



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

FEB -3 2022

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  
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:** Savannah River Site's Responses to the Regulatory Comments on the 2020 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action Effectiveness Interim Report (U) (SRNS-RP-2021-03858, Revision 0, June 2021) SEMS Numbers: 21, 29

In accordance with the terms of the Federal Facility Agreement, the U.S. Department of Energy (DOE) is submitting the subject comment responses for your review. The South Carolina Department of Health and Environmental Control (SCDHEC) and the U.S. Environmental Protection Agency (EPA) provided comments on the report on October 27, 2021 and November 15, 2021, respectively. The report will not be revised; however, all comment responses will be included and/or addressed in the next report, as applicable. Please review these responses and provide your approval thirty (30) days from receipt. The time and effort that the SCDHEC and the EPA 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, or the DOE Program Manager, Mr. Philip Prater, at (803) 952-9333.

Sincerely,

**Brian T. Hennessey** Digitally signed by Brian T. Hennessey  
Date: 2022.02.02 16:23:28 -05'00'

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

FEB -3 2022

Ms. Susan Fulmer  
Mr. Jon Richards

2

Enclosures:

1. SRS Responses to the SCDHEC Comments on the 2020 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action Effectiveness Interim Report (U) (SRNS-RP-2021-03858, Revision 0, June 2021) SEMS Numbers: 21, 29
2. SRS Responses to the EPA Comments on the 2020 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action Effectiveness Interim Report (U) (SRNS-RP-2021-03858, Revision 0, June 2021) SEMS Numbers: 21, 29

cc w/o encl:

J. Blalock, 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. A. Cameron, SCDHEC-Aiken Environmental Affairs Office  
K. L. Beatty, SCDHEC-Aiken Environmental Affairs Office  
H. L. Herlong, SCDHEC-Aiken Environmental Affairs Office  
R. H. Pope, EPA-Atlanta

cc w/ encl:

D. Lloyd, EPA-Atlanta  
C. VanTrees, EPA-Atlanta  
M. McRae, TechLaw, Inc.

**SRS Responses to EPA Comments on the  
2020 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action  
Effectiveness Interim Report (U), SEMS Number 21, 29, SRNS-RP-2021-03858, Revision 0, Dated  
June 2021, Savannah River Site, Aiken, South Carolina**

**Page 1 of 5**

**Comments Received 11/15/2021**

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**EPA COMMENTS:**

1. It is unclear whether the Old TNX Seepage Basin (OTSB) and/or the New TNX Seepage Basin (NTSB) received process wastewater that contained nitric and/or other acids that would impact the pH of sediments, soils, and groundwater as the wastewater seeped through the basins. Additionally, it is unclear whether the process wastewater contained chlorinated volatile organic compounds (VOCs). For example, the text in Section 1.2.1 [TNX Burying Ground (TBG)] states nitric acids were used in the pilot-scale chemical separation process tests conducted in the TNX Area for the Defense Waste Processing Facility (DWPF) and the General Separations Area. However, the text in Sections 1.2.2 and 1.2.3 do not indicate whether the process wastewater received at the OTSB and/or NTSB contained nitric and/or other acids or chlorinated VOCs. Please revise the 2020 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action Effectiveness Interim Report (U), SEMS Numbers: 21, 29, SRNS-RP-2021-03858, Revision 0, dated June 2021 (Annual Report) to clearly state whether nitric and/or other acids or chlorinated VOCs were received at the OTSB and/or NTSB so the nature of the low pH levels and the chlorinated VOCs in groundwater are better understood.

**Response: Clarification. Both nitric acid and volatile organic compounds were used within the TNX processing facilities. As documented in the RCRA Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment for the TNX Area Operable Unit, WSRC-RP-96-00808, Revision 1.2, January 1999, the OTSB received a number of chemicals ranging from inorganic salts and low-level radionuclides to organic solvents. Waste stream components of particular interest include natural thorium, uranyl nitrate, mercuric nitrate, several aluminum and ammonium compounds, and tributyl phosphate. Known constituents present in the influent waste stream to the New TNX Seepage Basin included aluminum, barium, chromium, nickel, nitrate, sodium, trichloromethane, chloroform, and naturally occurring uranium. Nitric acid was not specifically mentioned for either the OTSB or NTSB. Sections 1.2.2 and 1.2.3 will be revised in the next annual report to more clearly identify waste stream components received at the OTSB and NTSB. No change to the current report is proposed.**

**Responsible Party: Branden Kramer, (803) 952-6378, [branden.kramer@srs.gov](mailto:branden.kramer@srs.gov)**

2. It is unclear whether a surface water sample will need to be collected from the X-008 Ditch to ensure no contaminated groundwater discharge to surface water is occurring at levels that would result in an unacceptable risk to human or ecological receptors. The text in Section 2.0 (Site Hydrogeology), page 7 of 60, states, "Particle tracking from the groundwater model (WSRC 2000) illustrates westerly flow from TNX source areas to the Savannah River with some water discharging to the X-008 Ditch and wetlands." A review of Figure A-6 (Plan View of the TNX Area OU Showing Particle Starting Locations and Path Lines Towards the X-008 Ditch and the Savannah River) in Appendix A, page A-11 of A-46, depicts the particle path lines towards the X-008 Ditch. It is noted one of the groundwater remedial action objectives presented in Section 3.0 (Objectives), page 8 of 60, is to

**SRS Responses to EPA Comments on the  
2020 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action  
Effectiveness Interim Report (U), SEMS Number 21, 29, SRNS-RP-2021-03858, Revision 0, Dated  
June 2021, Savannah River Site, Aiken, South Carolina**

**Page 2 of 5**

**Comments Received 11/15/2021**

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prevent, minimize, or eliminate discharge of contaminated groundwater to surface water that would result in unacceptable risk to human or ecological receptors. Please revise the Annual Report to address collection of a surface water sample from the X-08 Ditch as a data need to ensure the objectives of the remedial action are being met.

**Response: Clarification.** The last samples from the X-008 Ditch were collected in 1999. The United States Geologic Survey (USGS) was contracted to assess the potential for natural attenuation processes in the TNX flood plain (Vroblesky, et al., 1999; *Natural Attenuation Potential of Chlorinated Volatile Organic Compounds in Groundwater, TNX Flood Plain, Savannah River Site, South Carolina*). Results from that sampling event verified that VOC concentrations were elevated in the upper reaches of the X-008 Ditch but decreased to below detection limits downstream before the surface water discharged to the Savannah River. The decrease in VOC concentration was attributed to volatilization.

In present day, the X-008 Ditch continues to be a potential point for groundwater to outcrop at the surface as groundwater migrates from underneath the TNX Area toward the Savannah River, as discussed in the 2000 groundwater model. The X-008 Ditch no longer receives any process wastewater from the TNX Area, only surface water runoff. Therefore, during periods of low precipitation and low river stage, water flowing in the X-008 Ditch would be attributed from groundwater. Like observed in the USGS study, any VOCs present in the ditch would volatilize before reaching the Savannah River. This assumption should continue to be accurate, since VOC concentrations in the TNX wetlands have decreased with time as the remedial actions applied to the source area, pump and treat, soil vapor extraction, and edible oil, continue to be effective.

To verify VOC concentrations in the X-008 Ditch, SRS will need to conduct a walkdown of the X-008 Ditch to evaluate if a surface water sample can be collected. The evaluation will determine if surface water is actively flowing in the X-008 Ditch, under what conditions (i.e., dry, wet, etc.), and if a viable sample location(s) can be identified. Results of the walkdown and recommendations for the collection of a surface water sample will be included in the 2021 annual report. No change to the current report is proposed.

**Responsible Party: Branden Kramer, (803) 952-6378, [branden.kramer@srs.gov](mailto:branden.kramer@srs.gov)**

3. Section 3.1 (Objectives) of the Annual Report, page 8 of 60, states, “Beneficial reuse of the groundwater will not be achieved until active remediation of the groundwater is complete.” It should be noted a period of groundwater attainment monitoring will be required to ensure no rebound in groundwater concentrations occurs during the post remediation phase per EPA guidance document, “Recommended Approach for Evaluating Completion of Groundwater Restoration Remedial Actions at a Groundwater Monitoring Well OSWER 9283.1-44, August 2014” (EPA Guidance). The EPA Guidance recommends groundwater monitoring well data and other related subsurface information be evaluated to make conclusions during both the remediation monitoring

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2020 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action  
Effectiveness Interim Report (U), SEMS Number 21, 29, SRNS-RP-2021-03858, Revision 0, Dated  
June 2021, Savannah River Site, Aiken, South Carolina**

**Page 3 of 5**

**Comments Received 11/15/2021**

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and attainment monitoring phases. Please revise the Annual Report to state that the determination of when groundwater has been returned to beneficial reuse will be conducted consistent with the EPA Guidance.

**Response: Agree with Clarification.** There are no immediate plans for beneficial reuse of groundwater in the TNX area because active remediation is still ongoing. Any reuse will be conducted in accordance with the EPA guidance document as referenced above. A statement will be added to the next annual report to indicate that any groundwater reuse at the TNX area will be consistent with EPA guidance. No change to the current report is proposed.

**Responsible Party: Branden Kramer, (803) 952-6378, [branden.kramer@srs.gov](mailto:branden.kramer@srs.gov)**

4. According to the Annual Report, there are no discernible and consistent radiologically contaminated groundwater plumes present, and therefore, no remedial action is needed. However, this statement appears contradictory to implementation of land use controls (LUCs) as a remedial action. Furthermore, based on the text it is unclear how radionuclide contaminated groundwater will be returned to beneficial use without implementing additional remedial action(s) (e.g., monitored natural attenuation [MNA]) in addition to LUCs. For example, the text in Section 3.5 (Radiologically Contaminated Groundwater), page 11 of 60, states, "Institutional controls (i.e., land use controls) are the agreed to remedial action for the radionuclide contaminated groundwater for the TNX OU." Since groundwater remedial actions typically do not include LUCs only as a standalone remedy, please revise the Annual Report to address whether additional actions will be implemented for returning radionuclide contaminated groundwater to beneficial use.

**Response: Clarification.** LUCs are the final remedial action for the TNX OU, not a standalone remedy for groundwater. Groundwater actions at TNX OU include the pump-and-treat with air-stripping, passive SVE, and edible oil treatment. These remedial actions pair with remedial actions taken at the T-Area OU and TNX Outfall Delta OU which include soil excavation from specific waste units, cover system, and soil amendments in the wetlands. There are no immediate plans for beneficial reuse of groundwater in the TNX area. Any future beneficial reuse of groundwater and the need for additional actions will be discussed with the Core Team. No change to the current report is proposed.

**Responsible Party: Branden Kramer, (803) 952-6378, [branden.kramer@srs.gov](mailto:branden.kramer@srs.gov)**

5. The nature of the 1,4-dioxane release is not clearly understood. For example, the text in Section 6.7 (1,4-Dioxane), pages 46-47 of 60, states, "The location of these wells near the TBG source area indicates that 1,4-dioxane was likely associated with debris buried at the TBG." However, it is noted 1,4-dioxane is used as a stabilizer in chlorinated solvents, but it is unclear if 1,4-dioxane was

**SRS Responses to EPA Comments on the  
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Effectiveness Interim Report (U), SEMS Number 21, 29, SRNS-RP-2021-03858, Revision 0, Dated  
June 2021, Savannah River Site, Aiken, South Carolina**

**Page 4 of 5**

**Comments Received 11/15/2021**

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released with the solvent or only associated with the buried debris at the TBG. Please revise the Annual Report to provide more information about the source(s) of 1,4-dioxane contamination in groundwater so the nature of the release(s) are clearly understood.

**Response: Agree with Clarification. The contaminant 1,4-dioxane was not a separate entity disposed within the TBG. 1,4-Dioxane is a stabilizer for VOCs commonly used at the facility and is only associated with the VOCs that were part of the disposable practice within the TBG. The text will be clarified in the next report and will state that 1,4-dioxane was a stabilizer for the VOCs that were disposed of in the area and consequently is found as a groundwater contaminant in the area. No change to the current report is proposed.**

**Responsible Party: Branden Kramer, (803) 952-6378, [branden.kramer@srs.gov](mailto:branden.kramer@srs.gov)**

6. The Annual Report does not discuss if corrective measures are planned to address the groundwater sampling issues noted in Section 4.1.1 (Sampling Issues), pages 16-17 of 60. For example, the text indicates during the second quarter 2020 (2Q2020) and fourth quarter 2020 (4Q2020) sampling events, TNX 72S was dry and no water level or sample was collected. Additionally, during the 2Q2020 sampling event, well TNX 72D was pumped dry, and sampling for mercury, uranium, gross alpha, radium-226, radium-228, and nonvolatile could not be performed due to insufficient water volume. Please revise the Annual Report to address this issue to ensure all future groundwater monitoring data needs are met.

**Response: Clarification. There are three screen intervals at the TNX 72 well cluster. TNX 72S is the shallowest screen (3.4 to 5.9 ft below ground surface [bgs]), then TNX 72M (6.4 to 8.9 ft bgs), and TNX 72D is the deepest (12.3 to 14.8 ft bgs). This well cluster was designed to observe the vertical distribution of contamination as the VOC plume migrated through the wetland toward the Savannah River. The fluvial sediments at these three wells are screened in consists of interbedded sands, silts, and clays. These three wells have historically not produced consistent volumes of water in the two shallowest screens while sampling in the deepest screen, TNX 72D, has been the most consistent. There are likely no corrective measures that can ensure productivity at these wells given the shallow design and heterogeneity of the fluvial sediments. SRS will continue to attempt to sample these wells semi-annually and report the associated results annually. No change to the current report is proposed.**

**Responsible Party: Branden Kramer, (803) 952-6378, [branden.kramer@srs.gov](mailto:branden.kramer@srs.gov)**

7. The Annual Report indicates Savannah River Site would like to conduct an evaluation of the soil vapor extraction (SVE) wells to determine the future operational status of the MicroBlowers™. However, it is unclear if the evaluation will include the need to equip all or some of the SVE wells with BaroBalls™. As noted in the Annual Report, the total annual pounds of solvent removed from

**SRS Responses to EPA Comments on the  
2020 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action  
Effectiveness Interim Report (U), SEMS Number 21, 29, SRNS-RP-2021-03858, Revision 0, Dated  
June 2021, Savannah River Site, Aiken, South Carolina**

**Page 5 of 5**

**Comments Received 11/15/2021**

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the MicroBlowers™ have decreased with time with approximately one pound of solvent removed per year during the last five years. Please revise the Annual Report to discuss the need to equip all or some of the SVE wells with BaroBalls™ when the data indicates the use of MicroBlowers™ are no longer warranted.

**Response: Clarification. An evaluation of the SVE system would lead to a proposal from the project team to the DOE, USEPA and SCDHEC to either cease the SVE operation altogether as the end point of the remedial action or to continue SVE in some capacity. The future operational status will be assessed after the results of the evaluation are carefully considered and discussed with the Core Team. No change to the current report is proposed.**

**Responsible Party: Branden Kramer, (803) 952-6378, [branden.kramer@srs.gov](mailto:branden.kramer@srs.gov)**

8. The Annual Report refers to the X-08 ditch by several designations, including X8 (e.g., Figure A-2), X-008 (e.g., Figure A-6), and X-8 (e.g., Figure A-8). For clarity and consistency, please revise the Annual Report to address this concern.

**Response: Agree. The X-008 Ditch has had numerous designations throughout all FFA documentation for the TNX Area. A statement will be added to the 2021 annual report to identify all previous aliases and the preferred designation of X-008 Ditch. Text, figures, and figure captions referencing the X-008 Ditch will be revised in the 2021 annual report where applicable. Figure A-2 and Figure A-6 are not easily reproduced and will not be revised. No change to the current report is proposed.**

**Responsible Party: Branden Kramer, (803) 952-6378, [branden.kramer@srs.gov](mailto:branden.kramer@srs.gov)**

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Effectiveness Interim Report (U), SEMS Number 21, 29, SRNS-RP-2021-03858, Revision 0,  
Dated June 2021, Savannah River Site, Aiken, South Carolina**

Page 1 of 1

Comments Received 10/27/2021

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**SCDHEC COMMENTS:**

1. Section 6.2, pH, page 35. Please reference Figure A-14 in the first sentence of the third paragraph which discusses the low pH plume depicted between XSB006R and TIR 1.

**Response: Agree. A reference to Figure A-14 will be added to the discussion of a low pH plume near wells XSB006R and TIR 1. No change to the 2020 report proposed.**

**Responsible Party: Branden Kramer, (803) 952-6378 [branden.kramer@srs.gov](mailto:branden.kramer@srs.gov)**