Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

JAN 30 2019

Ms. Susan B. Fulmer, P. G., Manager
Federal Remediation Section
Division of Site Assessment, Remediation and Revitalization
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Mr. Jon Richards
Acting Savannah River Site Remedial Project Manager
Superfund Division
U. S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

Dear Ms. Fulmer and Mr. Richards:

SUBJECT: Feasibility Study for the Lower Three Runs Integrator Operable Unit (U) (SRNS-RP-2018-00199, Revision 1 Redline, January 2019) and Savannah River Site's Responses to the Regulatory Comments on the Revision 0 Document, SEMS Number: 35

In accordance with the terms of the Federal Facility Agreement, the U. S. Department of Energy (DOE) is submitting the subject information for your review. The South Carolina Department of Health and Environmental Control (SCDHEC) and U. S. Environmental Protection Agency (EPA) provided comments on the Revision 0 document on October 31, 2018 and November 5, 2018, respectively. Please review the Redline Revision 1 Feasibility Study and provide your comments or approval within thirty (30) days of receipt. The effort and time that the EPA and the SCDHEC have given on the subject operable unit are greatly appreciated.

Questions from you or your staff may be directed to me at (803) 952-8365.

Sincerely,

Brian T. Hennessey
SRS Remedial Project Manager
Infrastructure and Area Completion Division

IACD-19-120

Enclosures:
1. Feasibility Study for the Lower Three Runs Integrator Operable Unit (U) (SRNS-RP-2018-00199, Revision 1, January 2019) SEMS Number: 35 (Redline Copy)
2. SRS Responses to South Carolina Department of Health & Environmental Control Comments on the Feasibility Study for the Lower Three Runs Integrator Operable Unit (U) (SRNS-RP-2018-00199, Revision 0, July 2018) SEMS Number: 35
3. SRS Responses to United States Environmental Protection Agency Comments on the Feasibility Study for the Lower Three Runs Integrator Operable Unit (U) (SRNS-RP-2018-00199, Revision 0, July 2018) SEMS Number: 35

cc w/o encl:
D. Scaturo, SCDHEC-Columbia
S. French, SCDHEC-Columbia
M. D. Wilson, SCDHEC-Columbia
G. K. Taylor, SCDHEC-Columbia
G. O'Quinn, SCDHEC–Aiken Environmental Affairs Office
R. H. Pope, EPA-Atlanta
cc w/ encl:
M. McRae, TechLaw, Inc.

I. GENERAL COMMENTS

1. According to the Feasibility Study, "none of the alternatives apply a treatment technology. Therefore, no reduction of toxicity, mobility, or volume through treatment is accomplished from any alternative evaluated for the Upper subunit of the LTR IOU." However, it was discussed during the February 2018 scoping meeting for the Feasibility Study that the in situ capping on PTSM sediment/soil (i.e. hybrid cap) could be considered treatment through reduction of mobility. Please revise the document accordingly and in particularly Tables 4.1, 4.3, 4.5, and 4.11 to account for this active treatment.

   Response: Agree.

   The text and Tables 4-1, 4-3, 4-5, and ES-2 will be updated to identify that the use of a Hybrid Cap would result in reduction of mobility of PTSM sediment/soil through treatment. Per the response to EPA's Specific Comment 5, the addition of a drying agent to excavated sediment/soil will be described as a treatment to reduce the mobility of PTSM sediment/soil during transport and disposal. The following changes to the text will be made in response to EPA's and SCDHEC's comment on the treatment of PTSM.

   Section 4.2, Reduction of Toxicity, Mobility, or Volume Through Treatment, will be revised as follows:

   > **~~"None~~ Two of the alternatives (A-3 and A-5) apply a treatment technology. ~~Therefore, no~~ A reduction of ~~toxicity,~~ mobility~~, or volume through treatment~~ is accomplished ~~from any~~ via the use of an amendment within the hybrid cap (A-3), and with the use of a drying agent for the excavated sediment/soil (A-5) to allow safe transport and disposal. No other alternatives evaluated for the Upper subunit of the LTR IOU are considered to provide a reduction of toxicity, mobility, or volume through treatment. Based on this logic, the Reduction of Toxicity, Mobility, or Volume Through Treatment of each of the remedial alternatives A-1, A-2, ~~A-3, A-5,~~ and A-6 have been identified as 'none' in Table 4.11"**

   Section 4.1.2.1, Alternative A-3 for EA1, will be revised as follows (similar revisions will be made in Section 4.1.2.3, A-3 for EA5):

   > **"…is also assumed in the design. The use of an amendment will bind Cs-137 to the clay to reduce mobilization and, when used in conjunction with other materials, can reduce the cap thickness. Application of the amendment, AquaBlok™, at other waste units is typically applied at a thickness of 0.15 m (0.5 ft), with an additional sand layer to assist with recolonization of the benthic community."**

Section 4.1.2.1, Alternative A-5 for EA1, will be revised as follows (a similar revision will be made in Section 4.1.2.3, A-5 for EA5):

> **"Excavation will be completed using standard earth moving equipment. Initially an estimated 10 m^3 (13 yd^3) of waste will be generated during excavation ~~and directly~~. The excavated sediment/soil will be treated with a drying agent to reduce mobility during transportation and disposal. Contaminated media will be loaded into roll-off containers with appropriate containers/bags and staged at the site."**

Section 4.1.2.2, Alternative A-3 for EA-3 will be revised as follows:

> **"The design would include bench scale testing to determine the appropriate composition of cap materials including the use of an amendment to reduce mobility of the PTSM."**

Section 4.1.2.2, Alternative A-5 for EA-3 will be revised as follows:

> **"Excavation will be completed using specialized dredging equipment to access the PTSM sediment/soil below water. Initially an estimated 200 m^3 (260 yd^3) of waste will be generated during excavation. Dewatering of sediment/soil will be required, and the sediments will be treated with a drying agent to reduce mobility of the PTSM during transport and disposal. Waste will be loaded into roll-off containers with appropriate containers/bags and staged at the site."**

Tables 4-1, 4-3, 4-5, and ES-2 will be revised to identify the use of an amendment in A-3 and the use of a drying agent in A-5 as a treatment method to reduce mobility. See response to EPA specific comment 5 for specific text changes.

Responsible Party: Monique Rabin, (803) 952-6695, monique.rabin@srs.gov

2. The estimates provided for the Baseline Dam Program and Minor Maintenance for PAR Pond, Pond B, and Pond C appear to be undervalue. According to the Key Agreements made during the Feasibility Study scoping meetings (February 14, 2018 and March 5, 2018), the Core Team "agreed that maintaining water levels addresses the general exposure to contaminated media, not just PTSM." Therefore, the cost estimates should be adjusted to reflect the time needed for PAR Pond, Pond B, and Pond C to meet their respective remedial goals (205 years, 260 years, and 200 years, respectively).

Also, it should be noted that an earthen dam lifespan is 50 to 100 years. Consideration of this fact should be incorporated into the revised estimates. Will the dam need to be reconstructed during the time it takes to meet the remedial goals? Does the cost include minor maintenance activities (i.e., mowing, tree removal, and repairs from animal burrowing) and major maintenance activities (i.e., replacement of the internal drainage system every 50 years and repair or replacement of the spillway every 50 to 100 years)? Does the cost estimate take into account catastrophic events such as dam failure? The revised document should include explicit details on how these new costs were derived and provide any referenced worksheets (i.e., the worksheet from SI).

Response: Agree with clarification.

Although the scoping summary stated, "maintaining water levels addresses the general exposure to contaminated media, not just PTSM," it also documented that the "response *(action)* requires site inspections, maintenance, and long-term monitoring and reporting." More specifically, the scoping summary included the following elements associated with the "Maintain Water in Ponds by Maintaining Dam Structures" action:

- Monitoring of dam structures and water levels per SRS procedure;
- Natural fluctuation of water levels in ponds is expected;
- Annual inspections and periodic maintenance of physical attributes that make water retention viable (i.e., dams, weirs, control gates, etc.);
- Five Year Remedy Review.

In line with those elements, the Scoping Summary evaluation considerations stated, "*Maintenance and inspection of water detention structures would be re-evaluated after Cs-137 concentrations drop below PTSM levels*." This is also the timeframe associated with MNR monitoring component for sediment and biota as documented in the Scoping Summary ("the MNR threshold is achieved when contaminant levels decay below PTSM levels, throughout the Upper subunit.") The current estimate only includes maintenance and repair of the dam structures based on the historical maintenance history of the PAR Pond and Pond B dam for the ~50-year timeframe. However, it is the inspection/maintenance process that identifies the need for more extensive repairs in the future. Should the structural integrity of the dam become compromised, the regulatory mechanization to address the condition will be accomplished by an Explanation of Significant Difference or Revised ROD. Current conditions will be assessed with each 5-year remedy review.

To address this comment, the last paragraph of Section 3.1.6 will be revised as follows:

> **"Alternative A-6 includes the monitoring of dam structures and water levels, annual inspections, and periodic maintenance of physical attributes that make**

water retention viable. Should future conditions warrant, the capability to provide water to PAR Pond currently exists through other site services and is expected to continue. Inspection and maintenance activities will be re-evaluated after Cs-137 concentrations drop below PTSM levels. Also, if an inspection or maintenance activity identifies structural inadequacies with the dams, the appropriate regulatory path will be pursued. This alternative will include LUCs with MNR (as detailed in A-2) and will require ~~a~~ five-year remedy reviews as part of the entire Upper subunit remedy."

The SI worksheet is provided below and will be included in Appendix A.

Site Infrastructure Worksheet for Alternative A-6						
FY	SpeedChart	Description	Pond B 15%	PAR 30%	Other P&R Ponds 10%	*ALL P&R Related Baseline 55%
FY17	07ILDAMMNT	Baseline Dam Program & Maintenance	$ 31,523	$ 63,045	$ 21,015	$ 115,583
FY16	07ILDAMMNT	Baseline Dam Program & Maintenance	$ 34,096	$ 68,193	$ 22,731	$ 125,020
FY15	07ILDAMMNT	Baseline Dam Program & Maintenance	$ 45,533	$ 91,065	$ 30,355	$ 166,953

FY	SpeedChart	Description	Pond B Project	PAR Repair		TOTAL P&R Projects
FY17	07J74G4113	Correct Erosion on Face of Pond B Dam	$ 69,030			$ 69,030
FY15	07ILPARBCP	Repair Valve Guide Interior of Dam		$ 54,548		$ 54,548

Total Cost - P&R Related Dams		
FY17	$	184,613
FY16	$	125,020
FY15	$	221,501

*Remaining 45% of Baseline is related to Non-P&R Related Dams

Responsible Party: Susan Blas, (803) 952-6904, susan.blas@srs.gov

3. The first sentence of the last paragraph of page 69 states: "Alternatives A-3, A-5 and A-6 each include LUCs with MNR as part of the remedy." The only other sections of the document that appear to indicate that Alternative A-2: LUCs with MNR is included with each of the other remedial alternatives are Table ES-2 and the cost estimates in Appendix A. The discussions for each remedial alternative in Sections 3.1 and 4.1.2 do not clearly state the inclusion of LUCs with MNR. Furthermore, these discussions state that five-year remedy reviews will be required for each alternative; however, according to the cost estimates for A-3, A-5 and A-6, there are no five-year review costs associated with these specific alternatives. Instead, for each of these alternatives there is a note stating that LUCs and remedy reviews are included in A-2. Sections 3 and 4 should be revised to include LUCs with MNR as a component for each remedial alternative discussion. Additionally, the cost estimates for each remedial alternative should be revised to include the five-year review costs associated with LUCs with MNR in addition to the separate costs applicable to each remedial alternative.

   Response: Agree with clarification.

   As agreed to by the Core Team (Scoping Meetings 2/14/2018 & 3/5/2018), LUCs with MNR is a remedy for the entire Upper subunit. As such, the total cost of this remedy added into Alternatives A-3, A-4, and A-6 would not result in an accurate cost accounting. EA specific alternatives are for only a portion of the entire Upper subunit and not for the entire subunit. The cumulative costs for the project will be estimated when the Proposed Plan is approved and the decision on each specific EA alternative, in addition to the LUCs and MNR remedy, is certain.

   To further note that the added remedies of Alternatives A-3, A-5 and A-6 will include LUCs with MNR, the last statement in each alternative's respective section within Section 3.0 will be revised as follows:

   > **"This alternative <u>will include LUCs with MNR (as detailed in A-2) and</u> will require five-year remedy reviews <u>as part of the entire Upper subunit remedy</u>."**

   Additionally, the first paragraph in Section 4.1.2 will include the following revision:

   > **"...are discussed in the following subsections for the applicable EAs. <u>All three alternatives are described as specific to the individual EAs however each alternative will include LUCs with MNR as a part of the entire Upper subunit remedy.</u> Alternatives that were carried through to the detailed analysis...."**

   The following footnote will be added to the detailed costs within Appendix A for each of these three alternatives in each specific EA:

   > **"<u>* In addition to costs associated with this alternative, LUCs with MNR and</u>**

five-year remedy reviews for the entire Upper subunit is estimated at ~$17 M (refer to details in Alternative A-2)."

Responsible Party: Jim Kupar, (803) 952-6525, james.kupar@srs.gov

4. Several sections in the referenced document discuss the implementability for Alternatives A-3 and A-5 in EA3. Section 4.2 Comparative Analysis under the Implementability Section, page 71, first paragraph states that "all of the alternatives evaluated are implementable." However, Table 4-3, Detailed Analysis of EA3 Pond B Including Canal to Pond C, page 89, under columns A-3 and A-5, the Implementability portion of the table states, "mobilization of a barge to this interior pond within a remote area may hinder availability of equipment and contractors," and "mobilization to this remote area may hinder availability of equipment and contractors." Please consider rewording these statements and confirm that while these alternatives may be difficult to implement, the alternatives are viable remedial options.

Response: Agree.

Table 4-3, Under column A-3 for "Availability of Materials, Equipment, Contractors" the text will be modified as follows:

~~"Mobilization~~ Availability of specialized equipment/contractors and mobilization of a barge to this interior pond within a remote area may ~~hinder availability of equipment and contractors~~ be difficult."

Table 4-3, Under column A-5 for "Availability of Materials, Equipment, Contractors" the text will be modified as follows:

~~"Mobilization~~ Availability of specialized equipment/contractors and mobilization to this remote area may ~~hinder availability of equipment and contractors~~ be difficult."

Responsible Party: Monique Rabin, (803) 952-6695, monique.rabin@srs.gov

II. SPECIFIC COMMENTS

1. Section 2.0, Identification and Screening of Technologies, Table 2-3 Summary of the Screening Technologies, page 37. Under the "Effectiveness" column for the No Action General Response Action, it states that short-term and long-term exposure to contaminated

sediment/soil is eliminated with this technology. Please correct this statement by rewording the statement to "...contaminated sediment/soil is **not** eliminated...".

Response: Agree.

The sentence will be revised as follows:

> **"Short-term and long-term exposure to contaminated sediment/soil is <u>not</u> eliminated through the implementation of this technology."**

Responsible Party: Susan Blas, (803) 952-6904, susan.blas@srs.gov

2. Section 2.1.3, Development of Remedial Goals, pages 28 and 29. Please include a statement using background concentrations as a possible basis for selecting the most likely remedial goal option.

Response: Agree.

As addressed in EPA specific comment 2, the following text will be added in Section 2.1.3, Development of Remedial Goals:

> **<u>"Risk-based RGOs for the IOU onsite worker for sediment/soil media and recreational fisherman for fish tissue media correspond to a risk of 1E-06 for carcinogens (i.e., Cs-137 and Co-60) and an HQ of 1 for noncarcinogens (i.e., Hg). The IOU onsite worker scenario is based on the most likely human receptor for the Upper Subunit: an SRS worker/researcher (20 years, 150 days/year, 8 hours/day). Because it is known that some contaminants could bio-accumulate in fish, and fish are a mobile media, the evaluation of human exposure also included a hypothetical recreational fisherman scenario for the ingestion of fish (26 years, 350 days/year, 54 g/day). The risk-based RGOs were obtained using the calculator function available at the USEPA Preliminary Remediation Goals website (USEPA 2018a) for the radiological constituents and the USEPA Regional Screening Levels website (USEPA 2018b) for mercury.</u>**
>
> **<u>The most likely RGOs also consider a comparison to background levels. Because of the inherently conservative nature of the risk assessment and RGO calculations, it is possible for the risk-based RGO to be less than what occurs naturally in background soil. In this case, the RGO defaults to the background concentration to be technically practical to achieve. Background levels presented in Table 2-2 are based on the SRS Background Soils Statistical</u>**

Summary Report (WSRC 2006) and the IOU Background Dataset (SRNS 2017), as available.

The SRS soil background two times (2x) the 95th percentile concentration is identified as the most likely RGO for Cs-137 in sediment/soil media for the onsite worker since this is the generally accepted concentration for "typical" anthropogenic fallout, and has been accepted as the RG for other SRS projects, specifically the SRS Wetland Area at Dunbarton Bay In Support of Steel Creek Integrator Operable Unit (SRNS 2018)."

In addition, Section 5.0, References will be revised to include the new citations:

SRNS, 2018. ***Record of Decision Remedial Alternative Selection for the Wetland Area at Dunbarton Bay in Support of Steel Creek Integrator Operable Unit (U),*** **Rev.1, SRNS-RP-2013-00730, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken SC**

USEPA, 2018a. ***USEPA Radionuclide Preliminary Remediation Goals for Superfund Preliminary Remediation Goals*** **website found at https://epa-prgs.ornl.gov/radionuclides**

USEPA, 2018b. ***USEPA Regional Screening Levels*** **website found at https://www.epa.gov/risk/regional-screening-levels-rsls**

WSRC, 2006. ***Background Soils Statistical Summary Report for Savannah River Site,*** **ERD-EN-2005-0223, Revision 1, October 2006, Washington Savannah River Company, Savannah River Site, Aiken, SC**

Responsible Party: Doug Martinson, (803) 952-6043, douglas.martinson@srs.gov

I. GENERAL COMMENTS

1. The Feasibility Study for the Lower Three Runs Integrator Operably Unit (IOU) (U) [LTR IOU FS] does not provide sufficient information about how the cost estimates for the remedial action alternatives were evaluated since no backup information or analyses are provided. In addition, According to Section 6.2 (Detailed Analysis of Alternatives) of EPA document *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA RI/FS guidance), each alternative selected for the detailed analysis should be reviewed to develop order-of-magnitude cost estimates (i.e., having a desired accuracy of + 50 percent to -30 percent). However, Section 4.0 (Detailed Analysis of Alternatives) of the LTR IOU FS does not provide order-of-magnitude cost estimates with accuracy ranges of +50% to -30%, with a breakout for capital costs and operation and maintenance costs totals. *Please revise the LTR IOU FS to include backup information about how cost estimates were derived. In addition, for the remedial alternatives selected for detailed analysis in Section 4.0 of the LTR IOU FS, include the cost estimates with accuracy ranges of +50% -30% and a breakout of capital versus operation and maintenance costs, in accordance with EPA RI/FS guidance.*

Response: Agree with clarification.

Section 4.0 will be modified to include a discussion that the cost estimates presented in Tables 4-1 through 4-9 have an accuracy range of +50% to -30%. Tables 4-1 through 4-9 provide a breakout of capital versus operation and maintenance costs for each remedial alternative selected for detailed analysis. Footnotes will be added to these tables to identify the accuracy range of the estimates provided. Appendix A (inadvertently left out of the electronic copy of the Rev. 0 document and the Table of Contents) includes the back-up data and notations for the cost estimates. Cost estimates provided in Appendix A for each of the alternatives represent a level of detail that is commensurate with detail provided in other FS documents prepared for SRS waste units. Text changes proposed to address this comment are below.

The text in Section 4.1.1.2 will be revised as follows:

> **"...every five years. The monitoring reports will include recommendations for continued sampling using ~~technology~~ technological advances in remote sensing. Remote sensing includes acquiring data from such technologies as aerial gamma surveys. It is anticipated that costs can be reduced by alternating remote sensing and ground truthing surveys at five-year intervals. Ground truthing includes field surveys using hand-held monitoring devices or collection of physical samples for laboratory analyses. The detailed cost estimate was based solely on the physical sample collection and analysis of sediment and biota. LUCs will be applied..."**

All references to the detailed cost estimate in Appendix A will be revised as follows:

"A detailed cost estimate, representative of an order of magnitude estimate with an assumed accuracy in the range of +50/-30%, is presented in Appendix A."

Section 4.2, "Cost", will be revised as follows:

"A total present worth cost for each alternative was calculated for each applicable EA and presented in Table 4-11. The cost estimates include capital and annual O&M costs. Capital costs include direct costs, such as construction, equipment, materials, labor, mobilization, pilot studies, disposal fees, etc., as well as indirect costs such as engineering, health and safety, project management, overhead, contingency, etc. Capital costs were derived from SRS experience, review of cost studies performed for similar technologies at other sites, consultation from vendors, volume estimates based on RI data, etc. O&M direct costs primarily consist of labor for inspections, labor and material for maintenance, and costs of periodic (every 5 years) reviews. Indirect O&M costs also include project management, health and safety, overhead and contingency. O&M costs were primarily derived from experience at SRS and recent maintenance costs from the SRS site infrastructure (SI) organization. A present worth analysis is performed for both Capital and O&M costs. The level of detail is representative of an order of magnitude estimate with an assumed accuracy of +50%/-30%.

Cost associated with Alternative A-2 ~~are~~is identified for the Upper subunit of the LTR IOU in its entirety. The total estimated cost of A-2 for the Upper subunit which includes all nine exposure areas (EA1 thru EA9), is ~$17 M. The cost of this alternative is in addition to any additional remedy selected for any individual EA."

Responsible Party: Monique Rabin, (803) 952-6695, monique.rabin@srs.gov

2. It is EPA's position that PAR Pond water level maintenance will likely need to be included with all applicable alternatives, as maintaining the water level as outlined in in the existing Interim ROD is key for the alternatives to be successfully implemented resulting protection of human health and the environment. However, it is unclear in the FS how the water level will be maintained. The existing IROD regarding water level maintenance needs to be superseded by this Final ROD for OU 35. *Therefore, the cost of maintaining the water level and by doing so keeping any contaminated sediments in the PAR Pond system from migrating beyond the*

existing PAR Pond dam needs to be properly evaluated. It is not clear that the FS does this in a complete and thorough way.

Response: Agree with clarification.

Although maintaining a specific water level in PAR Pond is not necessary to protect human health and the environment or minimize sediment movement downstream of the PAR Pond Dam, maintenance of the dam structure is necessary to prevent sediment transport downstream of the dam structure. Alternative A-6, Maintain Water in Ponds, will maintain the dam structures for water retention to allow for continued natural fluctuations of water levels and control sediment migration. If necessary, the capability to provide water to PAR Pond currently exists and is expected to continue for the foreseeable future. To address this comment, the last paragraph of Section 3.1.6 will be revised as follows:

> **"Alternative A-6 includes the monitoring of dam structures and water levels, annual inspections, and periodic maintenance of physical attributes that make water retention viable. Should future conditions warrant, the capability to provide water to PAR Pond currently exists through other site services and is expected to continue. Inspection and maintenance activities will be re-evaluated after Cs-137 concentrations drop below PTSM levels. Also, if an inspection or maintenance activity identifies structural inadequacies with the dams, the appropriate regulatory path will be pursued. This alternative will include LUCs with MNR (as detailed in A-2) and will require ~~a~~ five-year remedy reviews as part of the entire Upper subunit remedy."**

The cost for Alternative A-6, Maintain Water in Ponds, is detailed in Appendix A and includes inspection and scheduled maintenance costs associated with the dam structures. The costs for the inspection/maintenance activities (i.e., $2.1 M for EA3, $2.8 M for EA6, and $591 K for EA9) were derived from the cost incurred over the past several years for the Baseline Dam Program & Maintenance activities.

Responsible Party: Susan Blas, (803) 952-6904, susan.blas@srs.gov

3. It is noted that the LTR IOU FS on **page 70 of 124** states, "None of the alternatives apply a treatment technology. Therefore, no reduction of toxicity, mobility, or volume through treatment is accomplished from any alternative evaluated for the Upper subunit of the LTR IOU." However, based on recent conversations between the EPA and the Department of Energy (DOE), an argument could be made that the drying agents used to dewater/stabilize the waste would reduce contaminant mobility and thereby qualify as treatment regarding Principal Threat Waste (PTW) and Alternative A-5: Excavation and Disposal of PTSM Sediment/soil.

No response required.

Response: Agree

See Specific Comment #5 for more detail.

Responsible Party: Justin Steadman, (803) 952-7346, justin.steadman@srs.gov

4. **Section 3.1.2** (Alternative A-2: Land Use Controls with Monitored Natural Recovery) states the use of land use controls, institutional controls and Monitored Natural Recovery (MNR) have a high degree of certainty to continue within an acceptable time frame. However, the text does not define what is considered an 'acceptable time frame' and does not discuss how the timeframes needed for MNR to achieve an acceptable risk apply to this requirement. For example, Section 1.3.1 (Exposure Area 1: Pond A – Including R-Area Discharge Canal) states it will take 290 years for the Cesium-137 (Cs-137) levels to meet the remedial goal (RG) of 0.68 pico Curies per gram (pCi/g). *Please revise Section 3.1.2 to discuss the timeframes needed for the Cs-137 levels to decay to the RG and why this timeframe is considered acceptable.* This may include information pertaining to the Department of Energy's long-term stewardship of the Savannah River Site.

Response: Agree.

The term "acceptable time frame" is subjective. The third paragraph of Section 3.1.2 will be revised to delete the following sentence:

> **"~~These natural processes have a high degree of certainty to continue within an acceptable time frame~~."**

Also, the second sentence of the fifth paragraph of Section 3.1.2 will be revised as follows:

> **"This alternative may be an appropriate remedy to reduce risk ~~within an acceptable time~~ for some EAs~~,~~ or may be implemented in combination with more active alternatives...."**

Sections 1.3.1 through 1.3.9 provides the unit descriptions including the various timeframe to meet RGOs for each EA. Table 4-1 through 4-9 describe the time to meet RGOs based on the Detailed Analysis which allows for alternative comparisons. Finally, Table ES-2 provides a Summary of the Comparative Analysis and describes the time to reach RGOs for appropriate alternatives applied to each EA outlining the time to reach RGOs from the No Action alterative baseline of 290 years.

When LUCs are necessary to assure the reliability of land use assumptions, the SRS Land Use Control Assurance Plan ensures that LUCs will be maintained for as long as necessary to keep the selected remedy fully protective of human health and the environment.

The following text will be included as the last sentence in Sections 1.3.1 through 1.3.9 as well as at the end of Section 2.3.2 (Land Use Controls):

> **"The SRS Land Use Control Assurance Plan (WSRC 1999) ensures that LUCs will be maintained for as long as necessary to keep the selected remedy fully protective of human health and the environment."**

Also, the following reference will be added to Section 5.0 References:

WSRC, 1999. *Land Use Control Assurance Plan for the Savannah River Site*, WSRC-RP-98-4125, Revision 1.1, latest revision, Savannah River Nuclear Solutions, LLC Savannah River Site, Aiken, SC

Responsible Party: Susan Blas, (803) 952-6904, susan.blas@srs.gov

5. **Table 4-10**, Potential ARARs and TBC Criteria for the Lower Three Runs IOU Feasibility Study, includes Applicable or Relevant and Appropriate Requirement (ARARs) which do not meet the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 statute for selecting a remedy that is protective of human health and the environment in accordance with maintaining an excess upper bound lifetime cancer risk to an individual of between 10E-04 – 10E-06, as follows:

   - Table 4-10 includes DOE Order 458.1(4)(b)(1) and (2), limiting the exposure of members of the public to radiation sources as a consequence of all USDOE activities to no more than a total effective dose 100 millirem/year, and As Low As Reasonably Achievable (ALARA), as an action-specific ARAR. The DOE requirement does not meet the CERCLA Section 121 federal statutory requirement for maintaining an excess lifetime cancer risk remaining after remedial action completion within the risk range of 10E-04 – 10E-06. As such, the DOE Order 458.1 is not an ARAR for the CERCLA cleanup of the LTR IOU.

     In accordance with the CERCLA Compliance Policy in the 40 Code of Federal Regulations (CFR) Section 121(d)(2)(A), superfund remedial actions must meet Federal standards, requirements, criteria, or limitations that are determined to be legally ARARs. This includes the requirement that selection of a remedial action must result in concentrations of carcinogens that do not exceed an excess upper bound lifetime cancer risk to an

individual of between 10E-04 – 10E-06. *Please revise Table 4-10 to remove reference to ARARs that do not meet the federal statutory requirement to maintain an excess upper bound lifetime cancer risk to within the 10E-04 – 10E-06 risk range for remedial actions at the LTR IOU.*

Response: Agree.

DOE Order 458.1 (Requirement, Prerequisite, and Citation) will be removed from Table 4-10

Responsible Party: Joseph Burch, (803) 952-6660, joseph.burch@srs.gov

II. SPECIFIC COMMENTS

1. **Table 2-2. Summary of the RGOs for the Upper Subunit of the LTR IOU, page 36-of 134:** The table includes a column labeled "IOU On-Site Worker," but does not include footnotes or a discussion which states where the "IOU On-Site Worker" values were obtained (i.e. such as the Preliminary Remediation Goal Calculator*). Please revise Table 2-2 to include a more detailed column labels and/or footnotes as appropriate to fully identify where values listed in the table were referenced.*

Response: Agree.

Footnotes will be added to Table 2-2 that identify the sources of the RGOs as follows:

Table 2-2. Summary of the RGOs for the Upper Subunit of the LTR IOU

Media	RCOC	Units	IOU Onsite Worker RGO[1]	Recreational Fisherman RGO[1]	SRS BKGRD 95th %tile[2]	2X SRS BKGRD 95th %tile[2]	SRS BKGRD Max[2]	IOU BKGRD Max[3]	Most Likely RGO
Sediment/ Soil	Cesium-137 (+D)	pCi/g	0.144	NA	0.34	*0.68*	3.3	0.623	0.68
	Cobalt-60	pCi/g	*0.0295*	NA	NA	NA	NA	0.011	0.0295
Fish Tissue	Cesium-137 (+D)	pCi/g	NA	*0.0544*	NA	NA	NA	0.488	0.0544
	Mercury	mg/kg	NA	*0.154*	NA	NA	NA	0.24	0.154

Sources of the most likely RGO are italicized
NA = not applicable

1 – Risk-based RGOs obtained using the calculator function available at the USEPA Preliminary Remediation Goals website (USEPA 2018a) for the radiological constituents and the USEPA Regional Screening Levels website (USEPA 2018b) for mercury.

2 – SRS background concentrations obtained from the *Background Soils Statistical Summary Report for the Savannah River Site*, Table B-1 (WSRC 2006).

3 – IOU Background maximum concentrations from the *Remedial Investigation/Baseline Risk Assessment for the Lower Three Runs Integrator Operable Unit* (SRNS 2017).

In addition, Section 5.0, References will be revised to include the new citations as follows:

USEPA, 2018a. *USEPA Radionuclide Preliminary Remediation Goals for Superfund Preliminary Remediation Goals* website found at https://epa-prgs.ornl.gov/radionuclides

USEPA, 2018b. *USEPA Regional Screening Levels* website found at https://www.epa.gov/risk/regional-screening-levels-rsls

WSRC, 2006. *Background Soils Statistical Summary Report for Savannah River Site*, ERD-EN-2005-0223, Revision 1, October 2006, Washington Savannah River Company, Savannah River Site, Aiken, SC

Responsible Party: Doug Martinson, (803) 952-6043, douglas.martinson@srs.gov

2. **Table 2-2. Summary of the RGOs for the Upper Subunit of the LTR IOU, page 36-of 134:** The most likely remedial goal option (RGO) for Cs-137 of 0.68 pCi/g was selected based on twice the 95th percentile for the SRS site-wide background. However, the basis for selecting twice the 95th percentile for the entire facility versus selecting a background value from areas surrounding the LTR IOU is unclear. Background values used for identifying when concentrations of constituents are due to anthropogenic/background sources versus site contamination should be based on site-specific information to the greatest extent possible. *Please revise the LTR IOU FS to include additional text explaining how the background value determined most appropriate for the purpose of identifying the RG for the LTR IOU was selected. Also, please include text explaining why the chosen RG of 0.68 pCi/g for Cs-137 is appropriate.*

   Response: Agree.

   A Core Team discussion of an appropriate cleanup level for Cs-137 occurred at the Problem Identification scoping meeting that was conducted on February 8 and 9, 2017. Recognizing that the 1E-06 risk-based concentration for Cs-137 is below what can be found in background due to nuclear fallout, the Core Team agreed that the RGO concentration that was identified for the Wetland Area at Dunbarton Bay (2x SRS background 95th percentile) was an appropriate value that should be used at the LTR IOU for consistency within the program.

   Text in Section 2.1.3, Development of Remedial Goals will be added as follows:

   "Risk-based RGOs for the IOU onsite worker for sediment/soil media and recreational fisherman for fish tissue media correspond to a risk of 1E-06 for carcinogens (i.e., Cs-137 and Co-60) and an HQ of 1 for noncarcinogens (i.e., Hg). The IOU onsite worker scenario is based on the most likely human receptor for the Upper Subunit: an SRS worker/researcher (20 years, 150 days/year, 8 hours/day). Because it is known that some contaminants could bio-accumulate in fish, and fish are a mobile media, the evaluation of human exposure also included a hypothetical recreational fisherman scenario for the ingestion of fish (26 years, 350 days/year, 54 g/day). The risk-based RGOs were obtained using the calculator function available at the USEPA Preliminary Remediation Goals website (USEPA 2018a) for the radiological constituents and the USEPA Regional Screening Levels website (USEPA 2018b) for mercury.

   The most likely RGOs also consider a comparison to background levels. Because of the inherently conservative nature of the risk assessment and RGO calculations, it is possible for the risk-based RGO to be less than what occurs naturally in background soil. In this case, the RGO defaults to the background

concentration to be technically practical to achieve. Background levels presented in Table 2-2 are based on the SRS Background Soils Statistical Summary Report (WSRC 2006) and the IOU Background Dataset (SRNS 2017), as available.

The SRS soil background two times (2x) the 95th percentile concentration is identified as the most likely RGO for Cs-137 in sediment/soil media for the onsite worker since this is the generally accepted concentration for "typical" anthropogenic fallout, and has been accepted as the RG for other SRS projects, specifically the Wetland Area at Dunbarton Bay In Support of Steel Creek Integrator Operable Unit (SRNS 2018)."

In addition, Section 6.0, References will be revised to include the new citation:

SRNS, 2018. *Record of Decision Remedial Alternative Selection for the Wetland Area at Dunbarton Bay in Support of Steel Creek Integrator Operable Unit (U),* Rev. 1, SRNS-RP-2013-00730, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken SC

Responsible Party: Doug Martinson, (803) 952-6043, douglas.martinson@srs.gov

3. **Section 4.1.1.2, Alternative A-2: LUCs with MNR, page 61 of 124:** The second paragraph states that costs for this alternative can be reduced by alternating remote sensing and ground truthing surveys at five-year intervals. However, the text does not explain or define what the terms 'remote sensing' and ground truthing' represent. *For clarity and completeness, please revise this text to include a brief description of the remote sensing and ground truthing monitoring techniques.*

Response: Agree.

As described in general comment 1, Section 4.1.1.2 will be revised as follows:

"...every five years. The monitoring reports will include recommendations for continued sampling using ~~technology~~technological advances in remote sensing. Remote sensing includes acquiring data from such technologies as aerial gamma surveys. It is anticipated that costs can be reduced by alternating remote sensing and ground truthing surveys at five-year intervals. Ground truthing includes field surveys using hand-held monitoring devices or collection of physical samples for laboratory analyses. The detailed cost estimate was based solely on the physical sample collection and analysis of sediment and biota. LUCS will be applied to the entire..."

Responsible Party: Susan Blas, (803) 952-6904, susan.blas@srs.gov

4. **Table 4-1, Detailed Analysis EA1 R-Area Discharge Canal and Pond A, page 77 of 124:** The table indicates that maintaining the water level of Pond A does not provide any benefit to human health or the environment; however, information in the table does not reference the reason why this alternative is not applicable. *For clarity and completeness, it is recommended that a footnote be added to Table 4-1 stating that EA1 is not directly connected to the water body controlled by the dam and is the reason maintaining the water level does not apply.*

Response: Clarification.

Section 3.1.6 (the third sentence in the first paragraph) explains that this action is only applicable to EAs that contain infrastructure to retain water and have historically maintained consistent water levels (EA3, EA6, and EA9). Figure 3-1 also provides a reference to show that Alternative A-6 was not evaluated for EA 1. No change to the document is proposed.

Responsible Party: Susan Blas, (803) 952-6904, susan.blas@srs.gov

5. **Page 70 of 124 states**, "None of the alternatives apply a treatment technology. Therefore, no reduction of toxicity, mobility, or volume through treatment is accomplished from any alternative evaluated for the Upper subunit of the LTR IOU." However, it is EPA's position that the drying agents used to dewater/stabilize the waste would reduce contaminant mobility and thereby qualify as treatment regarding Principal Threat Waste (PTW) in Alternative A-5: Excavation and Disposal of PTSM Sediment/soil. *EPA requests that the stabilization needed for disposal of the material be considered treatment and described as such in the Feasibility Study (FS).*

Response: Agree.

Adding a drying agent to the excavated sediments will be described as a treatment to reduce the mobility of the PTSM sediments during transport and disposal. The use of a drying agent was not included in the detailed cost estimate, but this addition is not anticipated to significantly increase the total cost of the alternative. No change to the cost estimate for A-5 is proposed. Per the response to SCDHEC's general comment 1, the use of an amendment will also be considered as treatment to reduce mobility of PTSM sediments. The following changes to the text and tables will be made in response to EPA's and SCDHEC's comment on treatment of PTSM.

Section 4.2, Reduction of Toxicity, Mobility, or Volume Through Treatment, will be revised as follows:

> **~~"None~~ Two of the alternatives (A-3 and A-5) apply a treatment technology. ~~Therefore, no~~ A reduction of ~~toxicity,~~ mobility~~, or volume through treatment~~ is accomplished ~~from any~~ via the use of an amendment within the hybrid cap (A-3), and with the use of a drying agent for the excavated sediment/soil (A-5) to allow safe transport and disposal. No other alternatives evaluated for the Upper subunit of the LTR IOU are considered to provide a reduction of toxicity, mobility, or volume through treatment. Based on this logic, the Reduction of Toxicity, Mobility, or Volume Through Treatment of each of the remedial alternatives A-1, A-2, ~~A-3, A-5,~~ and A-6 have been identified as 'none' in Table 4.11"**

Section 4.1.2.1, Alternative A-3 for EA1, will be revised as follows (similar revisions will be made for 4.1.2.3, A-3 for EA5):

> **"...is also assumed in the design. The use of an amendment will bind Cs-137 to the clay to reduce mobilization and, when used in conjunction with other materials, can reduce the cap thickness. Application of the amendment, AquaBlok™, at other waste units is typically applied at a thickness of 0.15 m (0.5 ft), with an additional sand layer to assist with recolonization of the benthic community."**

Section 4.1.2.1, Alternative A-5 for EA1, will be revised as follows (a similar revision will be made for 4.1.2.3, A-5 for EA5):

> **"Excavation will be completed using standard earth moving equipment. Initially an estimated 10 m^3 (13 yd^3) of waste will be generated during excavation ~~and directly~~. The excavated sediment/soil will be treated with a drying agent to reduce mobility during transportation and disposal. Contaminated media will be loaded into roll-off containers with appropriate containers/bags and staged at the site."**

Section 4.1.2.2, Alternative A-3 for EA-3 will be revised as follows:

> **"The design would include bench scale testing to determine the appropriate composition of cap materials including the use of an amendment to reduce mobility of the PTSM."**

Section 4.1.2.2, Alternative A-5 for EA-3 will be revised as follows:

"Excavation will be completed using specialized dredging equipment to access the PTSM sediment/soil below water. Initially, an estimated 200 m^3 (260 yd^3) of waste will be generated during excavation. Dewatering of sediment/soil will be required~~.~~, and the sediments will be treated with a drying agent to reduce mobility of the PTSM during transportation and disposal. Waste will be loaded into roll-off containers with appropriate containers/bags and staged at the site."

Tables 4-1, 4-3, and 4-5 will be revised as follows:

Alternative	A-1	A-2[(b)]	A-3	A-5	A-6
Criterion	**No Action**	**LUCs with MNR**	**In Situ Capping on PTSM Sediment/Soil (Including Consideration of a Hybrid Cap)**	**Excavation and Disposal of PTSM Sediment/Soil**	**Maintain Water in Ponds by Maintaining Dam Structures**
Reduction of Toxicity, Mobility, or Volume Through Treatment					
Degree of Expected Reduction in Toxicity, Mobility or Volume Through Treatment	No active treatment.	No active treatment.	~~No active treatment~~ The use of an amendment in the cap is a treatment method that will reduce the mobility of the PTSM sediment/soil.	~~No active treatment~~ The use of a drying agent will treat the PTSM sediment/soil by reducing mobilization during transportation and disposal.	NA

Tables ES-2 will be revised as follows

Technology Alternative	Description	Cost
Alternative (A-1) – No Action	This alternative will not achieve RAOs. Alternative A-1 is not effective in reducing exposure of IOU on-site worker to contaminated media. The time to reach remedial goal options (RGOs) for the entire Upper Subunit of the LTR IOU is 290 years.	None
Alternative (A-2) – LUCs with MNR	This alternative will achieve RAOs. Alternative A-2 reduces exposure of IOU on-site worker to contaminated media by limiting access through administrative and engineering controls. The time to reach RGOs is not reduced by this remedy.	Upper subunit - $17.3 M
Alternative (A-3) – In Situ Capping on PTSM Sediment/Soil (Including Consideration of a Hybrid Cap)	This alternative includes LUCs with MNR as part of the remedy; therefore, RAOs would be achieved. Alternative A-3 reduces exposure of IOU on-site worker to PTSM sediment/soil by placing a barrier over the PTSM locations. The evaluation of a hybrid cap is considered and would include adding in situ amendments in addition to the barrier on PTSM sediment/soil. The addition of in situ amendments would reduce the bio-availability of Cs-137 for fish and subsequently human receptors who may eat the fish. **The use of an amendment in the cap is a treatment method that will reduce the mobility of the PTSM sediment/soil.** The time to reach RGOs is not reduced by this remedy.	EA1 - $417 K EA3 - $2.7 M EA5 - $805 K
Alternative (A-5) – Excavation and Disposal of PTSM Sediment/Soil	This alternative includes LUCs with MNR as part of the remedy; therefore, RAOs would be achieved. Alternative A-5 reduces exposure of IOU on-site worker to PTSM sediment/soil by removing the contaminated media through excavation or dredging. **The use of a drying agent will treat the PTSM sediment/soil by reducing mobilization during transportation and disposal.** ~~This alternative eliminates the exposure, toxicity, and mobility of PTSM sediment/soil at the known locations.~~ The time to reach RGOs is reduced to 220 years for EA1 and EA5 and to 230 years for EA3.	EA1 - $486 K EA3 - $2.0 M EA5 - $796 K
Alternative (A-6) – Maintain Water in Ponds	This alternative includes LUCs with MNR as part of the remedy; therefore, RAOs would be achieved. Alternative A-6 reduces exposure of IOU on-site worker to contaminated media by shielding sediment/soil with water. This alternative is accomplished through the continuance of annual inspections that are already in place along with periodic maintenance of the physical attributes (i.e., dams, weirs, control gates, etc.) that make water retention viable. The time to reach RGOs is not reduced by this remedy.	EA3 - $2.1 M EA6 - $2.8 M EA9 - $591 K

Responsible Party: Monique Rabin, (803) 952-6695, monique.rabin@srs.gov