Hanford Waste Management Area C WIR Evaluation
10-30-2018 DOE-NRC Teleconference Summary

Department of Energy (DOE) Attendees: Jan Bovier (DOE-ORP)

Nuclear Regulatory Commission (NRC) Attendees: Hans Arlt, Lloyd Desotell

DOE Contractor Attendees: Marcel Bergeron (WRPS), Sunil Mehta (INTERA), Matt Kozak (INTERA), Paul Rutland (WRPS), Keith Quigley (Veolia), Raziuddin Khaleel (INTERA), Doug DeFord (WRPS), Bill McMahon (CH2M Hill), Mike Connelly (TecGeo), DJ Watson (WRPS)

Member of the Public Attendees: Jeff Burright (Oregon Department of Energy)

The following topics regarding NRC's review of the Draft Waste Incidental to Reprocessing (WIR) Evaluation for Closure of Waste Management Area C (WMA C) at the Hanford Site were discussed during an October 30, 2018 teleconference.

The following non-sequential numbering is used to be consistent with the topic listing for the 10-30-18 teleconference on Surface and Subsurface barriers. The individual items discussed was based on staff availability. Items not discussed related to Surface and Subsurface barriers will be covered on a future teleconference.

This teleconference was open to the public. The call in information for this teleconference was posted on the following DOE Hanford webpage:
https://www.hanford.gov/page.cfm/WasteManagementAreaC

Engineered Surface Barrier

6. NRC staff asked about the technical basis to support the assumption that water erosion will not be a significant factor at WMA C barrier. Although some discussion is presented on p. 3-118 of the PA document, additional references may be needed. Potential erosion of the final closure cover was discussed. DOE stated that closure cover has not yet been designed and they are relying on the performance of the prototype cover that has not shown evidence of sideslope erosion over its 15-20 year life. Additionally, DOE stated that they would provide access to DOE/RL-2016-37, which documents over 20 years of studies conducted on Prototype Hanford Barrier.

7. NRC staff suggested DOE conduct a sensitivity case with net infiltration of 3.5 mm/yr over the entire closure period. NRC staff indicated that this simulation would provide insight as to the significance the reduced infiltration the closure barrier provides (the cover is assumed to reduce net infiltration to 0.5 mm/yr for the first 500 years post-closure). DOE staff said that they would consider this suggestion.

10. NRC staff asked if there will be any pipelines or transfer lines, especially plugged ones, not covered by the engineered surface barrier. DOE stated that closure cover has not yet been designed although the DOE staff did mention that the temporary cover would be similar to other intermediate covers in the Hanford Site and include an asphalt layer. Since the area outside of the WMA C is part of a CERCLA operable unit (200-IS-1),

DOE stated that they will provide access to a CERCLA document that discusses the pipelines in more detail.

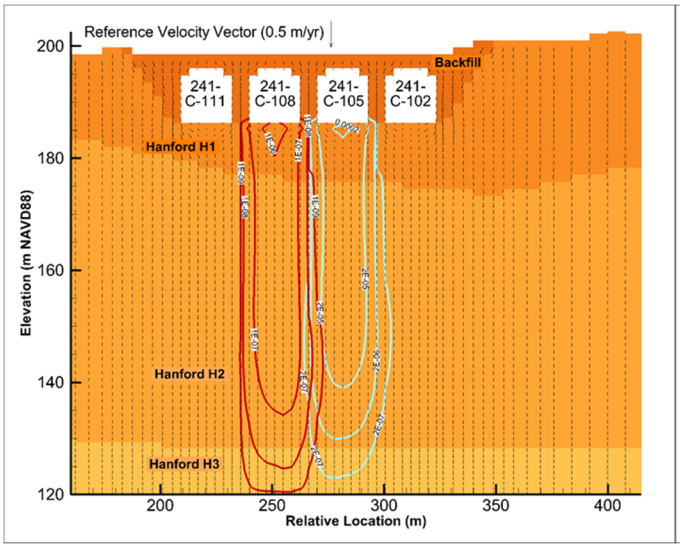
Tank Liner

14. NRC staff asked if any part of the overall performance relies on the Gunite covering inside the tanks. DOE stated that no credit for Gunite is taken in the PA.

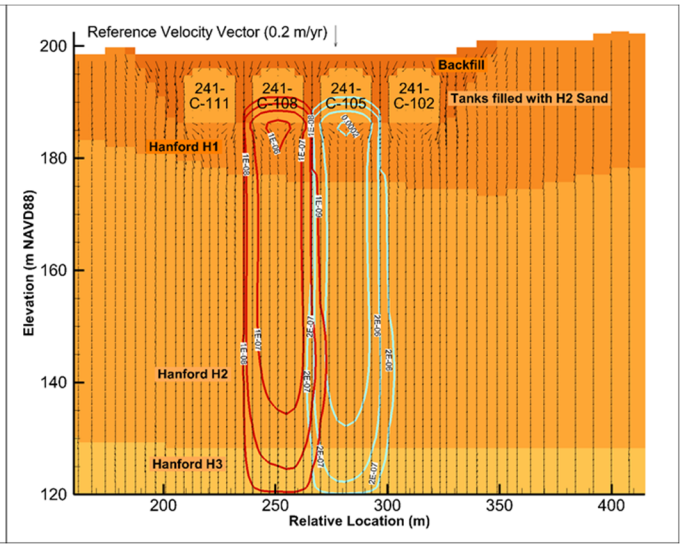
15. NRC staff asked about the potential impacts on performance if a tank carbon steel liner degrades. DOE stated that no credit (physical or chemical) is being taken for the steel liners and that steel corrosion could result in a chemically reducing environment locally that would slow radionuclide transport. DOE stated that due to the relatively dry subsurface conditions, they did not believe the occurrence of a “bathtub” effect was a reasonable scenario. In addition, the PA included the results of a sensitivity simulation similar to the “bathtub” effect as shown on pages 8-107 and 8-108. If the steel liner does degrade and dissolve relatively quickly, DOE staff did not think that the quarter-inch gap would be a fast pathway for contaminant transport since iron oxides and expanding grout would fill in that space. DOE stated that RPP-RPT-4879 Rev 3 and RPP-RPT-55804 provide additional information related to corrosion.

Grout

16. NRC staff asked DOE to discuss how the Darcy flux values were developed for the degraded grout sensitivity cases. DOE stated that the Darcy flux values were derived using a single STOMP simulation. In this STOMP model, the inactive area that in the base case represents the tanks was replaced with the properties of the H2 sand. DOE provided the below figure to aid the discussion and stated that the contrast in the material properties of the H2 sand and the backfill is such that infiltration is primarily diverted around the H2 sand (i.e. degraded tank grout) and into the backfill. DOE stated that flux and moisture content values from STOMP node 73 is used in the GoldSim model (as noted on p. 6-111). Node 73 is approximately 5 m above node 69. DOE stated that the STOMP model was run using the operational case to develop the initial conditions of the H2 sand that represented degraded tank grout. DOE stated that they would provide the GRT4 GoldSim file which was not provided with the other model files.



Base Case Flow Field 1000 years after assumed closure



Grout Degradation Case Flow Field ~ 1000 years after assumed closure

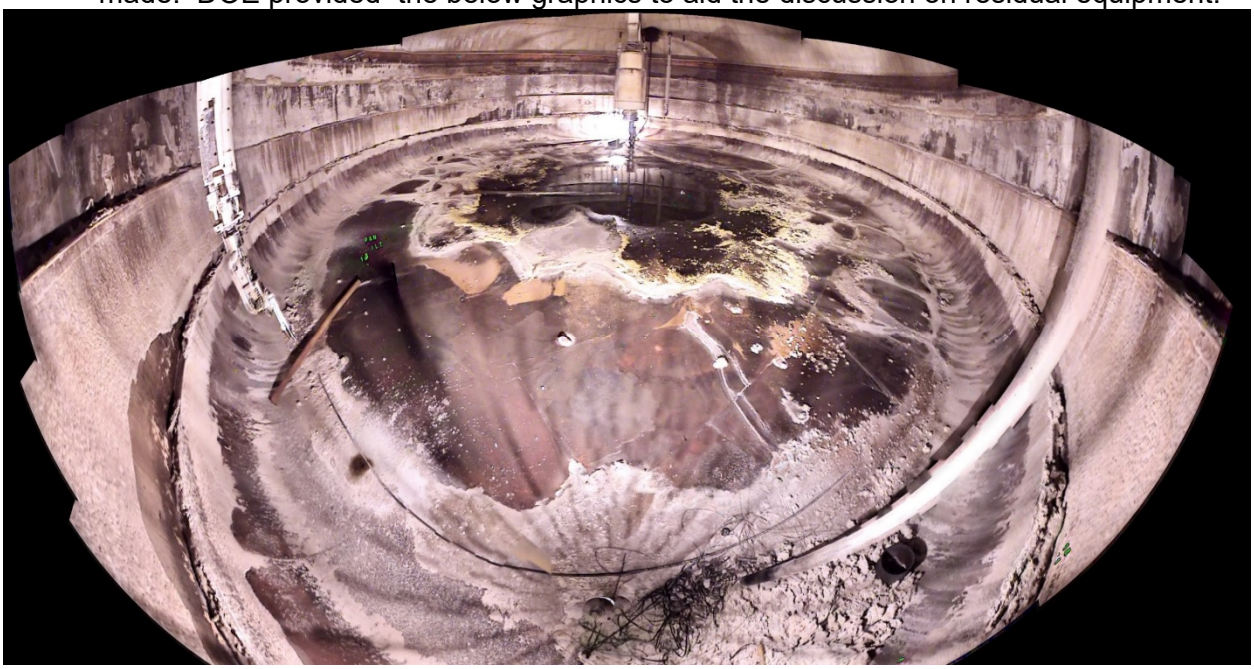
18. NRC staff asked about the technical basis to support appropriate temperature increases and gradients within the grout as it hydrates so as to prevent cracking. Sec. 5.6.1 in RPP-RPT-46879 discusses expected temperature during hydration but provides no additional references. DOE stated that the identified issues are being taken into consideration in the grout formulation planning. The reference for the quoted sentence is WSRC-TR-2005-00195 Rev. 0 (*Summary of Grout Development and Testing for Single Shell Tank Closure at Hanford,* 2005). Section 7.5.1 (Plastic Shrinkage) of that report mentions the calculations performed by ARES Corporation.

19. Sec. 5.6 in RPP-RPT-46879, Rev.3 was discussed. DOE confirmed that the document's statement that the SST PA modeling effort will model the release of the contaminants through the tank wall/sides without the presence of grout modifying the amount of infiltration reaching the waste residuals and leaching the contaminants was no longer correct. DOE and NRC staff clarified the definition of the term "additives" as to mean the supplemental ingredients added to achieve a specific chemical and physical condition. Additives are considered to be something that aids in the application, e.g., a polymer. The current status of the grout formulation development was discussed. DOE stated that current grout formula consists of the basic ingredients cement, fly ash, aggregate, slag and water. DOE reiterated that the final grout formulation was still being developed.

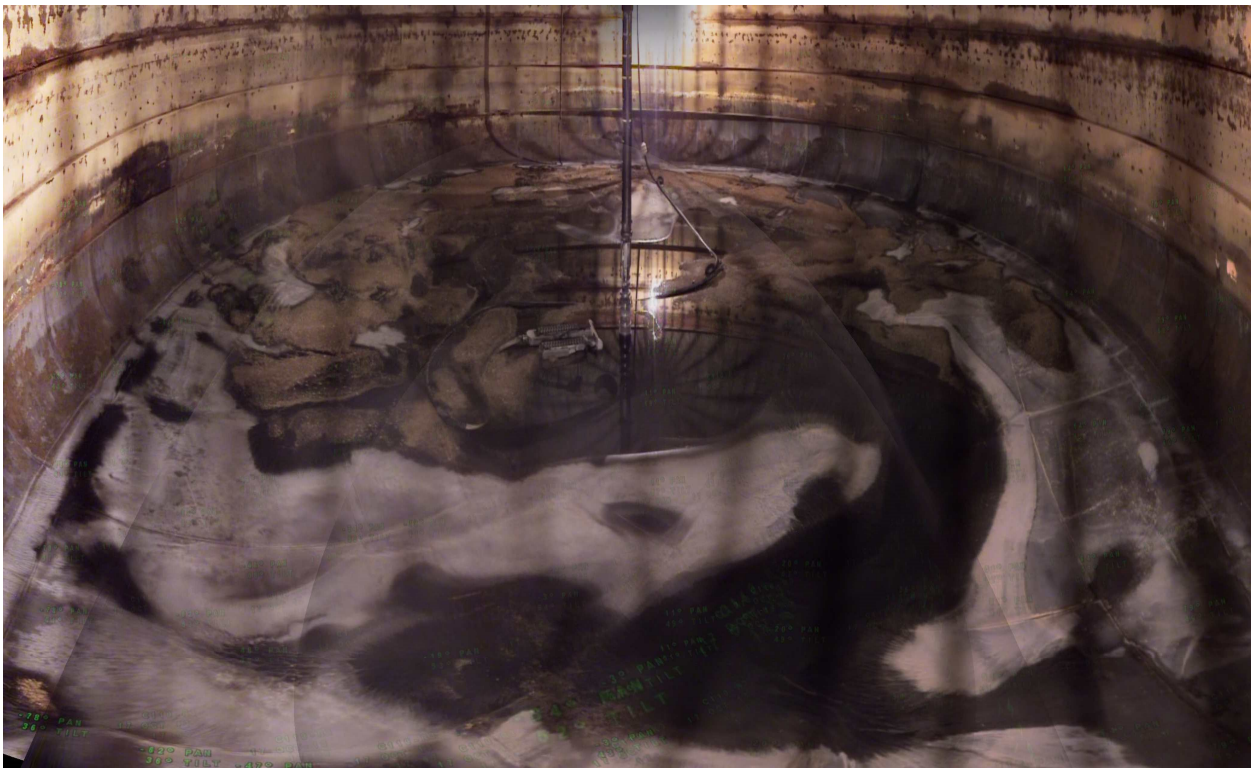
23. NRC staff asked why only 5 m of tank grout is modeled for the atmospheric transport pathway calculations. DOE stated that that the 5 m thickness is a conservative assumption and referred to p. 6-40 of the PA document.

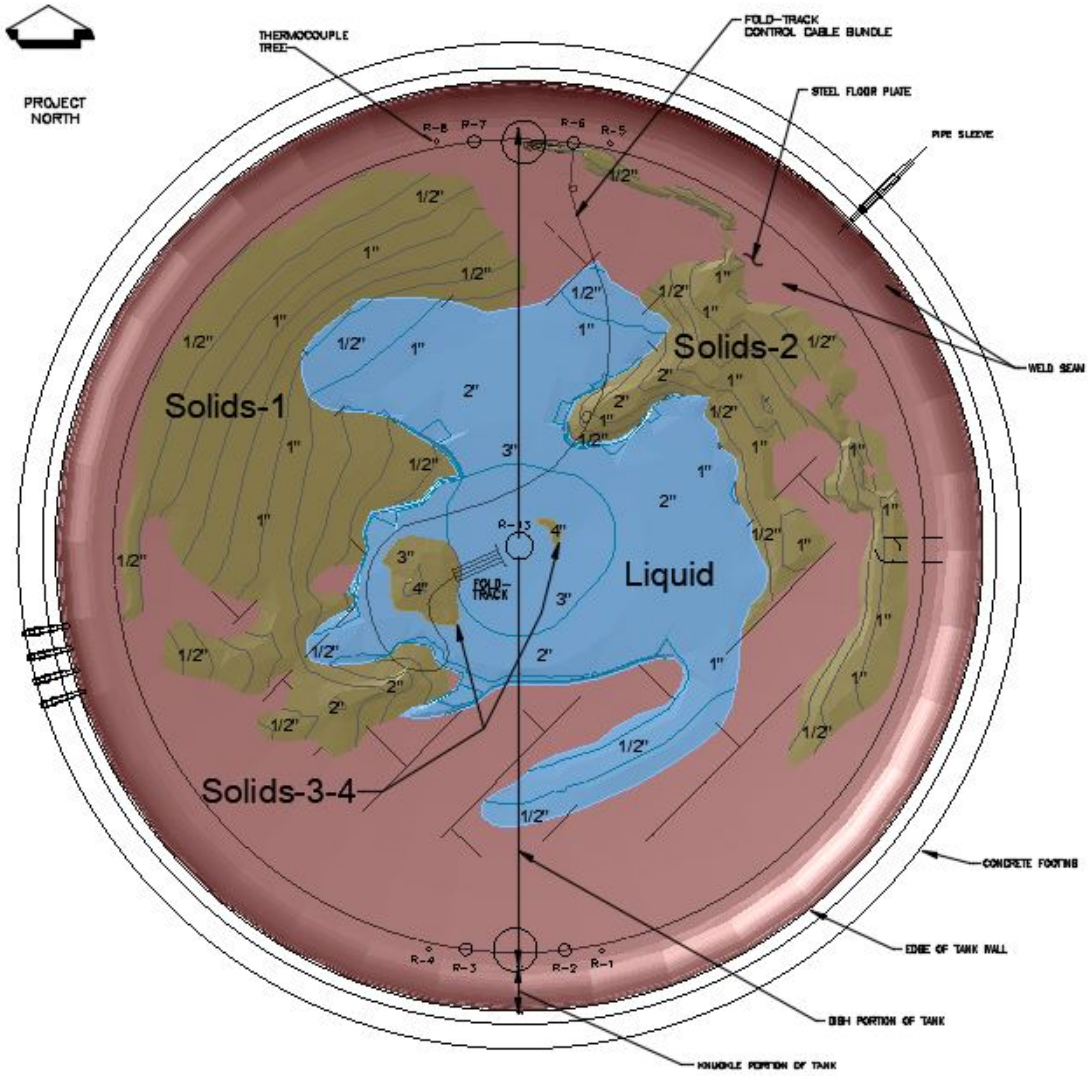
24. NRC staff asked what the moisture content is for the grout and concrete walls/floor throughout the 10,000 year simulation. DOE stated that both the grout and concrete walls/floor are assumed to fully saturated throughout the simulation.

25. The residual equipment that will be left inside the tanks at closure was discussed. DOE stated that most of the items remaining inside the tanks are made of steel and that the remaining equipment represents approximately 0.1 to 0.2% of the tank volume with tank C-105 containing the most residual equipment. DOE would search for further information on the type and shape of the items remaining in the tanks as well as their composition. DOE stated that equipment remaining in the tanks will be taken into consideration at the time of closure and attempts to fill the equipment with grout will be made. DOE provided the below graphics to aid the discussion on residual equipment.



Photomosaic of Tank C-105


Photomosaic of Tank C-110.



CCMS RESIDUAL WASTE SURFACE VOLUME
CONTOUR MAP

Reference: WRPS1805-04_3

- Center ~1 ft. diam/30 ft long pump/riser.
- 2 sluicers in 12-in risers for most tanks
- 8, 4-in risers extend ~1 ft below dome
- Penetrating access pipes
- Fold track and hydraulic hose in C-110
- Other debris in tanks: pipes, floaters, steel tapes, etc.
- C-105 has waste accumulator tank

Total Equipment/Debris Volume Estimate: ~50 to 100 ft^3 per tank
<0.2% of tank capacity for 530,000 gal (70,800 ft^3) tanks.
<0.1% of total volume including dome space.

Additional Photos

27. NRC staff asked how will waste, grout, concrete and steel liner degradation affect vadose zone chemistry and influence performance. DOE stated that past leaks of liquid waste have had some impact to pH and general chemistry but that the majority of those effects are shallow (approximately 20-40 feet below the release). DOE stated that they expect effects to be in the near field due to the buffering capacity of the unsaturated zone and stated that the best evaluation of chemical impacts are contained in PNNL-15503 which relates to releases from tank C-105 and the physiochemical characterization data collected on vadose zone sediment recovered from borehole C4297.

29. NRC staff asked if references were available to accompany Sec. 6.2.1.2.1 in the PA on grout degradation. DOE stated that they would search for those references.

<u>Concrete walls/vault</u>

31. NRC staff stated that the PA document does not discuss degradation of rebar in the concrete sidewalls and basemat. NRC staff asked when rebar is expected to begin degrading. DOE stated that for the base case, rebar is assumed to stay intact for at least 20,000 years, but that rebar degradation is accounted for in the grout degradation sensitivity cases presented in Section 8 of the PA document.

34. NRC staff asked if any of the WMA-C tanks have a leak collection system. DOE stated that the WMA-C tanks do not incorporate a leak detection system in their design.

35. The quality assurance of concrete batches was discussed, specifically how the uncertainty of quality variations between concrete batches during construction is handled. Construction quality assurance may have varied and not been consistent

between the tank farms and maybe even from tank to tank. DOE stated that this uncertainty was handled in the sensitivity analyses and run as a sensitivity simulation.

Action Items

Item Number	Date	Action	Status
9-6.3a	9-6-18	NRC to provide GoldSim run log to DOE	Completed 9-25-18
9-6.3b	9-6-18	DOE to provide NRC with GoldSim model for 400,000 year simulation	Completed 9-27-18
9-6.5	9-6-18	DOE to provide additional details regarding the scaling for other uranium isotopes	pending
9-6.6	9-6-18	DOE to provide the aqueous relative permeability parameters assigned in STOMP model	pending
9-6.8	9-6-18	DOE to provide map showing the location of node 69 in relation to the tank footprint	Completed 10-25-18
9-6.9	9-6-18	DOE to provide a water budget table with inflow at the surface and inflow/outflow at the four aquifer boundaries	pending
9-6.12	9-6-18	DOE to provide the simulated hydraulic heads from the STOMP model for the monitoring wells as seen in Fig. C-11, page C-22	pending
9-6.14	9-6-18	Future presentation on Leapfrog geological model	pending
9-6.15	9-6-18	DOE to check the discrepancy between 580 m^3/d on PA p. C-8 and 730 m^3/d on p. C-12.	pending
10-2.10	10-2-18	DOE to send information on tank specific retrieval technology selection information	pending
10-2.12	10-2-18	NRC to check information in NUREG 1854 on waste classification criterion guidelines	pending
10-2.a	10-2-18	DOE to check posting on website	Completed 10-02-18
10-11.5	10-11-18	Item #5 from the 10-11-18 clarification call list will be revisited next call when Bill McMahon is available.	Completed 10-25-18
10-11.6	10-11-18	DOE will generate a figure that represents the pipeline source area used in the STOMP model.	Completed 10-25-18
10-11.7	10-11-18	DOE will review the discussion of Figure 7-16 on page 7-24 of the PA document and make corrections as needed.	pending
10-11.8	10-11-18	DOE will produce a revised figure showing the early times (0 to 2000 years) for figures 7-15 and 7-16.	Completed 10-25-18
10-11.9	10-11-18	Item #9 from the 10-11-18 clarification call list will be revisited next call when Bill McMahon is available.	Completed 10-25-18
10-11.11	10-11-18	Item #11 from the 10-11-18 clarification call list will be revisited next call when Bill McMahon is available.	Completed 10-25-18
10-11.13	10-11-18	DOE to provide access to WRPS document RPP-ENV-334418 and CH2M Hill Hanford Group Inc. document RPP-32681	Completed 10-11-18
10-11.15	10-11-18	DOE to provide NRC document that discusses how the unsaturated zone is effective at filtering colloids.	pending

10-11.16	10-11-18	DOE to provide access to PNNL document PNNL-15226	Completed 10-11-18
10-11.18	10-11-18	DOE to provide access to Washington Closure Hanford document WCH-520	Completed 10-11-18
10-11.20	10-11-18	Item #20 from the 10-11-18 clarification call list will be revisited next call when Bill McMahon is available.	Completed 10-25-18
10-11.21	10-11-18	NRC will locate the Sr-90 plume map it referenced in Item #21 from the 10-11-18 clarification call list.	pending
10-11.31	10-11-18	DOE will address the typographic errors identified in Item #31 from the 10-11-18 clarification call list.	pending
10-11.9a	10-25-18	DOE will correct the text on p. 8-80 related to the vertical extent of the modeled clastic dike	pending
10-11.22	10-25-18	DOE to provide access to DOE/RL-2015-75	Completed 10-25-18
10-11.26	10-25-18	DOE to provide cross sections shown in Fig. 2.7 in PNNL-13024, and the cross-section G – G' from Fig. B-1 in RPP-RPT-46088, Rev. 2	pending
10-11.30	10-25-18	NRC staff to provide reference (PNNL-16407) to support discussion of y unknown subsurface features	Completed 11-05-18
10-11.a	10-25-18	DOE to provide the most appropriate reference supporting the use of a no-flow bottom boundary in the 3D STOMP model	pending
10-30.6	10-30-18	DOE to provide access to DOE/RL-2016-37	Completed 10-30-18
10-30.10	10-30-18	DOE to provide access to CERCLA documents that relate to closure of the pipelines outside WMA C	pending
10-30.15	10-30-18	DOE to provide access to RPP-RPT-55804	Completed 11-01-18
10-30.16	10-30-18	DOE to provide access to GRT4 GoldSim file	pending
10-30.25	10-30-18	DOE to search for references related to composition and types of equipment that will remain in the tanks at closure	pending
10-30.27	10-30-18	DOE to provide access to PNNL-15503 Rev 1	pending
10-30.29	10-30-18	DOE to search for references for Sec. 6.2.1.2.1 of the PA related grout degradation	pending

Acronyms and Abbreviations

CPGW	Central Plateau Groundwater
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
DOE U.S.	Department of Energy
DOE-ORP	U.S. Department of Energy Office of River Protection
DOE-HQ	U.S. Department of Energy Headquarters
EHM	equivalent homogeneous media
NRC	U.S. Nuclear Regulatory Commission
PA	performance assessment
PNNL	Pacific Northwest National Laboratory
SST	single-shell tank

WIR	waste incidental to reprocessing
WMA	waste management area
WMA C	Waste Management Area C
WRPS	Washington River Protection Solutions, LLC