

Hanford Waste Management Area C WIR Evaluation 11-01-2018 DOE-NRC Teleconference Summary

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

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

DOE Contractor Attendees: Sunil Mehta (INTERA), Matt Kozak (INTERA), Keith Quigley (Veolia), Doug DeFord (WRPS), Mike Connelly (TecGeo), DJ Watson (WRPS), Jim Field (WRPS), Benjing Sun (Intera).

Member of the Public Attendees: Jeff Burrigh (Oregon Department of Energy) Tom Sicilia (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 01, 2018 teleconference. Not all the items identified were discussed due to time constraints. These remaining items will be discussed 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>

Exposure Scenarios

1. The rationale for the future land use assumptions was discussed in addition to the procedure to determine when an exposure scenario is not consistent with the reasonably anticipated future land use within the Inner Area of the Central Plateau. DOE stated that the land-use information can be found in the DOE/EIS-0222-F (Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement), which is discussed in Section 1.5 of the PA document.
2. The rationale for assuming the farmer scenario represents the maximally exposed individual was discussed. DOE stated the Tank Closure and Waste Management EIS evaluated several scenarios for the groundwater pathway and found residential farmer was most conservative of those compared. DOE provided following text that supports the assumptions made and the rationale for this decision.

[The resident farmer scenario was developed to calculate the radiological dose to a maximally exposed individual from all exposure pathways for the purpose of performance assessment calculations at the Hanford Site. Conceptually, this agricultural scenario assumes that the resident farmer lives and works at the edge of the Hanford site, inhales the local air, is subject to external exposure to the contaminated ground, and ingests the locally produced vegetables, meat, poultry, egg and dairy products to the maximal level, which could be plausibly sustainable

at the Hanford Site. This “all-pathways farmer” scenario has been applied in many performance assessment and risk assessment projects prior to the WMA C performance assessment. It was described in the *Exposure Scenarios and Unit Factors for Hanford Tank Waste Performance Assessments* (HNF-SD-WM-TI-707 Re. 5, 2007) – among all the exposure scenarios evaluated, the All Pathways Farmer is the most conservative non-Native American scenario. Additionally, the “resident farmer” scenario was developed and described as the most conservative exposure scenario among the four types of receptors considered in the *Final Tank Closure & Waste Management Environmental Impact Statement for the Hanford Site* (DOE/EIS-0391, 2012).]

3. The farmer-type receptor scenarios were discussed. NRC staff indicated that for these scenarios, the assumed infiltration rates should include irrigation that would be applied to the crops. DOE stated that sensitivity cases were run that vary infiltration rates. NRC staff asked where farmers in the region obtain water, DOE replied that it is derived from the Columbia River and groundwater wells. DOE stated that assumptions are discussed in detail in the PA document (page 6-147).
4. NRC staff asked DOE to describe how the exposure scenarios implemented incorporated past experience and site usage. DOE stated that farming was not conducted in the Central Plateau previously. DOE stated that the 1999 Environmental Impact Statement includes a map of farming. DOE stated that previous farming irrigation was conducted via surface water diversions.
5. NRC staff indicated that DOE may want to consider the buildup of contamination in soils from irrigation in their dose modeling for long-term impacts. DOE stated that they looked into buildup during modeling efforts at the Integrated Disposal Facility and the impact was not significant because technetium was the primary contaminant.
6. NRC staff asked if there is any daylighting of groundwater originating in WMA-C at more distant locations prior to mixing with the river. DOE stated that there is no groundwater discharge prior to the river.
7. NRC staff asked if an industrial site use with a farther offsite receptor had been evaluated. DOE stated that they are looking at DOE 435.1 scenarios only but under the CERCLA process various receptor locations are being evaluated.
8. NRC staff asked if there is a need to consider exposure scenarios involving criticality. DOE stated that criticality is not a credible event and cited RPP 7475, Rev 8.
9. NRC staff asked what dose conversion factor DOE uses to convert radon flux to dose. DOE stated that they are required to follow DOE standards which excludes radon flux from all pathways doses.

Inadvertent Human Intruder (IHI)

10. The probability of intrusion was briefly discussed as NRC staff believed the discussion around intrusion probability lacked adequate basis. DOE stated they are not applying a probability approach.
11. NRC staff asked DOE to provide the basis that the intruder is an extremely unlikely scenario over the next 1,000 years and therefore below regulatory concern. DOE stated that is not below regulatory concern and they are attempting to provide the analysis suggested in NUREG-1854.
12. NRC staff asked DOE to describe why an intruder would put in a drinking water well but then not use any water from it in the dose assessment? DOE stated that the impacts to drinking water would be later after closure and the intruder dose is earlier after closure.
13. NRC staff asked DOE to provide the basis that grout is a deterrent to well drilling. DOE stated they would look for a report that describes regional drilling practices. NRC staff indicated that NUREG 1854 allows credit for tanks to provide a deterrent to well drilling for 500 years but for longer periods of time that protection becomes more speculative and a basis should be provided.
14. NRC staff asked DOE to confirm the dose calculation presented in Figure 9-15 of the PA document. DOE stated they confirmed Figure 9-15 is correct with a hand calculation.
15. NRC staff asked DOE to describe the depth to waste from the current land surface for the tanks, pipelines, and all ancillary equipment that is included within the scope of the assessment. DOE stated that the cover design is not complete but that the assumption is that at least 5 m of material will be over all components such that the excavation scenario is not credible.
16. NRC staff asked if DOE included radon flux into a basement for an inadvertent intruder. DOE stated that radon flux had only been calculated at the land surface.
17. NRC staff mentioned that to put the intruder results in context, it may be useful to show the intruder risk from unplanned releases. DOE stated it is not a regulatory requirement for WIR.

Radionuclide Inventory (Ancillary Equipment)

18. NRC staff asked DOE about the differences in the number of pipelines identified in RPP-PLAN-47559, Rev. 0 and Rev 1. DOE stated that the method to count pipeline segments may be different but that the pipeline diameters and lengths as presented in Appendix A are the same in both documents.

19. NRC staff asked what constitutes failed pipelines as referenced in RPP-PLAN-47559, Rev 1. DOE stated that failure is a pipeline that has leaked or has a breach of integrity which could be determined by a pressure test.
20. NRC staff asked DOE how many abandoned pipelines are within WMA C. DOE stated that all of the pipelines within WMA C are abandoned now or will be abandoned at closure.
21. NRC staff asked if 3 inches is the correct diameter for the V122 pipeline. DOE stated 3 inches is the correct diameter, and that most pipelines were 3 inches in diameter but that there were larger diameter pipelines in the WMA C including one 30-in pipeline. DOE staff referred to Appendix A of RPP-PLAN-47559, Rev. 1.
22. NRC staff asked DOE to discuss what activities have been planned or undertaken to justify the assumption that the pipelines have 5% residual waste by volume. DOE stated that the lines were routinely flushed during operations and they may do additional work to verify waste volume during closure activities.
23. NRC staff asked DOE why is the 5% by volume assumption appropriate for partially plugged pipelines. DOE stated that lines that could be partially plugged (i.e., cascade lines) were assumed to be full (p. 3-154 of the PA document). Furthermore, the uncertainty in the waste activity and volume is included in the uncertainty analyses.
24. NRC staff asked why it is appropriate to assign the present-day average waste concentrations of isotopes to pipelines. DOE stated that analytical packages are only available for post retrieval of tanks and that the values are chosen to represent an average of all the pipelines. DOE stated the rationale is presented on page 3-154 of the PA document.
25. NRC staff asked if DOE could provide a map showing the locations within WMA C of the eight assumed plugged cascade lines and the V122 pipeline. DOE indicated that they would provide a map.
26. NRC asked DOE to describe how the sludge volume was estimated for the tanks in 244-CR because some of the tanks were used for precipitation processes. DOE stated that the CR-vault volumes are from surface level measurements including sludge weight level and zip cord measurements and video assessment (RPP-RPT-24257).
27. NRC staff asked about the inventory in the 244-CR vault sump and what the sump is connected to. DOE indicated each of the four cells in the 244-CR vault has a concrete

sump with a volume of 45 gallons. The sump is not connected to another part of the system. It has to be pumped out with a submersible pump and the inventory is based on level measurements.

28. NRC staff referred to a picture of 241-C-151 diversion box from 1985 in RPP-RPT-46879, Rev. 2 (p. 3-8) and asked about one of the assumptions in Sec. 3.2.2.1 (p. 3-121) in the PA that states: “It was assumed that the waste was or will be flushed from pits and diversion boxes...” DOE stated that the “will be” text should be removed from the PA. DOE stated that the diversion boxes will be inspected in the future using a camera. DOE stated they would provide document SD-RE-EV-001 which provides additional information on why DOE believes the diversion boxes currently contain no radionuclides except for radionuclides that have seeped into the concrete structure.

29. NRC staff asked DOE if it is assumed that diversion boxes will be flushed and have minimal inventory. DOE stated their assumption is that the diversion boxes have been flushed and that further evaluation will be conducted during closure activities.

30. NRC staff also asked why a 3-in diameter pipeline was used to represent the pipelines for the intruder scenario in the PA when the average pipeline diameter is up to 4.262 in. DOE stated that the most common pipeline diameter was 3-in and therefore that was deemed most representative. However, if the average pipeline diameter value was chosen, it would only have a marginal effect. NRC staff asked from p. 9-9 of the PA document, what is the thickness of waste intercepted by borehole (Z_{ws})? DOE assumes that the 5% waste in the pipelines has been mixed with clean soil before it was brought to the surface by the hypothetical driller so that it is 3-in thick.

31. NRC staff asked if the potential for leaks from the piping to the encasements but not to the environment had been assessed. DOE stated they don't know what is retained inside the encasements which are basically concrete troughs. DOE stated their best information is presented in the leak assessment report. They know some pipes have leaked into the encasements.

Action Items

Item Number	Date	Action	Status
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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	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
10-11.9a	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	Completed 11-9-18
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 11-9-18
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 11-9-18
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 and the procedure for determining which exposure scenarios will be evaluated	Completed 11-9-18
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 eight assumed plugged cascade lines and the V122 pipeline	Completed 11-9-18
11-01.26	11-01-18	DOE stated that would provide NRC access to RPT-24257	Completed 11-9-18
11-01.28	11-01-18	DOE stated that would provide NRC access to SD-RE-EV-001	Completed 11-9-18

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