Hanford Waste Management Area C WIR Evaluation
11-27-2018 DOE-NRC Teleconference Summary

Department of Energy (DOE) Attendees: Sherri Ross (DOE-HQ), Jan Bovier (DOE-ORP), Rod Lobos (DOE-ORP)

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

DOE Contractor Attendees: Sunil Mehta (INTERA), Matt Kozak (INTERA), Paul Rutland (WRPS), Doug DeFord (WRPS), Marcel Bergeron (WRPS), David Watson (PNNL), Mike Connelly (TecGeo)

Member of the Public Attendees: none

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 27, 2018 teleconference. The topics were continued from a previous call and therefore the below numbering sequence begins with items 13 and 14 and then continues on from item 22. DOE displayed several graphics during this meeting using the GoToMeeting software program. While the intent was for this teleconference be open to the public, the call in information was inadvertently not posted on the DOE Hanford webpage (https://www.hanford.gov/page.cfm/WasteManagementAreaC) prior to the call time.

Topic: Results of Analysis, Sensitivity Analyses, and Uncertainty Analyses (continued)

13. NRC staff asked why, as shown on PA Figure 7-23, the plume in the southern corner of WMA C increased tenfold from 0.01 to 0.1 pCi/l from 500 to 1000 yr while other areas underneath the same modeled pipeline source area, e.g., east of tank C-110, saw concentrations remain below 0.005 pCi/l. DOE staff reproduced PA Figure 7-23 with a lower contour interval and discussed that figure with NRC.
14. NRC staff asked if DOE could reproduce PA Figure 7-24 with the visual model results of groundwater concentrations down to 0.0005 pCi/l (see Fig. 7-22). DOE staff reproduced PA Figure 7-24 with 0.0005 pCi/l concentrations and discussed that figure with NRC.

22. NRC staff asked DOE to explain the basis for assigning the range to unsaturated zone hydraulic properties and if these properties are correlated. DOE stated that the property assignments are based on a large, internally-consistent data set. DOE stated that they looked at the correlation of parameters as presented on PA page 8-26 and that they tried to preserve these correlations in their parameter selections.
23. NRC staff asked if the stability of the probabilistic dose curves has been demonstrated and NRC staff asked DOE to provide the peak values for the different sets of realizations from PA Figure 8-32. DOE stated that they could provide the values and that simulations with greater than 500 realizations could be conducted if needed.
24. NRC staff asked why was it necessary in RPP-CALC-60793 to reduce the groundwater flux to the 10th percentile value to obtain a reasonable approximation of the timing and magnitude of Tc-99 arrival in most of the monitoring wells surrounding WMA C. DOE

stated that for these simulations, they were primarily focused on unsaturated zone transport. DOE added that historically the gradients were transient due to water disposal but that these simulations assume a constant groundwater gradient. DOE stated that the historical water balance is somewhat uncertain which makes the modeling the saturated zone flow and transport challenging.

25. NRC staff asked DOE if any sensitivity analyses have been performed that vary the unsaturated zone/saturated zone thicknesses at WMA C, or the effective porosity. DOE stated that sensitivity analyses for these parameters were not conducted directly. DOE stated that uncertainty in these parameter is accounted for in the changes in the flux parameters. DOE added that the uncertainly in effective porosity is small compared to the uncertainty in other parameters.
26. NRC staff asked DOE if frames c and d of PA Figures 7-9 (p. 7-14) and 7-10 (p. 7-15) indicate that the shadow effect of the tanks does not extend very deep. DOE stated that the shadow effect for the 100 series tanks is minimal after 5 m and less than 5 m for the 200 series tanks because they are smaller.
27. NRC staff stated that the point of calculation segments in PA Figures 7-11 and 7-24 do not appear to be aligned along the centerlines of the plumes originated from the lines of 100 series tanks which are parallel to the direction of groundwater flow as stated on page 7-16. DOE stated that the appearance of a shift in the alignment could be due to the perspective of the figures.
28. NRC staff asked DOE if the lengths of the point of calculation segments (~30 m long) effect the dose results. DOE stated that this width was selected based on DOE guidance which suggests using the width of the facility. DOE added that if a smaller segment were used, the peak concentration may be slightly higher.
29. NRC staff indicated that PA Page 8-30 states that, “Even though the hydraulic gradients are likely to remain very small (around 10^{-5} m/m) as the water table declines in the future, current monitoring has indicated that gradients can vary by a factor of two, due to Columbia River stage fluctuations and interconnections to the aquifer in the Central Plateau.” NRC staff asked if this factor of two should be accounted for in the triangular distribution. DOE stated that they varied the Darcy flux because it captures the uncertainty in both the hydraulic conductivity and the gradient. DOE added that the uncertainty in the hydraulic conductivity is larger than the uncertainty of the gradient and was therefore the focus. NRC indicated that the uncertainty in the gradient should be accounted for also. DOE stated that uncertainties in the gradient could be explicitly addressed if needed but believe that the uncertainty range in Darcy flux already includes these effects.
30. NRC staff stated that the labeling for sensitivity cases inv1 and inv2 are frequently interchanged, e.g. PA Figure 8-47 and Table 10-6. DOE stated that the labeling for inv1 and inv2 are inconsistent and need to be corrected. In addition, NRC staff asked where the results for sensitivity case inv1 (Table 8-15) are presented. DOE indicated that some of the sensitivity modeling results using the 2012 TC&WM EIS estimated inventory values could be found in Appendix G.
31. NRC staff asked why the dose from tank C-301 is always higher (see PA Table 9-7) than the CR Vault when the Tc-99 inventory is about the same (see PA Table 3-15a). DOE stated that the base area for C-301 is smaller (resulting in larger thickness of the waste compared to CR Vault) and therefore has a higher dose.

32. NRC staff asked DOE to explain the results of the 25th percentile in PA Figures I-1 thru I-3 in Appendix I. NRC staff also asked DOE why are there such variations in vertical Darcy flux between percentiles in Fig. I-3(a). DOE stated that the percentiles here refer to percentiles in the vertical pore-water velocity (and not Darcy flux). The vertical pore-water velocity is calculated by dividing the Darcy flux (e.g., Figure I-1a) by the volumetric moisture content (e.g., Figure I-1b) to calculate vertical velocity shown in Figure 1-1c. DOE also stated that Figures 8-14 and 8-15 (p. 8-39 and 8-40) provides additional information on water velocity for the hydrostratigraphic units.

Topic: Miscellaneous

33. NRC asked DOE to explain some of the relatively higher moisture contents between H1 Gravel and H2 Sand in PA Figure 6-61 (p. 6-163). DOE stated that the difference is very small and may be a function of differing material types as well as contouring effects.
34. NRC asked DOE to provide the reference for the Henrys Law coefficient used for I-129. DOE stated that the reference is provided in the PA document p.6-123 in Section 6.3.2.5.
35. NRC asked DOE if there are there any differences in the concrete between sidewall concrete and base mat concrete as seen in PA Figure 3-46 (p. 3-110). DOE assumes the concrete is the same and stated that the construction specifications do not indicate any differences. DOE added that the base mat and sidewalls were constructed within approximately 2 months of each other and that the primary information they have on the base mat is photographs.
36. NRC asked DOE if there is any known or assumed waste between the liner and the backfill. NRC asked if there is uncertainty regarding the presence of waste between the liner and backfill, have any relevant sensitivity analyses been performed. DOE indicated they don't have information that waste is between the liner and the backfill and therefore assumes that there is no waste in this region. DOE stated that the sensitivity case (GRT4) where tank is assumed to be degraded at closure provides the bounding results.
37. NRC stated that the box model for air doses using average wind speed can result in excessive dilution if releases to the air are continual and the contaminant release is not driven by the wind. NRC asked DOE to explain how the box model is conservative or representative for the contaminants being released in the Hanford PA. DOE indicated they understood the concern but that air doses are a minimal contributor and therefore the modeling approach should not change the conclusion. DOE stated that the calculations are performed in a conservative manner as presented in Appendix E.
38. NRC asked DOE to explain the basis for spreading the cuttings over a 5,000 m^2 area for the rural pasture scenario. DOE stated that this area was based on DOE dose modeling guidance and it maximizes the amount of food that is contaminated.
39. NRC asked DOE to explain the basis for spreading the cuttings over a 647,000 m^2 area for the commercial farm scenario. DOE stated that this area is assumed so that the entire crop area is covered.
40. NRC asked DOE to explain why the mass loading and soil ingestion rates assigned are appropriate for an arid site and the particular practices that are taking place. DOE stated they selected the values based on literature (standard references) and do not have site specific data.

41. NRC asked that DOE verify that the calculations for the amount of waste assigned to the driller scenario that is dispersed in cuttings. DOE stated that they would review the calculations.

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 9-25-18
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	Completed 4-11-19
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.	Completed 4-10-19
10-2.10	10-2-18	DOE to send information on tank specific retrieval technology selection information	Completed 4-10-19
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.	Completed 4-11-19
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.	Completed 4-10-19
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 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	Completed 11-15-18
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	Completed 4-11-19
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	Completed 4-11-19
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	Completed 4-11-19
11-01.13	11-01-18	DOE stated they would look for a report that describes regional drilling practices	Completed 4-2-19
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	Completed 4-10-19
11-15.13	11-15-18	Revisit this item on the following call	pending
11-15.14	11-15-18	Revisit this item on the following call	Completed 11-27-18

Note: If NRC staff determines information related to any "pending" action items is potentially risk-significant, that information will be requested through a Request for Additional Information.

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
FEP	Features, Events, and Processes
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