

**Hanford Waste Management Area C WIR Evaluation
11-08-2018 DOE-NRC Teleconference Summary**

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

Nuclear Regulatory Commission (NRC) Attendees: Dave Esh, Lloyd Desotell

DOE Contractor Attendees: Sunil Mehta (INTERA), Paul Rutland (WRPS), Keith Quigley (Veolia), Doug DeFord (WRPS), Bill McMahon (CH2M Hill), Mike Connelly (TecGeo), Jim Field (WRPS), DJ Watson (WRPS)

Member of the Public Attendees: Jeff Burrig (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 a November 08, 2018 teleconference. These items were not covered in a previous teleconference due to time constraints and as a result the below items have non-sequential numbering.

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>

1. NRC staff indicated that future water usage at the site had been previously covered and did not need to be revisited.
2. DOE's plans for closing and decommissioning wells within WMA C were discussed. DOE stated that plans are in place to close and decommission wells in accordance with Washington State administrative code. DOE stated that the plan requires grouting wells and they believe that it is unlikely that a well exists that they are unaware of.

Topic: Infiltration

3. NRC staff asked if the 100 mm/yr used for disturbed recharge should be considered more of a central tendency rather than a conservative value when rates have been estimated to vary between 40 to 140 mm/yr (see p. 8-8 of the PA). DOE stated that 100 mm/yr is more of a central tendency for tank farm under operations conditions and the term "conservative" could be removed in the document.
4. NRC staff asked why the sensitivity case using a recharge rate of 100 mm/yr shows approximately a 174 yr travel time (see PA Table 8-16), which is much longer than the travel time for past UPR's. DOE stated that this case assumes an effective cover that lasts for 100 years (reducing the recharge to 0.5 mm/yr) and stated that if this 100 year period were eliminated, the travel time would be in general agreement with the travel times associated with past UPR's.

Topic: Engineered Surface Barrier

5. The basis for DOE stating on p. 6-82 of the PA that, “The surface barrier is expected to function comparably to a modified RCRA Subtitle C barrier (Section 3.2.1.2.2), which PNNL-16688 indicates should function similarly to the Prototype Hanford Barrier” was discussed. DOE stated that the modified barrier is expected to have similar materials and thicknesses but fewer layers compared to the prototype and therefore should have similar performance. DOE stated that the top 1 to 2 m of the modified barrier is similar to the prototype barrier and they haven’t observed drainage in the prototype unless enhanced precipitation treatments were applied to the cover. DOE stated that the cover will have to meet the performance requirements presented in the performance assessment. DOE stated they will have a construction quality assurance project plan.

8 and 11. The erosion observed on the prototype cover and its implications to the proposed WMA C cover were discussed. DOE stated that the erosion shown in the photo from PNNL-17176 was due to runoff from a nearby tank farm and not from the cover itself. DOE stated that the precipitation in the area can be characterized as generally low intensity with 6 days per year having 1 inch or more of precipitation (PNNL-15160).

9. NRC staff stated that the performance of the engineered surface cover can’t rely on active maintenance after the institutional control period, which is up to 100 years under the Title 10 of the *Code of Federal Regulations* Part 61 requirements. NRC asked about the animal burrow observed on the prototype cover. DOE stated that the burrow observed on the prototype cover was approximately 2 feet deep and that the barrier design is intended to perform adequately with burrows up to 3 ft deep. DOE stated that document DOE-RL-93-33 Rev 1 lists the requirements for the design of the final cover.

12. NRC staff asked if an asphalt (bitumen) layer will be included in the engineered cover design and what is its long-term durability. DOE stated that a bitumen layer is planned to be included in the design. DOE stated that they believe that asphalt may last more than 1,000 years but that they are not taking credit for its performance. DOE Referenced document DOE-RL-2016-37.

13. NRC staff asked why sand dune formation was not considered as part of the base case. NRC stated that past studies (pp. 3-47 of the PA document) at Hanford show that one of the largest drivers of long-term recharge rates is the fraction of fine-grained sediment in the surface layers. DOE stated that they do not consider dune formation as a likely case because the final cover will be approximately 15 feet higher than the surrounding area. DOE additionally stated that lysimeter studies with dune sand showed recharge below the design criteria during about 6 years of measurements with ambient precipitation.

Topic: Grout

17. NRC staff asked if grout shrinkage was considered in the PA conceptual model. DOE stated that grout degradation was considered within the sensitivity cases. DOE stated that they will try to keep a continuous grout pour to minimize cold joints and that shrinkage will be consideration during the design of the grout.

20. NRC staff asked if DOE has plans to conduct diffusion cell experiments with the actual grout formulation that is selected. DOE stated that the diffusion coefficient used is similar to values in the literature (SRNL-STI-2016-00175). DOE added that they plan to evaluate various aspects of performance during the PA maintenance.

21. NRC staff asked if DOE has determined that the chemical control envisioned can actually be achieved if the grout has very low permeability and diffusivity. DOE stated that they don't have any experimentation on this topic but also don't require reducing conditions within the tank. DOE stated that this type of experimentation could be added to their research and development activities. NRC referenced report by the Center for Nuclear Waste Regulatory Analyses (www.nrc.gov/docs/ML1011/ML101160513.pdf)

22. NRC stated that the tank characterization reports show that water intrusion rates of 1 to 3 m³ per year is relatively common and asked DOE to describe why the PA modeling does not include advective flow while present day observations show flow into the tanks. DOE stated that the voids that allow water intrusion into the tanks will be filled with grout upon closure effectively preventing water intrusion.

26. NRC staff asked DOE to describe the impact of organic substances on key grout properties, or if they haven't been addressed what plans are in place to assess the potential impacts. DOE stated that the amount of grout is large compared to the amount of organic substances that could be present in the tanks. DOE stated that this topic has not been evaluated in their research but that it could be added to their future research and development activities.

28. NRC staff asked if DOE has plans to assess the amount of sulfate in the waste layers and the impact on nearby grout. DOE stated that they have sulfate estimates in PA Table 3-13b. DOE stated that this topic has not been evaluated in their research but that it could be added to their future research and development activities.

30. NRC staff asked if DOE has plans to evaluate alkali-silica reaction (ASR)-type processes if sodium bentonite clay is used in the grout formation for closure. DOE stated that is unlikely to use sodium bentonite clay in this application. DOE added that p 6-19 of the PA document states that a non-reactive quartz sand will likely be used in the grout formulation.

Topic: Concrete walls/vault

32. NRC staff asked DOE how corrosion of the protruding steel had been assessed and incorporated into the conceptual model for tank degradation and near-field flow and transport. DOE stated that other than filling the tanks with grout, this issue is not specifically addressed in the model. DOE added that this issue would be evaluated further during closure.

33. NRC staff asked DOE to describe the integrity of the concrete basemat. DOE stated that they do not have much direct information on the basemat because it is difficult to obtain. DOE stated that grouting should seal any cracks in the tanks. DOE added that as part of their sensitivity analyses, they evaluated grout degradation and flow through the tank.

36. NRC staff asked DOE if alkali-silica reaction (ASR)-type processes for concrete have been evaluated. DOE stated that they have limited information on this topic but that it could be added to their research and development activities.

37. NRC staff stated that testing for carbonation thickness in the dome of C-107 shows an asphaltic layer and asked what was the impact of the asphaltic layer on the carbonation thickness. DOE referred NRC to RPP-RPT-50934.

38. NRC staff asked DOE how the PA model represents advective release from the 244-CR Vault. DOE stated that the vault is treated the same as a tank.

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 10-28-18
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	Completed 11-13-18
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
10-11.9	10-25-18	DOE will correct the test 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 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	Completed 11-09-18
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	Completed 11-09-18
10-30.25	10-30-18	DOE to search for references related to 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	Completed 11-09-18
10-30.29	10-30-18	DOE to search for additional references related grout degradation	pending
11-01.1	11-01-18	DOE to provide reference that supports land use assumptions	Completed 11-09-18
11-01.2	11-01-18	DOE to provide reference that supports the farmer scenario assumptions	pending
11-01.13	11-01-18	DOE stated they would look for a report that describes regional drilling practices	pending
11-01.25	11-01-18	DOE stated they would provide a map showing the pipelines	Completed 11-09-18

11-01.26	11-01-18	DOE stated that the would provide NRC access to RPT-24257	Completed 11-09-18
11-01.28	11-01-18	DOE stated that the would provide NRC access to SD-RE-EV-001	Completed 11-09-18
11-01.39	11-06-18	NRC will search for the figure it referenced regarding low uranium content in Tank C-106	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
INL	Idaho National Laboratory
NRC	US Nuclear Regulatory Commission
PA	Performance Assessment
PNNL	Pacific Northwest National Laboratory
SST	Single-Shell Tank
SRS	Savannah River Site
UPR	Unplanned Release
WVDP	West Valley Demonstration Project
WIR	Waste Incidental to Reprocessing
WMA	Waste Management Area
WMA C	Waste Management Area C
WRPS	Washington River Protection Solutions, LLC