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

FEB 13 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: Redline Pages to the Periodic Report 6 for the Steel Creek Integrator Operable Unit (IOU) (U) (SRNS-RP-2018-00809, Revision 1, February 2019) and Savannah River Site's Responses to Regulatory Comments on the Revision 0 Document, SEMS Number: 71

In accordance with the terms of the Federal Facility Agreement, the U. S. Department of Energy is submitting the subject document for your review. The U.S. Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC) provided comments on the Revision 0 document on December 11, 2018 and December 21, 2018, respectively. All comment responses have been incorporated into the attached redline page changes as appropriate. Please review the enclosed information 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,

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

IACD-19-127

Enclosures:
1. Periodic Report 6 for the Steel Creek Integrator Operable Unit (IOU) (U) (SRNS-RP-2018-00809, Revision 1, February 2019) SEMS Number: 71 (Redline Page Changes)
2. SRS Responses to the SCDHEC Comments on Periodic Report 6 for the Steel Creek Integrator Operable Unit (IOU) (U) (SRNS-RP-2018-00809, Revision 0, September 2018) SEMS Number: 71
3. SRS Responses to USEPA Comments on Periodic Report 6 for the Steel Creek Integrator Operable Unit (IOU) (U) (SRNS-RP-2018-00809, Revision 0, September 2018) SEMS Number: 71

cc w/o encl:
D. Scaturo, SCDHEC-Columbia
S. French, SCDHEC-Columbia
M. Reece, 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.

**Contact: Susan Blas, 803 952-6904, susan.blas@srs.gov**

## GENERAL COMMENTS

1. All operable units having a potential impact on groundwater and/or surface water should be included on the Conceptual Site Model (CSM), regardless if a Record of Decision has been signed, until remedial goals have been met. Therefore, G-Area Unit ID #509 and 462, listed on Table 1-1, Status of Potential IOU Contamination Sources, should be included on the Figure 1-5, SC IOU Conceptual Site Model under the Sources of Potential Contamination column. The G-Area Unit ID #509 and 462 include L Lake, L-Area Reactor Discharge Canal and P-Area Discharge Canal that could continue to have impacts on groundwater and surface water.

**Response: Agree with clarification.**
**The Phase II CSM focuses on units that may require further evaluation by the IOU program during Phase II monitoring and assessment as indicated by the asterisk on Table 1-1. Units with a ROD that are currently in the remediation phase are actively addressed outside of the IOU program by their individual OU agenda. Prior to initiating Phase III, the CSM will be revised to reflect the current understanding of all units associated with the SC IOU in terms of potential impact to the IOU for final repositioning.**

**To address this comment, the sixth paragraph of Section 1.2 will be revised to state, "The "Particle Track Flows to" column in Table 1-1 describes where GW or SW pathways from a particular OU would ultimately discharge, based on potentiometric or LiDAR surface contours. OUs that have not been closed, or units that have a GW component with ongoing monitoring requirements~~,~~ may have the potential to impact the IOU.~~ and are considered a potential contaminant source to the SC IOU. Whether impact to the IOU may need to be considered during Phase II of the IOU program is summarized in the Potential Impact to GW or SW columns Units that no longer represent a potential threat to the IOU due to implementation of remedial actions or issuance of regulatory decisions~~ However, the Potential Impact to GW or SW columns in the table summarizes whether impact to the IOU needs to be considered during Phase II of the IOU program. Closed units or units with ongoing remedial actions in place are noted as a "No" and are not ~~longer~~ considered an uninvestigated source to the IOU requiring action during Phase II evaluations. The CSMs have…"**

**Also, the footnote associated with Table 1-1 will be revised to state, "* The term "potential impact" is used to denote whether further evaluation may be required by the IOU program during Phase II monitoring and assessment. The potential impact consideration does not apply to closed units or units with ongoing remedial actions in place.**

**Unit 560 (L-Are Process Sewer Lines) will be shaded on Table 1-1.**

**Also, Unit 462 will be added to Figure 1-5 to a new P-Area box designated as "P-Area Reactor Discharge Canal (NBN) 462)".**

2. It is unclear as to what portion(s) of Meyers Branch is unimpacted or undisturbed by SRS operations and selected for background location. This declaration is mentioned in several sections of the document; however, the document also states contaminant exceedances in sediment, surface water and fish in the Meyers Branch subunit. Furthermore, it appears that the Dunbarton Rail Road Yard is a possible source of contamination that feeds into the Meyers Branch subunit. Please clarify and identify what portion of Meyers Branch is suitable for background sampling.

**Response: Agree.**
**Figures 2-1, 2-2, 2-3, 2-4, 2-5, 2-6 will be revised to show the label for the "unnamed tributary" to identify the side channel of Meyers Branch.**

**The last paragraph of Section 2.1 will be revised to state, "Also, Meyers Branch serves as a background location, and this location (side channel of Meyers Branch, unnamed tributary) is not influenced by SRS operational sources that would have provided contaminated discharges or a source of mercury."**

**A similar edit will be made to the Fish subsection of the HH Benchmark Screening and Results section of the Executive Summary, "Also, Meyers Branch serves as a background location, and this location (side channel of Meyers Branch, unnamed tributary)..."**

**Also, the last paragraph of Section 2.0 beginning with the second sentence will be revised to state, "HH benchmark exceedances are provided in Table 2-2. Figure 2-1 identifies historical sediment/soil sampling locations. There are no new sediment/soil data for SC PR6."**

3. Throughout the document, the terms "max ratio" and "mean ratio" are used interchangeably with "max HQ" and "mean HQ". Please change the term "ratio" to "HQ" for consistency with the scoping summary and other periodic reports for IOUs. For consistency reasons, this comment should applied to all future periodic reports.

**Response: Agree.**
**A global change to the document (Table 2-2 column headings and other locations in the text) will be revised to change "ratio" to "HQ" as appropriate.**

## SPECIFIC COMMENTS

1. Executive Summary: Ecological Benchmarks Screening and Results, Sediment, first sentence, page ES-4. Please correct the last portion of this sentence from "mean detected levels **less** than background" to "**above** background."

**Response: Agree.**
**The text will be corrected to state, "...and mean detected levels ~~less~~ greater than background."**

2. Table 1-1 Status of Potential IOU Contamination Sources, page 1-23. The L-Area Unit ID 560 should be highlighted.

**Response: Agree.**
**Unit 560 will be highlighted in Table 1-1.**

3. Figure 1-5, SC IOU Conceptual Site Model, page 1-17. Please identify OU 143 as P-Area Groundwater OU and OU 487 as L-Area Southern Groundwater in the legend.

**Response: Agree.**
**The Legend will be revised to state, "* Groundwater includes Operable Unit 143 (P-Area Groundwater Operable Unit) and 487 (L-Area Southern Groundwater)."**

4. Section 2.1, HH Benchmark Screening and Results, SW, page 2-5, second paragraph. Please include the anticipated start date of April 30, 2019 for the non-time critical removal action for the PAGW OU.

**Response: Agree.**
**The third paragraph of the SW subsection of Section 2.1 will be revised to state, "SW is being monitored in Upper SC as part of the PAGW OU. A non-time critical removal action will be implemented at PAGW OU to reduce the mass of TCE in GW that discharges to SC. The start date for the removal action is currently scheduled for April 30, 2019."**

**Contact: Susan Blas, 803 952-6904, susan.blas@srs.gov**

## I. GENERAL COMMENTS

1. The Executive Summary of the Periodic Report 6 for the Steel Creek Integrator Operable Unit (IOU) (U) [SC PR6 Report] appears to include ambiguous and conflicting information regarding whether the detection of mercury in sediment above the ecological screening benchmark in Meyers Branch indicates a need for further investigation. One of the data decision rules listed on page ES-3 of the Executive Summary states that as part of the human health and ecological benchmark screening, constituent levels observed within the IOU that are within background levels will not be considered unit-related and that further investigation in the IOU is not warranted. However, the discussion of Sediment data on page ES-4 in the Executive Summary states the detection of mercury in excess of the ecological benchmark for sediment requires further evaluation due to having a mean ratios >1.0, a frequency of exceedance >5%, and mean detected levels less than background. In addition, Section 2.2 (Ecological Benchmark Screening and Results) states on page 2-8 that one detection of mercury at the Dunbarton Rail Road Yard (DRRY) and four out of five detections of mercury in Meyers Branch exceeded the background level of 0.021 mg/kg; these results are indicated to require further evaluation as the unit approaches the Site Evaluation Report (SER) submittal date. *Please revise the SC PR6 Report to correct the Executive Summary discussion on Sediment data and Section 2.2 of the SC PR6 Report to provide consistent information.*

**Response: Agree.**
**The Sediment subsection of the "Ecological Benchmarks Screening and Results" section of the Executive Summary will be revised to state, "For the Meyers Branch subunit, dichlorodiphenyltrichloroethane, dichlorodiphenyldichloroethylene, dichlorodiphenyldichloroethane, and mercury require further evaluation (with mean ~~ratios~~HQs >1.0, a frequency of exceedance >5%, and mean detected levels ~~less~~ greater than background. These exceedances are all located in the Meyers Branch subunit near or within the DRRY and are associated with the walk-down of the DRRY and IOU sampling conducted in 2015.~~, and~~ ~~t~~ These pesticides and mercury will require further evaluation when the DDRY moves into the investigation phase."**

**Also, the heading "Ecological Benchmarks Screening and Results" will be corrected to "Ecological Benchmark Screening."**

**The last paragraph of the Sediment subsection of Section 2.2 will be relocated to follow the paragraph that discusses the DRRY pesticide exceedances. The last paragraph be revised to state, "~~The mean detected value for mercury associated with the DRRY (0.0575 mg/kg) is above the background value (0.021 mg/kg). For the Meyers Branch subunit, t~~ There were four exceedances ~~(above the background level) out of five analyses~~ for mercury (benchmark = 0.0045 mg/kg) for the Meyers Branch subunit with a mean ~~ratio~~ HQ of ~~16.4~~12.8 associated with the DRRY. The mean detected value for mercury (0.0575 mg/kg) is above the**

**background value (0.021 mg/kg). Mercury ~~L~~levels in the Meyers Branch subunit ranged from 0.0724 to 0.0249 mg/kg. The DRRY associated mercury exceedances will require further evaluation as the DRRY unit approaches the SER submittal date.**

**For mercury ~~(benchmark = 0.0045 mg/kg)~~ in the Lower subunit, there was one exceedance (0.0165 mg/kg) out of four analyses with a mean ~~ratio~~ HQ of ~~4.7~~ 3.7. The current maximum IOU…"**

**Also, per SCDHEC General Comment #3, the term "ratio" will be replaced with "hazard quotient" or "HQ" as appropriate.**

**Please see the response to Specific Comment #2 regarding the change from 4.7 to 3.7.**

2. The current screening analysis uses information on background concentrations to evaluate retention of analytes that exceed screening thresholds. The analysis compares mean concentrations of analytes in site samples to maximum levels in background samples. This is not consistent with typical screening analyses and is not representative of a conservative screening-level approach. *Revise the SC PR6 Report to compare the average site sample concentrations to average background concentrations.*

**Response: Clarification.**
**IOU Phase II screening was not designed as a conservative screening-level approach. The intent of Phase II reporting is to identify the need for early action prior to establishing final action remedial goals that will be formalized in the future. The intent of the background screen is to determine if a constituent is within the range of background. The background screen also assumes a receptor averages exposure across the subunit landscape. Therefore, the comparison is based on the mean constituent level (average exposure) to the maximum background. To provide protectiveness for a detected constituent (benchmark exceedance), the mean is based on the mean of detected results and is not lowered by including non-detects. A conservative approach, typical of final action determinations based on baseline risk assessment methodology will be applied during Phase III of the IOU program and will follow the appropriate risk screening approach that is in use at that time. The next IOU Phase III field start is not scheduled until 2049. SRS recommends further Core Team discussions be held to optimize future IOU data collection and reporting requirements for the IOU program as Phase II continues. No change to the document is proposed.**

3. Section 2.2, Ecological Benchmark Screening and Results, describes the screening analysis for radionuclides. However, ecological screening analysis results do not include radionuclide screening outcomes. To increase transparency, it is recommended that the SC PR6 Report provide a table that contains all screening analysis results in a format similar to Table 2-3, Summary of Ecological Benchmark Exceedances for SC [Steel Creek] PR6. This will provide

readers information on frequency of detections, analytical detection limits, and background exceedances. These are important pieces of information in understanding potential for risks and sensitivity of analytical methods in determining project objectives. *Revise the SC PR6 Report accordingly.*

**Response: Clarification.**
**Current PRs focus on constituents with benchmark exceedances and do not include statistics for all constituents screened. Also, analytical detection limits are variable since data are acquired from various data stewards so adding this attribute would require a thoughtful approach/additional scrutiny. SRS recommends further Core Team discussions be held to optimize future reporting requirements for the IOU program as Phase II continues. No change to the document is proposed.**

4. The last purpose (or goal) of the current SC PR6 Report is to "Develop data needs for the ongoing monitoring and assessment of the IOU based on review of the new data and information presented in this PR." While fish tissue/passive diffusive thin film (DGT) sampling is described in Section 3.0, Data Needs and Early Actions to evaluate human health (HH)-based risks, there is no mention of what is planned to evaluate the identified ecological risks (e.g., collection of more sediment samples). *Revise the SC PR6 Report accordingly to develop this recommendation in Section 3.0 at the same level of detail as the HH fish/DGT study.*

**Response: Clarification.**
**No data needs are identified for the sediment exceedances associated with the DRRY since the exceedances are associated with an active railyard and the Site Evaluation Report submittal date for that unit is scheduled for December 2035. No change to the document is proposed.**

5. Section 3.1 (Identification of Data Needs) of the SC PR6 Report does not provide sufficient information about how the data needs identified in the PR6 report will be met. Section 3.1 states the PR6 evaluation revealed a lack of recent fish data for Steel Creek/L-Lake and proposes the use of passive diffusive gradients in DGT samplers, and states supplemental data from data/tissue samples will be used to establish the comparability of the approach. However, the SC PR6 Report does not indicate additional fish will be collected. *Revise the SC PR6 Report to state whether additional fish will be collected in addition to the DGT data in order to supplement the human health and ecological evaluations in future periodic reports.*

**Response: Agree.**
**Fish and surface water sampling data will supplement the DGT data collection efforts. The last few sentences of Section 3.1 will be revised to state, "~~As t~~<u>The DGT sampling data ~~is~~ will be comparatively assessed with existing fish data. This evaluation will identify any other warranted data that would supplement~~ed~~ the DGT data</u>. <u>Additional future data collection</u>**

**efforts will likely include ~~with~~ surface water and other biological data/fish tissue to support refinement of the DGT approach, ~~samples,~~ and to demonstrate the comparability of the DGT sampler ~~approach~~ to traditional biological data collection efforts such as fish sampling ~~will be demonstrated~~. The DGT data collected will be used to begin the process of refining the approach for assessing contaminant threats for the IOU program. These data will be reported in a future ~~PR~~ report."**

6. Based on review of the ecological surface water benchmarks in Table 2-3, it appears that many of the benchmarks for inorganic surface water analytes were not normalized with respect to water hardness. It is noted that the values listed in Table 2-3 match those reported in the South Carolina Department of Health and Environmental Control, Priority Toxic Pollutants Appendix table. The respective benchmark footnotes state that these values were normalized using a hardness value of 25 mg CaCO3/L [calcium carbonate]; however, this may not be comparable to the hardness that occurs in sampled waters. *Revise the SC PR6 Report to clarify if hardness normalization was conducted.*

**Response: Agree.**
**Text will be added in Section 2.2 under the SW subsection to state, "For freshwater metals criteria-based benchmarks that are hardness-dependent (cadmium, chromium, copper, lead, nickel, silver, and zinc), the benchmark values are based on a water hardness of 25 mg/l (as expressed as CaCO3) which is appropriate for the SC IOU based on review of SC hardness data. A summary of SW benchmark exceedances is provided in…"**

**Please see additional proposed edits in the response to Comment #7 below.**

7. The SC PR6 Report does not mention if the surface water metals data represent the total or dissolved fraction. Amend the text to clarify this issue. No action would be required, beyond the requested revision, if total metals data were used in the SC PR6 Report data evaluation. *If total metals data were not used, ensure that the SC PR6 Report is revised to present the proper context for evaluating surface water risk.*

**Response. Agree.**
**Since data for the IOU database are acquired from various data stewards, the IOU program classifies metals data as total metals. To address this comment, text will be added in Section 2.2 under the SW subsection to state, "The IOU database compiles data from various data stewards; therefore the assessment of SW classifies results for metals as representative of total metals. For freshwater metals criteria-based benchmarks that are hardness-dependent (cadmium, chromium, copper, lead, nickel, silver, and zinc), the benchmark values are based on a water hardness of 25 mg/l (as expressed as CaCO3) which is appropriate for the SC IOU based on review of SC hardness data. A summary of SW benchmark exceedances is provided in…"**

8. Figure 2-5, Location of Sediment Samples Exceeding Ecological Benchmarks for the SC IOU, includes an excessive amount of information and cannot be used to readily identify SC PR6 sampling locations. If the historical sampling locations will not be utilized in the current evaluation, *revise Figure 2-5 to show only those exceedances of sediment screening criteria in SC PR6 samples.*

**Response: Agree.**
**Figures 2-2 through 2-6 will be revised to show only SC PR6 data. No changes will be made to Figure 2-1 since this figure only shows historical data.**

## SPECIFIC COMMENTS

1. **Executive Summary, Page ES-4 of ES-6:**
   The last paragraph on this page states, "For the Meyers Branch subunit, dichlorodiphenyltrichloroethane, dichlorodiphenyldichloroethylene, dichlorodiphenyldichloroethane, and mercury require further evaluation (with mean ratios >1.0, a frequency of exceedance >5%, and mean detected levels less than background)." It appears that this sentence contains a typographical error, as it should indicate if the mean detected levels are above background. *Revise the SC PR6 Report to address this apparent discrepancy.*

**Response: Agree.**
**The text will be revised to state that the mean detected levels are greater than background. Please see response to General Comment #1 for the specific edits proposed to address this comment.**

2. **Section 2.2, Ecological Benchmark Screening and Results, Page 2-8 of 2-34:**
   The second full paragraph on page 2-8 indicates that the mean ratio for mercury in the Lower subunit is 4.7 mg/kg. However, this mean ratio is inconsistent with the value listed on Table 2-3, Summary of Ecological Benchmark Exceedances for SC PR6. *Revise the SC PR6 Report to ensure that the mercury mean ratio listed on page 2-8 is consistent with the mean ratio listed on Table 2-3.*

**Response: Agree.**
**Per SCDHEC General Comment #3, the term "ratio" will be replaced with "hazard quotient" or "HQ" as appropriate. The mean HQ for mercury in the Lower subunit is 3.67 as listed in Table 2.3. The first sentence of the paragraph in the Sediment subsection of Section 2.2 that begins with "For mercury..." will be revised to state, "For mercury ~~(benchmark = 0.0045 mg/kg)~~ in the Lower subunit, there was one exceedance (0.0165 mg/kg) out of four analyses with a mean ~~ratio~~ HQ of ~~4.7~~ 3.7.**

3. **Section 2.2, Ecological Benchmark Screening and Results, SW subsection, pages 2-8 and 2-9 of 2-34:**
   The text provides benchmarks when describing contaminants detected in excess of screening criteria. Reporting benchmarks does not provide information on the magnitude of respective exceedances. *To increase transparency, revise Section 2.2 to report mean ratios.*

**Response: Agree.**
**Per SCDHEC General Comment #3, the term "ratio" will be replaced with "hazard quotient" or "HQ" as appropriate. The following changes will be made to Section 2.2 for discussions that do not already call out mean HQs.**

**The third paragraph of the Sediment subsection will be revised as follows, "The selenium exceedances~~, as well,~~ (with a mean HQ of 1.23), have a background value of 5.65 mg/kg, (greater than both detected results of 1.73 and 1.21 mg/kg), and do not require further evaluation."**

**Similarly, the second paragraph of the SW subsection of Section 2.2 will be revised to state, "Constituents requiring further evaluation (with mean ~~ratio~~HQs >1.0, a frequency of exceedance >5%, and mean detected levels greater than background) include various semivolatiles: anthracene (mean HQ of 114), benzo(a) pyrene (mean HQ of 30), ~~benzo[b]fluoranthene,~~ benzo[g,h,i]perylene (mean HQ of 255), benzo[k]fluoranthene (mean HQ of 34.8), fluoranthene (mean HQ of 2.8), and indeno[1,2,3-cd]pyrene (mean HQ of 253) in the Meyers Branch subunit, and cadmium (mean HQ of 121) and lead (mean HQ of 39) in the Lower SC subunit.**

**Also, Table 2-3 will be revised to show the mean HQ for benzo[b]fluoranthene mean as black text instead of red indicting the mean is < 1.0. The first sentence of the SW subsection of the Ecological Benchmark Screening section in the Executive Summary will also be revised to state, "Constituents requiring further evaluation for SW include various semivolatiles: anthracene, benzo(a) pyrene, ~~benzo[b]fluoranthene,~~ benzo[g,h,i]perylene…"**

4. **Table 2-3, Summary of Ecological Benchmark Exceedances for SC PR6, Page 2-33 of 2-34:**
   This table contains highlighted text and acronyms; however, none of these are sufficiently defined (e.g., as footnotes) on Table 2-3 to fully convey their meaning. *To increase transparency, ensure all elements identified on Table 2-3 are sufficiently detailed.*

**Response: Agree.**
**The following footnotes, corresponding to the column headings listed, will be included in the revised Tables 2-2 and 2-3 as indicated below.**

**Analyte[1]**
**Mean Detect[2]**
**Mean ~~Ratio~~HQ [3]**
**Freq Exceed[4] (%)**
**Mean Detect > Benchmark?[5]**

**Notes**

**[1] Shaded boxes indicate the constituent failed the three criteria: mean HQ > 1.0, frequency of exceedance > 5%, and mean detect value > background.**

**[2] The Mean Detect is calculated using detected values.**

**[3] Constituents with a mean detected HQ > 1.0 are noted in red. The mean HQ is based on the mean of detected values (Mean HQ = mean of detected values/benchmark).**

**[4] Constituents with a frequency of exceedance > 5% are noted in red (Freq Exceed [%] = # of Exceedances/# Analyses).**

**[5] Constituents with a mean detected value > background are noted in red. Dashes (---) indicate all results for the constituent were reported as non-detects or background levels are indeterminate.**