

January 2, 2014

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

FROM: Nishka Devaser, Project Manager **/RA/**  
Low-Level Waste Branch  
Environmental Protection  
and Performance Assessment Directorate  
Division of Waste Management  
and Environmental Protection

SUBJECT: OCTOBER 3, 2013, PUBLIC MEETING SUMMARY: MEETING TO  
DISCUSS WASTE DISPOSAL AT THE SAVANNAH RIVER SITE IN  
ACCORDANCE WITH THE NATIONAL DEFENSE AUTHORIZATION  
ACT FOR FISCAL YEAR 2005, DOCKET NO.: PROJ0734

On October 3, 2013, the U.S. Nuclear Regulatory Commission (NRC) held a public meeting with the U.S. Department of Energy (DOE) to discuss recent activities at the Savannah River Site, Saltstone Disposal Facility. The meeting was conducted in accordance with NRC's monitoring and DOE's disposal responsibilities under Section 3116(b) of the National Defense Authorization Act for Fiscal Year 2005. The meeting was held by teleconference.

Enclosure:  
Meeting Summary

cc: WIR Service List

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January 6, 2014

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## **Public Meeting Summary: Meeting to Discuss Waste Disposal at the Savannah River Site in Accordance with the National Defense Authorization Act for Fiscal Year 2005**

### **Purpose**

The primary purpose for the public meeting was for the U.S. Department of Energy (DOE) to brief U.S. Nuclear Regulatory Commission (NRC) staff on recent activities at the Savannah River Site (SRS) Saltstone Disposal Facility (SDF). This meeting was conducted in accordance with NRC's monitoring responsibilities under Section 3116(b) of the National Defense Authorization Act for Fiscal Year 2005 (NDAA).

### **Background**

On March 31, 2005, DOE submitted to NRC the *Draft Section 3116 Determination for Salt Waste Disposal Savannah River Site* (DOE-WD-2005-001, Rev. 0) to demonstrate compliance with the NDAA criteria, including demonstration of compliance with the performance objectives in 10 CFR Part 61, Subpart C. In its consultation role, the NRC staff reviewed the draft waste determination (WD). In the NRC technical evaluation report (TER) issued in December 2005 (NRC, 2005), the NRC documented the results of its review and concluded that there was reasonable assurance that the applicable criteria of NDAA could be met, provided certain assumptions made in the DOE analyses were verified via monitoring. Taking into consideration the assumptions, conclusions, and recommendations in the NRC 2005 TER, DOE issued the final WD in January 2006 (DOE-WD-2005-001, Rev. 1).

In November 2009, DOE submitted a revised Performance Assessment (PA) to NRC (SRR-CWDA-2009-00017). The NRC reviewed the revised PA, engaged in public discussions with DOE, sent requests for additional information and reviewed DOE responses. On April 30, 2012, NRC issued both the TER (NRC, 2012a) and a Type IV Letter of Concern (NRC, 2012b). In the 2012 TER, NRC concluded that it did not have reasonable assurance that salt waste disposal at the SDF met §61.41. The Type IV Letter of Concern formally communicated the NRC concerns to both DOE and the South Carolina Department of Health and Environmental Control.

In July 2012, DOE responded to the Type IV Letter (DOE, 2012a; DOE, 2012b). DOE's response included information about an updated technetium-99 (Tc-99) inventory projection for the newly constructed disposal structures (DOE referred to as "disposal cells"); and information about the DOE Case K and K1 uncertainty and sensitivity analyses. In response to DOE's submittal, NRC issued a letter of acknowledgement, dated August 31, 2012 (NRC, 2012c), stating that a (Type II) Letter to the U.S. Congress is not needed at this time. Based on the NRC's TER analyses and DOE's revised Tc-99 inventory, the staff determined that, if DOE's new projected Tc-99 inventory for the newly constructed disposal structures is correct, then it is unlikely to cause an off-site peak dose exceeding the requirements of §61.41 (i.e., 0.25 mSv/yr (25 mrem/yr)).

In February 2013, SRS received nine inches of rain (highest seasonal rainfall recorded since 1960). Following this large rain event, radiological contamination was detected in the Vault 4 retention basin discharge. The Vault 4 retention basin storm water outfall had not discharged before February 2013. This basin discharged to McQueen Branch. Also during February 2013, DOE identified a large fracture on the roof of Vault 4.

Sampling results showed elevated levels of Cs-137, Tc-99, H-3, Sr-90, gross alpha, and gross beta in the basin. However, risk to safety appears to be minimal as DOE indicates the concentrations in the basin did not exceed derived concentration standards in accordance with DOE Order 458.1. DOE believes that radioactive contamination from the vault seeped into the storm water system and into the storm water pond. DOE believes that infiltration of water through a large crack found on the roof of Vault 4 was the cause for this contamination in the basin. It is not clear how much water infiltrated into the fracture, through the structure, and into the groundwater. NRC has been aware of cracks in Vault 4 and seepage of bleed water and infiltrating rainwater from Vault 4 since 2008 (NRC, 2008), and discussion of DOE repairs to such cracks is a continuous part of NRC's monitoring program. The NRC staff monitors the potential effects of long-term degradation of Vault 4.

The purpose of this meeting was for DOE to provide more details to the NRC on activities associated with the Vault 4 retention basin storm water outfall discharge, DOE actions to mitigate overflow of the basin in the future, stabilize Vault 4, and characterize local groundwater. The additional groundwater characterization is related to DOE discovering elevated levels of nitrates, conductivity, and Tc-99 in well ZBG-2<sup>1</sup> (SRR-CWDA-2013-00131). However, DOE indicates first quarter 2013 sample results did not exceed groundwater protection standards.

#### Meeting Summary

After opening remarks, Mr. Steve Thomas (of Savannah River Remediation (SRR)), provided DOE's presentation (SRR-CWDA-2013-00131). Major comments of the discussion and questions and comments from members of the public are included in Table 1 and Table 2 below.

**Table 1: NRC Comments or Questions from the Public Meeting Discussion**

NRC Comment or Question	DOE Response
To ensure the assumptions of our previous review of the referenced DOE analysis (the 2008 DOE unreviewed disposal question evaluation (UDQE)) apply, we need a few more details. For instance, how much water infiltrated through the Vault 4 roof fracture?	Approximately tens of gallons infiltrated into Cell K.
Was any water pumped out of Cell K?	Yes. Approximately 200 gallons were pumped into portable containers and then pumped into the Saltstone Processing Facility.
What was the size of the fracture?	The fracture was approximately 1/8 <sup>th</sup> inch wide and approximately 100 feet long.
How much contaminated water flowed overland, as compared to how much made it to groundwater?	We do not believe that any of the contaminated water made it to the groundwater.

<sup>1</sup> The phrase "ZBG-#" refers to monitoring wells local to Vault 4.

NRC Comment or Question	DOE Response
The UDQE performed by DOE to address the referenced Open Issue considered contamination that seeped into the groundwater and was diluted in the aquifer. This analysis may not be applicable to overland flow. For example, in this case we potentially have a different amount of release, amount of dilution, amount of sorption, or timing.	We believe the analysis is applicable and we do not believe there was significant overland contamination because water was piped to the basin.
What were the results of the gamma over flight?	The general result was that contamination was detected at the basin; however, nothing was detected as far as McQueen's branch.
For the clean cap installation, is the bleed water system operational? If not, what happens to bleed water coming from the clean cap?	We minimize the volume of water used during pouring of the clean cap by using low-bleed grout and using mobile equipment so that flush water was not added to the cells.
What were the groundwater protection standards based on?	Derived limits that lead to a 4 mrem/year drinking water beta-gamma dose contribution. These standards are prescribed by the site regulator, South Carolina Department of Health and Environmental Control (SC DHEC).
Since upper three runs is separated by the tan clay layer, it seems like ZBG-2 may be in an aquifer, not in a perched zone as DOE has indicated.	Both the DHEC and SRR subject matter experts agreed that it was a perched aquifer. The water table has risen in recent years with all the rainfall, thus we anticipate seeing more perched water than we have seen in recent history.
Were wells ZBG-3 through ZBG-5 screened below any contamination that may have come from Vault 4? Are there plans for any additional wells?	We can cover this topic in the next onsite observation.
In what aquifers will the future cone penetration test pushes be placed?	Not only in the perched area, but also to penetrate through the tan clay layer, down to a depth of about 150 feet. However, the intention is to avoid cross contamination between the layers and to characterize at depth. Following the test they will back-grout the hole to avoid creating a path through the clay layer.
What had been done previously to characterize these wells (frequency and constituents)?	We sample semi-annually, in accordance with groundwater monitoring plan as part of the disposal facility permit. The samples are analyzed for nitrates, gross alpha, gross-beta, photon emitters, iodine, and tritium.
How often are Tc measurements taken?	We always check for gross-beta, but Tc has not been sampled on a routine basis; however, as a proactive step, we will be sampling for Tc in the future.

NRC Comment or Question	DOE Response
Have estimates been taken of the volumes of the discharges from the pond going to McQueen's branch?	No. We did not monitor the volume discharged because the basin was not built to discharge <sup>2</sup> .
What is the technical basis for the derived concentration guidelines for the basin?	It is a DOE Order.
Regarding the methods used for measuring the concentrations in the storm water outfall, are the samples taken liquid only or sediment samples?	We are taking both liquid and sediment samples.
Is sediment being filtered out of the liquid samples?	No.
What is the volume of the basin?	Approximately 800,000 gallons.
Does this basin capture all the Z-Area runoff?	It captures 50 acres of the saltstone disposal facility. The new cells do not drain to this basin.
Historically, was bleed water the only water entering the cells? Is infiltration through the roof a new condition?	Yes, process water (i.e., water from associated flushing). And yes, it is a new condition, however, we believe this infiltration is so minimal that it does not constitute a new condition. The elastomeric coating has been used very successfully for years to eliminate these cracks. The northern six cells have been coated and have had none of these issues.
What has been done so far to repair the fracture found on Cell K?	Following the event, we sealed all of the cracks that could be found. This was done quickly because more rain was anticipated. Patching took place within a few days of the event (early March at the latest). Following these repairs, no additional infiltration took place. The frequency of inspection of the roof for cracks was increased to every six months instead of every year.
Was the sealant used on the roof the same that has been used on the walls?	No.
What mechanism is believed to have led to the crack?	Our structural engineers concluded that it was possibly temperature variations over time between the outside and the inside of the vault structure (i.e., normal expansion and contraction). The structural engineers did not have structural integrity concerns.
How long was the crack on the roof before discovery?	Operators do a monthly inspection on the roof, and no crack was identified in the previous monthly inspection, so we do not think that the crack could have been there for any longer than a month. In addition, increased water levels in the cell would have been identified from within the operations room.

<sup>2</sup> DOE installed monitoring equipment after the discharge.

NRC Comment or Question	DOE Response
Our understanding is that water pumped from Cell K was placed directly back into the treatment system and was not sampled, correct?	Yes. Dose rates were monitored, but the water was not sampled.
We would find it helpful to view the dose rates, however, we can view those during the next observation.	This can be added to the next NRC onsite observation agenda.

**Table 2: Public Comments or Questions from the Public Meeting Discussion**

Commenter	Comment/Question and Response
<b>Tom Clements, Friends of the Earth</b>	<p>Is the grout formulation the same for Vault 4 as it is for the new disposal structures?</p> <p><b>DOE Response:</b> Yes. The saltstone grout is the same.</p>
	<p>Regarding the gutters and troughs, why are they there? Furthermore, why do they not just drain into the soil?</p> <p><b>DOE Response:</b> The purpose of the gutters is to protect the weather enclosure. Legacy contamination under the weather enclosure would be less protected without the gutters. The troughs are there to ensure that any water going into Vault 4 will come out. It was never anticipated that the rain gutters would have contamination in them. The event that caused this to happen was completely unexpected.</p>
	<p>Regarding the gutters and troughs, what is their lifespan?</p> <p><b>DOE Response:</b> We will be maintaining them indefinitely until closure.</p>
	<p>Regarding the elastomeric coating, what is its lifespan?</p> <p><b>DOE Response:</b> The team has discussed the lifespan of the coating. It is likely that the coating would have to be reapplied. We believe that the coating will be reliable for up to decades. The coating is not intended to be a part of the closure process, it is only an interim step during disposal.</p>
	<p>Regarding pages 6 and 16 of the 2013 groundwater monitoring report, why is there a jump in Tc-99 readings? Is this not a reason for concern?</p> <p><b>DOE Response:</b> We are investigating this jump. On Slide 9 of today's presentation, we discuss additional characterization that will take place to better understand what we may be seeing.</p>
	<p>What will DOE be doing to improve communication to the public and other stakeholders about events such as these in the future?</p> <p><b>DOE Response:</b> DOE will be briefing the Citizens Advisory Board about this at the next meeting.</p>

Commenter	Comment/Question and Response
<b>Kenneth Fletcher, Exchange Monitor</b>	<p>Regarding the Open Issue that applied to Vault 4 seepage and was subsequently closed, will the Issue be reopened?</p> <p><b>NRC Response:</b> No. We do not believe there would be a need to reopen the issue or create a new Open Issue. The NRC's new monitoring plan for the SDF does address issues such as these related to Vault 4 (e.g., structural integrity, fractures, potential future degradation). The NRC is already monitoring these aspects of Vault 4.</p>
<b>George Lobsenz, Energy Daily</b>	<p>What were the performance requirements for the vaults (such as Vault 4) when they were approved and what was their lifespan intended to be at construction?</p> <p><b>DOE Response:</b> The initial Vault 4 design was a 12 cell, 100 foot by 100 foot designed to hold the saltstone. The design was more structural than containment (only minimally for containment). Some cracking was expected. The issues identified with Vault 4 were what prompted the new cylindrical design. Vault 4 was designed to be protective for 1,000 years, the new design is intended to protect for 10,000 years<sup>3</sup>. An additional step taken to evaluate performance of the new design was to conduct hydrotests on the cells.</p>
	<p>So, to confirm, DOE feels sure that the cracking mechanisms that have taken place in Vault 4 will not occur in the new circular cells?</p> <p><b>DOE Response:</b> Yes.</p>
	<p>Are there other vaults like Vault 4?</p> <p><b>DOE Response:</b> Yes. Vault 1 is of a similar design. Three of the six cells have been filled with saltstone.</p>
	<p>With regard to the elevated levels of Tc in ZBG-2, DOE stated that these elevated levels may be a result of the bottoms of the effluent facility and with the ITP (In-Tank Precipitation) project. Do materials from the effluent facility and ITP project have higher concentrations of undesired constituents than wastes from the vaults?</p> <p><b>DOE Response:</b> No, the concentrations are lower.</p>

<sup>3</sup> Period of performance begins at final closure configuration. Final closure configuration occurs after installation of the closure cap.



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Meeting Attendees

George Alexander	U.S. Nuclear Regulatory Commission
Nishka Devaser	U.S. Nuclear Regulatory Commission
Lisa London	U.S. Nuclear Regulatory Commission
Christopher McKenney	U.S. Nuclear Regulatory Commission
Aby Mohseni	U.S. Nuclear Regulatory Commission
Karen Pinkston	U.S. Nuclear Regulatory Commission
Christianne Ridge	U.S. Nuclear Regulatory Commission
Gregory Suber	U.S. Nuclear Regulatory Commission
Justin Koon	South Carolina Department of Health and Environmental Control
Nathan Hinkle	South Carolina Department of Health and Environmental Control
Trey Reed	South Carolina Department of Health and Environmental Control
Bill Barnes	U.S. Department of Energy
Daniel Ferguson	U.S. Department of Energy
Sherri Ross	U.S. Department of Energy
Patricia Suggs	U.S. Department of Energy
Linda Suttora	U.S. Department of Energy
Kim Hauer	Savannah River Remediation
Mark Mahoney	Savannah River Remediation
Kent Rosenberger	Savannah River Remediation
Richard Sheppard	Savannah River Remediation
Steven Thomas	Savannah River Remediation
Derek Asbury	Aiken Standard
George Lobsenz	Energy Daily
Kenneth Fletcher	Exchange Monitor
Thomas Clements	Friends of the Earth
Suzanne Rhodes	League of Women Voters of South Carolina