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United States Department of Energy

Savannah River Site

Explanation of Significant Difference (ESD) to the Revision 1.1 Record of Decision (ROD) for the F-Area Retention Basin (281-3F) (U)

WSRC-RP-2000-4079

Revision 1

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Introduction

This Explanation of Significant Difference (ESD) is being issued by the U.S. Department of Energy (US DOE), the lead agency for the Savannah River Site (SRS) remedial activities, with concurrence by the U.S. Environmental Protection Agency (US EPA) – Region IV and the South Carolina Department of Health and Environmental Control (SCDHEC). The purpose of this ESD is to announce changes in the remedial decision selected in the *Record of Decision (ROD) for the F-Area Retention Basin (FRB)* Waste Unit (U), WSRC-RP-97-145, Revision 1.1, August 1998. The effective signature date of this ROD is September 4, 1998.

The ROD selected a common remedy, in situ stabilization with a low-permeability soil cover system, for high-risk, radioactively contaminated soils at FRB.

During field implementation of the selected remedial action, it was discovered that quantities of contaminated soils associated with the process sewer line at FRB are possibly up to 10 times larger than originally estimated in the ROD. Analytical data indicates that there are no contaminants of concern (COCs) at concentrations that meet the definition of a principal threat source material (PTSM) at any of the pipeline hot spot locations. Due to limited available basin capacity for treatment of these soils, SRS is proposing to modify the screening criteria as identified in the original ROD for disposition of these soils in accordance with this ESD. The remedial action objectives of the ROD would still be met while holding the cost and schedule of the remedy approximately constant.

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 117 (c), SRS is required to publish an ESD whenever there is a significant change to a component of a remedy specified in a ROD. Sections 300.435 (c) (2) (i) and 300.825 (a) (2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requires the lead agency to provide an explanation of the difference and to make this information available to the public in the Administrative Record File and information repositories.

The ESD is part of the Administrative Record File, and is available for public review during normal business hours at the following information repositories.

U.S. Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina Aiken
171 University Parkway
Aiken, SC 29801
(803) 641-3465

Thomas Cooper Library
Government Documents Department
University of South Carolina
Columbia, SC 29208
(803) 777-4866

Reese Library
Augusta State University
2100 Walton Way
Augusta, GA 30910
(706) 737-1744

Asa H. Gordon Library
Savannah State University
Thompkins Road
Savannah, GA 31404
(912) 356-2183

Summary of Site History, Contamination Problems, and Selected Remedy

The F-Area Retention Basin (FRB), designated as Building 281-3F, is located outside and south of the F-Area perimeter fence, approximately 3,397 ft north of Fourmile Branch. The FRB, with an area of approximately 0.6 acre and approximate dimensions 200 ft long, 129 ft wide, and 6.9 ft deep, was designed and operated as an unlined, temporary storage pond [capacity approximately 1.2 million gallons] for potentially contaminated cooling water from the F-Area Canyon Facility and stormwater drainage from the F-Area Tank Farm. Water was conveyed to the basin by a process sewer line [approximately 550-ft of 24-inch diameter and approximately 700-ft of 36-inch diameter] that discharged into the north side of the basin.

The FRB became operational in 1955, remained active until 1972, and was closed in December 1978. At the time of closure, soil sampling was performed at the basin, and approximately 2 ft of soil was excavated from the bottom of the basin. The basin was backfilled with clean soil and the area was seeded with grass. A total of 1,268 yd^3 of contaminated soil was removed from the basin and transported to Building 643-G for disposal.

When the basin was closed, two sections of the process sewer line that served the basin were abandoned. These included both branches of pipeline that ran from the Tank Farm and from the Canyon Facility. The 24-inch diameter pipeline that extended approximately 550 ft from the Tank Farm was sealed off at manhole 805-2F. The 36-inch diameter pipeline that extended 538 ft from the canyon facility was sealed off at manhole P-40. The approximate length of the abandoned portion of the process sewer line located to the north and south of the basin is 1,150 ft and forms a part of this unit.

The depth to the top of the process sewer line ranges from less than 3 ft to 15 ft for the segment from P-40 to P-39. Five access points to the abandoned process sewer line exist. Three of the five points (P-37, P-39, and P-40) are standard manholes constructed of brick. Access point P-38 is a nonstandard manhole constructed of concrete walls and floor. The final access point is a valve/junction box located downstream from manhole P-39. The box was used during normal operation to regulate the volume of liquid released to the retention basin.

The FRB was designed to discharge its contents through an outlet pipe/structure into an outfall ditch naturally connected by an unnamed tributary that discharged into Fourmile Branch. Remedial investigations conducted in accordance with the established Federal Facility Agreement (FFA) protocols indicated that the outfall ditch area and unnamed tributary to Fourmile Branch were not impacted by FRB operations and therefore were not considered under this remedial action. However, field sampling conducted during remedial construction indicated a potential impact to the outfall ditch area. This change is included as part of this ESD.

The basin, surrounding soils, and groundwater were characterized in detail in 1997 and are documented in the *Remedial Investigation Report with Baseline*

Risk Assessment for the F-Area Retention Basin (281-3F) (U), WSRC-RP-96-356, Revision 1.2 and The Groundwater Sampling Report With Residential Risk Assessment for the F-Area Retention Basin (281-3F) (U) WSRC-RP-96-00905, Revision 0. The preliminary investigation conducted for the FRB identified two primary sources of contamination: (1) the former basin area; and (2) the process sewer line area. The primary media of contamination associated with the former basin area are the subsurface soils deeper than 4 ft; the surface soils 0-2 ft; and subsurface soils associated with the process sewer line area; and sediment within the process sewer pipeline.

Only human health COCs (i.e., Cs-137, Ra-226, K-40, and thallium) were identified in the surface soil and only one contaminant migration COC (Sr-90) was identified in the subsurface soil. Radionuclide contaminants (Sr-90) in the basin subsurface soil (deep soils, 6 – 14 feet) represent a PTSM.

Analytical data pertaining to the FRB indicates that radionuclide contaminated soils associated with the basin are the principal threat wastes which pose risk to both the future resident and industrial worker. These radionuclide risks are primarily associated with levels of Sr-90 in soils beneath the basin that represent a potential risk of future contaminant migration that could result in contamination of the groundwater. No COCs associated with the FRB OU were identified for groundwater.

The approved remedial action as stated in the Revision 1.1 ROD (August 1998) consists of: (1) in-situ grouting of deep basin soil from approximately 2 ft above the basin bottom to approximately 6 ft below the basin bottom or approximately 14 ft below grade; (2) process sewer line and manhole grouting with zero bleed Controlled Low Strength Material (CLSM) and excavation and disposition of hot spot pipeline soils (approximate volume of 300 yd^3) into the basin and institutional controls; (3) installation of a low permeability engineered soil cover over the basin area, and; (4) The selected remedy for FRB OU groundwater is "No Action", however, the groundwater will be monitored semi-annually until it is confirmed that the remedial response action for the FRB OU has achieved the required stabilization of contaminants.

Based on risks posed by COCs in the FRB soil and pipelines sediment, the general remedial action objectives for the FRB OU (as presented in the ROD) are as follows:

- Reduce risks to human health associated with COCs through – external exposure to radiological constituents by direct contact with the former basin area soils, surface water, and sewer line area soil, - ingestion of former basin area and sewer pipeline area soils and pipeline sediment or produce grown in soils with radiological constituents, and
- Prevent or mitigate exposure to highly toxic or highly mobile contaminants that represent principal threat source material.
- Prevent or mitigate the leaching and migration of Sr-90 to unit groundwater. MCL for Sr-90 is 8.0 pCi/l.

Basis for the Explanation of Significant Difference

The purpose of this ESD is to document a Post-ROD change to the remedy selected for the FRB. The significant difference of the modified remedy from the original remedy is to modify the acceptance criteria for pipeline soils. The original remedy included an estimate of 300 yd^3 of contaminated pipeline soils that would require excavation and placement into the basin for stabilization along with the existing basin soils. This estimate was based on the amount of soil that would exceed the established 20 pCi/g gross alpha and 50 pCi/g nonvolatile beta screening criteria. During field execution of the selected remedy, it was determined that the estimate of 300 yd^3 of contaminated pipeline soils was low. SRS based the 300 yd^3 of pipeline soils on areas of known leaks in the pipeline coupled with correlating characterization data. SRS has been unable to reasonably achieve the established screening levels of 20 pCi/g gross alpha and 50 pCi/g nonvolatile beta in the soils surrounding the process sewer line. To date approximately 263 yd^3 of contaminated soils have been excavated from the basin sidewalls, inlet/outlet structures, outlet ditch area and process pipeline and placed into the basin for treatment. In addition to the 263 yd^3 of contaminated soil, nine sections of inlet/outlet 36-inch RCP, a headwall/wingwall, 3.5 yd^3 drainage ditch rip rap and a spillway have been placed into the basin. Due to an unexpected volume of soil swell during the solidification/stabilization process, basin capacity does not exist to handle the potential 3,850 yd^3 of soil exceeding the 20/50 screening criteria now estimated to be associated with the process sewer lines. Although this remaining soil exceeds 20/50 screening criteria, it does not represent a PTSM or contaminant migration concern. SRS has been successful in achieving the 20/50 screening criteria at the basin sidewalls and outlet structure and drainage ditch areas.

Due to the limited basin capacity available for soil treatment, this change proposes excavation and treatment of soils representing a PTSM while leaving in place pipeline soils that do not represent a PTSM or migration concern. A description of the field activities leading up to this determination and proposed change follow.

Field sampling conducted during removal of the outlet pipe/structure indicated contamination in the outlet ditch area in excess of the established screening levels of 20 pCi/g gross alpha and 50 pCi/g nonvolatile beta. This area was not originally considered for remedial action under this ROD. Further analysis indicated a maximum concentration of Cs-137 at 51.5 pCi/g in the outlet ditch rock and soils. This value exceeded the established residential PTSM threshold for soils of 22.1 pCi/g. This discovery initiated the excavation and removal of an unscoped 77.0 yd^3 of soil and rock exceeding the PTSM threshold and 20/50 screening criteria and disposition into the basin. In addition, contaminated soils located in and around the outlet pipe resulted in the excavation of the entire outlet structure (9 sections of 24-inch reinforced concrete outlet pipe and wingwall) and disposition into the basin.

Similar conditions were encountered in the vicinity of the inlet pipe and manhole area (location 9, figure 6 of ROD) and on the west-side slope of the basin. The original estimate for removal of contaminated soils from the inlet pipe and manhole area was approximately 30 yd^3. Soil conditions encountered in the field after removal of the estimated 30 yd^3 and one section of inlet pipe were still in excess of the 20/50 screening criteria. Further analysis was performed at location 9 resulting in the identification of one area of elevated Sr-90 at a maximum concentration of 76.5 pCi/g, (the resident soil PTSM threshold for Sr-90 is 14,200 pCi/g). Subsequently, the manhole, two more sections of inlet pipe and an additional 24 yd^3 of soil were removed and dispositioned into the basin. Upon removal of a total of 54 yd^3 of soil in excess of the 20/50 screening criteria from in and around the inlet pipe and manhole, it was determined that the 20/50 screening criteria would not be reasonably achievable for the deeper soils underlying the process sewer line. Soil was excavated to a depth of approximately 10 feet at location 9 with no PTSM encountered. Soil excavation around the process sewer line was discontinued pending outcome of this ESD. Additionally, an unscoped 102 yd^3 of contaminated soil was also removed from the west-side slope basin in order to achieve the 20/50 screening criteria.

Contaminated soils excavated from the FRB outfall ditch area, inlet pipe/manhole area, sidewall area, and process pipeline have been placed within the basin and will be treated by soil stabilization/solidification along with the other basin soils.

SRS proposes that soils inside the F-Area perimeter fence at locations 16A and 16C (figure 6 of ROD) and at location 9 that do exceed the 20/50 screening criteria, but do not represent a PTSM or migration concern, remain in place. It has been discovered during implementation of the selected remedy that soil swell during the in situ stabilization/solidification process is likely to use any additional basin capacity available. All soils in and around the FRB that represent a PTSM and a potential migration concern have been excavated and will be treated in the basin by solidification/stabilization.

Description of Significant Differences

The original approved remedy, as identified in Revision 1.1 of the ROD (1998), WSRC-RP-97-145, Page 55 of 74, Paragraph 1, *Alternative P4 – Institutional Controls, Pipeline Grouting, Soil Excavation, and Disposal of Soil with Basin Soil*, states the following;

"This alternative includes pumping grout into the pipeline and manholes to stabilize contaminants, thereby restricting access to the contaminants inside the pipeline. This alternative also involves excavating localized areas of contaminated soil (areas around the trouble spots determined by robotics investigation and soil sampling) (Figure 19) around the pipeline areas using standard earth moving equipment. The volume of contaminated soil will be determined by comparing the existing sampling data against the acceptance criteria (concentration levels not to exceed 20-pCi/g alpha and 50-pCi/g for beta and gamma emitters). The material (unacceptable contaminated soil with an

estimated volume of approximately 240 m^3 or 300 yd^3) is then transported to the basin for disposal along with basin soils."

The significant difference of the modified remedy from the original remedy is to modify the acceptance criteria for pipeline soils from the 20/50 screening criteria to the following.

"The volume of contaminated soil will be determined by comparing the existing sampling data against the acceptance criteria (concentration levels not to exceed 20-pCi/g alpha and 50-pCi/g for beta and gamma emitters to a depth of 2 feet while leaving any deeper soils (at depths greater than 2 feet) exceeding the 20/50 screening criteria but that do not represent a PTSM or migration concern)."

Analytical data indicates that there are no COCs at concentrations that meet the definition of PTSM at any of these hot spot locations. Soils remaining in the vicinity of the pipeline would be designated as an Underground Radioactive Materials Area (URMA) and would remain under institutional control within the existing nuclear facility. The cost and schedule for this remedy remains approximately the same.

Statutory Determinations

The modified remedy meets the requirements specified in CERCLA Section 121 to:

- Protect human health and the environment
- Comply with applicable or relevant and appropriate requirements
- Be cost-effective
- Utilize permanent solutions and alternative treatment technologies to the maximum extent practicable
- Satisfy the preference for treatment as a principal element

As-built drawings of the basin, inlet and outlet structures and pipelines, and process pipelines displaying areas of soil sampling and excavation will be included in the Post Construction Report.

Public Participation Activities

The public will be notified of this ESD through mailing of the *SRS Environmental Bulletin*, a newsletter sent to approximately 3,500 citizens in South Carolina and Georgia, and through the *Aiken Standard,* the *Allendale Citizen Leader,* the *Barnwell People Sentinel, The State,* and the *Augusta Chronicle* newspapers. To obtain more information concerning this ESD, or to submit written comments contact:

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The public will be informed of regulator concurrence with this ESD through public notices in the *Barnwell People Sentinel/, Allendale Citizen Leader, Aiken Standard, Augusta Chronicle* and *The State.*

9/7/00
Date

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