UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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November 15, 2023

Ms. Avery Hammett
SRS Remedial Project Manager
Infrastructure and Area Completion Division
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

EPA Comments: 2022 ANNUAL COMPREHENSIVE TNX AREA GROUNDWATER MONITORING AND REMEDIAL ACTION EFFECTIVENESS INTERIM REPORT (U) SEMS NUMBER: 21, 29, SRNS-RP-2023-00875 REVISION 0 DATED AUGUST 2023

Dear Ms. Hammett:
EPA has reviewed this Annual GW and RA EIR for TNX for 2022. Our comments are attached.

If you have any questions or require additional information, please contact Jon Richards at (404) 562-8648.

Sincerely,

JON RICHARDS Digitally signed by JON RICHARDS Date: 2023.11.15 16:57:37 -05'00'

Jon Richards, FFA RPM
Restoration & Site Evaluation Branch
Superfund and Emergency Management Division

cc: C.L. Bergren, SRNS-ACP
Susan Fulmer, SCDHEC

GENERAL COMMENTS

1. The Annual Report does not discuss the overall increasing trend in trichloroethylene (TCE) and uranium concentrations at monitoring well TNX 28D and what this means regarding potential plume migration and expansion. As noted in Section 6.3, VOC Constituents (i.e., PCE, TCE, Cis-1,2-DCE, VC, Ethylene, and CCl_4), concentrations of TCE were elevated from 2016 to 2018, but review of Appendix E, Time Series Plots, shows that concentrations of TCE have been increasing at this well since the edible oil (EO) injections began and generally since 1999 (see pdf page 323 of 364). Concentrations of uranium also appear to be increasing (see pdf page 352 of 364). In addition, according to Figure A-15, TNX Area Trichloroethylene (TCE) Concentration in Groundwater, 4Q2022 with >500 µg/L TCE Plume from 4Q1996 Superimposed, the TCE plume is migrating downgradient (see pdf page 106 of 196). These trends and potential plume migration should be discussed in the Annual Report. Also, Section 8.0, Summary/Recommendations, should indicate whether additional treatment may be necessary for the groundwater plume at wells TNX 28D and TRW 2 that is detached from the source (e.g., if EO injections should be considered). Additionally, these trends support the need for an additional well between wells TNX 28D and the TNX 72 well cluster. It is noted SRS agrees with installing a new monitoring well to address this data gap. *Please revise the Annual Report to discuss the increasing trends in TCE and uranium concentrations and any applicable recommendations to address further plume migration.*

2. The current locations of the five Microblowers™ are not specifically identified on Figure A-9, Location of TNX Area SVE [Soil Vapor Extraction] Monitoring Well System, and the rationale for the placement of the Microblowers™ is unclear. The text in Section 3.2, Soil Vapor Extraction, states that five Microblowers™ are rotated between the SVE wells to optimize volatile organic compound (VOC) vapor removal and references Figure A-9 for the current SVE well network; however, it is unclear if the SVE wells equipped with BaroBalls™ were monitoring for soil vapor to determine how the five current locations were selected. Based on Section 7.1, Soil Vapor Extraction (SVE) Operations, during 2021 and 2022, the Microblowers™ were connected to wells TVM 1V, TVM 3V, TVM 4U, TVX004U, and TVX007U; however, it is unclear if these locations will change in the next year based on BaroBall™ well sample results. *Please revise the Annual Report to identify the five current locations of the Microblowers™ on Figure A-9 and to discuss whether the rationale for selecting these locations considers BaroBall™ well soil vapor results.*

SPECIFIC COMMENTS

1. **Executive Summary, Groundwater Monitoring, Page ES-3 of ES-8:** The text states that the TCE groundwater plume is located downgradient of the TNX Burial Ground source area and provides a figure reference, Figure ES-2, TNX Area Trichloroethylene (TCE) Concentration in Groundwater, 4Q2022 with >500 µg/L TCE Plume from 4Q1996 Superimposed. However, the TNX Burial Ground is not shown in Figure ES-2; it is unclear if this area is synonymous with the "Estimated EO Treatment Area". *Please revise Figure ES-2 and all other applicable figures, to show where the TNX Burial Ground is located.*

2. **Figure ES-2, TNX Area Trichloroethylene (TCE) Concentration in Groundwater, 4Q2022 with >500 µg/L TCE Plume from 4Q1996 Superimposed, Page ES-6 of ES-8:** The concentration used in the title of Figure ES-2 contradicts the 1996 and 2022 isocontour concentrations in the legend, which show that the plume contours were drawn using 5 µg/L. Additionally, the unit of measure for the 2022 isocontour line is absent from the figure

legend. *Please revise the figure title to reflect the correct concentration used to draw contour lines, update the title in the Table of Contents, and add the unit of measure to the 2022 isocontour line concentration in the figure legend.*

3. **Section 3.2, Soil Vapor Extraction, Page 9 of 68:** The second paragraph mentions "V" and "U" screen horizons, but these horizon depths are not defined in the text. Also, several wells on Figure A-9, Location of TNX Area SVE Monitoring Well System, have "L" in the identifications, but the definition of L is not provided in the text. *Please revise the text to define all the letters and screen horizons used in the SVE wells nomenclature.*

4. **Section 3.5, Radiologically Contaminated Groundwater, Page 12 of 68:** The text notes that there are two localized areas in the wetlands where radiological constituents in the groundwater monitoring wells exceed the Federal Maximum Contaminant Levels (MCLs), but only one monitoring well (i.e., TCM 5 for uranium) is identified in the text. According to Section 5.4, Analytical Results, MCL exceedances were noted for uranium at wells TCM 5 and TNX 28D; adjusted gross alpha during fourth quarter 2022 at well TNX 28D; and for combined radium during fourth quarter 2022 at wells TIR 1M, TNX 5D, TNX 28D, and TNX075D. *Please revise the text to clarify the locations within the wetlands where radiological exceedances were detected.*

5. **Section 4.1.1, Sampling Issues, Page 18 of 68:** The first bullet point notes that there is a history of well TNX 72S being dry due to the shallow screen depth but does not discuss if a data gap exists from this missing sample and result. *Please revise this section to state whether a data gap exists due to the missing sample result at TNX 72S and if additional actions are necessary.*

6. **Table 4-1, TNX Sample Stations, Page 21 of 68:** The text in Section 4.1, Sampling Events, notes there are 43 wells in the monitoring well network, but this table lists 44 wells. It appears well TVR 1A is listed twice with two separate screen depth intervals, but the results in Appendix B, Groundwater Monitoring Results [Matrix Tables], only list one result for well TVR 1A. *Please revise this table to clarify why TVR 1A is listed twice and note which screen depth interval was sampled in 2022.*

7. **Section 5.4.13, Edible Oil Parameters, Pages 32 and 33 of 68:** Oxidation reduction potential (ORP) is discussed as decreasing after EO injections with sustained low concentrations at three wells (i.e., TBG 4, TBG 5, TNX 3D) through 2022; however, the bullet point for well TBG 4 notes a temporary increase in ORP in 2021 and the bullet point for well TNX 3D states that ORP in this well has steadily increased since 2015. *Please revise the initial statement that describes ORP in these three wells to be consistent with the trends discussed in the bullet points.*

8. **Table 5-2, Constituents Exceeding USEPA MCLs in T Area Wells and Surface Water During 2022, Page 38 of 68:** The table shows that at least one primary well was above the MCL during 2022 for uranium and combined radium. However, according to Sections 5.4.7, Uranium and 5.4.9, Combined Radium, there were only two auxiliary wells that exceeded the uranium MCL and three auxiliary wells and one secondary well that exceeded the combined radium MCL during 2022. *Please revise the table to remove the primary well indicators for Uranium and Combined Radium.*

9. **Section 6.3, VOC Constituents (i.e., PCE, TCE, Cis-1,2-DCE, VC, Ethylene, and CCl_4), Page 41 and 42 of 68:** The trends shown in Appendix E, Time Series Plots, do not support

the statements in the text. Section 6.3 states that variable TCE concentrations at well TRW 2 are likely due to treated groundwater flowing from upgradient sources based on the changing EO parameters and references decreasing dissolved oxygen (DO), decreasing ORP, increasing methane, and denitrification. However, the Time Series Plots for Station TRW 2 show variable DO concentrations (pdf page 194 of 364) and decreasing methane concentrations (Appendix E, pdf page 218 of 364) since 2015. It is also noted in Section 5.4.13, Edible Oil Parameters, that ORP concentrations at well TRW 2 have been variable from 2018 to 2021. *Please revise the discussion of the EO parameters at TRW 2 in Section 6.3 to be consistent with the recent data presented in the Annual Report.*

10. **Section 6.4, Edible Oil Parameters, Page 44 of 68:** There is conflicting information presented for DO trends. The text states that DO concentrations are increasing at the injection and monitoring wells within the area treated with EO. However, Figure A-31, Comparison of Dissolved Oxygen Concentration in the Treatment Zone in 2007 and 2022, shows a decreasing trend in DO for this area. *Please revise the text to reflect the information provided in Figure A-31.*

11. **Section 6.4, Edible Oil Parameters, Page 44 of 68:** There is conflicting information regarding total organic carbon (TOC) trends. The text states that elevated TOC is evidence of a reductive environment in the treatment area. However, Figure A-32, Comparison of Total Organic Carbon Concentration in the Treatment Zone in 2008 and 2022, shows that TOC has decreased since 2008. *Please revise the text to reflect the information provided in Figure A-32.*

12. **Section 6.4, Edible Oil Parameters, Page 45 of 68:** There is conflicting information presented for the ORP results for well TRW 3. The text states, "ORP results at injection wells (i.e., TBG 4, TBG 5, TNX 3D, TRW 3, TRW 4R, and TVM 1M) decreased to values of < -100 mV [millivolts] after each injection of EO;" however, based on the time series plot in Appendix E, injection well TRW 3 (pdf page 258 of 364) did not have ORP values less than -100 mV after each injection of EO. *Please revise Section 6.4 to indicate that well TRW 3 did not reach ORP values less than -100mV after each of the EO injections.*

13. **Appendix B, Groundwater Monitoring Results (Matrix Tables), Pages B-3 and B-4 of B-4:** There are five results listed for TOC at various wells in each table, but it is unclear why these multiple results are reported. *Please revise these tables to note why five results are listed for TOC at various wells and clarify which result is used in the Annual Report text and figures (e.g., Appendix E, Time Series Plots).*

14. **Appendix D, Hydrographs, and Appendix E, Time Series Plots:** Some of the graphs show vertical lines marking when the different remedial actions were taken, but the color coding does not always match the colors in the key. For example, in Appendix D the red line in the hydrographs appears to mark the SVE start date of 2002, but this line does not appear red in the key. In Appendix E, the green vertical lines in the time series graphs appear to represent when the EO injection occurred, but the EO injections are also labeled as black lines in the key. *Please revise the graphs in these appendices to show the correct color coding for the lines or provide a key for both appendices to clarify the dates noted on the hydrographs and time series graphs.*

MINOR COMMENTS

1. **List of Figures, Page iii of viii:** Figure A-12, TNX Area Well Locations (which is the same figure as Figure ES-1, TNX Area Well Locations), is missing from the List of Figures.

Please revise the List of Figures to include Figure A-12, TNX Area Well Locations found on page A-17.

2. **List of Abbreviations and Acronyms, Page vi of viii:** The abbreviation for below ground surface (bgs) and United States Geological Survey (USGS) are used in the text but are not included in the List of Abbreviations and Acronyms. Conversely, the abbreviations for centimeter (cm), feet (ft), gallon (gal), inch (in), meter (m), cubic meter (cm^3) and gallons per minute (gpm) are not used. *Please revise the List of Abbreviations and Acronyms to add the abbreviations used in the text but not listed and remove those that are not used in the text.*

3. **Section 1.3, Regulatory and Operational History, Page 3 of 68:** The text states that Figure A-2a shows the location of the TNX well system for the interim remedial action during startup and initial operations. However, it is Figure A-2b, Location of TNX Area Interim Remedial Action/Effectiveness Monitoring Strategy Well System during Startup and Initial Operations, which shows this information. *Please revise the text to replace the Figure A-2a reference with Figure A-2b.*

4. **Section 3.3, Edible Oil Treatment, Page 11 of 68:** The text references Figures A-27, A-31, and A-38 to depict the reduction of VOC concentrations due to EO treatments. However, Figure A-27 shows the graphical relationship between pH and water elevation at well TBG 3 and Figure A-30 shows the estimate of TCE mass reduction since EO injections began. In addition, Figure A-37 shows the comparison of TCE concentrations in the treatment zone in 2007 and 2022. *Please revise the references listed to depict the reduction of VOC concentrations due to EO treatments to remove Figures A-27 and A-30 and add Figure A-37.*

5. **Section 4.0, Monitoring Network, Page 17 of 68:** The text states that Figure A-2a shows the T-Area monitoring well locations that were in place during the start-up and initial operation of the remedial action system. However, it is Figure A-2b, Location of TNX Area Interim Remedial Action/Effectiveness Monitoring Strategy Well System during Startup and Initial Operations, which shows this information. *Please revise the text to replace the Figure A-2a reference with Figure A-2b.*

6. **Section 5.4.13, Edible Oil Parameters, Page 30 of 68:** The text states that Figures A-32 through A-41 represent DO, TOC, oxidation/reduction potential ORP, sulfate, methane, nitrate, and volatile fatty acid (VFA) comparison of current and prior to, or during, EO injections. However, these representations are shown in Figure A-31, Comparison of Dissolved Oxygen Concentration in the Treatment Zone in 2007 and 2022, through Figure A-36, Comparison of Dissolved Oxygen Concentration in the Treatment Zone in 2007 and 2022. Additionally, a figure depicting a comparison of VFA in the Treatment Zone is not presented. *Please revise the text to state that Figures A-31 through A-36 represent DO, TOC, ORP, sulfate, methane, and nitrate comparisons and clarify why no VFA figures were prepared for comparison of current and prior to, or during, EO injections.*

7. **Section 6.0, Evaluation of Field and Analytical Results, Page 39 of 68:** The text states that Figures A-13 through A-24 show two dimensional planar and cross section maps for certain constituents during 4Q2022. However, Figure A-13 is the TNX Area Water Table Elevation 4Q2022 representation and should not be included. Likewise, the text states that Figures A-32 through A-41 provide a comparison of pre-EO injection parameters with 4Q2022 results. However, the figures referenced should be Figures A-31 through A-40. *Please remove Figure A-13 from the first reference and correct the second reference to read "Figures A-31 through A-40".*

8. **Section 6.4, Edible Oil Parameters, Page 43 and 44 of 68:** The text states that Figures A-32 through A-37 illustrate the reductive environment created in the EO treatment area by comparing pre-injection groundwater parameters to post-injection parameters collected during 4Q2020. However, Figure A-31 is the Comparison of Dissolved Oxygen Concentration in the Treatment Zone in 2007 and 2022 and as such, should be included as a reference. Likewise, Figures A-38 through A-40 show the reduction of TCE daughter products between 2007 and 2022 and should be included in the reference. The date through which the EO parameters are shown in the figures is also incorrect. *Please revise the text to state that Figures A-31 through A-40 illustrate the reductive environment created in the EO treatment area by comparing pre-injection groundwater parameters to post-injection parameters collected during 4Q2022.*

9. **Section 6.5.1, TBG (Area Under the TAOU Cap), Page 47 of 68:** Appendix E, page E-343 is referenced in the text when discussing the pH history at well TBG 3. However, this graph is found on page E-341 of Appendix E. *Please revise the page referenced for pH history discussions at well TBG 3 in Appendix E to state E-341.*

10. **Section 7.2, Edible Oil Injections, Page 53 of 68:** The text presents conflicting information for the number of wells that define the TCE plume outside of the EO treatment area. The text states that wells TRW 2 and TNX 28D have experienced elevated TCE concentrations. The following sentence states that "These three wells define the TCE groundwater plume that is outside of the EO treatment area" however, the text should state "two wells." *Please revise the text to state the correct number of wells that define the TCE groundwater plume that is outside of the EO treatment area.*

11. **Section 9.0, References, Page 64 of 68:** The citations DOE, 2013; SRNS, 2012b; SRNS, 2 015c; SRNS, 2021; and WSRC, 2004b are not used in the report. Conversely, a "(WSRC, 1995, Revision 1.5, Attachment 17)" citation is used on page ES-1 of ES-8 but is not listed in the references. *Please remove the DOE, 2013; SRNS, 2012b; SRNS, 2015c; SRNS, 2021; and WSRC, 2004b citations and add the WSRC, 1995 reference.*