

August 1, 2011

MEMORANDUM TO: Gregory Suber, Chief
Low-Level Waste Branch
Environmental Protection
and Performance Assessment Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

FROM: Mathews George, Project Manager **/RA by N. Devaser for/**
Low-Level Waste Branch
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Division of Waste Management
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Office of Federal and State Materials
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SUBJECT: JUNE 2, 2011 PUBLIC MEETING SUMMARY: MEETING TO
DISCUSS SECOND REQUEST FOR ADDITIONAL INFORMATION
FOR REVIEW OF THE UPDATED PERFORMANCE ASSESSMENT
FOR THE SALTSTONE DISPOSAL FACILITY, DOCKET NUMBER
PROJ0734

On June 2, 2011, the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE) engaged in a teleconference to discuss DOE's proposed responses to the NRC's second request for additional information. DOE's disposal activities at the Saltstone Facility at the Savannah River Site and the NRC's monitoring of these activities are done in accordance with Section 3116 of the National Defense Authorization Act for Fiscal Year 2005. The meeting was held by teleconference from 8:30 a.m. to 10:00 a.m.

Enclosure: Meeting Summary

cc: WIR Service List

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(301) 415-7065

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OFC	DWMEP	DWMEP	DWMEP	DWMEP	DWMEP
NAME	NDevaser	AWalkerSmith	CMcKenney	GSuber	NDevaser
DATE	6/27/11	6/28/11	6/28/11	7/25/11	8/1/11

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Public Meeting Summary: Meeting to Discuss Status of the U.S. Nuclear Regulatory
Commission Monitoring Activities at the Saltstone Disposal Facility at the Savannah River Site
June 2, 2011

The Meeting was divided into three parts:

- Part 1. Discussions involving Request for Additional Information (RAI) Responses based on deterministic sensitivity Case K.
- Part 2. Discussions involving 19 RAI responses sent to U.S. Nuclear Regulatory Commission (NRC) on April 21, 2011.
- Part 3. Discussions involving responses to the remaining RAIs.

Background

The U.S. Department of Energy (DOE) began preparing an update to the "Performance Assessment for the Saltstone Facility at the Savannah River Site" (PA) in 2007 and provided the document to the U.S. Nuclear Regulatory Commission (NRC) upon its completion in November 2009 (ML101590008). The NRC began its review immediately and submitted its first Request for Additional Information (RAI) on March 31, 2010 (ML100820097). An RAI is a list of questions and/or comments the NRC staff must have answered by DOE before completing its review. The DOE provided responses to this RAI on July 22, 2010 (ML102090664). Upon review, the NRC staff found some of these responses to be insufficient and submitted a second RAI to the DOE on December 15, 2010 (ML103400571). The purpose of this meeting was for the NRC to provide the public an explanation of some of the NRC's concerns as identified during review of the PA and for the DOE to provide the public with an explanation of their disposal process at the Saltstone Facility as it relates to the NRC's concerns. All presentations and assisting documentation are provided as attachments to this summary and are listed below.

Part 1: Discussions involving RAI Responses based on deterministic sensitivity Case K

During this portion of the meeting, DOE staff discussed parameter values to be used in the new Case K. DOE staff read through a table which had been provided to the NRC in a letter dated May 20, 2011 (ML111400306) which contained the proposed parameters for Case K. NRC staff raised questions about the parameters of concern. The table below summarizes DOE's proposed parameter values and the discussion that took place during the meeting.

Enclosure

Modeling Parameter	RAIs	Change from Case A (associated RAI)	Discussion Points
Saltstone and clean cap physical degradation	SP-1 SP-2 SP-7 SP-17	Complete degradation occurs within 10,000 years with degraded saltstone having a saturated hydraulic conductivity of 1E-06 cm/sec and an effective diffusion coefficient of 5E-06 cm ² /sec using a semi-log relationship. Final degradation values based on soil properties.	NRC staff had no questions on this set of parameters.
Moisture Characteristic Curves (MCCs)	SP-3	MCCs will not be used for fractured cementitious material. Relative permeability and saturation are set equal to 1 for all suction levels for saltstone, clean cap, and disposal unit concrete.	NRC staff had no questions on this set of parameters.
Saturated hydraulic conductivity for intact saltstone and clean cap	SP-5	Assumed to be 1.0 E-8 cm/sec, which is the largest value, reported using simulants with a minimum of 90-day curing time and nominal curing temperature.	NRC staff had no questions on this set of parameters.
Effective diffusivity of saltstone and clean cap	SP-6	For intact saltstone and clean cap the value is unchanged, but it increases to 5E-06 cm ² /sec (soil property) as the saltstone and clean cap degrade within 10,000 years using a semi-log relationship.	NRC staff had no questions on this set of parameters.

Modeling Parameter	RAIs	Change from Case A (associated RAI)	Discussion Points
Saltstone pore volumes required to initiate E_H and pH transitions	SP-12	E_H transition volume changes to 18% of the Case A value based on reducing by a factor of four the reduction capacity of saltstone and implementing a porosity correction. pH transition volume changes to 73% of the Case A value based on a porosity correction.	NRC staff had no questions on this set of parameters.
Tc release via shrinking core model	SP-13	<p>Modified to a single porosity shrinking core model based on the Smith and Walton (1993) approach and using a semi-log fracture growth relationship with a final fracture spacing of 10 cm. Pertinent parameters are:</p> <ul style="list-style-type: none"> • Constant diffusion coefficient of intact matrix of $1E-07 \text{ cm}^2/\text{sec}$, • Reduction capacity of 0.206 meq e-/g (one-fourth of Case A value), and • Dissolved oxygen concentration at fracture face is 1.06 meq e-/L. 	<p>NRC staff asked a question about the K_d values assumed for Tc under oxidizing and reducing conditions. DOE staff responded that a value of 10 mL/g was assumed for oxidized regions and a value of 1000 mL/g was assumed for reduced regions. The value of 10 mL/g was based on research presented in SRNL-STI-2010-00667.</p> <p>NRC staff expressed concern that these values were based on research performed under lab conditions that were different than the field conditions and the results of this research may not be applicable to the real system. NRC staff additionally stated that the reported values in this research for the K_d for Tc under reducing conditions was less than 1000 mL/g and was closer to 500 mL/g, hence it was not clear what the basis is for the use of 1000 mL/g.</p> <p>DOE stated that they would change the K_d used in the model for reduced technetium.</p>
Drainage layer performance	C-22 IEC-8	No Change Time periods refined to capture significant changes to model parameters	NRC staff had no questions on this set of parameters.

Modeling Parameter	RAIs	Change from Case A (associated RAI)	Discussion Points
Physical degradation of disposal unit concrete	VP-6 VP-2 VP-3	<p>Using a semi-log relationship, concrete fully degrades to soil properties with a saturated hydraulic conductivity of 1E-06 cm/sec and an effective diffusion coefficient of 5E-06 cm²/sec:</p> <ul style="list-style-type: none"> Initially for walls of Vaults 1 and 4, Within 3,500 years for the roof of Vault 4, and Within 10,000 years for other disposal unit concrete. <p>Undegraded properties provided in PA Table 4.2-16</p>	NRC staff asked about the methodology used to model the fracturing of the saltstone monolith in the GoldSim [®] model. The NRC staff created a model thought to be identical to the DOE model, but the results did not match. NRC staff is therefore interested in the exact methodology that DOE used in their model. NRC and DOE staffs plan to have a follow-up phone call, after NRC has reviewed the model files to discuss the details of the particular methodology used in the model.
Dose to the chronic intruder in vicinity of disposal units	II-2	Dose estimated doses based on modeled water concentrations below Vault 4 and an FDC for this alternative sensitivity case	NRC staff had no questions on this set of parameters.
Radionuclides analyzed		No change - all radionuclides	NRC staff had no questions on this set of parameters.

Modeling Parameter	RAIs	Change from Case A (associated RAI)	Discussion Points
Inventory	IN-5	Key radionuclides being investigated (Ra-226, I-129, Tc-99). Th-230, U-234, and Pu-238 inventory being investigated for in-growth of Ra-226.	NRC staff asked a question regarding the assumed inventory of I-129. It was noted during the onsite observation in April that the inventory that had been disposed of to date seemed to be higher than the total predicted inventory for I-129 in the PA. In April, DOE stated that the preliminary reported inventory disposed of was based on conservative assumptions which resulted in an overestimation of the inventory. In light of this, NRC staff asked if DOE expected for the inventory of I-129 assumed in the PA to be much higher than the actual final inventory. DOE staff responded by stating that the I-129 inventory assumed in the PA is appropriate and is expected to be close to the final total amount.
K _d values for saltstone, disposal unit concrete, and soil	SP-10 SP-14 SP-15 FFT-2 FFT-3	Based on latest issued reports	NRC staff had no questions on this set of parameters.
Dose methodology	B-1 B-2 B-3 B-4	<ul style="list-style-type: none"> • Biotic transfer factors based on latest report • Inclusion of poultry and egg pathway • 25-year buildup of radionuclides in irrigated soil • Inclusion of leafy portion in plant transfer factor 	NRC staff had no questions on this set of parameters.

Part 2: Discussions involving responses to 19 RAIs sent to NRC on April 21, 2011

DOE then discussed changes to the draft responses to RAIs based on discussions with NRC during the April public meeting. These specifically included the following RAIs: PA-11, PA-13, IN-5, SP-14, SP-15, FFT-1, and B-2.

IN-5: **Comment:** Additional information is needed about the Th-230 inventory assumed for Vault 4 and the process used to confirm that all risk-significant radionuclides have been identified as key radionuclides as waste is disposed and final inventory information becomes available.

Discussion: DOE will use an updated inventory for Ra in the Case K analysis that reflects an inventory of Ra-226 that DOE thinks is more realistic. DOE believes that the inventory of Ra-226 assumed in the PA is over-estimated based on conservative assumptions and that the actual inventory of Ra-226 disposed of will be significantly less.

PA-13: **Comment:** The dose consequence from early releases from the vaults prior to completion of the closure cap is not considered.

Discussion: NRC staff noted several possible concerns with the draft response to this RAI.

- All of the cells do not have sheet drains.
- The freeze/thaw cycles are not addressed. South Carolina has days below freezing.
- Oxygen could cause oxidation of the saltstone before the time of closure.

DOE staff responded that DOE is working on these issues and DOE staff responded that they are not putting saltstone into cells that do not have sheet drains.

SP-14: **Comment:** Additional information is needed about the basis for the K_d values used for iodine and radium in cementitious materials.

Discussion: NRC staff asked if DOE was going to change the value assumed for the K_d of iodine in Case K. DOE staff responded and said that they are not planning on changing this.

VP-5: **Comment:** The uncertainty in the performance of the vaults is not adequately represented in the PA and the PORFLOW model.

Discussion: NRC staff noted that it could review any new information on the new FDCs as this information becomes available. NRC and DOE staff then discussed the RAI responses that would be sent to NRC at a later date. DOE said that the target date for sending the RAI responses is August 19th.

PA-11: **Comment:** The GoldSim® probabilistic model used for sensitivity and uncertainty analyses is not adequately supported.

Discussion: NRC staff noted that during one of the technical phone calls it deferred the discussion of this RAI to the public meeting. DOE and NRC staffs discussed the potential for DOE to perform an uncertainty analysis based on Case K. DOE staff indicated it is considering performing such an analysis using the GoldSim® simulation software. DOE suggested that a follow-up call could be arranged to discuss the technical aspects of the uncertainty analysis under consideration for Case K.

Part 3: Discussions involving responses to remaining RAIs

The RAI responses discussed during this portion of the meeting were those not addressed by the development of Case K (Part 1 of this summary) and those not included in the partial set submitted on April 21 (Part 2 of this summary). DOE described the RAI responses that will be included in the September 2011 response and those that would be accounted for under DOE's PA maintenance program and NRC's monitoring program.

DOE stated that NRC could expect to see response to the following RAIs in the full package:

Performance Assessment:	PA-4, PA-5, PA-7, PA-11, PA-14
Inventory:	IN-2, IN-3, IN-4
Infiltration and Erosion Control:	IEC-7
Saltstone Performance:	SP-4, SP-8, SP-10, SP-11, SP-19
Far-Field Transport:	FFT-3, FFT-4
Inadvertent Intruder:	II-1, II-2
ALARA:	A-1

Action Items:

- NRC staff to engage in a technical exchange with DOE technical staff to discuss the GoldSim® model.
- NRC staff to engage in a technical exchange with DOE on the details of the technetium leaching GoldSim® model.
- DOE staff to provide NRC with a list of the K_d values assumed and the basis for these values.

Questions and Comments from Members of the Public

One member of the public was present at the meeting. Mr. John Greeves inquired as to whether the calculations or data supporting NRC staff's conclusion with regard to the Saltstone Facility Performance Assessment providing reasonable assurance that compliance with the Performance Objectives in 10 CFR Part 61 can be maintained would be made publically

available. NRC responded by saying that the staffs review would be fully documented in the Technical Evaluation Report (either within the document or an associated appendix). Details of the NRC staff's review of DOE's performance assessment model and supporting documentation will be provided in the staff's TER. Any independent analyses used to inform the staff's review also would be described in the TER.

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Meeting Attendees

George Alexander	U.S. Nuclear Regulatory Commission
Nishka Devaser	U.S. Nuclear Regulatory Commission
Karen Pinkston	U.S. Nuclear Regulatory Commission
Gregory Suber	U.S. Nuclear Regulatory Commission
Christianne Ridge	U.S. Nuclear Regulatory Commission
Mathews George	U.S. Nuclear Regulatory Commission
Christopher McKenney	U.S. Nuclear Regulatory Commission
Linda Suttora	U.S. Department of Energy
Jim Folk	U.S. Department of Energy
Sherri R. Ross	U.S. Department of Energy
Thomas Gutmann	U.S. Department of Energy
Patricia Suggs	U.S. Department of Energy
Justin Koon	South Carolina Department of Environmental Health and Control
Virginia Dickert	Savannah River Remediation
Kent Rosenberger	Savannah River Remediation
Malcolm Smith	Savannah River Remediation
Steve Thomas	Savannah River Remediation
Richard Shephard	Savannah River Remediation
Gregory Flach	Savannah River National Laboratory
Barry Lester	Savannah River National Laboratory
John Greeves	Member of the Public