



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

FEB 26 2020

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 1.1, February 2020) (Redline Page Changes and Clean Copy) and Savannah River Site's Responses to the Regulatory Comments on the Revision 1 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) provided approval of the Revision 1 document on February 28, 2019 and U. S. Environmental Protection Agency (EPA) provided comments on the Revision 1 document on April 8, 2019. Please review the Redline Revision 1.1 Feasibility Study and provide your 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,

A handwritten signature in black ink, appearing to read "BTH", with a long horizontal stroke extending to the right.

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

FEB 26 2020

Ms. Susan Fulmer  
Mr. Jon Richards

2

Enclosures:

1. Feasibility Study for the Lower Three Runs Integrator Operable Unit (U) (SRNS-RP-2018-00199, Revision 1.1, February 2020) SEMS Number: 35 (Redline Page Changes and Clean Copy)
2. 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 1, January 2019) SEMS Number: 35

cc w/o encl:

D. Scaturro, SCDHEC-Columbia

S. French, SCDHEC-Columbia

M. Reece, SCDHEC-Columbia

G. K. Taylor, SCDHEC-Columbia

T. R. Fuss, SCDHEC – Aiken Environmental Affairs Office

G. O'Quinn, SCDHEC - Aiken Environmental Affairs Office

B. Cameron, SCDHEC–Aiken Environmental Affairs Office

R. H. Pope, EPA

cc w/ encl:

M. McRae, TechLaw, Inc.



Savannah River  
**NUCLEAR SOLUTIONS**<sup>SM</sup>

FLUOR • NEWPORT NEWS NUCLEAR • HONEYWELL

# **Feasibility Study for the Lower Three Runs Integrator Operable Unit (U)**

**SEMS Number: 35**

**SRNS-RP-2018-00199**

**Revision 1.1 Redline**

**February 2020**

## EXECUTIVE SUMMARY

This Feasibility Study (FS) has been developed for the Lower Three Runs (LTR) Integrator Operable Unit (IOU) located at the Savannah River Site (SRS) in South Carolina. The LTR IOU is listed as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Unit in Appendix C, Resource Conservation and Recovery Act/CERCLA Units, of the SRS Federal Facility Agreement.

The SRS encompasses 803 square kilometers ( $\text{km}^2$  [310 square miles  $\{\text{mi}^2\}$ ]) of South Carolina coastal plain along the Savannah River in Aiken, Barnwell, and Allendale counties. The LTR IOU is one of six IOUs that correspond to the respective watersheds associated with the stream systems located on the SRS (Upper Three Runs, Fourmile Branch, Pen Branch, Steel Creek, and Lower Three Runs), and the Savannah River that establishes the northwestern boundary of the SRS. The SRS IOUs are defined as surface water bodies (e.g., stream, lakes, and ponds) and associated wetlands/floodplains, including surface water, sediment/soil (sediment and floodplain/wetland soils), and related biota.

The LTR watershed is located in the southeastern portion of SRS. LTR is a large blackwater stream containing ponds and tributary systems that are designated as freshwater. The stream ~~that~~ originates in the northeast portion of SRS and follows a southerly direction for approximately (~) 40 kilometers ( $\text{km}$  [24.5 miles  $\{\text{mi}\}$ ]), discharging into the Savannah River. The LTR watershed drains about  $460 \text{ km}^2$  ( $180 \text{ mi}^2$ ) and includes two main industrial operable units: P-Area Operable Unit including P-Reactor, and R-Area Operable Unit including R-Reactor. The LTR IOU was predominately contaminated with cesium-137 (Cs-137) from historical releases associated with reactor operations in P Area and R Area.

The LTR IOU is delineated into Upper, Middle, and Lower subunits. The Upper subunit of the LTR IOU is located upgradient of the PAR Pond Dam and includes PAR Pond and the pre-cooler ponds and canal system. The Middle and Lower subunits are located below the PAR Pond Dam. The Lower subunit bounds the LTR stream system by a narrow buffer of United States Department of Energy property, an area referred to as the “tail portion” of the LTR IOU. The remedial action for the Middle and Lower subunits was previously addressed and documented in the *Explanation*

- EA3: Pond B – Including canal to Pond C
- EA4: Canal from Pond B to North Arm of PAR Pond
- EA5: Joyce Branch (Old Discharge Canal)
- EA6: PAR Pond
- EA7: Canal from P-Area to Ponds 4 and 5 – Including Pond 2
- EA8: Ponds 4 and 5 – Including canal from Ponds 4 and 5 to Pond C
- EA9: Pond C

## 1.2 Unit Background

The LTR watershed is located in the southeastern portion of SRS. LTR is a large blackwater stream containing ponds and tributary systems that are designated as freshwater. The stream ~~that~~ originates in the northeast portion of SRS and follows a southerly direction for approximately (~) 40 kilometers (km [24.5 miles {mi}]), discharging into the Savannah River. R-Reactor and P-Reactor, which historically produced special nuclear materials for national defense, released reactor effluent, known as “thermal discharges,” into the LTR watershed. The LTR IOU reactor effluent pathway is shown in Figure 1-3.

R-Reactor began operations in 1953 and was followed by P-Reactor in 1954. Both received cooling water from the Savannah River via the river water distribution system. R-Reactor discharged reactor effluent directly into Joyce Branch, while P-Reactor discharged reactor effluent directly into Steel Creek. In 1958, PAR Pond and a series of pre-cooler ponds and a canal system were constructed to address the cooling water requirements of both P- and R-Reactors. Effluent from R-Reactor was routed to the R-Area Discharge Canal and pre-cooler Pond B where it discharged into what was identified as the north arm of PAR Pond (Figure 1-3). This effluent pathway was used for R-Reactor discharge from 1961 until the reactor was shut down in 1964. Since the shutdown of R-Reactor, R-Area Discharge Canal and Pond B have remained essentially undisturbed.

PAR Pond also served as a heat exchange/cooling reservoir for P-Reactor until 1988. Heated water was released through a series of man-made canals and smaller impoundments into the pre-cooler Pond C and released into PAR Pond. Effluent discharges from P-Reactor ceased in 1987. As with

contaminant in the PAR Pond/canal system. Extensive sampling of the IOU was undertaken to augment existing data and ensure sufficient information would be available for evaluating risks to human and ecological receptors. Characterization was performed in accordance with approved Sampling and Analysis Plans (SRNS 2009 and SRNS 2016) and included sampling within the canals, pre-cooler ponds, PAR Pond, and the stream channel/floodplain. With the exception of the larger ponds, the sampling plan design was based on evenly spaced transects. Field gamma measurements were augmented by sediment, sediment/soil, and surface water samples collected for laboratory analyses. Biological data (primarily fish) were collected from LTR subunits. Background samples were collected for all media.

The Upper subunit of the LTR IOU is used as a research site and is part of the National Environmental Research Park. The primary entities that conduct research within the Upper subunit are the Savannah River Ecology Laboratory and the Savannah River National Laboratory. Emphasis in recent years has primarily been associated with aspects of radioecology in the Pond A, Pond B, and PAR Pond systems.

The habitats within the LTR IOU support both terrestrial and aquatic/semi-aquatic receptors. A conservative screening-level effects evaluation used literature-based ecological threshold levels to assess (i.e., screen) sediment/soil and surface water data from potentially contaminated exposure areas for these receptors. The thresholds were derived from several published sources and were used in a tiered approach to evaluate No and Low Adverse Effect Levels. The screening-level ecological effects evaluation concluded that more information was needed for some constituents to more thoroughly assess the risk potential to wildlife receptors. Trophic-level modeling used site-specific data to address the uncertainty associated with relying strictly on literature-based toxicity values and exposure assumptions. More specifically, aluminum, iron, cyanide, lead, manganese, mercury, DDD (dichlorodiphenyldichloroethane), DDE (dichlorodiphenyldichloroethylene) and DDT (dichlorodiphenyltrichloroethane) were identified as constituents of potential concern. Risks posed by these contaminants to mammalian and avian receptors (river otter, raccoon, belted kingfisher, and blue heron) that represent the ecological niches of concern were assessed using contaminant exposure models that estimated contaminant intake resulting from ingestion of food, water, and sediment/ soil and compared these

intakes with literature-based toxicity reference values. The results of the of the ecological risk assessment (ERA) showed that no ecological refined constituents of concern (RCOCs) were identified for any exposure area (EA) within the LTR IOU. Therefore, there were no problems warranting action from an ecological risk perspective.

The human health risk assessment (HHRA) estimated the risk potential in the absence of any remedial action and provided a basis for determining whether or not remedial actions are necessary to reduce or eliminate risks to human health. A streamlined approach that considered both standardized and site-specific receptor scenarios/exposure assumptions was used for this evaluation. The receptors evaluated for the HHRA included a future resident, future industrial worker, onsite worker, and recreational fisherman. Human health RCOCs were identified in the sediment/soil medium (cesium-137 and cobalt-60), and for fish tissue (cesium-137 and mercury); no RCOCs were identified for the surface water media. Details are provided in the following section.

### **1.3 Unit Description**

A brief summary of each EA is provided in Section 1.3.1 through Section 1.3.9 and shown in Figure 1-3. A complete history for each EA is documented in the Remedial Investigation/ Baseline Risk Assessment (RI/BRA) for the LTR IOU (SRNS 2017).

For the Upper subunit of the LTR IOU, the IOU on-site worker was selected as the most likely receptor for exposure to contaminated sediment/soil. The IOU on-site worker is based on an SRS researcher scenario and is also protective of an adolescent trespasser. The IOU on-site worker scenario is applicable to the entire Upper subunit. Because it is known that some contaminants could bio-accumulate in fish and fish are a mobile medium, the hypothetical recreational fisherman was chosen as the most likely receptor for the ingestion of contaminated fish tissue. The recreational fisherman scenario was determined to only be viable to EAs that can sustain populations of consumable fish, specifically EA3, EA6, and EA9.

A summary of the risk and identified ~~refined constituents of concern (RCOCs)~~ for each individual EA is described in the sections below and identified in Table 1-2. RCOCs were only identified if

sediment/soil in EA2, EA3, EA4, and EA8. With respect to the recreational fisherman scenario, Cs-137 and mercury were identified as RCOCs in fish tissue in EA3, EA6, and EA9. Although mercury was identified as a RCOC (for fish tissue), its presence is the result of atmospheric deposition (i.e., regional issue/problem) and from the use of the elevated levels of mercury in Savannah River water as part of the river water distribution system. Therefore, mercury was introduced into the LTR system not as a result of Site operations but rather a combination of atmospheric deposition and the use of Savannah River water. No RCOCs were identified for the surface water media or for ecological receptors.

RAOs identified for the Upper subunit of the LTR IOU are based on the results of the ~~human health risk assessment (HHRA)~~, ~~ecological risk assessment (ERA)~~ and PTSM evaluation and are as follows:

- Protect IOU on-site workers from exposure to Cs-137 and Co-60 in sediment/soil that exceed 1E-06 risk threshold or background levels. The primary exposure route of concern is the external radiation pathway.
- Protect the recreational fisherman from exposure to Cs-137 and mercury in fish tissue. The primary route of exposure is the ingestion of fish pathway.

Table 2-1 lists the RAOs for each individual EA.

### ***2.1.2 Allowable Exposure Based on Risk Assessment***

#### Target Risk Range

The risk for the Upper subunit of the LTR IOU was identified in the HHRA and ERA conducted in the RI/BRA (SRNS 2017). RCOCs were identified for EAs with constituents that pose an exposure risk (i.e.,  $\geq 1.0E-06$ ) to the IOU on-site worker and the recreational fisherman.

#### ARARs

Section 121(d) of CERCLA (1980), as amended by the Superfund Amendments and Reauthorization Act (1986), requires that remedial actions comply with requirements or standards set forth under Federal and State environmental laws (i.e., ARARs), as well as, non-promulgated

recolonization by bottom-dwelling or riparian organisms. Resuspension of contaminated sediment/soil is minimal during cap placement. Erosion protection for in-situ caps in shallow water bodies or floodplain/wetland environments may require the use of a stone armor, essentially a layer of rubble used to provide a barrier of protection.

Cap placement in shallow water would be placed from the shore using conventional equipment such as a clamshell or front-end loader. During placement, ~~silt curtains would be installed~~ best management practices (e.g. silt curtains) will be implemented to reduce sediment/soil migration. Placement of an in-situ cap in deeper water will require a bathymetric survey prior to installation to determine slope and cap material dispersion during placement. A barge with a surface release mechanism such as a tremie or bottom placement using conventional equipment such as clamshells, would be required to place the in-situ cap in deeper water.

The performance objective of the in-situ cap is to provide sufficient physical isolation and stabilization of the Cs-137 contaminated sediment/soil until concentrations are reduced below the PTSM thresholds which would require long-term monitoring. Inspections and maintenance activities would be implemented to ensure that there is no erosion or other physical disturbance of the cap. Prior to implementation, this alternative would require sampling to define the extent of PTSM in the identified EAs and a cap design that considers the unique site characteristics at each location. The cap design would consider the use of an amendment to reduce bioavailability. Amended caps have the potential to reduce the thickness of traditional caps and improve the resistance to erosional events and advective transport of Cs-137. Implementation of this alternative would involve significant mobilization and demobilization of heavy equipment and materials, clearing of vegetation, radiological controls, and a post installation verification to ensure the placement and thickness of the cap. This alternative will include LUCs with MNR (as detailed in A-2) and will require five-year remedy reviews as part of the entire Upper subunit remedy.

### ***3.1.4 Alternative A-4: Broadcast of Amendments to Limit Bioavailability***

Alternative A-4 involves the broadcasting of a reactive material into applicable pond systems to bind contaminants and limit the bioavailability. This alternative was selected to limit subsequent risk based on a recreational fisherman scenario. This alternative is only applicable to EA3, EA6,

and EA9, which can sustain a population of consumable fish and the only EAs identified with a potential risk to the recreational fisherman.

Studies have shown that illite clay has been proven to effectively bind with Cs-137 (Hinton, et al., 2006). Activated carbon is generally used to bind mercury. Alternative A-4 involves the bulk application of amendments directly on the surface of the water and is intended to be mixed with the underlying sediment/soil through natural processes. The intent is direct application to change the native sediment/soil geochemistry to reduce contaminant bioavailability without creating a new surface layer or cap. Long-term monitoring to ensure the alternatives effectiveness would be required. There is difficulty in accurately placing bulk amendments via broadcast methods in surface water due to the potential for entrainment on surface vegetation and movement with the water column. Delivery systems for bulk delivery of amendments, such as SediMite™ and AquaBlok™ have not been used with illite. A delivery system for the specific amendment would need to be developed. In addition, implementation of this alternative would require a full-scale site treatability study. Although previous studies have shown effectiveness, this technology has not been proven on large-scale aquatic systems such as those within the Upper subunit of the LTR IOU. This alternative requires the mobilization and demobilization of specialized equipment (i.e., barges, spreader) and materials, broadcasting of the amendment, and sampling verification to ensure the effectiveness of the amendment. This alternative will require five-year remedy reviews.

### ***3.1.5 Alternative A-5: Excavation and Disposal of PTSM Sediment/Soil***

Alternative A-5 involves the excavation and disposal of known PTSM sediment/soil to reduce exposure, mobility, and toxicity of the overall risk. This alternative is only applicable to EA1, EA3, and EA5 that contain sediment/soil above the PTSM threshold. Implementation of this alternative will involve the excavation of PTSM in shallow water bodies/floodplain sediment/soil and dredging of PTSM sediment/soil from deeper ponds (EA3). Migration of suspended contaminated sediment/soil that will result from subaqueous excavation/dredging will be controlled by ~~installing silt curtains~~ implementing best management practices (e.g., silt curtains) as appropriate. Excavation of shallow PTSM sediment/soil will require the use of standard commercial equipment (i.e., mini-excavator, skidsteer, dump truck) which will require special access control provisions for the remote floodplain conditions. PTSM sediment/soil located in

deep water will require the use of a barge and dredging equipment. Significant mobilization will be required to transport and launch the barge as there is currently no significant infrastructure to support large vessels. Sediment/soil will be placed into large disposal bags or containers and dewatered before being transported to an approved waste disposal facility (e.g., E-Area Low Level Waste Facility [LLWF]). The E-Area LLWF has CERCLA Off Site Rule Acceptability issued by the USEPA Region 4 RCRA Division. A post excavation sampling survey to ensure the effectiveness of the remedy will be required.

This action includes sampling to define the extent of PTSM in the unit, mobilization and demobilization of heavy equipment and materials, the scanning and clearing of vegetation, dewatering, installation of sediment/soil control features, sediment/soil excavation, and a post excavation sampling survey. This alternative will include LUCS with MNR (as detailed in A-2) and will require five-year remedy reviews as part of the entire Upper subunit remedy.

### ***3.1.6 Alternative A-6: Maintain Water in Ponds***

Alternative A-6 consists of maintaining dam structures to sustain water levels. This alternative minimizes access and limits exposure to submerged, contaminated sediment/soil within the pond. This action is only applicable to EAs that contain infrastructure to retain water and have historically maintained consistent water levels (EA3, EA6, and EA9). The dams will retain water to act as a shield to submerged contamination and prevent exposure to receptors. These physical structures also act as sedimentation barriers to prevent contaminant mobilization to prevent harm to receptors and the public. Inspections and maintenance of the water retaining structures would be required.

The dam structure for Pond B (EA3) was constructed in 1960 as a simple earthen dam with a sand toe drain system, with no spillway discharge system or monitoring devices. O&M of the dam currently includes routine inspections and repairs as needed.

The dam structure for PAR Pond (EA6) dam was constructed in 1958. O&M of the dam currently includes routine inspections and repairs as needed.

**SRS Responses to**  
**U.S. ENVIRONMENTAL PROTECTION AGENCY**  
**Comments on the**  
**Feasibility Study for the Lower Three Runs Integrator Operable Unit**  
**(SRNS-RP-2018-00199, Revision 1 Redline January 2019, SEMS Number: 35)**  
**Comments Received: April 4, 2019**  
**Page 1 of 4**

---

**Contact for all comments: Jim Kupar, (803) 952-6525, [james.kupar@srs.gov](mailto:james.kupar@srs.gov)**

**GENERAL COMMENTS**

1. Per the SCDHEC's verbal communication to EPA Region 4, DHEC considers the Lower Three Runs Pond Systems and Tributaries as "waters of the state." In addition, DHEC has communicated to EPA that discharges of water from Par Pond into Lower Three Runs should be monitored to ensure compliance with CWA requirements and state AWQC (or AWQC equivalent for radionuclides) for contaminants of concern from any remedial action. SCDHEC has further communicated to EPA that the Point Of Compliance is the discharge point from Par Pond to Lower Three Runs Creek. Thus, *the CWA NDPEs ARARs should be included in the FS ARAR tables and are "applicable" to discharges of "pollutants," and are "relevant and appropriate" for discharges of radionuclides.* There are not promulgated SCDHEC numeric AWQC for cesium-137 and cobalt-60; thus, EPA needs to assess the concentrations in the discharge water against AWQC equivalent, which can be calculated by the EPA water protection division based upon the surface water class designation. If above those levels after the completion of remedial action, requires treatment before discharge. If below the AWQC equivalent, then treatment is not necessary. Monitoring details should be developed in the Remedial Design.

**Response: Disagree with clarification. SRS believes that the incidental fallback of water associated with the excavation of sediment does not constitute a CWA discharge and, therefore, AWQC is not considered an Applicable or Relevant and Appropriate requirement. No change to the document is proposed.**

2. In addition to the ARARs already provided in FS Table 4-10, please also add the attached ARARs prepared by EPA R4 ORC which includes the chemical-specific ARARs for protection of surface water; and the action-specific ARARs for application of AWQC, development of discharge limits, and discharge monitoring requirements.

**Response: Disagree with clarification. Additional discharge-related ARARs are not required per the response to General Comment #1.**

3. Include a statement in the FS providing SCHEC's determination that the ponds and tributary systems are waters of the state and identify the class designation (fresh water, "FW"). If SCDHEC considers the ponds and their tributaries between them as waters of the state, they are likely classified as "FW" because the Savannah River is classed FW. All South Carolina waters are classified even if they are not specifically named or listed in R. 61-69. For those
-

**SRS Responses to  
U.S. ENVIRONMENTAL PROTECTION AGENCY  
Comments on the  
Feasibility Study for the Lower Three Runs Integrator Operable Unit  
(SRNS-RP-2018-00199, Revision 1 Redline January 2019, SEMS Number: 35)  
Comments Received: April 4, 2019  
Page 2 of 4**

---

waters not listed, the classification of the waterbody that they are tributary to is the assigned class for those waters pursuant to the rules in both R.61-68 and R.61-69.

**Response: Agree: SRS agrees that Lower Three Runs surface water bodies are waters of the state and should be designated as freshwater (FW).**

**Text will be added to the third paragraph of the Executive Summary and the first paragraph of Section 1.2, Unit Background, as follows: “The LTR watershed is located in the southeastern portion of SRS. The LTR is a large blackwater stream containing ponds and tributary systems that are designated as freshwater. The stream that originates in the northeast portion of SRS and follows a southerly direction....”**

4. Include a statement in the FS clarifying that any water that comes up with the sediments during excavation will be gravity drained back to the water body where the sediments were removed. The activity is subject to CWA 404 requirements and the relevant and appropriate ARARs have been previously provided in the location-specific ARARs tables prepared by DOE and submitted with the Rev.1 draft FS. Gravity drainage of water may be considered ‘incidental fallback’ under 404; however, some courts have held that movement of pollutants already in the water is nonetheless considered an “addition” of pollutants. *United States v. Deaton*, 209 F.3d 331 (4th Cir. 2000) (deposit of dredged material from wetland back into that same wetland constitutes discharge of a pollutant); *Rybachek v. U.S. EPA*, 904 F.2d 1276, 1285 (9th Cir. 1990) (decided in Section 402 context; even if “material discharged originally comes from the streambed itself, such resuspension may be interpreted to be an addition of a pollutant under the Act.”). Discharge water should be characterized to determine if pollutants are present which may trigger 402 requirements and should be managed appropriately. It is EPA’s expectation that Best Management Practices should also be used (silt fence, sediment curtains, floating booms, etc.) to stop any migration of the resultant water that could possibly have Cs-137 entrained. These BMPs would ensure the sediments re-settle to the bottom of the water body allowing for shielding by the water itself and keeping the sediments from moving down stream. EPA requests statements regarding the use of BMPs be added to the FS, where appropriate.

**Response: Clarification. As explained in the response to General Comment #1, there is not a CWA discharge associated with the actions described.**

**To expand on the description of the use of BMPs for the remedial actions evaluated in the FS, Section 3.1.3 and Section 3.1.5 for Alternatives A-3 and A-5 will be revised to acknowledge that BMPs will be used as appropriate. Specifically, the text will be revised as follows:**

---

SRS Responses to  
U.S. ENVIRONMENTAL PROTECTION AGENCY  
Comments on the  
Feasibility Study for the Lower Three Runs Integrator Operable Unit  
(SRNS-RP-2018-00199, Revision 1 Redline January 2019, SEMS Number: 35)  
Comments Received: April 4, 2019  
Page 3 of 4

---

**Section 3.1.3, third paragraph:** “During placement, ~~silt curtains would be installed~~ best management practices (e.g. silt curtains) will be implemented to reduce sediment/soil migration.

**Section 3.1.5, first paragraph:** “Migration of suspended contaminated sediment/soil that will result from subaqueous excavation/dredging will be controlled by ~~installing silt curtains~~ implementing best management practices (e.g., silt curtains) as appropriate.”

5. It is EPA’s expectation that the drained sediments would be placed in containers for shipping and that no staging piles will be needed. In addition, EPA expects the containers will have a drying agent that will stabilize the sediments and that the drying agent will serve as a form of treatment by reducing mobility. Please include statements to cover these issues. Please include the attached ARAR requirements for containerized RCRA waste.

**Response:** Agree with clarification. As stated in the excavation and disposal alternative description in Section 4.1.2.1 for Alternative A-5, any excavated contaminated sediment removed as a result of this remedy will be treated with a drying agent to reduce mobility during the transportation to the disposal facility. Contaminated media will be loaded into roll-off containers with appropriate containers/bags. Staging piles will not be necessary for any of the alternatives since all removed contaminated sediment will be placed directly into disposal containers. The suggested additional hazardous waste ARARs will not be included in the document for any of the alternatives since the sediment is neither RCRA characteristic nor RCRA listed hazardous waste. There is no other hazardous waste associated with this unit being removed or managed. No change to the document is proposed.

6. Include statement in FS clarifying that the containers will be shipped to the low level waste disposal trenches (E Area) and that E Area has CERCLA Off Site Rule Acceptability issued by the Region 4 RCRA division.

**Response:** Agree. The first paragraph of Section 3.1.5 Alternative A-5: Excavation and Disposal of PTSM Sediment/Soil will be revised to state, “Sediment/soil will be placed into large disposal bags or containers and dewatered before being transported to an approved waste disposal facility (e.g., E-Area Low Level Waste Facility [LLWF]). The E-Area LLWF has CERCLA Off Site Rule Acceptability issued by the USEPA Region 4 RCRA Division. A post excavation sampling.....”

7. The FS should include a summary of the Ecological Risk Assessment findings, e.g., identifying pathways and receptors evaluated, and risks presented. The Risk Assessment findings need to be more fully summarized in the FS in the Introduction Section of Background Information.
-

SRS Responses to  
U.S. ENVIRONMENTAL PROTECTION AGENCY  
Comments on the

Feasibility Study for the Lower Three Runs Integrator Operable Unit  
(SRNS-RP-2018-00199, Revision 1 Redline January 2019, SEMS Number: 35)  
Comments Received: April 4, 2019

Page 4 of 4

---

Response: Agree. Text will be added to Section 1.2 Unit Background as follows:

Section 1.2 Unit Background: "...The Upper subunit of the LTR IOU is used as a research site and is part of the National Environmental Research Park. The primary entities that conduct research within the Upper subunit are the Savannah River Ecology Laboratory and the Savannah River National Laboratory. Emphasis in recent years has primarily been associated with aspects of radioecology in the Pond A, Pond B, and PAR Pond systems.

The habitats within the LTR IOU support both terrestrial and aquatic/semi-aquatic receptors. A conservative screening-level effects evaluation used literature-based ecological threshold levels to assess (i.e., screen) sediment/soil and surface water data from potentially contaminated exposure areas for these receptors. The thresholds were derived from several published sources and were used in a tiered approach to evaluate No and Low Adverse Effect Levels. The screening-level ecological effects evaluation concluded that more information was needed for some constituents to more thoroughly assess the risk potential to wildlife receptors. Trophic-level modeling used site-specific data to address the uncertainty associated with relying strictly on literature-based toxicity values and exposure assumptions. More specifically, aluminum, iron, cyanide, lead, manganese, mercury, DDD (dichlorodiphenyldichloroethane), DDE (dichlorodiphenyldichloroethylene) and DDT (dichlorodiphenyltrichloroethane) were identified as constituents of potential concern. Risks posed by these contaminants to mammalian and avian receptors (river otter, raccoon, belted kingfisher, and blue heron) that represent the ecological niches of concern were assessed using contaminant exposure models that estimated contaminant intake resulting from ingestion of food, water, and sediment/soil and compared these intakes with literature-based toxicity reference values. The results of the of the ecological risk assessment (ERA) showed that no ecological refined constituents of concern (RCOCs) were identified for any exposure area (EA) within the LTR IOU. Therefore, there were no problems warranting action from an ecological risk perspective.

The human health risk assessment (HHRA) estimated the risk potential in the absence of any remedial action and provided a basis for determining whether or not remedial actions are necessary to reduce or eliminate risks to human health. A streamlined approach that considered both standardized and site-specific receptor scenarios/exposure assumptions was used for this evaluation. The receptors evaluated for the HHRA included a future resident, future industrial worker, onsite worker, and recreational fisherman. Human health RCOCs were identified in the sediment/soil medium (cesium-137 and cobalt-60), and for fish tissue (cesium-137 and mercury); no RCOCs were identified for the surface water media. Details are provided in the following section."

---