: Jerry Holloway