Department of Energy

Washington, DC 20585

SEP 28 1999

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W.
Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

Enclosed are the compliance evaluation and the disposal authorization for the Savannah River Site E-Area Vaults and Saltstone disposal facilities. The Low-Level Waste Disposal Facility Federal Review Group (LFRG) conducted reviews of the performance assessments and composite analysis for the E-Area Vaults and Saltstone disposal facilities and recommended that the Department authorize the continued operations of the DOE Savannah River Site E-Area Vaults and Saltstone disposal facilities subject to the conditions in the disposal authorization statement. The Department accepted the LFRG recommendation and signed the disposal authorization statement for the Savannah River Site E-Area Vaults and Saltstone disposal facilities.

The Department has completed the following actions related to commitments VII.B.5.b.1., 2., and 3. in the Defense Nuclear Facilities Safety Board Recommendation 94-2 Implementation Plan: "Complete Headquarters' Review of Savannah River Site Performance Assessments," "Complete Headquarters' Review of Savannah River Site Composite Analysis," and "Issue Disposal Authorization Statement for E-Area Vaults and Saltstone Disposal Facilities." The Department proposes closure of these commitments. If you have any questions concerning this information, please contact me at (202) 586-7710 or Mark Frei at (202) 586-0370.

Sincerely,

Carolyn L. Huntoon
Assistant Secretary for
Environmental Management

Enclosures

SEPARATION

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Disposal Authorization Statement
for the
Department of Energy Savannah River Site
E-Area Vaults and Saltstone Disposal Facilities

Revision No.:_____

Effective Date:_____

Background:

DOE Order 435.1 requires that a disposal authorization statement be obtained prior to construction of a new low-level waste disposal facility. Field Elements with existing low-level waste disposal facilities shall obtain a disposal authorization statement in accordance with the schedule in the Complex-Wide Low-Level Waste Management Program Plan. The disposal authorization statement shall be issued based on a review of the facility's performance assessment and composite analysis. The disposal authorization statement shall specify the limits and conditions on design, construction, operations, and closure of the low-level waste facility based on these reviews. A disposal authorization statement is part of the radioactive waste management basis for a disposal facility. Failure to obtain a disposal authorization statement can result in the termination of disposal operations.

Disposal Authorization Statement:

In fulfillment of the requirements of DOE Order 435.1, this Disposal Authorization Statement is hereby issued authorizing the Savannah River Site to transfer, receive, possess, and dispose of low-level radioactive waste at the E-Area Vaults and Saltstone disposal facilities.

The Savannah River Site shall conduct its low-level waste disposal program in accordance with the requirements contained in the following documents.

E-Area Vaults

Radiological Performance Assessment for the E-Area Vaults Disposal Facility, WSRC-RP-94-218, dated April 15, 1994.

Letter from J. Lytle to Heenan, dated September 23, 1994, Subject: Conditional Approval of the Radiological Performance Assessment for the E-Area Vaults Disposal Facility.

Addendum to Radiological Performance Assessment for the E-Area Vaults Disposal Facility, WSRC-RP-94-218, dated November 14, 1995.

Saltstone Disposal Facility

Radiological Performance Assessment for the Z-Area Saltstone Disposal Facility, WSRC-RP-92-1360 rev. 0, dated December 18, 1992.

Letter from M. Frei to McCoy, dated February 18, 1998, Subject: Conditional Acceptance of the Saltstone Disposal Facility Performance Assessment.

Addendum to Radiological Performance Assessment for the Z-Area Saltstone Disposal Facility, WSRC-RP-98-00156 rev. 0, dated April 1998.

Savannah River Site

Composite Analysis, E-Area Vaults and Saltstone Disposal Facilities at the Savannah River Site, WSRC-RP-97-311, dated September 1997.

Letter from J. Rhoderick and W. Murphie to Assistant Manager for Environmental Management, Savannah River Operations Office and Manager, Savannah River Operations Office dated January 21, 1999, Subject: Review of the Savannah River Site Composite Analysis.

Letter from W. L. Noll to M. Frei and James Fiori dated March 9, 1999, Subject: Savannah River Site Composite Analysis Maintenance Plan Schedule.

This Disposal Authorization Statement is subject to all applicable rules and Orders now or hereafter in effect and to all conditions specified below. Also, this authorization is applicable to any subsequent revisions and additions to the performance assessments and the composite analysis provided such revisions and additions are in accordance with the performance assessment and composite analysis maintenance program. Applicable permits and reports that comprise the Radioactive Waste Management Basis shall be approved and continue to be maintained according to the applicable DOE Orders and regulations.

Facility Construction and Design

The E-Area Vaults Disposal Facility consists of a number of disposal units described in the performance assessment and composite analysis: Low Activity Waste Vaults, Intermediate Activity Waste Vaults, trenches and Naval Component Disposal Areas. The design features of each disposal unit constructed in the field shall conform to the conceptual model used in the performance assessment or Special Analyses. Any changes in disposal technology, disposal unit, or waste form must be analyzed and authorized according to the performance assessment and composite analysis maintenance program and approved by DOE.

The Saltstone Disposal Facility consists of concrete vaults filled with grout prepared with decontaminated salt solution from the high-level waste tank farms. This combination of

disposal unit and waste form has been analyzed in the Saltstone Disposal Facility performance assessment and composite analysis. Changes in disposal technology, disposal unit or waste form must be analyzed according to the performance assessment and composite analysis maintenance program and approved by DOE.

Radionuclide Limits, Waste Form, and Packaging

Each disposal unit within the E-Area Vaults Disposal Facility and the Saltstone Disposal Facility shall have waste acceptance criteria which provide specific radionuclide disposal limits, waste form restrictions, and descriptions of acceptable waste packages. The waste acceptance criteria shall be based on facility performance assessments, special analyses, and composite analyses as well as safety documentation and criticality considerations. Waste acceptance procedures shall be in place that describe requirements for waste characterization, waste certification and record keeping, as well as the process for authorizing deviations from the requirements. All waste received for disposal at these facilities must conform to the waste acceptance procedures. The waste acceptance criteria shall be reviewed and approved through the facility Radioactive Waste Management Basis.

Closure

Closure plans for the E-Area Vaults Disposal Facility and the Saltstone Disposal Facility shall be prepared within one year of the issuance of this Disposal Authorization Statement and submitted to the Savannah River Operations Office for review and approval. These closure plans must address any outstanding closure commitments from the review of the E-Area Vaults and Saltstone Disposal Facilities performance assessments and composite analysis. Deviations in the closure plan from the closure concept analyzed in the performance assessments must be analyzed and approved per the performance assessment and composite analysis maintenance program.

Monitoring

Monitoring plans for the E-Area Vaults Disposal Facility and the Saltstone Disposal Facility shall be written, approved by the Savannah River Operations Office, and implemented within one year of the issuance of this Disposal Authorization Statement. These plans shall be updated at least every five years to reflect changing facility conditions. The plans shall include monitoring frequencies and protocols for the existing data collection and any new data collection required to measure the continued performance of the disposal facilities. These plans shall also include a requirement for comparison with the performance assessment results and development of any necessary corrective action.

Performance Assessment and Composite Analysis Maintenance

Maintenance plans shall be written and approved by the Savannah River Operations Office for the Saltstone and E-Area Vaults Disposal Facility performance assessments and composite analysis by December 31, 1999. Changes in the disposal facility (e.g., waste form,

disposal unit design, radionuclide quantity) or in site policy (land use plan) or strategy (closure plans, remedial actions) and consequent changes in disposal facility controls shall be managed per the performance assessment and composite analysis maintenance program.

The Composite Analysis Maintenance Program should address the following areas:

- Disposition of all Composite Analysis Review Team comments.

- Provide a discussion of the Environmental Monitoring Program, inclusion of environmental monitoring data, and a comparison with the expected results from the composite analysis.

- Include the information that Savannah River Site committed to be incorporated in the composite analysis maintenance plan over the course of the composite analysis review. Copies of the annual review of the adequacy of the performance assessment and composite analysis shall be provided to the Low-Level Waste Disposal Facility Federal Review Group (LFRG).

Savannah River Site Composite Analysis Addendum

By March 31, 2000, provide an addendum to the Savannah River Site composite analysis which addresses the following issues:

- Provide a complete source term inventory for the Upper Three Runs watershed and a re-analysis of the source term that was arbitrarily assigned to Cesium and Strontium to provide a more realistic radionuclide distribution.

- A single point of assessment at the confluence of Upper Three Runs and the Savannah River using the recreational scenario currently in the composite analysis.

- Perform a sensitivity analysis on the radionuclides important to the composite analysis and flux rates and on the hydrologic model including the groundwater divide and the model boundary conditions. Perform an uncertainty analysis on the inventory, flux rates, and resultant dose calculations for the radionuclides important to the composite analysis.

- Include the information needed to clearly define the assumptions for each portion of the analysis along with justification for these assumptions.

Violations of Operational Requirements

Performance assessment and composite analysis commitments that are not met will result in the review of the applicability of continued disposal authorization.

James Fiore
Acting Deputy Assistant Secretary
for Environmental Restoration
Environmental Management

Mark W. Frei
Acting Deputy Assistant Secretary
for Waste Management
Environmental Management

Date:

SEPARATION

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Compliance Evaluation of the Performance Assessments and Composite Analysis for the Disposal of Low-Level Waste in the Savannah River Site E-Area Vaults and Saltstone Disposal Facilities

The Low Level Waste Disposal Facility Federal Review Group (LFRG) concludes that the performance assessments and the composite analysis were generally acceptable and that continued waste management operations be approved with specific conditions as delineated in the disposal authorization statement.

On September 23, 1994, the radiological performance assessment for the E-Area Vaults disposal facility was conditionally approved. On February 18, 1998, the radiological performance assessment for the Saltstone disposal facility was conditionally approved. All of the conditions for the performance assessments have been met. On January 21, 1999, the Savannah River Site composite analysis was accepted with conditions. The primary conditions for approval were the incorporation of additional information and analysis into the composite analysis by issuance of an addendum and the development and implementation of a composite analysis maintenance program. The LFRG concluded that the composite analysis provided sufficient information to determine that the subject low-level waste sites' operations would not contribute significantly to any composite effects. Therefore, if any adverse exposure concerns resulted, management alternatives should be directed at other sites or sources of radioactive contamination. Although the composite analysis was found to be conditionally adequate to support ongoing disposal operations, it was not adequate for assessing comprehensive site-wide conditions.

The base case analysis results in the following calculated doses relative to the performance measures:

Performance Assessment for the Saltstone Disposal Facility

PA Component	Measure	Saltstone Disposal Facility Projected Maximum Dose or flux*
All pathways	≤ 25 mrem/yr	4 mrem/yr
Air pathway	≤ 10 mrem/yr	10 mrem/yr for a person residing 15 cm above exposed saltstone, in a confined space for a complete year (extremely conservative)
Radon flux	an average flux of ≤20 $pCi/m^2/s$ *or* an air concentration of ≤ 0.5 pCi/L unless constrained by applicable laws and regulations, or agreements	0.1 $pCi/m^2/s$
Hypothetical inadvertent intruder	100 mrem/yr from chronic exposure 500 mrem/yr from a single event	0.6 mrem/yr from chronic exposure < 0.6 mrem/yr from a single event
Water resource protection	Established consistent with laws, agreements or groundwater protection management program SRS adopted a performance measure of 4 mrem/yr	 0.6 mrem/yr

* Maximum doses during the 1000 year compliance period are not reported, therefore, the reported peak doses which occur beyond 1000 years are used to evaluate compliance.

Sensitivity/uncertainty analyses were conducted by identifying the modeling parameters to which the results were most sensitive, then individually evaluating the impacts by using higher and lower input values than those used for the base cases and by using a statistical method that samples multiple parameters and tests various combinations. Those parameters with the greatest impact resulted in calculated doses higher by a factor of up to 300. This result of a conservative sensitivity/uncertainty calculation, considered in light of the other

conservatism employed in the modeling, is judged to be consistent with a reasonable expectation that the performance target for protecting groundwater will be met. However, it does emphasize the necessity to conduct a maintenance program aimed at reducing uncertainties in the values of input parameters and the modeling results.

The performance assessment included analysis of the migration and groundwater concentration of nitrates. Since the nitrates are not radioactive, they are not considered in this compliance evaluation.

Performance Assessment for the E-Area Vaults

PA Component	Measure	E-Area Vaults Disposal Facility Projected Maximum Dose or flux*
All pathways	≤ 25 mrem/yr	0.3 mrem/yr
Air pathway	≤ 10 mrem/yr	0.06 mrem/yr
Radon flux	an average flux of ≤ 20 $pCi/m^2/s$ *or* an air concentration of ≤ 0.5 pCi/L unless constrained by applicable laws and regulations, or agreements	0.3 $pCi/m^2/s$
Hypothetical inadvertent intruder	100 mrem/yr from chronic exposure 500 mrem/yr from a single event	140 mrem/yr** from chronic exposure < chronic exposure
Water resource protection	Established consistent with laws, agreements or groundwater protection management program SRS established a performance measure of 4 mrem/year	 0.4 mrem/yr

* Maximum doses during the 1000 year compliance period are not reported, therefore, the reported peak doses which occur beyond 1000 years are used to evaluate compliance.

** The intruder dose of 140 mrem/year results from U-233 and Cm-247. The projected inventory of these isotopes in the performance assessment is rather conservative. Current Savannah River Site inventory estimates are a factor of 20 less for U-233 and more than 10 orders of magnitude less for Cm-247; currently, none of these isotopes have been disposed. Using the revised inventory, the maximum intruder dose will be 43 mrem/year. In any event, the waste acceptance criteria derived from the performance assessment will limit waste receipts to ensure that the performance objectives are not exceeded.

Sensitivity/uncertainty analyses were conducted by identifying the modeling parameters to which the results were most sensitive and then using a statistical method that samples multiple parameters and tests various combinations. For example, in the case of Tc-99 in the Intermediate Level vaults, variation in the times of vault degradation (i.e., cracking, roof collapse) and the distribution coefficient for the vault concrete resulted in 95 percent confidence limits within no more than a factor of 5 higher and lower than the base case. This result of a conservative sensitivity/uncertainty calculation, considered in light of the other conservatism employed in the modeling, is judged to be consistent with a reasonable expectation that the performance target for protecting groundwater will be met. However, it does emphasize the necessity to conduct a maintenance program aimed at reducing uncertainties in the values of input parameters and the modeling results.

Composite Analysis, E-Area Vaults and Saltstone Disposal Facilities

Composite Analysis Component	Measure	Savannah River Site Projected Maximum Dose
All pathways	Composite Analysis dose constraint of 30 mrem/yr	1.8 mrem/yr

Sensitivity analysis show that the values of parameters used in the base case and the results of the base case are in the conservative portions of their respective ranges. This supports the premise that the performance measure can reasonably be expected to be met.

LFRG Chairmen:

Jay E. Rhoderick, Co-Chairman

Bill Murphie, Co-Chairman

Date: