

February 22, 2011

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SUBJECT: JANUARY 25-27, 2011, PUBLIC MEETING SUMMARY:
MEETING REGARDING HANFORD WASTE MANAGEMENT
AREA C PERFORMANCE ASSESSMENT WORKING SESSION:
NUMERICAL CODES AND MODELS

On January 25-27, 2011, representatives from U.S. Department of Energy-Office of River Protection (DOE-ORP), DOE Richland Operations Office (DOE-RL), DOE-Headquarters (DOE-HQ), the Washington State Department of Ecology (Ecology), the U.S. Nuclear Regulatory Commission (NRC), State of Oregon, Environmental Protection Agency (EPA), and representatives of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Nez Perce Tribe, and Yakama Nation met at the Ecology offices in Richland, Washington.

DOE is pursuing closure of Waste Management Area (WMA) C located at the Hanford Site. At some point in the future, DOE and NRC will consult on waste determinations for these tank closures; additionally these tanks will be closed in coordination with EPA and Ecology in accordance with the Hanford Federal Facility Agreement and Consent Order – Tri-Party Agreement and State-approved closure plans. This meeting was the tenth in a series of

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technical exchanges on the proposed inputs for a WMA C Performance Assessment (PA). The technical exchanges are intended to capitalize on early interactions between the agencies with a goal of developing DOE's WMA C PA. Technical discussions during the meeting are intended to allow for the clarification of general modeling approaches and for the identification of other specific questions.

Enclosed is the meeting summary, and attached are the meeting agenda, NRC comments on the meeting documents, and WMA C Scoping Meeting Schedule.

Enclosure: As stated

Docket No.: PROJ0736

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OFC	DWMEP:PM	DWMEP:TR	DWMEP:LA	DWMEP:BC	DWMEP:PM
NAME	DLowman	HArt	AWalkerSmith	KPinkston for CMcKenney	DLowman
DATE	02/16/11	02/16/11	02/17/11	02/17/11	02/22/11

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Hanford Scoping Meeting Summary – Numeric Codes and Models January 25-27, 2011

This enclosure provides a background of the work being performed at Hanford and a summary of the scoping meeting. Attachments include the meeting agenda, NRC comments on meeting documents, and a list of past and upcoming scoping meetings.

Background:

The U.S. Department of Energy's (DOE) Hanford Site sits on 586-square-miles in the desert of southeastern Washington State. The area is home to nine former nuclear reactors and their associated processing facilities that were built beginning in 1943. The reactors were used to produce plutonium which was needed for atomic weapons associated with America's defense program during World War II and throughout the Cold War.

The Hanford reactors produced plutonium from 1944 until 1987. The processes required to transform raw uranium into plutonium generated 53 million gallons of liquid waste which is stored in 177 underground tanks.

In 1989, the DOE joined with the Washington State Department of Ecology and the U.S. Environmental Protection Agency (EPA) in signing the Hanford Federal Facility Agreement and Consent Order more commonly known as the Tri-Party Agreement (TPA). This document outlines legally enforceable milestones for the Hanford cleanup over the next several decades. The TPA is a living document that is regularly reviewed to confirm completion of milestone requirements or to make adjustments in scheduled dates when milestones are to be completed.

There are two local DOE offices associated with Hanford cleanup. The Richland Operations Office (RL) oversees the projects associated with cleaning up the reactors, soil, groundwater, and solid waste burial sites. RL also manages the demolition of facilities, and the disposition of the remaining plutonium left on the Hanford Site. The Office of River Protection (ORP) is the agency tasked with managing the liquid and semi-solid nuclear and chemical waste that is currently stored in the 177 underground tanks on the site. ORP is also in charge of constructing the Waste Treatment Plant, a complex of structures located in central Hanford that will vitrify the wastes from these tanks creating a stable waste form. The vitrified waste is currently planned to be safely stored in a permanent repository away from Hanford. Some of the vitrified waste may also be stored at the Integrated Disposal Facility on site.

Enclosure

Meeting Summary:

The scoping meeting was held in Richland, Washington at the Ecology offices on January 25-27, 2011. The meeting consisted of the following sessions:

- Update on Characterization Efforts in WMA C.
- Role of Subsurface Geophysical Exploration (SGE) in Tank Farm Characterization.
- Updates from Previous Sessions and Review of Alternative Modeling Approaches.
- Overview of STOMP and GoldSim Capabilities, Proposed Modeling Approach and Scope.
- Tank Closure and Waste Management Environmental Impact Statement (TC & WM EIS) Results Relevant to WMA C.
- Role of Uncertainty and Sensitivity Analysis in Initial Performance Assessment. (PA.)

NRC attendees at the meeting were Christopher McKenney, Hans Arlt, and Donald Lowman. Additionally, Brooke Traynham and Christopher Grossman attended via webcast. Major items from the meeting are as follows:

- Participants were notified of an internal decision at the DOE to delay work on the numerical analysis and modeling in support of the PA until the Environmental Impact Statement (EIS) for WMA C is finalized by the state. The EIS was originally scheduled to be finalized in March 2011 but now is projected to be completed in November 2011. The overall schedule of emptying the tanks in 2014 and closing the tank farm in 2019 will not be affected by this delay but scheduled modeling work for this year will be pushed out to the first quarter of 2012.
- State of Washington (Ecology) needs a schedule to show EIS delay will not affect Tri-Party Agreement closure schedule. DOE to provide schedule.

NRC Meeting Comments:

- With the extra time available from the delay in the EIS, the DOE should work more on integrating and completing the Features, Events, and Processes (FEPs) process. The current FEPs are not integrated into the documentation. FEPs need to be well documented and defensible. What FEPs are used and not used needs to be documented along with why they are being used or not used.
- A stratigraphic dip merges with the groundwater layer outside the fence line so it would be better for the model to extract water outside the fence line to ensure maximum concentration.

- More information on the abstraction process is needed from the process level model to the system level model.
- More detail should be provided for the bottom of the tanks in FEPs (e.g. relationships to grout, waste, liner, concrete, etc.)
- A spreadsheet is currently being maintained by ORP that is updated regularly. The spreadsheet contains data to be used in the modeling. Recommend that information should be added to the spreadsheet to link the data to the model.
- Porosity should be considered in the sensitivity analysis.
- The summer meeting placeholder on the schedule should be used to go over FEPs and modeling.
- When putting together FEPs lists the group needs to reach out to experts in the applicable fields; currently the group is only using ideas of meeting participants.

The next scoping meeting is scheduled for May 17-19, 2011 and will cover Ecological Risks (and possibly FEPs).

Attachments:

- Attachment 1. Meeting Agenda
- Attachment 2. NRC Comments on Meeting Documents
- Attachment 3. WMA C Scoping Meetings Schedule

**Final Agenda for WMA C PA
Numerical Codes and Models Working Session
January 25-27, 2011
Ecology's Office, Richland WA**

Jan 25 am	Introductions, Goals and Objectives - Numerical Codes and Models, Characterization Updates, Overview of SGE. Previous Independent Evaluation of SST-PA
8:00 am	Refreshments
8:15 am	Introductions (C. Kemp/S. Eberlein/T. Martin)
8:30 am	Goals and Objectives of Numerical Models and Codes Working Session (S. Eberlein)
8:45 am	Update on Characterization Efforts in WMA C (M. Connelly)
9:30 am	Break
9:45 am	Role of SGE in Tank Farm Characterization (D. Rucker, HGI)
10:45 am	Independent Evaluation of Initial Single-Shell Tank System Performance Assessment Results (Jim Wulff, Tetra Tech)
11:30 am	Lunch
Jan 25 pm	Updates from Previous Sessions and Review of Alternative Modeling Approaches
12:45 pm	Updates on Alternative Leak Volumes and Soil Inventory Estimates (S. Sobczyk/D. Bernhard Nez Perce)
1:45 pm	Updates on Previous Sessions & Open items (M. Bergeron)
2:00 pm	Context of Proposed Technical Approach and Scope (M. Bergeron)
2:15 pm	Break
2:30 pm	Review of Alternative Modeling Approaches and Recommendations for PA (Portage/Neptune Team)
3:15 pm	Selection of Process and System Model Software (Portage/Neptune Team)
4:00 pm	Adjournment
Jan 26 am	Overview of STOMP capabilities, Proposed Modeling Approach and Scope
8:00 am	Refreshments
8:15 pm	Overview of Development and Capabilities of STOMP Code (M. White, PNNL)

9:30 am	Break
9:45 pm	Overview of Proposed Technical Approach (Portage/Neptune Team)
10:15 am	Proposed Model Design and Scope - Pre-Closure Period (Portage/Neptune Team)
11:30 am	Lunch
Jan 26 pm	Proposed Modeling Approach and Scope (continued)
12:45 am	Options for Analysis of Soil Inventory Uncertainty (Portage/Neptune Team)
1:30 pm	Proposed Model Design and Scope- Post-Closure Period (Portage/Neptune Team)
2:00 pm	Engineered System - Recharge (Portage/Neptune Team)
Jan 26 pm	Proposed Modeling Approach and Scope
2:15 pm	Break
2:30 pm	Engineered System - Waste Release (Portage/Neptune Team)
2:45 pm	Vadose Zone/Groundwater Flow and Transport (Portage/Neptune Team)
3:15 pm	Use of GOLDSIM in Initial PA (Portage/Neptune Team.)
4:00 pm	Adjournment
Jan 27 am	TC & WM EIS Update, Uncertainty and Sensitivity Analysis, Working Session Close-out/Feedback, Look Forward to Upcoming Working Sessions
8:00 am	Refreshments
8:15 am	Review of TC&WM EIS Results Relevant to WMA C (TC & WM EIS team)
9:30 am	Break
9:45 am	Role of Uncertainty and Sensitivity Analysis in Initial PA- (Portage/Neptune Team)
10:45 am	Numerical Codes and Models (Open Discussion and Q&A)
11:30	Lunch
12:45 pm	Review of Consensuses and Notes (T. Martin)
1:00 pm	Working Session Feedback (T. Martin)
1:15 pm	Look Forward to Upcoming Working Sessions (S. Eberlein)
1:30 pm	Final Adjournment

NRC Comments on Meeting Documents

Document RPP-RPT-48490, Revision 0

Section 3.0, p. 3-3:

- The definition of ‘*Uncertainty Analysis*’ on page 3-3 is somewhat confusing. An overall approach to uncertainty analysis is shown in Fig. 5 in NUREG-1573. A general structure of uncertainty analysis involves i) future uncertainty, ii) model uncertainty, and iii) parameter uncertainty, i.e., i) different **scenarios** (including alternative future events), and ii) alternative **conceptual models** of behavior represented in a mathematical model (e.g., the different conceptual models for vadose zone flow; or the conceptual model for a climate change scenario), and iii) alternative sets of input **parameter values** for each scenario and conceptual model (NUREG/CR-5927, Vol.1, M. Kozak et al., 1993). An uncertainty analysis involves these three components, and not just varying ranges of parameter values. A systematic FEPs analysis and screening would be advantageous.

A particular type of uncertainty analysis is an “*Importance Analysis*,” which is described as an “analysis of performance assessment models for the purpose of identifying assumptions and parameter values which, when changed within credible bounds, **can affect a decision about compliance of a waste disposal facility with applicable regulatory performance objectives.**” An importance analysis is directly coupled with the compliance decision. The importance analysis is closer to what Neptune and Portage were discussing during the working session. Matt Kozak might be able to tell us more on this point.

Section 3.0:

- The terms benchmarking and response surface should be included in the glossary.

Section 3.1.6:

- In the documentation for the selection of codes such as STOMP and GoldSim, a discussion of the limitations of the model as it pertains to the WMA C application should be included. Limitations may include areas such as the ability to adequately represent the conceptualization of the site as well as more computationally-based limitations such as those described in the presentation for process vs. system models.

Sec. 4.1.1.2:

- This section states that the NRC has used GoldSim to construct system-level PA models of waste facilities at West Valley, the Yucca Mountain Project, and Savannah River Site. NRC had not built a system-level model of YMP though NRC staff had used GoldSim in its interactions with DOE.

Sec. 4.2.1.1, Fig. 4-1 and Fig. 4-4(a):

- If the alternative conceptual model for unsaturated zone flow is along the stratigraphic dip within H2, then the interception of this dip with H3 and the saturated zone would probably be the point of highest concentration. If that is so, the 'water well withdrawal' would need to be located here, i.e., outside of the fence line.

Sec. 4.3.1, Fig. 4-4:

- "Source of Contamination" on the upper right-hand side of the figures lists tank residual, ancillary equipment, past leaks including surface contamination, and potential retrieval leaks. The latter two are not discussed in section 4.3.2.

Figure 5-1, p. 5-2:

- Additional arrow from "Initial WMA C PA" to a box labeled "Reevaluate assumptions and obtain specific data." A purpose of PA is to evaluate assumptions made and collect additional data if need be and possible.

Figure 5-2, p. 5-5:

- Between the current Chapters 2 and 3 should go two additional chapters: i). Results of FEPs Analysis: Scenarios and Conceptual Models, and ii). Process-Model Abstraction into System Model.

Appendix B:

- Discussion needed on FEPs analysis and screening, STOMP, GoldSim, uncertainty analysis.
- Appendix B needs to be linked with the main text of the data package. Currently there is no linkage. Information from the data package and FEPs analysis should be incorporated into Appendix B.

Comments from Todd Martin's Flipcharts which NRC staff emphasizes:

- WRPS plans are to use the additional time to complete the ecological risk session in May and more fully complete the FEPs process.
- Both sensitivity and uncertainty are on this spreadsheet but are really just sensitivity.
- Consider solubility limitations for elements such as uranium.

- Slide 12: Should include a line indicating that the PA informs on those FEPs to be focused on [see comment above on Figure 5-1].
- Slide 17: Analysis of FEPs should go between chapter 2 and chapter 3. There is extra time to more fully complete the FEPs effort. This extra time will impact the lines on this slide [see comment above on Figure 5-2].
- Stratigraphic dip merges with H3 layer outside the fence line so it would be better for the model to extract water outside the fence line to ensure maximum concentration.
- Ensure that bioturbation is addressed in the FEPs.
- Slide 13: Word 'extreme' should be deleted from 'episodic recharge' [The intent of the this comment was to include actual extreme episodic recharge events. In nature, extreme precipitation events can occur, i.e., inches of rain within a few days, not within three months].
- Slide 18: Need to be consistent with what we are calling the undifferentiated H3/cold creek/etc. layer [Current best knowledge states three layers as discussed to in working session 6: H1, H2, undifferentiated H3/etc].
- Slide 30: Consider effective porosity range (min-max) instead of just .25
- More information on abstraction process would be useful [how does this differ from benchmarking against the process-level model].
- May need to spend more time discussing in FEPs bottom of the tank (e.g. relationships to grout, waste, liner, concrete, etc.) [corroded steel liner at the tank bottom will have left a thin void at the between the grout and gunite/concrete; potential transport pathway?].
- Need documentation of FEPs in scoping, model runs, schedules, etc., detailing FEPs analysis, including why a FEPs was closed out. FEPs documentation needs more detail and a document needs to be produced that meets these needs. Participants need to have access to this document prior to working session.
- Clarity getting from spreadsheet to model [For example, in RPP-RPT-46879, the connection between Table 6-1 titled "Summary of FEPS ..." and Table 6-2, "Recommended Reference and Sensitivity Cases ..." is not clear. The cases from Tab. 6-2 should have derived from the FEPs screening process based on Tab. 6-1].

Additional Comments:

- A systematic FEPs analysis and screening in the next few months will help incorporate uncertainties, provide for better transparency and documentation of features, events, and processes that have been excluded from the WMA C model, and provide more confidence in the modeling results.
- The previous working session discussed the leaching/solubility values for Tc and U. However, unless these are the only significant radionuclides considered, all the key radionuclides for the advection-dominated case should be discussed/provided (e.g., in the form of a table).

WMA C Scoping Meetings Schedule

The following scoping meetings have been scheduled (those highlighted have been completed):

Num.	Subject	Date
0.	Goals/Process	2/24 - 2/25/2009
1.	Residual Inventory	5/5-5/7/2009
2.	Assessment Context/General Conceptual Model	9/1-9/3/2009
3.	Soil Inventory	10/27-10/29/2009
4.	Engineered Systems #1 (waste residuals, surface cap, recharge)	1/26-1/29/2010
5.	Features, Events and Processes (FEPS)	3/30-4/1/2010
6.	Natural Systems (Detailed conceptual models, FEPs, and data associated with vadose zone, groundwater, and near surface environments including discussion of existing contamination)	5/25-5/27/2010
7.	Engineered Systems #2 (Detailed conceptual models, FEPs, and data associated with steel corrosion, concrete/grout degradation of tanks and related facilities)	7/27-7/29/2010
8.	Exposure Scenarios (Detailed conceptual model, data, and dosimetry)	9/28-9/30/2010
9.	Numeric Codes and Models (as well as topics not covered sufficiently above)	1/25-27/2011
10.	Ecological Risk Assessment (as well as topics not covered sufficiently above)	5/17-5/19/2011
11.	Preliminary Results from Initial PA Model Analysis (Contents of PA Maintenance Plan)	8/30-9/1/2011
12.	Placeholder (No topics currently planned)	10/25-27/2011
13.	Final Results from Initial PA Model Analysis	1/24-26/2012