009229

United States Department of Energy

Savannah River Site

Unit-Specific Plug-In Record of Decision Amendment for the C-Area Reactor Seepage Basin (904-67G) and L-Area Reactor Seepage Basin (904-64G) (U)

WSRC-RP-2002-4063

Revision 1

August 2002

Prepared by:
Westinghouse Savannah River Company LLC
Savannah River Site
Aiken, SC 29808

Prepared for U.S. Department of Energy under Contract No. DE-AC09-96SR18500

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Prepared for
U.S. Department of Energy
and
Westinghouse Savannah River Company LLC
Aiken, South Carolina

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DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION (U)

C-Area Reactor Seepage Basin (904-67G) and
L-Area Reactor Seepage Basin (904-64G) (U)

WSRC-RP-2002-4063
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LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
ALARA	as low as reasonably achievable
CRSB	C-Area Reactor Seepage Basin
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COC	constituent of concern
FFA	Federal Facility Agreement
LUC	Land Use Controls
LUCAP	Land Use Controls Assurance Plan
LUCIP	Land Use Controls Implementation Plan
LRSB	L-Area Reactor Seepage Basin
LLC	Limited Liability Company
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
OU	operable unit
pCi/g	Picocuries per gram
PTSM	principal threat source material
PP	Proposed Plan
ROD	Record of Decision
RG	remedial goal
RAO	remedial action objective
RBC	risk based concentration
SRS	Savannah River Site
SCDHEC	South Carolina Department of Health and Environmental Control
SARA	Superfund Amendments Reauthorization Act
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
WSRC	Westinghouse Savannah River Company, LLC

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I. INTRODUCTION TO THE UNITS AND STATEMENT OF PURPOSE

Unit Name and Location

C-Area Reactor Seepage Basin (904-67G) and L-Area Reactor Seepage Basin (904-64G)

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: OU-60 (CRSB) and OU-65 (LRSB)

Savannah River Site

Comprehensive Environmental Response, Compensation and Liability Act Identification Number: SC1 890 008 989

Aiken, South Carolina

United States Department of Energy

Identification of lead and support agencies

This amended Record of Decision (ROD) is being issued by the United States Department of Energy (USDOE), which functions as the lead agency for SRS remedial activities, with concurrence by the United States Environmental Protection Agency (USEPA) and the South Carolina Department of Health and Environmental Control (SCDHEC) for the L-Area Reactor Seepage Basin (LRSB) and C-Area Reactor Seepage Basin (CRSB) basin #2. (This amended ROD does not affect the Plug-in remedy for CRSB basins #1 and #3.)

Citation of CERCLA Section 117 and NCP Section 300.435 (c)(2)(ii)

The change to the remedy has been determined to be a fundamental change in the remedy selected in the Plug-in ROD. This Plug-in ROD amendment is necessary to comply with National Oil and Substance Pollution Contingency Plan (NCP) Section 300.435(c)(2)(ii) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 117.

Date of original Plug-In ROD signature

The original Plug-in ROD was issued by the three parties (SCDHEC, USDOE, and USEPA) on 11/29/99.

Summary of circumstances that led to the need for a Plug-In ROD Amendment

The following circumstances led to the need for a Plug-in ROD Amendment.

- After the original Plug-in ROD was signed by the three parties, it was recognized that the risk from principal threat source material (PTSM) would be reduced to below 1×10^{-3} in the year 2006 for LRSB and 2002 for CRSB basin #2 from radioactive decay.

- The USDOE, USEPA, and SCDHEC agreed that the current access controls and site use controls at SRS would effectively protect human health and the environment at least through 2006; therefore, a low permeability soil cover is an appropriate remedy for the LRSB and CRSB basin #2. After this period, the LRSB and CRSB basin #2 will not pose a risk greater than 1×10^{-3} and will no longer require in situ stabilization with a grout-like material as a component of the prescribed remedy presented in the Plug-in ROD.

Statement that ROD Amendment will become part of Administrative Record file (NCP 300.825(a)(2))

Information presented in this amendment will become part of the Administrative Record File in accordance with the requirements of the NCP, Section 300.825(a)(2), because it (1) supports the need to significantly alter the response actions, (2) is not contained elsewhere in the Administrative Record File, and (3) was not available for public review when the Plug-in ROD (WSRC 1999) was issued.

The Federal Facility Agreement (FFA) Administrative Record File, which contains the information pertaining to the selection of the response action, is available at the following locations:

US Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina – Aiken
171 University Parkway
Aiken, South Carolina 29801
(803) 641-3465

Hours of availability:
Monday – Thursday: 8:00am – 11:00pm
Friday: 8:00am – 5:00pm
Saturday: 10:00am – 5:00pm
Sunday: 2:00pm – 11:00pm

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

Hours of availability:
Monday – Friday: 7:30am – 12:00 midnight
Saturday: 10:00am – 8:00pm
Sunday: 1:00pm – 12:00 midnight

II. SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

Brief summary of contamination problems and Operable Unit History

L-Area Reactor Seepage Basin

The LRSB Operable Unit (OU) is located in the central portion of SRS, southeast of the L-Reactor facility. The LRSB OU includes the basin, concrete pad, buffer area, perimeter, and process sewer line. The LRSB is located in an industrial zone identified in the proposed SRS future land use map of the SRS FFA Implementation Plan (WSRC 1996). The basin is adjacent to a nuclear facility and has been selected to remain an industrial use area.

The LRSB is an L-shaped unlined earthen basin with dimensions of 200 feet on each outer side of the L-shape, 36 feet in width, and 7 feet in depth (Figure 1). The basin has not been backfilled to grade and is currently open.

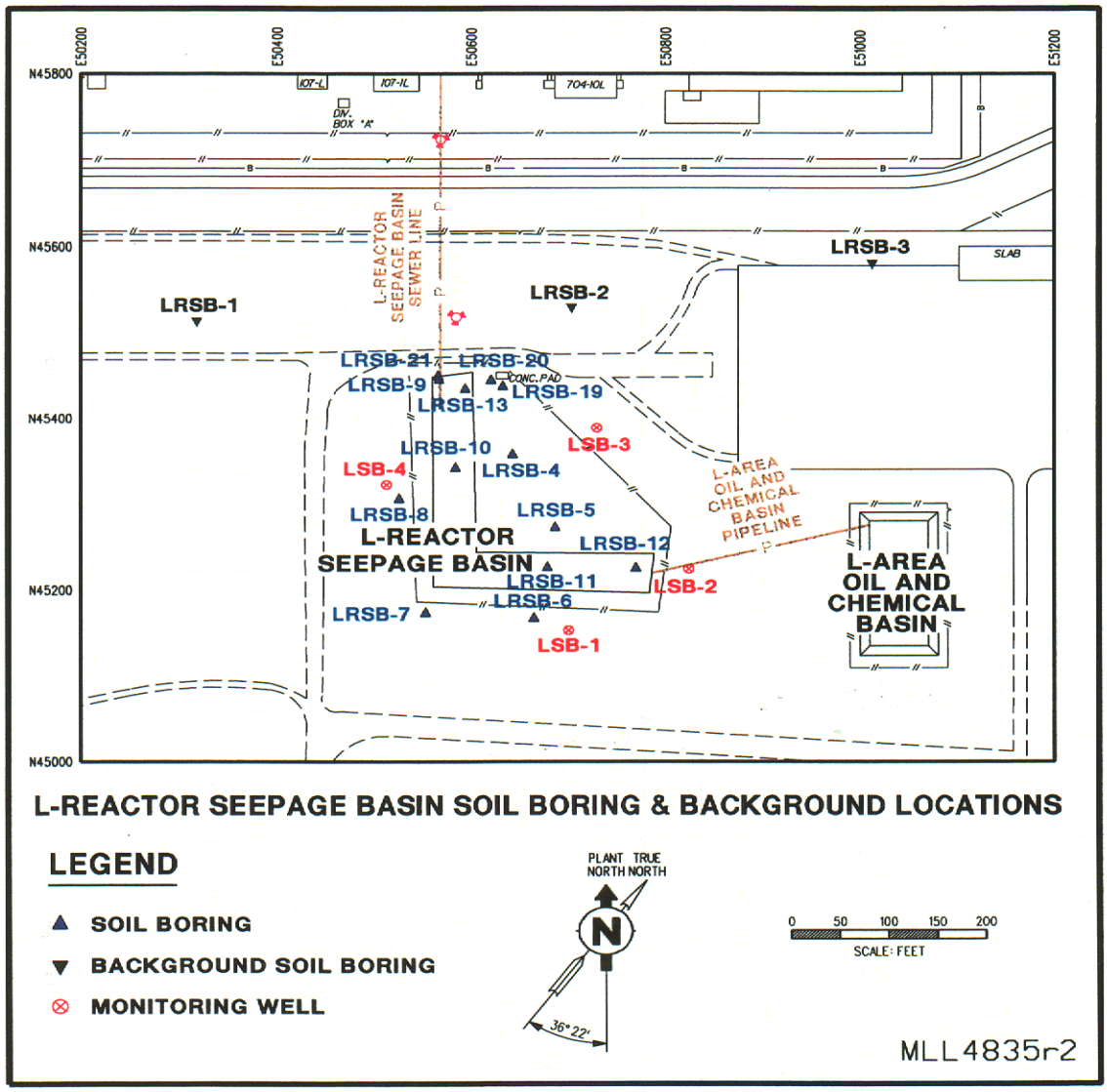

Figure 1. Layout of the LRSB

A process sewer line that is approximately 450 feet long extends from the disassembly basin with the L-Reactor facility to the discharge point at the north end of the basin. In addition to the process sewer line, a concrete pad, approximately 10 by 10 feet, sits adjacent to the basin on the north side. This pad was most likely used as an offloading area. Liquid waste was disposed of into the basin from tanker trucks at the offloading pad via a flexible pipe that extends from the pad into the north end of the basin.

In 1958, the process sewer line began conveying low-level radioactive purge water from the L-Area Reactor disassembly basin to the seepage basin. The LRSB received purge water from 1958 to 1968 and from 1985 to 1988. The L-Area Reactor was not in operation from 1969 to 1984 and no purge water was generated. However, from 1985 to 1988, mixed-bed deionizers and sand filters intercepted the purge water before it was discharged into the LRSB. In 1988, L Reactor was placed on warm standby; in 1993, it was placed in shutdown status and has not been restarted.

Although many radionuclides were discharged to LRSB, the majority of radioactivity was due to tritium. Other radionuclides include strontium-90, cesium-137, cobalt-60, and promethium-147. In addition, chemical components entered the disassembly basin in small amounts through additions for pH control, filter promotion, and algae treatment as well as through minimal additions of wastewater to the settler tank from other sources in L-Reactor building. These contaminants entered LRSB when purge water from L-Reactor disassembly basin was released to the seepage basin.

The LRSB has been contaminated with radionuclides from past activities at SRS. The cumulative radiological risk to the industrial worker from the LRSB is 3×10^{-3}. Radiological risk assessments for humans are more conservative than ecological health risk assessments. Therefore, only human health risk evaluations

were considered. At LRSB, the primary contaminant remaining in the basin soil is cobalt-60 (which has a half-life of 5.27 years). The half-life indicates the time necessary for a radionuclide to naturally decay to half of its radioactivity. Currently, the level of contamination in the soil at the LRSB creates a risk in excess of 1×10^{-3} (may cause one additional incidence of cancer in every 1,000 people that become exposed to the radionuclides). This level of contamination is considered PTSM. No other contaminant exceeded the PTSM threshold. PTSM is present to a depth of 1 foot in LRSB.

Additionally, at the LRSB, strontium-90 was detected at depth (7 to 10 feet bls) in the buffer area at a concentration (4.8 pCi/g) approximately equal to the average strontium-90 concentration in the basin (4.03 pCi/g). Strontium-90 is not in contact with the groundwater. Because strontium-90 was identified as a potential threat to future groundwater due to migration through the basin soils, it is also identified as a contaminant migration concern for the buffer area.

Actual or threatened releases of hazardous substances from this waste unit, if not addressed by the amended alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

C-Area Reactor Seepage Basins

The CRSB OU is located in the central portion of SRS in the southwestern portion of C Area. The CRSB OU includes basin #1, basin #2, basin #3, and the process sewer line. The CRSBs are located in an industrial zone identified in the proposed SRS future land use map of the SRS FFA Implementation Plan (WSRC 1996). The basins are adjacent to a nuclear facility and have been selected to remain an industrial use area.

Three unlined (earthen) basins were constructed in 1957 that comprise the CRSB OU. Basin #1 is L-shaped and was constructed with an approximate outside dimension of 250 by 35 feet in the north-south direction, approximately 180 by 35 feet in the east-west direction, and a depth of 7 feet below land surface (bls). Basin #2 was constructed with an approximate outside dimension of 300 x 60 feet and a depth of 11 feet bls. Basin #3 was constructed with approximate outside dimensions of 180 x 90 feet and a depth of 12 feet bls.(Figure 2).

A process sewer line that is approximately 800 feet long extends from the C-Area Reactor disassembly basin to basin #1. From 1957 until 1970 and from 1978 until 1986, the process sewer line conveyed low-level radioactive purge water from the C-Area Reactor disassembly basin to the seepage basins. The process sewer line has been grouted as part of the CRSB remedial action.

Basin #1 slopes to the north and west where a cascade overflow pipe connects it to basin #2. Basin #2 also has a similar cascade overflow into basin #3 at its southeastern corner. Flow between the basins was via the cascade overflow pipes positioned near the top of the basin walls.

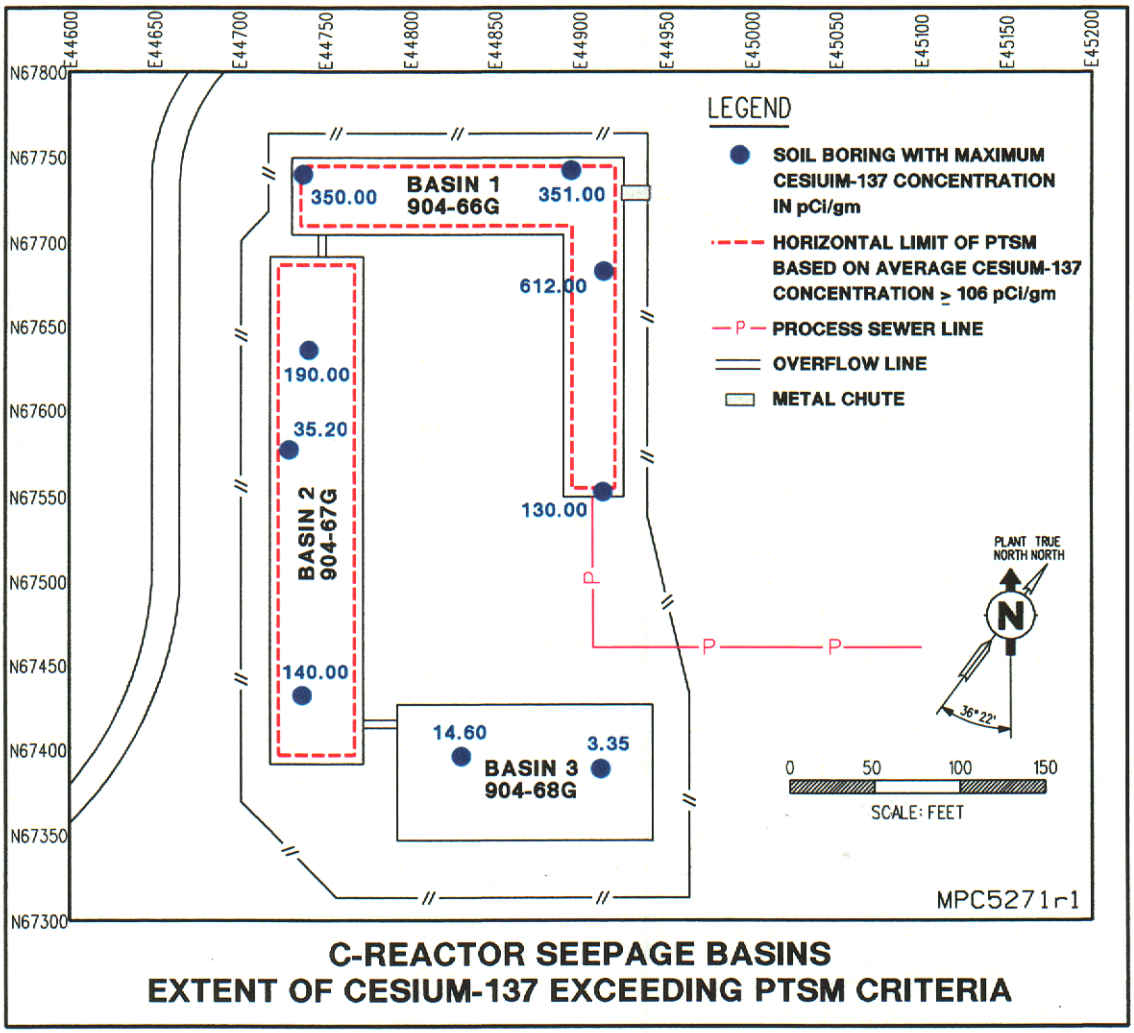

Figure 2. Layout of the CRSB

In addition to the process sewer line going to CRSB basin #1, a metal chute was placed at the northeastern bend of the basin during operation. The chute consists of an exterior, corrugated metal pipe surrounding a 10-inch diameter, stainless steel pipe. This 20- to 25-foot long metal chute is open-ended and extends to the top of the CRSB berms (Figure 2). Previous surveys have posted the chute as radiologically contaminated but soils surrounding the chute have been surveyed and are consistent with background radiation levels.

The seepage basins were used from 1959 to 1970 to dispose of low-level radioactive process purge water from the reactor disassembly basin. In 1963, disassembly basin wastewater was deionized and filtered prior to discharge, which reduced radioactivity and removed solids and sludges. The seepage basins were not used from 1971 to 1977 while purge water was mixed with large volumes of heat exchanger cooling water and discharged to area streams. After improvements for processing disassembly basin water, purge water discharges to the seepage basins resumed in 1978. The C-Reactor was shut down for repairs in 1985, placed on cold standby in 1987, and followed by shutdown. The seepage basins have not received wastewater since 1986.

Waste disposal records indicated that the CRSB OU received aqueous radioactive waste via basin #1. Radionuclides in the wastewater from the disassembly basin, sumps, tanks, and drums included tritium, chromium-51, cobalt-60, cesium-134, cesium-137, and other beta-gamma fission products. The records show almost all of the radioactivity in the reactor seepage basin discharge water was due to tritium, with lesser amounts of cesium-137, cobalt-60, and strontium-90. During the entire operation of the CRSBs, it is estimated that 56,000 curies (Ci) of tritium was released to the basins. Prior to 1970, 0.08 Ci of strontium-90, 0.07 Ci of cesium-137, and 240 Ci of nonvolatile beta emitters were released to the CRSBs.

CRSB basin #2 has been contaminated with radionuclides from past activities at SRS. The cumulative radiological risk to the industrial worker from the CRSB basin #2 is 2 x 10^{-3}. Radiological risk assessments for humans are more conservative than ecological health risk assessments. Therefore, only human health risk evaluations were considered. The primary contaminant at CRSB is cesium-137 (which has a half-life of 30.17 years). The half-life indicates the time necessary for a radionuclide to naturally decay to half of its radioactivity. Currently, the level of contamination in the soil at the CRSB basin #2 creates a risk in excess of 1 x 10^{-3} (may cause one additional incidence of cancer in every 1,000 people that become exposed to the radionuclides). This level of contamination is considered PTSM. No other contaminant exceeded the PTSM threshold. PTSM is present to a depth of 4 feet in CRSB basin #2.

Actual or threatened releases of hazardous substances from this waste unit, if not addressed by the amended alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

Selected Remedy

The Plug-in strategy established a common remedy to be used for OUs that have similar histories and similar characteristics. The approved Technical Evaluation Report and Explanation of Significant Difference for the CRSB and Technical Evaluation Report and Amended Plug-in Proposed Plan for the LRSB documented that the basins meet the Plug-in criteria. Because the CRSB and LRSB meet all plug-in criteria, components of the plug-in remedy will be used at the CRSB and LRSB. In general, the selected remedy in the Plug-in-ROD consists of five components, which are as follows:

1. ***Institutional controls*** will consist of near- and long-term actions. Those actions will be consistent with industrial land use and the SRS Land Use

Control Assurance Plan. For the near-term, signs and existing SRS access controls will be used to prevent disturbance of the soil cover system. In the long term, if the property is ever transferred to nonfederal ownership, the U.S. Government will take those actions necessary pursuant to Section 120(h) of CERCLA, which will likely include deed restrictions precluding residential use or excavation within the boundaries of the unit.

2. ***Consolidation*** of contaminated soil outside the basins exceeding PTSM criteria, leachability remedial goals, or surficial exposure RGs will occur. The soils will be excavated and placed into the primary discharge basin. Consolidated soil that is PTSM will be stabilized with the rest of the soil in that basin. Any existing steel pipeline associated with the basin will also be consolidated in the basin for remediation.

3. A ***low-permeability soil cover system*** (10^{-5} cm/s hydraulic conductivity soil cover) will be provided over the in situ stabilized soil to reduce water infiltration and to provide shielding to potential receptors on the surface. For basins that contain non-PTSM soil, but may leach contaminants to groundwater, a low-permeability soil cover system will be placed over the soil. The soil cover system will be designed with a permeability low enough to prevent migration of contaminants to groundwater in less than 1,000 years at concentrations that will exceed maximum contaminant levels (MCLs). The depth to the contaminated soils will be a minimum of 6 feet or a bio-barrier will be included as part of the cover system so plants and animals will not contact the waste.

4. ***In situ stabilization*** through grouting will be used to address PTSM soil within the basins which poses a risk in excess of 1×10^{-3} for future industrial workers, that is practicable to treat. Stabilization treatment for this principal threat material is selected to meet the CERCLA preference for treatment. Stabilization treatment will provide for greater long-term effectiveness in

protecting groundwater, and will also serve to augment prevention of potential direct exposure to the principal threat source material by converting the waste into a form less susceptible to uptake by human intruders.

5. ***Grouting*** will be used to stabilize any potential contamination left inside the pipeline and prevent access by small animals.

III. BASIS FOR THE DOCUMENT

Information that prompted and supports fundamentally changing the remedy selected in the ROD

The LRSB and CRSB basin #2 have PTSM based on the concentrations of cobalt-60 and cesium-137, respectively. The risk from PTSM will be reduced over time due to radioactive decay to below 1×10^{-3} in the year 2006 for LRSB and 2002 for CRSB basin #2. To eliminate the stabilization component of the Plug-in remedy, the following criteria must be satisfied in addition to meeting all of the Plug-in ROD criteria:

1. The current PTSM will radioactively decay to levels that no longer pose a 1×10^{-3} risk to future industrial workers within a relatively short time (i.e., PTSM will be reduced to below 1×10^{-3} in the year 2006 for LRSB and 2002 for CRSB #2).

2. USDOE, USEPA, and SCDHEC agree that it is reasonable to assume that USDOE will continue to own and operate the SRS for this time period and access controls will be provided to prevent exposure to the current PTSM.

USDOE, USEPA, and SCDHEC have agreed that PTSM in the LRSB and in CRSB basin #2 will radioactively decay to levels that no longer pose a 1×10^{-3} risk to future industrial workers within a relatively short time - which is as early as 2002 for CRSB basin #2 and 2006 for LRSB. USDOE, USEPA, and SCDHEC

also agreed that the current access controls and site use controls at SRS would effectively protect human health and the environment at least through 2006; therefore, a low permeability soil cover is an appropriate remedy for the LRSB and CRSB basin #2. In addition, a fence with warning signs will surround the LRSB and CRSB basin #2 while the LRSB and CRSB basin #2 pose a risk of 1×10^{-3} or more. After this period, the LRSB and CRSB basin #2 will not pose a risk greater than 1×10^{-3} and will no longer require in situ stabilization with a grout-like material as a component of the prescribed remedy presented in the Plug-in ROD (Figure 3).

IV. DESCRIPTION OF SIGNIFICANT DIFFERENCES

Description of Alternatives

This section describes the original Plug-in remedy and the amended remedy. Table 1 compares the original Plug-in remedy with the amended remedy as applied at the LRSB and CRSB basin #2. A schematic drawing (Figure 4) shows how the amended remedy will be applied.

Description of the Original Selected Remedy

The original selected remedy in the Plug-in-ROD consists of institutional control, in situ stabilization of PTSM, a low-permeability soil cover system, consolidation of contaminated soil, and grouting of pipelines.

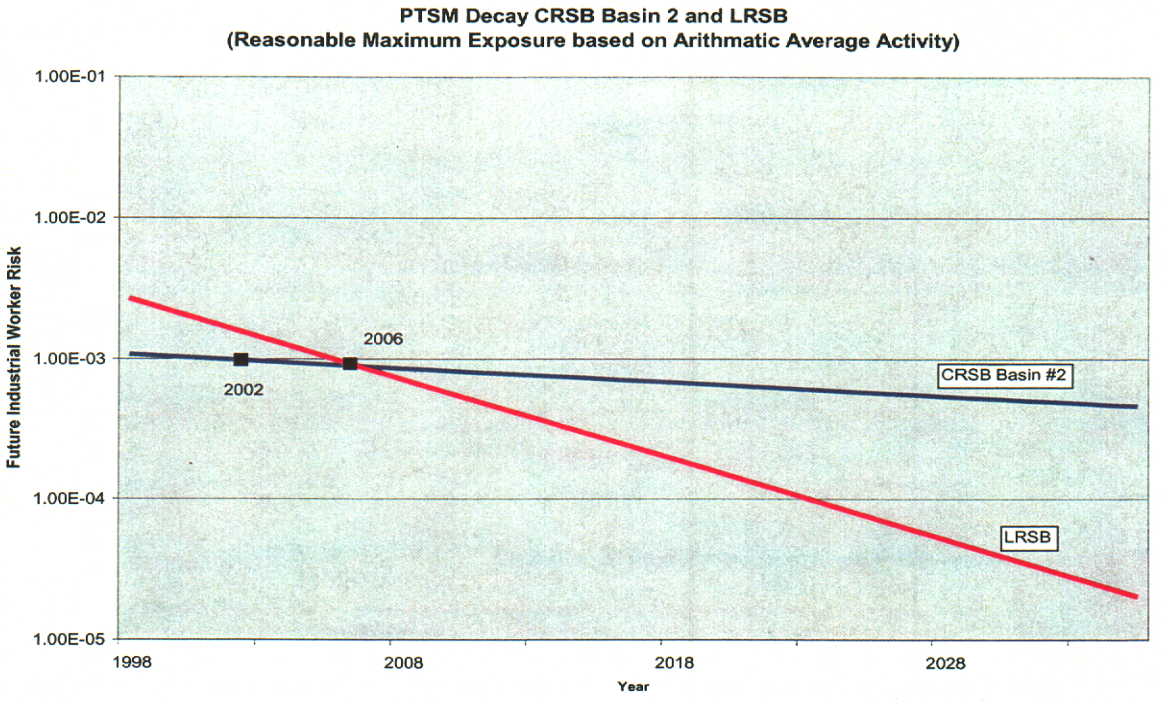

Figure 3. PTSM Decay in the LRSB and CRSB basin #2

Figure 3 indicates that PTSM (risk to future industrial workers greater than 1×10^{-3}) will be present in the LRSB (cobalt-60) through the year 2006 and in CRSB basin #2 (cesium-137) through the year 2002. The risk from PTSM decreases over time due to radioactive decay. The rate that radionuclides decay is a function of the half-life (time for one-half of the radionuclides to decay). The risk from PTSM in LRSB decreases more rapidly than the risk from PTSM in CRSB because the half-life for cobalt-60 (5.27 years) is shorter than for cesium-137 (30.17 years). The risk from cesium-137 (half-life = 30.17 years) will be less than 1×10^{-5} in approximately 200 years and less than 1×10^{-6} in approximately 300 years.

Table 1. Expected Outcome for Each Alternative

Components of the Original Plug-in remedy	Amended Remedy for LRSB	Amended Remedy for Basin #2 at CRSB
In situ stabilization to stabilize PTSM	In situ stabilization will not be performed. USDOE will continue to own and operate the SRS for as long as PTSM is present (through the year 2006) and will provide access controls to prevent exposure to the current PTSM.	In situ stabilization will not be performed. USDOE will continue to own and operate the SRS for as long as PTSM is present (through the year 2002) in Basin #2 and will provide access controls to prevent exposure to the current PTSM.
Land use controls (institutional control) to prevent disturbance of the cover system and excavation of the PTSM. Residential or agricultural use of the area will be prohibited.	In addition, a fence will be erected around the LRSB for the time period that the contaminated soil would be considered PTSM, and warning signs will be posted.	In addition, a fence will be erected around the CRSB basin #2 for the time period that the contaminated soil would be considered PTSM, and warning signs will be posted.
Contaminated Soil Consolidation and pipeline grouting	No change from the Plug-in-ROD.	No change from the Plug-in ROD.
Soil Cover System	No change from the Plug-in-ROD.	No change from the Plug-in-ROD.

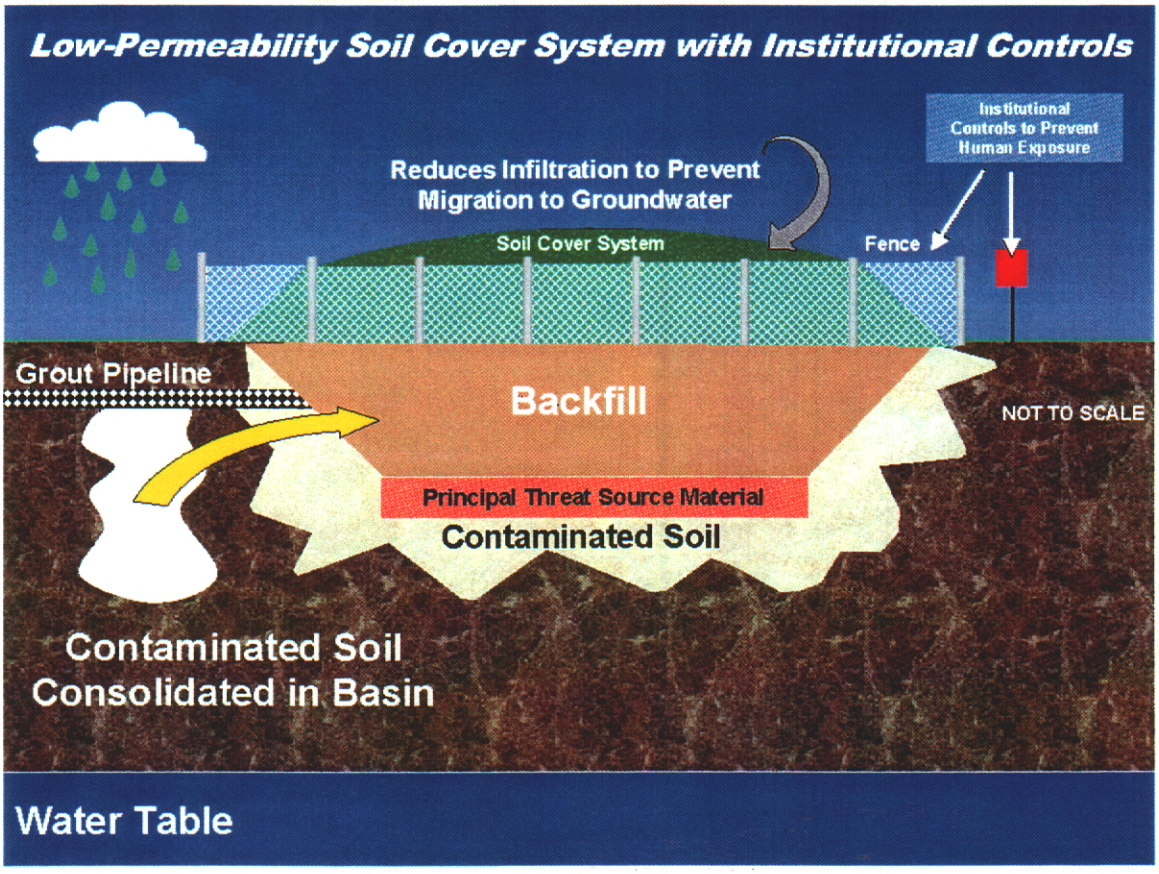

Figure 4. Typical Basin with the Amended Plug-in remedy

Figure 4 illustrates components of the remedial action that will be implemented at the L-Area Reactor Seepage Basin and Basin #2 at the C-Area Reactor Seepage Basin. Principal threat source material will not be treated as long as the USDOE is able to provide access control and engineering controls (institutional controls). The fence is required as an element of institutional controls to prevent exposure to untreated principal threat source material.

Treatment Components

In situ stabilization through grouting will be used to address PTSM soil (risk in excess of 1 x 10^{-3} for future industrial workers) in the LRSB OU and CRSB basins #1 and #2.

Consolidation of any contaminated soil surrounding the pipelines or found at the surface exceeding remedial goals will occur. The soils will be excavated and placed into the primary discharge basin. Consolidated soil that is PTSM will be stabilized with the rest of the soil in that basin. Any existing steel pipeline associated with the basin will also be consolidated in the basin for remediation. Grouting will be used to stabilize the plastic pipelines in place. Grouting of existing underground pipeline interiors will stabilize any radiological contamination existing inside the pipeline, associated with the OUs.

Containment or storage components

A low-permeability soil cover system (10^{-5} cm/s hydraulic conductivity soil cover) will be provided over the in situ stabilized soil to reduce water infiltration and to provide shielding to potential receptors on the surface The depth to the PTSM soils will be a minimum of 6 feet or a bio-barrier will be included as part of the cover system so plants and animals will not contact the waste.. For basins that contain non-PTSM soil, but may leach contaminants to groundwater, a low-permeability soil cover system will be placed over the soil. The soil cover system will be designed with a permeability low enough to prevent migration of contaminants to groundwater in less than 1,000 years at concentrations that will exceed maximum contaminant levels (MCLs). The low-permeability soil cover is designed to provide source control to prevent migration of contaminants to groundwater. Periodic groundwater monitoring to confirm the soil cover effectiveness for the CRSB and LRSB will be addressed as part of the C-Area

Groundwater Operable Unit and L-Area Southern Groundwater Operable Unit, respectively.

Institutional Control components

Current access controls such as badging requirements, security guards, Site Use/Site Clearance policy, etc. will continue to be provided as long as USDOE continues to own and operate SRS.

Institutional controls will consist of long term site maintenance and site controls. Site maintenance will consist of maintenance of drainage features to minimize the formation of large gullies and minor earthwork to repair any erosion damage that may occur. Site maintenance will also include maintaining signs around the OU. Access controls will include site security measures such as warning signs. Signs will be posted around the facility with a legend warning of the hazard. They will be posted at each entrance to the restricted portion of the subunit and at other appropriate locations in sufficient numbers to be seen from any approach. Warning signs will also be posted over the underground, grouted pipeline.

Per the USEPA – Region IV Land Use Controls (LUCs) Policy, a LUC Assurance Plan (LUCAP) for SRS has been developed and approved by the regulators. In addition, a LUC Implementation Plan (LUCIP) for OUs that use the Amended Plug-in remedy will be developed and submitted to the regulators for their approval with the post-ROD documentation. The LUCIP will detail how SRS will implement, maintain, and monitor the land use control elements of the OUs that use the Amended Plug-in remedy to ensure that the remedy remains protective of human health and the environment under the industrial land use scenario.

In the long term, if the property is ever transferred to nonfederal ownership, the U.S. Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site.

The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of waste.

The deed shall also include deed restrictions precluding residential use of the property. However, the need for these deed restrictions may be reevaluated at the time of transfer in the event that exposure assumptions differ and/or the residual contamination no longer poses an unacceptable risk under residential use. Any reevaluation of the need for the deed restrictions will be done through an amended ROD with USEPA and SCDHEC review and approval.

In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency.

Key ARARs

Key applicable and relevant or appropriate requirements (ARARs) for the selected remedy relate to protection of individuals from exposure to the waste (R.61-63, 7.19 and R.61-63, 7.18) and to protection of drinking water (40 CFR 141 and SC R.61-58.5). Deed restrictions and stabilization of PTSM are intended to protect individuals from exposure to the waste. The low-permeability soil cover is intended to prevent future leaching to groundwater at unacceptable levels. This remedy complies with all ARARs listed in Table 3.

Description of the amended remedy

The Amended remedy is identical to the Plug-in remedy in all respects except for the following:

1. PTSM will not require in situ stabilization when it can be demonstrated that the radioactive contamination will naturally decay to a level that no longer

poses a 1×10^{-3} risk to future industrial workers within a short time period during which the USDOE will likely continue to own and operate SRS.

2. A fence and warning signs will be placed around the LRSB and CRSB basin #2 until the risk posed has been reduced to below 1×10^{-3} for future industrial workers.

The amended remedy eliminates in situ stabilization from the original remedy. In situ stabilization by grouting will be performed to treat the PTSM soils in basin #1 only of the CRSB OU. No stabilization will be performed on the PTSM soils in basin #2 of the CRSB OU or LRSB OU. No stabilization will be performed in basin #3 of the CRSB OU because the soils are not considered to be PTSM.

Effect of Changes on Remedial Action Objectives

The Plug-in ROD specifies three remedial action objectives applicable to the LRSB and CRSB.

1. Prevent human exposure to highly contaminated basin PTSM soils by performing stabilization treatment to the extent practicable and backfilling the basins with clean soil. Reduce risks to the future worker from surface soils (0 to 1 foot) outside the basin by establishing RGs for constituents of concern (COCs) at concentrations equivalent to 1×10^{-6} for carcinogens and a hazard quotient of 1 for noncarcinogens or background (where background levels of COCs exceed 1×10^{-6}).

2. Prevent the release of COCs in the soil (basin soil and buffer area) to groundwater beneath the unit above MCLs or risk-based concentrations (RBCs) if there are no MCLs. The soil RGs are back-calculated based on MCLs or RBCs.

3. Protect the ecological receptors indigenous to the area by preventing or limiting contact with contaminated basin soil/pipelines and preventing plants and animals from bringing contaminants up toward the surface.

The amended remedy will satisfy all of the remedial action objectives (RAOs) except RAO #1 which is no longer considered necessary for the LRSB and CRSB basin #2. The National Oil and Hazardous Substances Contingency Plan (NCP) states that USEPA expects to use treatment to address principal threats posed by a site wherever practicable. The LRSB and CRSB basin #2 have PTSM based on the concentrations of cobalt-60 and cesium-137 respectively. The risk from PTSM will be reduced over time due to radioactive decay to below 1×10^{-3} in the year 2006 for LRSB and 2002 for CRSB basin #2 (Figure 3). To eliminate the stabilization component of the Plug-in remedy and demonstrate that RAO #1 is no longer necessary for the LRSB and CRSB basin #2, this ROD amendment must show that the OU meets all of the Plug-in ROD criteria in addition to the following criteria:

1. The current PTSM will radioactively decay to levels that no longer pose a 1×10^{-3} risk to future industrial workers within a relatively short time - which is as early as 2002 for CRSB basin #2 and 2006 for LRSB.

2. USDOE, USEPA, and SCDHEC agree that it is reasonable to assume that USDOE will continue to own and operate the SRS for this time period and access controls will be provided to prevent exposure to the current PTSM.

USDOE, USEPA, and SCDHEC have agreed that the current access controls and site use controls at SRS will effectively protect human health and the environment at least through 2006; therefore, a low permeability soil cover is an appropriate remedy for the LRSB and CRSB basin #2. In addition, the LRSB and CRSB basin #2 will be surrounded by a fence and warning signs while the LRSB and CRSB basin #2 pose a risk of 1×10^{-3} or more. After this period, the LRSB and CRSB

basin #2 will not pose a risk greater than 1×10^{-3}, the LRSB and CRSB basin #2 will no longer require in situ stabilization as a component of the prescribed remedy presented in the Plug-in ROD, and the remedy will meet RAO #1.

Changes in the Expected Outcome That Will Result from the ROD Amendment

This amendment will eliminate stabilization of PTSM at the LRSB and CRSB basin #2. The LRSB and CRSB basin #2 will be surrounded by a fence and warning signs while the LRSB and CRSB basin #2 pose a risk of 1×10^{-3} or more. This amendment to the ROD will not result in any permanent impact to the expected outcome for the LRSB and CRSB remedy actions. The amended remedy remains protective of human health and the environment under the industrial land use scenario.

V. EVALUATION OF ALTERNATIVES

The nine remedial criteria were established by the NCP. The criteria were derived from the statutory requirements of CERCLA Section 121. The NCP [40 CFR-300.430 (e)(9)] sets forth the nine evaluation criteria that provide the basis for evaluating alternatives and selecting remedies.

Table 2 compares the Plug-in remedy and the Amended Plug-in remedy for LRSB and Basin #2 at CRSB against the nine criteria. Additional discussion is provided in the sections following the table.

Table 2. Comparison of Alternatives against the Nine Criteria

CERCLA Criteria	Original Plug-in Remedy	Amended Plug-in remedy for LRSB	Amended Plug-in remedy for CRSB basin #2
Overall Protection of Human Health and the Environment			
Human Health	Protective	Protective	Protective
Environment	Protective	Protective	Protective
Compliance With ARARs			
Chemical-specific	Meets ARARs	Meets ARARs	Meets ARARs
Location specific	Meets ARARs	Meets ARARs	Meets ARARs
Action-specific	Meets ARARs	Meets ARARs	Meets ARARs
Long-term Effectiveness and Permanence			
Magnitude of residual risk	Long-term effectiveness provided through land use controls and less accessible form of material (stabilized).	Long-term effectiveness provided through radioactive decay and land use controls.	Long-term effectiveness provided through radioactive decay and land use controls.
Adequacy of controls	Access controls prevent worker contact while USDOE operates SRS.	Access controls prevent worker contact while USDOE operates SRS.	Access controls prevent worker contact while USDOE operates SRS.
Permanence	Permanent for life of stabilized material. No credit taken for radioactive decay.	Permanent	Permanent
Reduction in Toxicity, Mobility, or Volume through Treatment			
Treatment process used and materials treated	PTSM is stabilized in situ.	None	None
Degree of expected reduction in toxicity, mobility, or volume	Soil cover reduces contaminant mobility to groundwater and limits exposure to workers. No credit taken for soil stabilization.	Soil cover reduces contaminant mobility to groundwater and limits exposure to workers.	Soil cover reduces contaminant mobility to groundwater and limits exposure to workers.
Amount of hazardous materials destroyed or treated	No hazardous material destroyed during stabilization process.	No treatment. Natural radioactive decay will reduce the toxicity over time	No treatment. Natural radioactive decay will reduce the toxicity over time
Degree to which treatment is irreversible	Not irreversible	Not applicable	Not applicable
Types and quantities of residuals remaining after treatment	PTSM will be stabilized in grout. No reduction in quantity following treatment. No credit taken for reduction from radioactive decay.	Not applicable	Not applicable

Table 2. Comparison of Alternatives against the Nine Criteria

CERCLA Criteria	Original Plug-in Remedy		Amended Plug-in remedy for LRSB	Amended Plug-in remedy for CRSB basin #2
Short-term Effectiveness				
Risks to workers	Higher potential worker exposure during stabilization. Minimal worker exposure during installation of the soil cover.		Minimal worker exposure during installation of the soil cover.	Minimal worker exposure during installation of the soil cover.
Risk to community	None		None	None
Risk to environment	Minimal		Minimal	Minimal
Implementability				
Availability of materials, equipment, contractors	Fewer subcontractors available for stabilization, but still readily available.		Numerous subcontractors available to install a soil cover.	Numerous subcontractors available to install a soil cover.
Ability to construct and operate the technology	Stabilization has been completed at other waste units.		Well demonstrated and commonly used technology.	Well demonstrated and commonly used technology.
Ability to obtain permits/approvals from other agencies	Implementable		Implementable	Implementable
Ability to monitor effectiveness of remedy	Implementable; sampling required to verify uniform homogeneity and mixing.		Implementable; easy to verify soil cover construction.	Implementable; easy to verify soil cover construction.
Ease of undertaking additional actions (if required)	Medium; additional grouting is more difficult if rework is required in previously grouted location.		Compatible	Compatible
Time to implement	13 months		2 months	2 months
Cost				
Present Worth Capital Cost	LRSB $3,206,209	CRSB $6,502,178	$2,005,350	$4,978,734
Present Worth O&M Cost	$360,484	$1,236,535	$410,467	$166,304
Total Present Worth Cost	$3,566,693	$7,738,123	$2,415,817	$5,145,038
State Acceptance	Approved ROD.		State acceptance for instances where radioactive contaminants decay over a short time period to below PTSM levels.	State acceptance for instances where radioactive contaminants decay over a short time period to below PTSM levels.
Community Acceptance	Approved ROD.		Approved PP	Approved PP

Overall Protection of Human Health and the Environment

The Plug-in remedy was designed to provide protection against migration to groundwater with the low permeability soil cover. No credit was taken for any reduction in mobility due to the use of in situ stabilization. This feature of the remedy will not be changed in the Amendment.

While the soil cover would also shield any future workers from direct radiation, SCDHEC and USEPA required in situ stabilization of PTSM to limit the accessibility of the contaminated soil to potential receptors in case the property was no longer owned and operated by USDOE. The stabilization would convert the PTSM to a form that would be less likely to endanger the public and the environment.

In the Amendment, PTSM no longer requires in situ stabilization, since the three parties agree that PTSM will naturally decay to levels that no longer pose a 1×10^{-3} risk to future industrial workers within a period where USDOE (or successor) will continue to own and operate the SRS over this time period. In this instance, USDOE will provide access controls limiting visitors to the site through their badging requirements, will prevent exposure to SRS workers through their Site Use/Site Clearance program, and will further prevent access by installing a fence and warning signs surrounding the PTSM area. With these access restrictions, the Amendment provides equal protection to the public and the environment from the risks posed by the PTSM.

Compliance with Applicable or Relevant and Appropriate Requirements

A list of chemical-, action-, and location-specific ARARs are included in Table 3 of the Plug-in Proposed Plan (WSRC 1998). Both the Plug-in remedy and the Amended Plug-in remedy comply with ARARs.

Table 3. Applicable, Relevant or Appropriate Requirements

CITATION/REQUIREMENT	REMARKS
CHEMICAL-SPECIFIC	
NRC Requirements for Land Disposal of Radioactive Waste	
10 CFR 61.40 – Maximum annual dose from all pathways of 25 mrem to the whole body, 75 mrem to thyroid, and 25 mrem to any other organ of any member of the public, including ALARA principles	Relevant and appropriate regulation. This regulation is intended for the same types and levels of radionuclides that will remain in the operable units that are managed in facilities regulated under 10 CFR 61. Cleanup levels for radionuclides to be left in place must at least meet these levels. The soil cover prevents exposure to radionuclides left in place.
SC Radioactive Material Regulations	
R.61-63, 7.19 – Protection of Individuals from Inadvertent Intrusion. Closure of land disposal facility shall prevent inadvertent intrusion into the site, or contact with the waste after active institutional controls are removed.	Relevant and appropriate regulation. This regulation is intended for the same types and levels of radionuclides that will remain in the operable units as after the closure of a state-licensed facility for land disposal of radioactive waste. Deed restrictions and stabilization of PTSM will meet intent of this regulation.
R.61-63, 7.18 – Protection of the General Population from Releases of Radioactivity. Maximum dose from all pathways of 25 mrem to the whole body, 75 mrem to thyroid, and 25 mrem to any other organ of any member of the public, including ALARA principles.	Relevant and appropriate regulation. This regulation is intended for the same types and levels of radionuclides that will remain in the operable units after the closure of a state license facility for land disposal of radioactive waste. Cleanup levels for radionuclides to be left in place must at least meet these levels. The soil cover prevents exposure to radionuclides left in place.
Drinking Water Standards	
40 CFR 141 – MCLs and MCLGs for groundwater that may be a source of drinking water	Relevant and appropriate regulation. This standard for maintaining quality of groundwater that could be used as a drinking water source. Used as basis to back calculate soils' RGs to prevent future leaching to groundwater at unacceptable levels.
SC R.61-58.5 – MCLs and MCLGs for groundwater that may be a source of drinking water	Relevant and appropriate standards for maintaining quality of groundwater through source controls. Used as basis to back calculate soils' RGs to prevent future leaching to groundwater at unacceptable levels.
Occupational Radiation Protection	
10 CFR 835.202 – Maximum exposure for employees of 5 rem/year	Applicable regulation to workers during remediation activities.
10 CFR 835.206 – Exposure limits for embryo/fetus of 0.5 rem	Applicable regulation to workers during remediation activities.
10 CFR 835.208 – Exposure limits for members of the public during direct on-site access shall not exceed 0.1 rem TEDE	Applicable regulation to workers during remediation activities.

Table 3. Applicable, Relevant or Appropriate Requirements (continued)

LOCATION-SPECIFIC ARARs	
Clean Air Act	
40 CFR 61.92 – Emissions of radionuclides to the ambient air from US DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.	Applicable during construction activities.
SC Water Classification Standards	
SC R. 61-68 – Definition of and classification of state groundwaters.	Relevant and appropriate standard for the classification of groundwater in the state, which subsequently triggers state groundwater protection standards. Used as basis to backcalculate soils RGs to prevent future leaching to groundwater at unacceptable levels.
ACTION-SPECIFIC ARARs	
National Environmental Policy Act	
10 CFR 1021 – National Environmental Policy Act – Implementing procedures and guidelines	Applicable regulation to remedial actions. Met by categorical exclusion for CERCLA remedial actions.
SC Storm Water Regulations	
SC R. 72-300 – Storm Water Management and Sediment Reduction Regulation. Section 305 specifies a Stormwater management and Sediment control Plan required for any land disturbing activities.	Applicable regulations to construction activities. Compliance with this regulation will also meet federal Clean water Act regulations. Must be considered during soil cover system design and followed during construction activities.

Long-term Effectiveness

The two remedies provide identical long-term effectiveness once the PTSM has naturally decayed to a risk level below 1×10^{-3} because the remedy used in the amendment is the same as that used for basins that do not contain PTSM. While the OU contains PTSM, the Plug-in remedy relies on in situ stabilization to reduce access to potential receptors; alternately, the Amendment remedy relies on engineering and institutional controls to reduce access to the PTSM.

Reduction in Toxicity, Mobility, or Volume

The Plug-in remedy provides in situ stabilization of the PTSM to limit accessibility to potential receptors in the event that the OU is no longer owned

and operated by USDOE. The Amended Plug-in remedy does not treat the PTSM, but does limit access to the contaminated soil through institutional controls until the natural radioactive decay reduces the risk to levels that no longer pose a 1×10^{-3} risk to industrial workers. Both remedies provide a soil cover designed to reduce mobility of the contaminants to groundwater. In both cases, natural radioactive decay will reduce the level of toxicity over time.

Short-term Effectiveness

The Amended remedy provides a higher level of protection to the remedial workers than the Plug-in remedy because it does not require in situ stabilization of the PTSM. Stabilization poses some moderate risk to the workers through potential direct contact with the PTSM. This risk, however, is minimized through the use of SRS procedures and personal protective equipment. Construction activities already completed or planned for CRSB basins #1 and #3 will not be impacted by the Amended remedy. Construction completion will not occur earlier than originally projected for the CRSB.

Implementability

The Amended remedy is slightly more implementable than the Plug-in remedy because it does not include in situ stabilization. While the number of qualified contractors that can perform this operation in radioactively contaminated soil is limited, there are sufficient numbers of contractors available so that this is not a concern. The low permeability cover in the Amended remedy will not require any more operations and maintenance than for the low permeability cover in the Plug-in remedy.

Cost

The cost for the Amended remedy is considerably less than for the Plug-in remedy because the Amended remedy does not require in situ stabilization. In situ

stabilization is an expensive process that varies from OU to OU depending on the volume and depth of soil to be treated. The only additional cost that the Amended remedy incurs over the Plug-in remedy without stabilization is the cost for the fence. This cost is a very small fraction of the typical cost of in situ stabilization. Table 2 compares the present worth cost of the Plug-in remedy with present worth cost for the amended remedy. The amended remedy present worth cost in Table 2 for the CRSB is based upon actual costs to date and future estimated costs. Appendix B presents the present worth cost of the amended remedies for L and C RSBs.

State Acceptance

The State has agreed that the Amended remedy is acceptable in instances where it can be shown that the PTSM will decay to a level that no longer poses a 1×10^{-3} risk to current and future industrial workers within a short time period during which USDOE will likely continue to own and operate SRS. The Plug-in ROD has previously been approved by the State.

Community Acceptance

The Plug-in ROD has previously been available for public comment. The community has been provided an opportunity to review and comment on the Amended remedy in the Proposed Plan (PP). The Proposed Plan 30-day public comment period began on April 10, 2002 and ended on May 9, 2002. A Responsiveness Summary, prepared to address any comments received during the public comment period, is provided in Appendix A of this amendment.

VI. SUPPORT AGENCY COMMENTS

Given the significant changes between the original interim remedy and the revised interim remedy, USEPA and SCDHEC recommended that a ROD Amendment (as opposed to an Explanation of Significant Differences or other document) be used to document the revised remedy decision.

A summary of USEPA comments on the Plug-in ROD Amendment for the CRSB and LRSB include the following:

- -Describe the 'original' conditions, problem, remedy and cost and compare those to the 'new' or 'amended' conditions, problems, etc. Further a bit of repetition is required between the 'Site History, Contamination and Selected Remedy' section and the 'Description of the Significant Differences or New Alternatives' section.

- -Evaluate the CRSB against the Plug-in Criteria in the ROD amendment rather that referencing the CRSB Plug-in Criteria evaluation performed in the CRSB TER and ESD.

- -Clarify whether strontium-90 which was identified in the LRSB buffer area at 4.03 pCi/g is classified as PTSM and whether it is in contact with groundwater?

- -Add a statement that all reference documents supporting the ROD amendment are in the Administrative Records (files).

- -Clarify the statement that implies that regardless of how long it would take for natural decay to occur, in-situ stabilization would not be required if USDOE continued to own and operate SRS during the natural decay time period.

- -Explicitly state which ARARs are applicable rather that referencing the ARAR table in the proposed plan,

- -Include a more detailed cost break-down, preferably in tabular format, for the Original Plug-in Remedy and the Amended Remedy.

- -Additional comments regarding land use controls were provided in the form of comments previously made on the L-Area Burning Rubble Pit/Rubble Pile OU.

A summary of SCDHEC comments on the Plug-in ROD Amendment for the CRSB and LRSB include the following:

- For clarification and consistency, the Department requests that the CRSB OU be evaluated/summarized in the same manner as the LRSB.

- Please project the graph forward in time to estimate when the risk from Cs-137 activity will become less than 1×10^{-5} and 1×10^{-6}. It should be made clear in the text how long institutional controls will need to be maintained before unrestricted use of the CSRB OU is achieved.

- Delete references to RCRA since this is a CERCLA waste unit.

- Explicitly identify which basins are being grouted when being discussed in the document.

- Clarify how periodic groundwater will be performed.

- Provide additional discussions regarding elements of the remedial action.

- Natural radioactive decay does not satisfy the preference for treatment.

- Clarify further the chronological steps which led to the ROD Amendment.

- Clarify what is defined by "... within a relatively short time.", by adding " - which is as early as 2002 for CRSB basin #2 and 2006 for LRSB."

- Revise the schedules in the document to accurately reflect the actual public comment period.

VII. STATUTORY DETERMINATIONS

Based on information currently available, USDOE believes the Amended Plug-in remedy provides the best balance of tradeoffs among the other alternatives with respect to the evaluation criteria. The USDOE expects the Amended Plug-in remedy to satisfy the statutory requirements in CERCLA Section 121(b) to: (1) be protective of human health and the environment under the industrial land use scenario, (2) comply with ARARs, (3) be cost-effective, and (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The remedy in these OUs does not satisfy the statutory preference for treatment as a principal element because treatment of the principal threats at the LRSB and in CRSB basin #2 was not found to be cost-effective for the following reasons.

- The LRSB and CRSB basin #2 have PTSM based on the concentrations of cobalt-60 and cesium-137 respectively. The risk from PTSM will be reduced over time due to radioactive decay to below of 1×10^{-3} in the year 2006 for LRSB and 2002 for CRSB basin #2.

- USDOE, USEPA, and SCDHEC have agreed that the current access controls and site use controls at SRS will effectively protect human health and the environment at least through 2006; therefore, a low permeability soil cover is an appropriate remedy for the LRSB and CRSB basin #2.

- In addition, the LRSB and CRSB basin #2 will be surrounded by a fence and warning signs while the LRSB and CRSB basin #2 pose a risk of 1×10^{-3} or

more. After this period, the radioactively contaminated basins will not pose a risk greater than 1×10^{-3} and will no longer require in situ stabilization with a grout-like material as a component of the prescribed remedy presented in the Plug-in ROD.

Section 300.430(f)(ii) of the NCP requires that a 5-year remedy review of the ROD be performed if hazardous substances, pollutants, or contaminants above levels that allow for unlimited use and unrestricted exposure remain in the OU. The three parties, SCDHEC, USEPA, and USDOE, have determined that a 5-year review of the ROD for the LRSB and CRSB basin #2 will be performed to ensure that the remedy continues to provide adequate protection of human health and the environment.

VIII. PUBLIC PARTICIPATION COMPLIANCE

Responsiveness Summary

The Responsiveness Summary is included as Appendix A of this document.

IX. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

Implementation schedules are attached which include amended Plug-in ROD dates and post-ROD document submittals and Remedial Action Start date for LRSB and CRSB (Figures 5 and 6).

Post ROD Documentation

Design changes will be necessary for the CRSB to address the amended remedy. All changes from the original design (WSRC 2001a) made during field implementation will be documented in the CRSB Post-Construction Report.

Periodic groundwater monitoring to confirm the soil cover effectiveness for the CRSB and LRSB will be addressed as part of the C-Area Groundwater Operable Unit and L-Area Southern Groundwater Operable Unit.

X. REFERENCES

FFA, 1993. *Federal Facility Agreement for the Savannah River Site,* Administrative Docket No. 89-05-FF (Effective Date: August 16, 1993)

USDOE, 1994. *Public Involvement, A Plan for the Savannah River Site,* Savannah River Operations Office, Aiken SC

WSRC, 1996. *Federal Facility Agreement Implementation Plan,* WSRC-RP-94-1200, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1998. *Plug-In Proposed Plan for In Situ Stabilization with a Low Permeability Soil Cover System for Radiological Contaminants in Soil (U),* WSRC-RP-98-4098, Revision 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 1999. *Plug-In Record of Decision for In Situ Stabilization with a Low Permeability Soil Cover System for Radiological Contaminants in Soil (U),* WSRC-RP-98-4099, Revision 0, September, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2000a. *Unit-Specific Plug-In Technical Evaluation Report for the C-Reactor Seepage Basins (904-66G, 904-67G, and 904-68G) Operable Unit (U),* WSRC-RP-2000-4008, Revision 1, April, Westinghouse Savannah River Company, Aiken, SC.

WSRC, 2000b. *Explanation of Significant Difference for the Plug-In ROD for In Situ Stabilization with a Low Permeability Soil Cover System for Radiological*

Contaminants in Soil – CRSB (U), WSRC-RP-2000-4032, Revision 1.1, June, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2001a. *Remedial Action Implementation Plan (RAIP) for the C-Area Reactor Seepage Basin (U),* WSRC-RP-99-4213, Revision 1, January, Westinghouse Savannah River Company, Aiken, SC.

WSRC, 2001b. *Unit-Specific Plug-In Technical Evaluation Report for the L-Area Reactor Seepage Basin (904-64G) Operable Unit (U),* WSRC-RP-2000-4130, Revision 1.1, December, Westinghouse Savannah River Company, Aiken, SC.

WSRC, 2002. *Unit-Specific Amended Plug-In Proposed Plan for the C-Area Reactors Seepage Basin (904-67G) and L-Area Reactor Seepage Basin (904-64G) (U),* WSRC-RP-2001-4255, Revision 1, February, Westinghouse Savannah River Company, Aiken, SC.

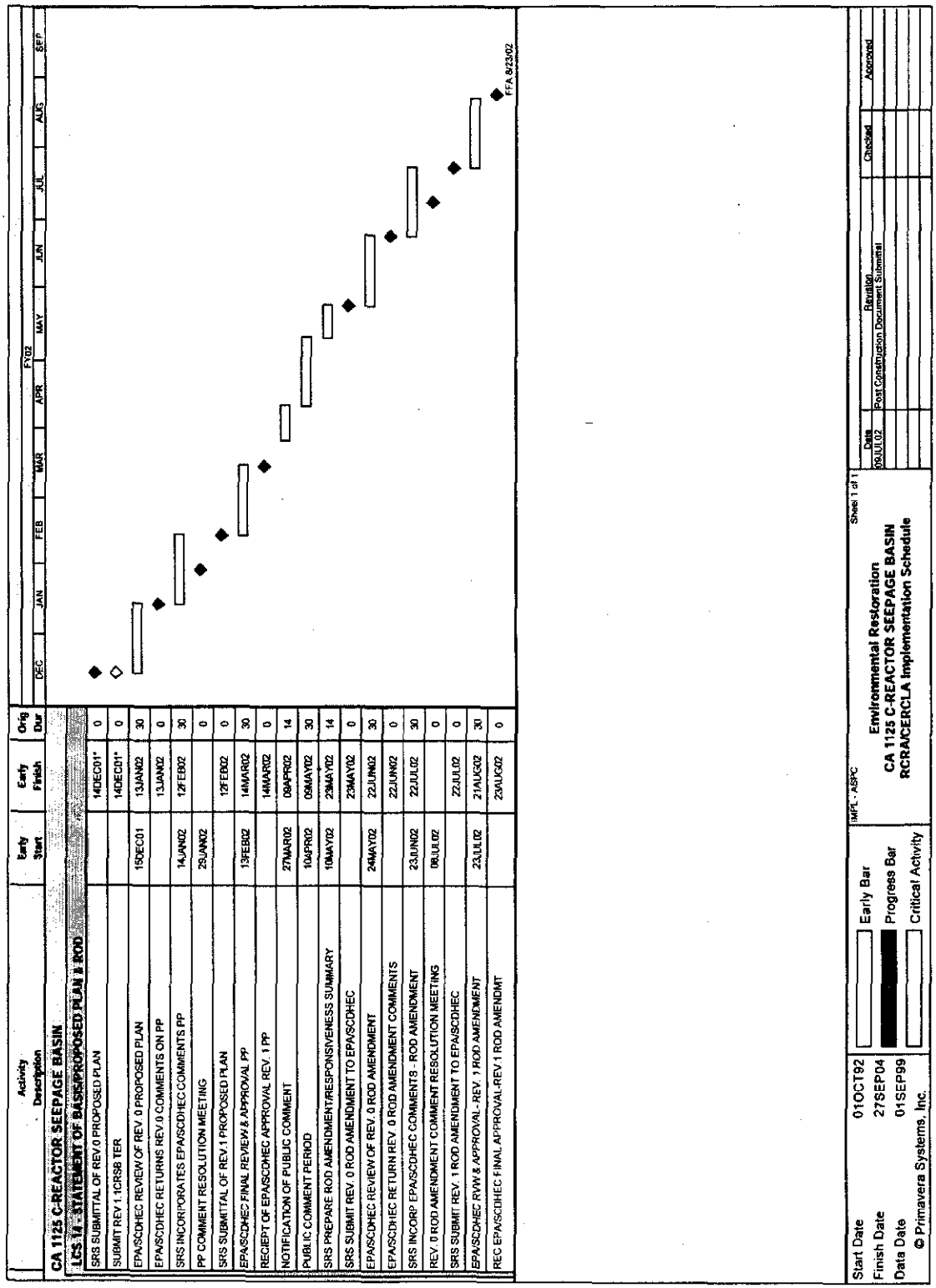

Figure 5. CRSB Implementation Schedule

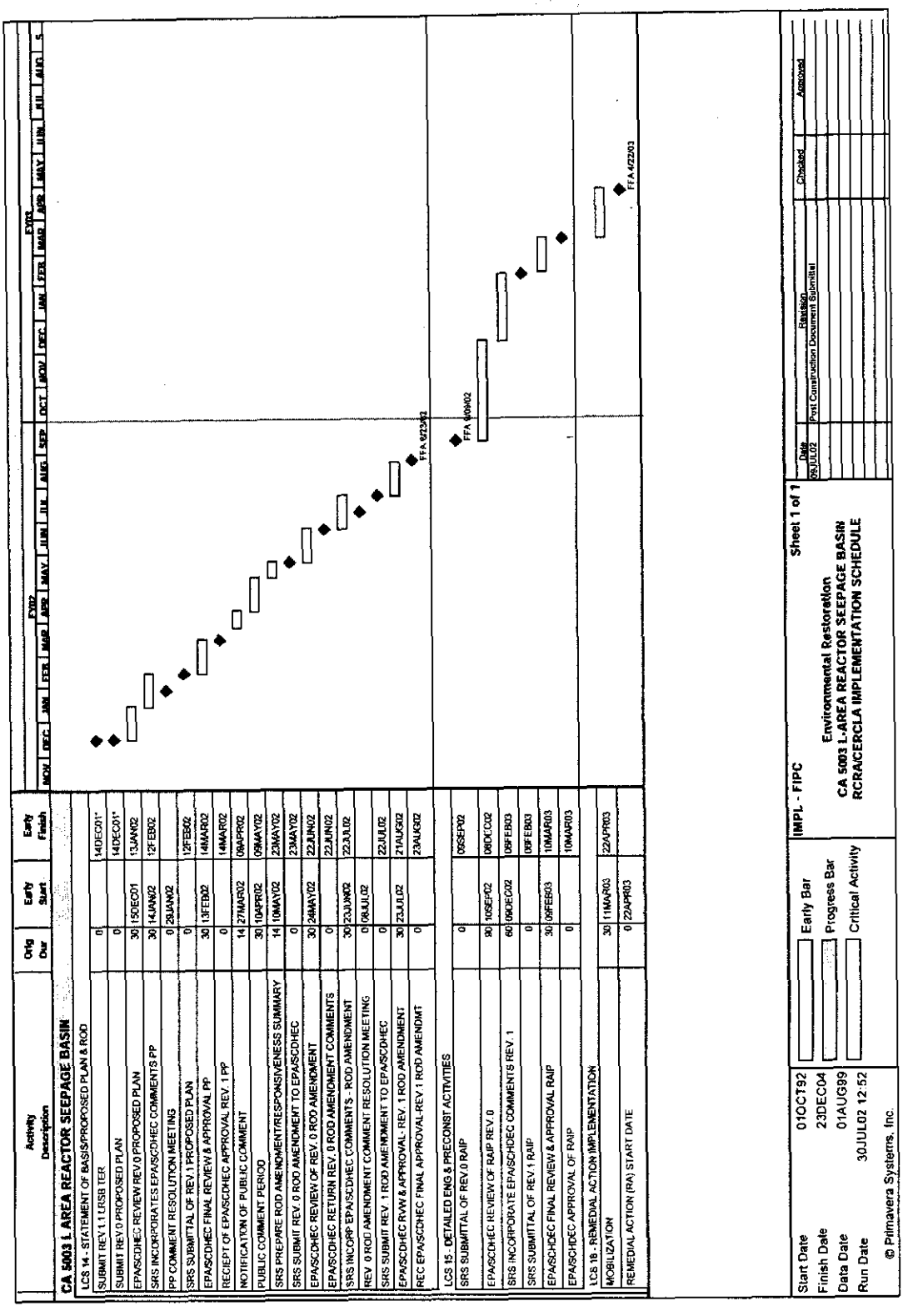

Figure 6. LRSB Implementation Schedule

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APPENDIX A -RESPONSIVENESS SUMMARY

Responsiveness Summary

The 30-day public comment period for the Proposed Plan for the L-Area Reactor Seepage Basin (904-64G) and basin #2 at the C-Area Reactor Seepage Basin (904-67G) began on April 10, 2002 and ended on May 9, 2002. The following comment was received. No other comments were received.

Public Comment

"It is my understanding that because of the presence of certain Principle Threat Source Materials in the basin soils, in-situ solidification coupled with low-permeability soil covering is currently being utilized to stabilize the basin soils and the Source Materials present in those soils. I also understand that this methodology was identified as the preferred alternative for basin stabilization at the Savannah River Site.

According to the Administrative Record File for these projects, you are now proposing to eliminate the in-situ stabilization, and to use instead just the low-permeability soil cover with fencing and signage. What, other than USDOE's ability to control site access, is the justification for this change? Were not sufficient in-basin soil tests conducted prior to implementing in-situ stabilization to scientifically determine whether or not it was the best alternative?

What data was used previously to justify the time and expense associated with in-situ stabilization? What has changed so significantly since 1999 to now justify your proposal to simply "cap" these basins? The statements contained within your Public Notice and the Amended Proposed Plan do not appear to justify what appears to be a dramatic change.

It is my understanding that the Amended Proposed Plan for the L-Area Reactor Seepage Basin and the #2 C-Area Reactor Seepage Basin was released on April 10, 2002. The document itself, however, is dated "February 2002". What is the explanation of justification for this date discrepancy?

From a review of the Amended Proposed Plan, it appears that you have not yet implemented the amended "cap only" strategy, and that you will not do so, if at all, until after May 9, 2002. On page 4 of the Amended Proposed Plan, it states "[T]he final remedial decision will be made only after the public comment period has ended and all comments have been received and considered." According to the public notice that was run in the *Augusta Chronicle*, the comment period runs through May 9, 2002.

Based upon the above information, members of the public would expect that none of the three basins at issue has been "stabilized with a low permeability soil cover" without in-situ stabilization. The public would also expect that "all three basins are open and have not been backfilled" as you state on page 11 of the Amended Proposed Plan.

If, on the other hand, "soil cap only stabilization" has already been used at these basins, and the basins have already been backfilled, the information contained in the Public Notice is inaccurate, the Amended Proposed Plan contains substantive misrepresentations, public involvement in the decision-making process has been thwarted, and members of the public have been denied their substantive rights under CERCLA.

It is my understanding that Westinghouse Savannah River Company (WSRC) and Bechtel Savannah River Incorporated (BSRI) have long-since eliminated the use of in-situ stabilization at both the L-Area Reactor Seepage Basin and the C-Area Reactor Seepage Basin. They have also had some, if not all, of these basins backfilled and capped with soil. I have also been led to believe that prior to these

actions, WSRC and BSRI materially diminished the in-situ stabilization processes that were actually being used at the basins.

Have these "proposed plans" already been implemented? Has the previously approved stabilization method already been abandoned?

If so, I have great concern regarding the well-being of our community. The requirements for public notice, public comment, and consideration of public comment are valuable rights that should be carefully protected. This is especially true when it relates to the environmental health of this community. Without those rights, community acceptance can never be obtained, as one cannot accept what one does not know. Also, your accountability to the public is rendered meaningless.

Please provide me information and documentation regarding these issues and concerns. Please also let me know how my comments are considered in conjunction with the final remedial decision for the Unit-Specific Amended Plug-in Proposed Plan for the CRSB and LRSB. If necessary to fully address these issues and concerns, kindly accept this as my request for a public meeting."

Sincerely,

Hugh M. Claytor

Response:

The C-Area Reactor Seepage Basin (CRSB) and the L-Area Reactor Seepage Basin (LRSB) are being remediated according to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process by following an approach that was developed by the US Environmental Protection Agency – a Plug-in Record of Decision (ROD). A Plug-in ROD streamlines the CERCLA process by reducing the amount of documentation and establishes common remedies for waste sites that have similar histories and similar characteristics. This process began with a Proposed Plan for the Plug-in ROD that was submitted for public comment.

In 1999, the US Department of Energy (DOE), US Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC) approved the Plug-in Record of Decision (ROD) for In Situ Stabilization with a Low Permeability Soil Cover for Radiological Contaminants in Soil (WSRC-RP-98-4099, September 1999) for several of our radioactively contaminated seepage basins. The referenced Plug-in ROD remedy includes the following remedial components: institutional controls, consolidation of contaminated soil, a low permeability soil cover, in situ stabilization of basin soils, and grouting of pipelines associated with the waste units. The Plug-in ROD remedy can be used if the contamination in a waste unit is not in contact with surface water or ground water and allows a range of the remedial components to be implemented (in situ stabilization and /or soil cover) depending on the level of contamination. An evaluation of a waste unit's historical data and field characterization data are summarized in a Technical Evaluation Report to document that the unit meets the criteria for this Plug-in ROD. Once the three parties agree that the unit meets the criteria, an Explanation of Significant Difference (ESD) document is prepared and issued for public comment. With respect to Plug-in RODs, the ESD communicates and documents the use of the plug-in remedy at the waste unit. When the final ESD is approved, remediation can proceed according to the plug-in remedy.

This process was followed for CRSB and is currently being followed for LRSB. Both waste units were identified in the original Proposed Plan as potential candidates for the plug-in remedy. The original Proposed Plan was available for public comment from June 12, 1999 to July 26, 1999. No public comments were received. A Technical Evaluation Report and an Explanation of Significant Difference for CRSB were prepared in April 2000. The ESD (which documents the use of the plug-in remedy at this site) was available for public comment from May 8, 2000 to June 6, 2000. Public comments were received that were addressed in the final version of the ESD that was approved August 31, 2000. The start of remediation activities began on February 5, 2001.

During 2001 and after further analysis of the historical and field data, it was determined that the radioactive contamination levels in Basin #2 of the CRSB would decay below the PTSM threshold level (1×10^{-3} cancer risk for future industrial workers) in 2002. This analysis is presented graphically in the following figure (Figure 6 from the Amended Proposed Plan). Therefore, Basin #2 no longer triggered the Plug-in ROD requirement that in situ stabilization be conducted as the remedy for this basin. A low permeability soil cover was adequate as the final remedy for this basin. A TER Addendum for CRSB was submitted to the regulators in October 2001 presenting the results of the analysis and recommending that an Amended Proposed Plan and Plug-in ROD be submitted. The TER Addendum was submitted with an

Amended Proposed Plan in October 2001. Both the EPA and SCDHEC conditionally approved the TER in November 2001 and the three parties approved the Proposed Plan in March 2002. Since the modification to the remedy (a low permeability soil cover for Basin #2) is consistent with the Plug-in ROD previously reviewed by the public, the three agencies agreed to proceed with a soil cover without in situ stabilization following the conditional approval of the TER. The three parties were confident that the proposed remedy was acceptable. Basin #1 has been in situ stabilized and a low permeability soil cover constructed over the three basins.

The remedial process for LRSB is following the normal CERCLA process (i.e. Amended Proposed Plan for the Plug-in ROD submitted for public comment, response to public comments (the responsiveness summary) incorporated into the Amended Plug-in ROD, approval of Amended Plug-in ROD). The radioactive levels in LRSB will decay below the PTSM threshold level in 2006 and therefore, if the Amended Plug-in ROD is approved, this basin will not be in situ stabilized. No field activities have been initiated with respect to the LRSB remedial action to date.

There is not a date discrepancy between the date the Amended Proposed Plan was submitted to the regulators (February 2002) and the date the document was released for public comment (April 10, 2002). All Proposed Plans are issued for public comment only after the three Parties to the Federal Facility Agreement (US DOE, US EPA, and SCDHEC) approve the document. After the document is approved a period of time is needed to prepare for the public comment period (make copies, place advertisements, etc.). The time span from February to April is the time for all these activities necessary to prepare a Proposed Plan for issuance to the public.

The soil stabilization methods previously approved in the Plug-in ROD have not been abandoned. In situ stabilization and/or a low permeability soil cover continue to be the prescribed action for waste units that can be remediated using the Plug-in ROD.

The SRS ER program places a high priority in communicating with and soliciting input from the public. We have made presentations to the Citizens Advisory Board (CAB) on numerous occasions, with a presentation on the application of the plug-in remedy at reactor seepage basins being made within the last six months. We will continue to make presentations to the CAB at key decision points in the CERCLA process. We will continue to work with you and other stakeholders on the clean up activities at the Savannah River Site.

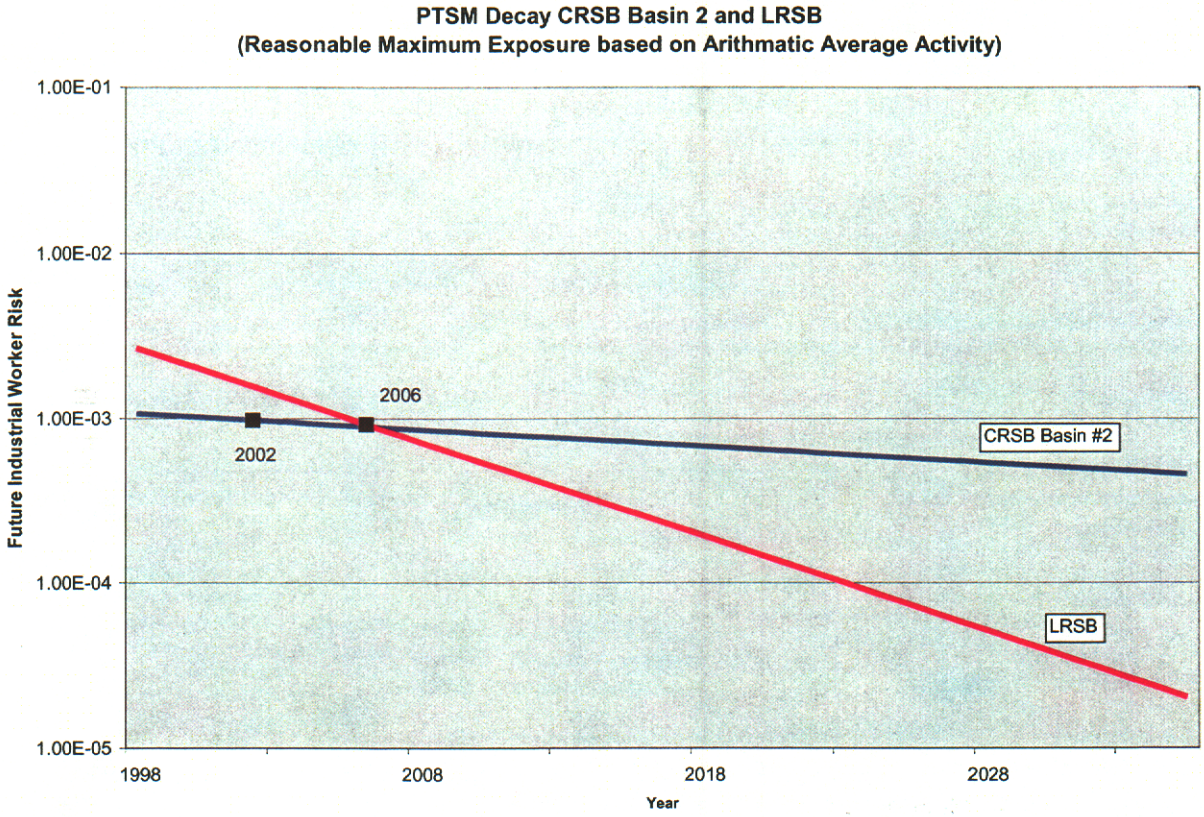

Figure 6. PTSM Decay in the LRSB and CRSB basin #2

APPENDIX B – CRSB AND LRSB COST INFORMATION

C-Reactor Seepage Basin (CRSB) - Capital and Operations and Maintenance Costs & Present Worth Analysis

Operations and Mantenance (O&M) Costs:	UNIT COST	UNITS	TOTAL
Erosion Control	$0.66 / Sq.Ft.	4688 Sq.Ft.	$3,094.00
Ditch Repair	$1.63 / Sq.Ft.	938 Sq.Ft.	$1,529.00
Mowing (Semi-annual)	$362.32 / Acre	3 Acre	$1,087.00
Fertilize (Semi-annual)	$362.32 / Acre	3 Acre	$1,087.00
Nonmanual Support	$1,354.07 / Acre	2 Acre	$2,704.00
		Total Annual O&M Cost:	**$9,501.00**

Capital Cost = In Situ Stabilization + Soil Cover System = $4,500,585

Present Worth Analysis Based on 30 Year Program

Year	Capital Cost	O&M Costs	Discount Factor (3.9%)	Present Worth
0	$4,978,734.00		1.000	$4,978,734.00
1		$9,501.00	0.962	$9,144.37
2		$9,501.00	0.926	$8,801.13
3		$9,501.00	0.892	$8,470.77
4		$9,501.00	0.858	$8,152.81
5		$9,501.00	0.826	$7,846.78
6		$9,501.00	0.795	$7,552.24
7		$9,501.00	0.765	$7,268.76
8		$9,501.00	0.736	$6,995.92
9		$9,501.00	0.709	$6,733.32
10		$9,501.00	0.682	$6,480.58
11		$9,501.00	0.656	$6,237.32
12		$9,501.00	0.632	$6,003.20
13		$9,501.00	0.608	$5,777.86
14		$9,501.00	0.585	$5,560.98
15		$9,501.00	0.563	$5,352.25
16		$9,501.00	0.542	$5,151.34
17		$9,501.00	0.522	$4,957.98
18		$9,501.00	0.502	$4,771.88
19		$9,501.00	0.483	$4,592.76
20		$9,501.00	0.465	$4,420.37
21		$9,501.00	0.448	$4,254.44
22		$9,501.00	0.431	$4,094.75
23		$9,501.00	0.415	$3,941.05
24		$9,501.00	0.399	$3,793.12
25		$9,501.00	0.384	$3,650.74
26		$9,501.00	0.370	$3,513.70
27		$9,501.00	0.356	$3,381.81
28		$9,501.00	0.343	$3,254.87
29		$9,501.00	0.330	$3,132.70
30		$9,501.00	0.317	$3,015.11
Totals	$4,978,734.00	$285,030.00		$5,145,038.92

Total Present Worth Cost = Capital Cost + O&M Costs (discounted on 30-year basis)
Total Present Worth Cost: **$5,145,038.92**

NOTES: Capital cost estimates are not discounted because the construction work was performed in the first year. O&M costs are reported as present worth estimates given a 3.9% discount rate for a 30 year duration. Cost estimates are within +50% to -30% accuracy expectation.

Total Estimated Contracted Costs $4,264,464.00
(Based on actual Contract Value, 8/20/2002)

Engineering & Other Services
(Based on ESD Estimate, 4/00) $714,270.00

TOTAL CAPITAL COST (EST. ENGR'G): **$4,978,734.00**

L-Area Reactor Seepage Basin Remedial Action Capital Costs

General Requirements	Quantity	Units	Cost / Unit	Total	Grand Total
Submittals	1	LS	$25,000.00	$25,000	
Temporary Controls/Miscellaneous Items	1	LS	$135,000.00	$135,000	
Technical Requirements	1	LS	$260,000.00	$260,000	
Dust Suppression	6	MO	$1,100.00	$6,600	
Total General Requirements				**$426,600**	**$426,600**
Clean Sitework					
Mobilization	1	LS	$21,000.00	$21,000	
Site Surveys	3	ACRE	$4,700.00	$14,100	
Preparation of Borrow Area for Fill Material	11,400.0	CY	$2.50	$28,500	
Geophysical/Geotechnical Investigation (Borrow Area)	1.0	LS	$15,000.00	$15,000	
Erosion Control	1	LS	$30,000.00	$30,000	
Geophysical/Geotechnical Investigation (Earthwork)	1	LS	$30,000.00	$30,000	
Modify Existing Wells	4	EA	$2,500.00	$10,000	
Permanent Fencing	860	LF	$30.00	$25,800	
Topsoil Mix/Site Seeding	30	MSF	$800.00	$24,000	
Demobilization	1	LS	$21,000.00	$21,000	
Total Clean Sitework				**$219,400**	**$219,400**
Remediation					
Removal of Contaminated Vegetation	1	LS	$ 127,000.00	$127,000	
Grouting of Pipeline	55	CF	$185.00	$10,175	
Herbicides and Insecticides	31	MSF	$250.00	$7,750	
Grading Fill (Contaminated)	1,200	CY	$21.00	$25,200	
Grading Fill (Clean)	6,000	CY	$18.00	$108,000	
Low Permeability soil Layer	2,800	CY	$18.00	$50,400	
Vegetative Layer	1,400	CY	$19.00	$26,600	
Equipment Decontamination	1	LS	$41,000.00	$41,000	
Total Remediation				**$396,125**	**$396,125**
Other Items					
Preliminary Engineering	1	LS	$30,000.00	$30,000	
Detailed Engineering & Preconstruction	1	LS	$180,000.00	$180,000	
Project Support for Remedial Design	1	LS	$130,000.00	$130,000	
Remediation Derived Waste	1	LS	$12,000.00	$12,000	
Project Support for Construction	1	LS	$55,000.00	$55,000	
Tittle III Support	1	LS	$68,000.00	$68,000	
Final Action Report	1	LS	$15,000.00	$15,000	
Post Construction Activities	1	LS	$45,000.00	$45,000	
Project Support for Post Construction	1	LS	$14,000.00	$14,000	
Project Support for Remedial Action Phase	1	LS	$80,000.00	$80,000	
Total Other Items				**$629,000**	**$629,000**
Contingency Allowance (20%)					**$334,225**
Total Capital Cost					**$2,005,350**

L-Area Reactor Seepage Basin Remedial Action A2Operations and Maintenance Costs

	Quantity	Units	Cost/Unit	Total
Inspection (monthly)	7	500 m^2	$ 1,750	$ 12,250
Subsidence Monitoring	7	500 m^2	$ 200	$ 1,400
Mowing (Bi-monthly)	7	500 m^2	$ 1,200	$ 8,400
Cover Repair	7	500 m^2	$ 200	$ 1,400
		Total Annual O&M Cost		$ 23,450

Summary of Present Worth Analysis

Year	Capital Cost	Annual O&M Cost	Total Cost	Discount Factor (3.9%)	Present Worth
0	$2,005,350		$ 2,005,350	1.000	$ 2,005,350
1		$ 23,450	$ 23,450	0.962	$ 22,570
2		$ 23,450	$ 23,450	0.926	$ 21,723
3		$ 23,450	$ 23,450	0.892	$ 20,907
4		$ 23,450	$ 23,450	0.858	$ 20,122
5		$ 23,450	$ 23,450	0.826	$ 19,367
6		$ 23,450	$ 23,450	0.795	$ 18,640
7		$ 23,450	$ 23,450	0.765	$ 17,940
8		$ 23,450	$ 23,450	0.736	$ 17,267
9		$ 23,450	$ 23,450	0.709	$ 16,619
10		$ 23,450	$ 23,450	0.682	$ 15,995
11		$ 23,450	$ 23,450	0.656	$ 15,395
12		$ 23,450	$ 23,450	0.632	$ 14,817
13		$ 23,450	$ 23,450	0.608	$ 14,261
14		$ 23,450	$ 23,450	0.585	$ 13,725
15		$ 23,450	$ 23,450	0.563	$ 13,210
16		$ 23,450	$ 23,450	0.542	$ 12,714
17		$ 23,450	$ 23,450	0.522	$ 12,237
18		$ 23,450	$ 23,450	0.502	$ 11,778
19		$ 23,450	$ 23,450	0.483	$ 11,336
20		$ 23,450	$ 23,450	0.465	$ 10,910
21		$ 23,450	$ 23,450	0.448	$ 10,501
22		$ 23,450	$ 23,450	0.431	$ 10,107
23		$ 23,450	$ 23,450	0.415	$ 9,727
24		$ 23,450	$ 23,450	0.399	$ 9,362
25		$ 23,450	$ 23,450	0.384	$ 9,011
26		$ 23,450	$ 23,450	0.370	$ 8,672
27		$ 23,450	$ 23,450	0.356	$ 8,347
28		$ 23,450	$ 23,450	0.343	$ 8,034
29		$ 23,450	$ 23,450	0.330	$ 7,732
30		$ 23,450	$ 23,450	0.317	$ 7,442
Totals	$ 2,005,350.00	$ 703,500	$ 2,708,850		$ 2,415,817
Total Present Worth Cost					**$ 2,415,817**

Notes:
Capital cost estimates are not discounted because the construction work will be performed in the first year. O&M costs are reported as present worth estimates given a 5% discount rate for a 30 year duration. Cost estimates are based on soil volume estimates which are based on a conceptual design. Cost estimates are within +50% to -30% accuracy expectation.

CY=Cubic Yard
EA=Each
HR=Hours
LS=Lump sum
LF=Linear Foot
M=Meter
MO=Month
MSF=Thousand Square Feet
SY=Square Yard

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