June 7, 2010

Mr. Thomas Gutmann, Director
Waste Disposition Programs Division
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29802

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION FEBRUARY 9 – 11, 2010 ONSITE OBSERVATION REPORT FOR THE SAVANNAH RIVER SITE SALTSTONE FACILITY

Dear Mr. Gutmann:

The enclosed report describes the U.S. Nuclear Regulatory Commission's (NRC's) onsite observation activities on February 9 – 11, 2010, at the Savannah River Site (SRS) Saltstone Facility. This onsite observation was conducted in accordance with Section 3116 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (Section 3116), which requires NRC to monitor disposal actions taken by the U.S. Department of Energy (DOE) for the purpose of assessing compliance with the performance objectives set out in 10 CFR Part 61, Subpart C. The activities conducted during the site visit were consistent with those described in the NRC's monitoring plan for salt waste disposal at SRS (dated May 3, 2007) and NRC's staff guidance for activities related to waste determinations (NUREG-1854, dated August 2007).

This onsite observation at SRS was focused on assessing compliance with two of the four performance objectives: (i) protection of the general population from releases of radioactivity (10 CFR 61.41) and (ii) protection of individuals during operations (10 CFR 61.43). Meeting these two performance objectives is predicated heavily on the performance of the disposal cells within the period of compliance.

While drafting this observation report, on April 19, 2010, NRC conducted a second Saltstone observation, to observe damp spots identified on the surface of the cell 2B found shortly before beginning the hydrostatic test. The test was postponed until the mechanism causing the spots was better identified. Details of the April 19 observation will be available in Onsite Observation Report CY 2010-2, which is currently being drafted.

NRC continues to conclude that there is reasonable assurance that the applicable criteria of Section 3116 can be met if key assumptions made in DOE's waste determination analyses prove to be correct. In accordance with the requirements of Section 3116 and consistent with NRC's monitoring plan for the Saltstone Disposal Facility, NRC will continue to monitor DOE's disposal actions at SRS. The monitoring activities are expected to be an iterative process. Several onsite observation visits and technical reviews may be necessary in order to obtain the information needed to close all of the current open issues, as well as issues that may be opened in the future.

If you have any questions or need additional information regarding this report, please contact Nishka Devaser of my staff at (301) 415-5196.

Sincerely,

/RA/

Larry W. Camper, Director
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Enclosure:
NRC Observation Report

cc w /encl:
S. Wilson
Federal Facilities Liaison
Environmental Quality Control Administration
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, SC 29201-1708

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U.S. NUCLEAR REGULATORY COMMISSION FEBRUARY 9 – 11, 2010 ONSITE OBSERVATION REPORT FOR THE SAVANNAH RIVER SITE SALTSTONE FACILITY

EXECUTIVE SUMMARY:

The U.S. Nuclear Regulatory Commission (NRC) staff conducted its seventh onsite observation visit to the Saltstone Facility at the Savannah River Site (SRS) on February 9 – 11, 2010. The intention of this visit was to focus on compliance with two of the four performance objectives: (i) protection of the general population from releases of radioactivity (10 CFR 61.41) and (ii) protection of individuals during operations (10 CFR 61.43) by observing and participating in various activities. The staff observed Saltstone production operations and activities related to new disposal cell construction. The staff participated in discussions related to radiological inventory and models used in the performance assessment. This report provides a description of NRC onsite observation activities and identifies NRC observations from the visit. Based on the results of the visit, the NRC continues to have reasonable assurance that the performance objectives of 10 CFR 61 can be met in the areas reviewed.

There are no new open issues resulting from this observation, however, SRR staff provided proposed resolutions to currently open issues and follow-up actions. The NRC staff participated in this dialogue and the presentation provided by SRR is accessible via NRC's document repository, the Agencywide Documents Access and Management System (ADAMS), at ADAMS accession number ML100550009. These discussions, in combination with the recent release of the NRC staff's Request for Additional Information (NRC, 2010) resulted in the closure of many follow-up actions. Some of these follow-up actions migrated into being comments in the staff's Request for Additional Information (NRC, 2010).

A summary of the staff's observations and conclusions is provided below:

Disposal Cell Construction:

- Due to inclement weather, the construction schedule for the disposal cells was delayed resulting in an extended schedule for completion of the hydrostatic test (hydro-test). Because of this delay, the staff was unable to observe the hydro-test of disposal cell 2B and rescheduled that portion of the observation. As this report was being completed, SRR staff observed damp spots while filling the cell with water in preparation for the hydro-test. The hydro-test was postponed, however, NRC staff visited the site for Onsite Observation CY2010-2 which will be documented in a separate report that will be available in the near future.

Saltstone Production Facility Operation:

- Due to drain line maintenance prior to and during the observation, saltstone production was not taking place such that staff could observe its operation. In lieu, operations staff and management provided a tour of the facility and a presentation of normal operations.

Performance Assessment Process Review:

- In accordance with the NRC's review of the 2009 Performance Assessment (PA), SRS staff provided a walkthrough of the GoldSim and PORFLOW models used in the PA. The NRC staff found the presentations provided and explanations therein to be very helpful in understanding thought processes and assumptions in the PA.

Radionuclide Inventory:

- The staff participated in a discussion of procedures for tracking disposal of key radionuclides at the Saltstone Disposal Facility (SDF) and other topics related to radiological inventory at Saltstone.

- The discussion provided sufficient information to close follow-up actions ML091320439-003 (quarterly Saltstone permit reports support documentation) and ML091320439-004 (tank 50 material balance).

1.0 BACKGROUND:

Section 3116 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (Section 3116) authorizes the Department of Energy (DOE), in consultation with the NRC, to determine that certain radioactive waste related to the reprocessing of spent nuclear fuel is not high-level waste, provided certain criteria are met. Section 3116 also requires NRC to monitor DOE disposal actions to assess compliance with the performance objectives in 10 CFR Part 61, Subpart C.

On March 31, 2005, DOE submitted a "Draft Section 3116 Determination Salt Waste Disposal Savannah River Site" to demonstrate compliance with the Section 3116 criteria including demonstration of compliance with the performance objectives in 10 CFR Part 61, Subpart C (DOE, 2005a). In its consultation role, the NRC staff reviewed the draft waste determination and concluded that there was reasonable assurance that the applicable criteria of Section 3116 could be met, provided certain assumptions made in DOE's analyses are verified via monitoring. NRC documented the results of its review in a Technical Evaluation Report issued in December 2005 (NRC, 2005). DOE issued a final waste determination in January 2006 taking into consideration the assumptions, conclusions, and recommendations documented in NRC's Technical Evaluation Report (DOE, 2006).

To carry out its monitoring responsibility under Section 3116, NRC plans to perform three types of activities: (i) technical reviews, (ii) onsite observations, and (iii) data reviews. These activities will focus on key assumptions – called "factors" – identified in the NRC monitoring plan for salt waste disposal at SRS (NRC, 2007). Technical reviews generally will focus on obtaining additional model support for assumptions DOE made in its PA that are considered important to DOE's compliance demonstration. Onsite observations generally will be performed to (i) observe the collection of data (e.g., observation of waste sampling used to generate radionuclide inventory data) and review the data to assess consistency with assumptions made in the waste determination, or (ii) observe key disposal (or closure) activities related to technical

review areas (e.g., slag and other material storage, grout formulation and preparation, and grout placements). Data reviews will supplement technical reviews by focusing on monitoring data that may also indicate future system performance or by reviewing records or reports that can be used to directly assess compliance with performance objectives.

2.0 NRC ONSITE OBSERVATION ACTIVITIES:

2.1 DISPOSAL CELL CONSTRUCTION:

2.1.1 Observation Scope:

The staff's interest in observing construction relates to ensuring the integrity of the disposal units and identifying the potential mechanisms of contaminant release from the facility. Section 3.1.3, "Hydraulic Isolation of Saltstone," of the May 2007 monitoring plan provides details of the staffs particular interests.

2.1.2 Observation Results:

This portion of the observation did not take place during this observation due to schedule changes resulting from unexpected weather. In lieu of this portion and the portion described in Section 2.2 Saltstone Production Facility Operation, DOE operations staff and management provided a tour of the facility, which included the new disposal cells, 2A and 2B.

2.1.3 Conclusions and Follow-up Actions:

The staff maintains an interest in observing the hydro-test when it takes place. Prior to the observation, DOE provided the vendors hydro-test procedure (CROM, 2009). Photos of the tour of the facility that took place in lieu of observing the hydro-test are available in NRC's document repository, the Agencywide Documents Access and Management System (ADAMS), at ADAMS accession number ML100550095.

2.2 SALTSTONE PRODUCTION FACILITY OPERATION:

2.2.1 Observation Scope:

The objective of NRC staff observing the grouting operation is to evaluate any mechanisms that may contribute to contaminant release and transport and to evaluate Factor 2, "Hydraulic Isolation of Saltstone," which was identified as being a key factor in assessing compliance with the performance objectives in Section 3.1.3 of the May 2007 monitoring plan.

2.2.2 Observation Results:

Saltstone production was not taking place during our visit due to routine maintenance needs. Alternatively, the staff was provided a tour of the facility as well as received a presentation on normal saltstone production operations which included a short video demonstrating the production of saltstone. During this tour, the staff observed the dry feed storage system. The staff climbed the large silos to evaluate their adequacy for slag and cementitious materials storage.

2.2.3 Conclusions and Follow-up Actions:

Photos taken during the tour of the dry feed storage system and other portions of the tour are available in NRC's document repository, ADAMS, at ADAMS accession number ML100550095. At the time of observation, the staff found the silos to be adequate storage facilities for slag and cementitious materials and found reasonable assurance that the Part 61 performance objectives were still being met. Details of the staffs interest in the dry feed storage can be found in Section 3.2.4 of the May 2007 monitoring plan.

2.3 PEFORMANCE ASSESSMENT PROCESS REVIEW:

2.3.1 Observation Scope:

As noted in Section 3.1.9, "Performance Assessment Process Review," of the May 2007 monitoring plan, NRC staff must perform a consistent and thorough evaluation of the revised PA (DOE, 2009). As part of this review, the NRC staff was interested in obtaining more information about the software used to model the saltstone disposal facility during development of the revised PA.

2.3.2 Observation Results:

NRC staff was provided with PORFLOW and GoldSim models that were used in support of the PA. An overview was presented on model structure and implementation. SRNL staff discussed the modular approach utilized in PORFLOW to facilitate the integration of elements, such as (i) temporal variability represented as a sequence of steady-state flow fields, and (ii) flow and transport of multiple hazardous constituents in the near and far field environment. SRNL and SRR staff discussed the benchmarking of GoldSim from PORFLOW flux output files, which was used to develop the probabilistic assessment.

2.3.3 Conclusions and Follow-up Actions:

Review of the PORFLOW and GoldSim models provided insight regarding the integration of the data with the computational modules used in the 2009 PA. SRNL and SRR staff answered questions from NRC staff. NRC review of the models is ongoing and additional comments may be submitted.

2.4 RADIONUCLIDE INVENTORY:

2.4.1 Observation Scope:

As noted in Section 3.1.1.1, "Data Reviews – Radioactive Inventory" of the May 2007 monitoring plan, it is important for NRC staff to verify the radioactive inventory disposed of at the Saltstone Disposal Facility because the inventory is an important factor in the compliance with the performance objective identified in 10 CFR 61.41, protection of the general population from releases of radioactivity.

2.4.2 Observation Results:

NRC staff previously discussed the processes used for waste sampling and for tracking the inventory of radionuclides disposed of at the Saltstone Disposal Facility during onsite observations in October 2007 (NRC, 2008a), March 2008 (NRC, 2008b), and March 2009 (NRC, 2009). Two action items remained opened from these onsite observations. The first action item is to provide an evaluation of the Tank 50 material balance (action item number ML091320439-004), and the second action item is to provide sufficient documentation to support quarterly Saltstone Permit Reports (action item number ML091320439-003).

During the onsite observation, SRS site staff provided the NRC with a document on the Tank 50 Material Balance to address action item ML091320439-004 (SRR-CWDA-2010-00008 Revision 1). This document contains flow charts of the process used to derive the inventory in the quarterly reports that are posted to the SRS website as well as the process used to derive the inventory on an annual basis. This document also contains a comparison of the concentration predicted using a material balance calculation to the measured concentration for 10 radionuclides (H-3, C-14, Ni-63, Sr-90, Tc-99, I-129, Cs-137, U-233, U-235, and Pu-241). The measured and predicted concentrations were generally comparable, though there were some differences for radionuclides that were present at levels near or below the detection limit. This document provided sufficient information to close action item ML091320439-004.

Prior to this onsite observation, NRC staff reviewed several documents related to the radionuclide inventory in Saltstone Disposal Facility. These documents included SRNS-J2100-2009-00014 (Unreviewed Disposal Question Evaluation: Evaluation of Updated Radionuclide Inventory in Saltstone Disposal Facility), X-CLC-Z-00027 (Inventory Determination of PODD Radionuclides in Saltstone Vaults 1 and 4), X-ESR-H-00188 (Alternative Determination of Saltstone Disposal Facility (SDF) Radionuclides Inventory as of March 31, 2009), LWO-RIP-2009-00025 (Evaluation of Saltstone Disposal Facility Radiological Inventory), and LWO-LWE-2009-00159 (Best Estimate of the Concentration of Radionuclides in a Tank 50 Influent Stream Aggregate). NRC staff transmitted a list of 17 questions on these documents to DOE on December 17, 2009 which are available at ADAMS accession number ML101370016. During the onsite observation SRS staff addressed these questions, and the questions and responses will be described in more detail in a forthcoming technical review summary for the inventory documents. The information presented by SRS site staff during the onsite observation was sufficient to address the NRC questions on the inventory documents and to close action item ML091320439-003 (quarterly Saltstone permit reports support documentation).

During the onsite observation, NRC staff raised a question about the basis for arriving at inventory estimates and any subsequent accounting practices for each radionuclide (e.g., was the inventory based on analytical sample results, material balance calculations, etc). In response to this question, SRS staff provided a document to the NRC staff containing crosswalk tables of saltstone inventory data bases (SRR-WSE-2010-00051). This document contains a list of the data source for each radionuclide for the quarterly reports from 3rd Qtr 2007 to 4th Qtr 2009 as well as the source for the data presented in X-CLC-Z-00027 (Inventory Determination of PODD Radionuclides in Saltstone Vaults 1 and 4). The information in this document is sufficient to address the question raised by the NRC staff.

2.4.3 Conclusions and Follow-up Actions:

The discussion on inventory held during the onsite observation provided NRC staff with a thorough explanation of the process used by SRS staff to quantify and track the inventory of radionuclides disposed of at the Saltstone Disposal Facility. This discussion provided sufficient information to close follow-up actions ML091320439-004 (evaluation of the tank 50 material balance) and ML091320439-003 (quarterly Saltstone permit reports support documentation). During the onsite observation, SRS staff also addressed the questions NRC staff had about documents related to the inventory in the Saltstone Disposal Facility. In addition, the document that was provided on the crosswalk of the types of input used as the basis for the inventory of each radionuclide addressed the NRC question raised during the onsite observation. More detail about the review of the documents related the inventory that was performed by NRC staff will be documented in a Technical Review Summary.

3.0 PARTICIPANTS:

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4.0 REFERENCES:

CROM Corporation, Water Tank Tightness Test Procedure, Job No. 2008-M-084, Aiken, SC, November 23, 2009.

U.S. Department of Energy (DOE). DOE-WD-2005-001, "Basis for Section 3116 Determination Salt Waste Disposal at the Savannah River Site." Washington, DC: DOE. March 2005a.

———. CBU-PIT-2005-0146, "Saltstone Performance Objective Demonstration Document." Westinghouse Savannah River Company. June 2005b.

———. DOE-WD-2005-001, "Basis for Section 3116 Determination Salt Waste Disposal at the Savannah River Site." Washington, DC: DOE. January 2006.

———. X-CLC-Z-00027, Rev. 1. Inventory Determination of PODD Radionuclides in Saltstone Vaults 1 and 4, June 2009.

Le, T.A., Alternative Determination of Saltstone Disposal Facility (SDF) Radionuclides Inventory as of March 31, 2009, X-ESR-H-00188. June 2009. (ADAMS Accession Number ML092570261).

U.S. Nuclear Regulatory Commission (NRC). "Technical Evaluation Report for Draft Waste Determination for Salt Waste Disposal." Letter from L. Camper to C. Anderson, DOE. December 28, 2005. (Agencywide Documents Access and Management System (ADAMS) Accession No. ML053010225).

———. "U.S. Nuclear Regulatory Commission Plan for Monitoring the U.S. Department of Energy Salt Waste Disposal at the Savannah River Site in Accordance with the National Defense Authorization Act for Fiscal Year 2005." Washington, DC: NRC. May 3, 2007. (ADAMS Accession No. ML070730363).

———. "Nuclear Regulatory Commission Onsite Observation Report for the Savannah River Site Saltstone Production and Disposal Facilities, October 29, 2007." January 31, 2008a (ADAMS Accession Number ML073461038).

———. "Nuclear Regulatory Commission Onsite Observation Report for the Savannah River Site Saltstone Production and Disposal Facilities, March 25, 2008." June 5, 2008b (ADAMS Accession Number ML081290367).

———. "Nuclear Regulatory Commission Onsite Observation Report for the Savannah River Site Saltstone Production and Disposal Facilities, March 24, 2009." May 22, 2009 (ADAMS Accession Number ML091320439).

———. "U.S. Nuclear Regulatory Commission Request for Additional Information on the 2009 Performance Assessment for the Saltstone Disposal Facility at the Savannah River Site." March 31, 2010 (ADAMS Accession Number ML100820097).

Romanowski, L.B., Evaluation of Saltstone Disposal Facility Radiological Inventory, LWO-RIP-2009-00025. June 2009. (ADAMS Accession Number ML092570251).

Rosenberger, K.H., Unreviewed Disposal Question Evaluation: Evaluation of Updated Radionuclide Inventory in Saltstone Disposal Facility, SRNS-J2100-2009-00014. June 2009. (ADAMS Accession Number ML091800403).

Savannah River Remediation (SRR). SRR-CWDA-2009-00017, Performance Assessment for the Saltstone Disposal Facility at the Savannah River Site, October 29, 2009.

_____. NRC Salt Waste Monitoring Tank 50 Material Balance, SRR-CWDA-2010-00008 Revision 1. February 2010. (ADAMS Accession Number ML100550046).

Staub, A.V., Crosswalk Tables of Saltstone Inventory Data Bases, SRR-WSE-2010-00051. March 2010. (ADAMS Accession Number ML100900022).

Tisler, A.J., Best Estimate of the Concentration of Radionuclides in a Tank 50 Influent Stream Aggregate, LWO-LWE-2009-00159. June 2009. (ADAMS Accession Number ML092570171).