

# Appendix C: Nonradiological Environmental Monitoring Program

## Supplemental Information

### Appendix Table C-1 River and Stream Water Quality Results Summary

The Savannah River Site (SRS) collected monthly water quality samples at 5 Savannah River locations and 10 stream locations in 2023, totaling 177 samples per analyte or 3,717 records. Locations sampled are as follows: Savannah River locations (RM-118.8, RM-129.1, RM-141.5, and RM-150.4 [Vogtle discharge]) and SRS Stream locations (FM-2B, FM-6, FMC-2, L3R-2, PB-3, SC-4, TB-5, and U3R-4). The control location for the river samples is RM-161.0. The control locations for the stream samples are TC-1 and U3R-1A.

The table compares all results to South Carolina Freshwater Quality Standards (unless otherwise noted) and shows the average and maximum values of each analyte for the river and stream samples. Locations in which analytes are outside standard limits are shown in **red** text. Field duplicates were not included in the generation of these tables.

#### Notes:

1. The dissolved oxygen (DO) value in the maximum column is a minimum value because the South Carolina Freshwater Quality Standard is based on a minimum value.
2. The pH value in the average column is a minimum value because the South Carolina Freshwater Quality Standard includes minimum and maximum limits.

DL = Detection Limit

DO = Dissolved Oxygen

TOC = Total Organic Carbon

TSS = Total Suspended Solids

Appendix Table C-2 River and Stream Water Quality Results Summary

Four River Locations Plus One Control

Analyte	South Carolina Freshwater Quality Standard	Unit	Number of Results Outside Standard	Number of Results > DL	Control RM-161.0		Highest River Location				Comments
					Avg. <sup>a</sup>	Max. <sup>b</sup>	Avg. <sup>a</sup>		Max. <sup>b</sup>		
DO <sup>c</sup>	min. 4.0	mg/L	0 of 57		8.6	7.1	RM-129.1	8	RM-129.1	6.2	All samples met standard
pH <sup>d</sup>	6.0-8.5	SU	5 of 57		5.8	7.1	RM-141.5	5.9	RM-118.8	7.2	All maximums met standard
Temperature	< 5°F (2.8°C) above nat. cond. and not > 90°F (32.2°C)	°C	0 of 57		17	24.2	RM-141.5	18.8	RM-141.5	30.2	All samples met standard
Aluminum	87 <sup>e</sup>	µg/L	47 of 57	55 of 57	356	2,260	RM-141.5	501	RM-150.4	2,830	
Beryllium	4 <sup>f</sup>	µg/L	0 of 57	3 of 57	< DL	< DL	RM-141.5	0.1	RM-141.5	0.12	All samples met standard
Cadmium	0.26	µg/L	0 of 57	1 of 57	< DL	< DL	RM-150.4	0.1	RM-150.4	0.1	All samples met standard
Chromium	11	µg/L	0 of 57	37 of 57	1.5	3.5	RM-118.8	2.4	RM-118.8	4.4	All samples met standard
Copper	2.9	µg/L	0 of 57	43 of 57	1.3	2.2	RM-141.5	1.4	RM-150.4	2.8	All samples met standard
Hardness (total)	none	mg/L	no standard	57 of 57	19	30	RM-150.4	26	RM-150.4	76	
Iron	1,000 <sup>g</sup>	µg/L	4 of 57	57 of 57	491	1,580	RM-141.5	676	RM-150.4	1,500	All averages met standard
Lead	0.54	µg/L	6 of 57	11 of 57	0.53	1.07	RM-150.4	0.56	RM-150.4	1.28	
Manganese	none	µg/L	no standard	57 of 57	94.7	160	RM-141.5	96.9	RM-141.5	211	
Mercury	0.05	µg/L	0 of 57	0 of 57	< DL	< DL	< DL	< DL	< DL	< DL	All samples met standard
Nickel	16	µg/L	0 of 57	27 of 57	0.58	1.2	RM-141.5	0.64	RM-150.4	1.5	All samples met standard
Nitrate-Nitrogen	1 <sup>h</sup>	mg/L	0 of 57	57 of 57	0.23	0.36	RM-118.8	0.28	RM-118.8	0.4	All samples met standard
Nitrite-Nitrogen	1 <sup>h</sup>	mg/L	0 of 57	52 of 57	0.006	0.01	RM-150.4	0.006	RM-150.4	0.01	All samples met standard
Thallium	0.24 <sup>i</sup>	µg/L	0 of 57	0 of 57	< DL	< DL	< DL	< DL	< DL	< DL	All samples met standard
TOC	none	mg/L	no standard	57 of 57	3.2	5.3	RM-129.1	3.7	RM-129.1	7.2	
Phosphorus	0.06	mg/L	50 of 57	53 of 57	0.1	0.17	RM-118.8	0.13	RM-118.8	0.33	
TSS	none	mg/L	no standard	56 of 57	8.7	42	RM-118.8 & RM-141.5	11	RM-150.4	40	
Zinc	37	µg/L	1 of 57	47 of 57	6.3	28	RM-150.4	9	RM-150.4	48	All averages met standard

Appendix Table C-3 River and Stream Water Quality Results Summary (continued)

## Eight Stream Locations Plus Two Controls

Analyte	South Carolina Freshwater Quality Standard	Unit	Number of Results Outside Standard	Number of Results > DL	Control TC-1		Control U3R-1A		Highest Stream Location				Comments
					Avg. <sup>a</sup>	Max. <sup>b</sup>	Avg. <sup>a</sup>	Max. <sup>b</sup>	Avg. <sup>a</sup>		Max. <sup>b</sup>		
DO <sup>c</sup>	min. 4.0	mg/L	6 of 120		8.6	5.4	8.3	6.8	FMC-2	5.4	FMC-2	1.5	All averages met standard
pH <sup>d</sup>	6.0-8.5	SU	35 of 120		5.4	7	5.3	7.2	FMC-2	4.7	L3R-2	7.4	All maximums met standard
Temperature	< 5°F (2.8°C) above nat. cond. and not > 90°F (32.2°C)	°C	0 of 120		16.4	23.3	16.7	22.1	SC-4	19	U3R-4	27.3	All samples met standard
Aluminum	87 <sup>e</sup>	µg/L	57 of 120	105 of 120	52	118	110	668	PB-3	267	PB-3	538	
Beryllium	4 <sup>f</sup>	µg/L	0 of 120	8 of 120	< DL	< DL	0.11	0.19	U3R-4	0.11	FMC-2	0.16	All samples met standard
Cadmium	0.26	µg/L	0 of 120	0 of 120	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	All samples met standard
Chromium	11	µg/L	0 of 120	24 of 120	1.1	3.1	0.98	1.7	FM-2B	1.4	FMC-2	3.4	All samples met standard
Copper	2.9	µg/L	3 of 120	27 of 120	0.95	1	1	1.4	U3R-4	1.7	U3R-4	10	All averages met standard
Hardness (total)	none	mg/L	no standard	111 of 120	14	18	7	16	L3R-2	32	L3R-2	44	
Iron	1,000 <sup>g</sup>	µg/L	32 of 120	120 of 120	470	1,160	351	781	FMC-2	2,169	FMC-2	5,940	
Lead	0.54	µg/L	3 of 120	23 of 120	0.43	0.5	0.51	1.22	FM-2B	0.48	FM-2B	1.07	All averages met standard
Manganese	none	µg/L	no standard	120 of 120	17.6	31.5	9.6	23.9	FMC-2	126	FMC-2	497	
Mercury	0.05	µg/L	1 of 120	2 of 120	< DL	< DL	< DL	< DL	FMC-2	0.02	FMC-2	0.07	All averages met standard
Nickel	16	µg/L	0 of 120	82 of 120	0.54	0.8	0.73	1.4	TB-5	4.2	TB-5	7	All samples met standard
Nitrate-Nitrogen	1 <sup>h</sup>	mg/L	1 of 120	119 of 120	0.08	0.17	0.37	0.42	FM-6	0.63	FM-6	1.2	All averages met standard
Nitrite-Nitrogen	1 <sup>h</sup>	mg/L	0 of 120	37 of 120	0.003	0.003	0.003	0.01	FM-6	0.006	FM-6	0.03	All samples met standard
Thallium	0.24 <sup>f</sup>	µg/L	0 of 120	3 of 120	< DL	< DL	< DL	< DL	FMC-2	0.068	FMC-2	0.24	All samples met standard
TOC	none	mg/L	no standard	119 of 120	4	7.7	2.7	14	FMC-2	6.9	FMC-2	11	
Phosphorus	0.06	mg/L	32 of 120	69 of 120	0.056	0.16	0.04	0.096	FM-6	0.1	FM-6	0.13	
TSS	none	mg/L	no standard	112 of 120	4.3	8	2.9	6	FM-2B	9.4	FM-2B	65	
Zinc	37	µg/L	2 of 120	104 of 120	4.2	23	4	7	FMC-2	11	FMC-2	49	All averages met standard

<sup>a</sup> If analyte is non-detect, detection limit is used in averaging calculation.<sup>b</sup> Maximum detected value<sup>c</sup> Minimum was reported in the maximum (Max.) value reported columns for DO.<sup>d</sup> Minimum was reported in the average (Avg.) value columns for pH.<sup>e</sup> Environmental Protection Agency (EPA) Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018 Update<sup>f</sup> Standard from Human Health vs. Freshwater Aquatic Life, which has no standard<sup>g</sup> EPA National Recommended Water Quality Criteria—Aquatic Life<sup>h</sup> Per South Carolina Department of Health and Environmental Control Environmental Surveillance and Oversight Program 2022 Data Report (CR-004111 12/23)

**Appendix Table C-2 Summary of Nonradiological Results for Sediments Collected from the Savannah River, SRS Streams, and Stormwater Basins**

SRS collected annual sediment samples at 25 locations in 2023: 9 Savannah River locations, 13 stream locations, and 3 stormwater basin locations, totaling 400 analytes. The control location for the river samples is RM-161.0. The control locations for the stream and stormwater basin sediment samples are TC-1 and U3R-1A, respectively.

The table compares all results to Environmental Protection Agency Region 4 Refinement Screening Values (RSVs) for sediment and shows the maximum detected value of each analyte for the river, stream, and stormwater basin samples. Locations in which detected analytes exceed RSVs are shown in **red** text and are counted in the number of results greater than the RSV. Analytes not detected are not counted in the number of results greater than the RSV.

**River Sediment Results***Eight River Locations Plus One Control*

Analyte	No. of Detected Results	Control RM-161.0 (mg/kg)	Location of Maximum Result	Maximum Conc. (mg/kg)	EPA Region 4 RSV for Sediment (mg/kg)	No. of Results > RSV	Comments
<b>Aluminum</b>	9 of 9	17,000	RM-157.2	40,000	58,000	0	All samples met standard
<b>Antimony</b>	0 of 9	< DL	All < DL	< DL	25	0	All samples met standard
<b>Arsenic</b>	2 of 9	< DL	RM-129.0	1.24	33	0	All samples met standard
<b>Barium</b>	9 of 9	<b>130</b>	RM-157.2	<b>200</b>	60	6	Control exceeded RSV
<b>Cadmium</b>	0 of 9	< DL	All < DL	< DL	5	0	All samples met standard
<b>Chromium</b>	9 of 9	25	RM-157.2	51	111	0	All samples met standard
<b>Copper</b>	9 of 9	12	RM-157.2	26	149	0	All samples met standard
<b>Iron</b>	9 of 9	20,000	RM-157.2	<b>41,000</b>	40,000	1	
<b>Lead</b>	9 of 9	11	RM-157.2	28	128	0	All samples met standard
<b>Manganese</b>	9 of 9	<b>2,400</b>	RM-157.2	<b>2,400</b>	1,100	5	Control exceeded RSV
<b>Mercury</b>	0 of 9	< DL	All < DL	< DL	1.1	0	All samples met standard
<b>Nickel</b>	9 of 9	9.1	RM-157.2	20	48.6	0	All samples met standard
<b>Selenium</b>	1 of 9	1.9	RM-157.2	< DL	2.9	0	One DL is greater than RSV
<b>Silver</b>	0 of 9	< DL	All < DL	< DL	2.2	0	Three DLs are greater than RSV
<b>Uranium</b>	0 of 9	< DL	All < DL	< DL	1,000	0	All samples met standard
<b>Zinc</b>	9 of 9	42	RM-157.2	88	459	0	All samples met standard

Note:

DL = Detection Limit

EPA = U.S. Environmental Protection Agency

RM = River Mile

RSV = Refinement Screening Values

Appendix Table C-2 Summary of Nonradiological Results for Sediments Collected from the Savannah River, SRS Streams, and Stormwater Basins (continued)

## Stream Sediment Results

Eleven Stream Locations Plus Two Controls

Analyte	No. of Detected Results	Control TC-1 (mg/kg)	Control U3R-1A (mg/kg)	Location of Maximum Result	Maximum Conc. (mg/kg)	EPA Region 4 RSV for Sediment (mg/kg)	No. of Results > RSV	Comments
Aluminum	13 of 13	6,600	38,000	U3R-3	13,000	58,000	0	All samples met standard
Antimony	0 of 13	< DL	< DL	All < DL	< DL	25	0	All samples met standard
Arsenic	9 of 13	< DL	< DL	SC-4	3	33	0	All samples met standard
Barium	13 of 13	110	230	U3R-3	160	60	5	Controls exceeded RSV
Cadmium	0 of 13	< DL	< DL	All < DL	< DL	5	0	All samples met standard
Chromium	13 of 13	12	45	U3R-3	19	111	0	All samples met standard
Copper	13 of 13	5.3	24	BDC	11	149	0	All samples met standard
Iron	13 of 13	5,100	13,000	U3R-3	12,000	40,000	0	All samples met standard
Lead	13 of 13	13	45	U3R-3	14	128	0	All samples met standard
Manganese	13 of 13	180	78	SC-4	740	1,100	0	All samples met standard
Mercury	5 of 13	< DL	< DL	SC-4	0.1	1.1	0	All samples met standard
Nickel	10 of 13	< DL	< DL	U3R-3	18	48.6	0	All samples met standard
Selenium	2 of 13	< DL	< DL	L3R-2	1.1	2.9	0	One DL is greater than RSV
Silver	0 of 13	< DL	< DL	All < DL	< DL	2.2	0	All samples met standard
Uranium	1 of 13	< DL	< DL	L3R-3	2.7	1,000	0	All samples met standard
Zinc	13 of 13	26	86	U3R-3	49	459	0	All samples met standard

Note:

DL = Detection Limit

EPA = U.S. Environmental Protection Agency

RSV = Refinement Screening Values

Appendix Table C-2 Summary of Nonradiological Results for Sediments Collected from the Savannah River, SRS Streams, and Stormwater Basins (continued)

## Stormwater Basin Sediment Results

## Three Basin Locations Plus Two Stream Controls

Analyte	No. of Detected Results	Control TC-1 (mg/kg)	Control U3R-1A (mg/kg)	Location of Maximum Result	Maximum Conc. (mg/kg)	EPA Region 4 RSV for Sediment (mg/kg)	No. of Results > RSV	Comments
Aluminum	5 of 5	6,600	38,000	E-005	34,000	58,000	0	All samples met standard
Antimony	0 of 5	< DL	< DL	All < DL	< DL	25	0	All samples met standard
Arsenic	1 of 5	< DL	< DL	E-004	9.7	33	0	All samples met standard
Barium	5 of 5	110	230	E-004	40	60	2	Controls exceeded RSV
Cadmium	0 of 5	< DL	< DL	All < DL	< DL	5	0	All samples met standard
Chromium	5 of 5	12	45	E-004	45	111	0	All samples met standard
Copper	5 of 5	5.3	24	E-004	17	149	0	All samples met standard
Iron	5 of 5	5,100	13,000	E-004	43,000	40,000	1	
Lead	5 of 5	13	45	E-006	23	128	0	All samples met standard
Manganese	5 of 5	180	78	E-004	120	1,100	0	All samples met standard
Mercury	0 of 5	< DL	< DL	All < DL	< DL	1.1	0	All samples met standard
Nickel	3 of 5	< DL	< DL	E-005	8.6	48.6	0	All samples met standard
Selenium	0 of 5	< DL	< DL	All < DL	< DL	2.9	0	Two DLs are greater than RSV
Silver	0 of 5	< DL	< DL	All < DL	< DL	2.2	0	All samples met standard
Uranium	0 of 5	< DL	< DL	All < DL	< DL	1,000	0	All samples met standard
Zinc	5 of 5	26	86	E-004	60	459	0	All samples met standard

Note:

The two stream and stormwater basin control locations, TC-1 and U3R-1A, are included in the number of results greater than the detection limit and the number of results greater than the RSV for both the stream and stormwater basin sediment results tables.

DL = Detection Limit

EPA = U.S. Environmental Protection Agency

RSV = Refinement Screening Values

**Appendix Table C-3 Summary of Detected Metal Results for Freshwater Fish Tissue Collected from the Savannah River**

All antimony, chromium, lead, and nickel results were not detected; therefore, they were not reported in this table.

<b>Analyte</b>	<b>Number of Detected Values (above the MDC)</b>	<b>Number of Estimated Values (above the MDC, below the SQL)</b>	<b>Maximum Detected Concentration (µg/g)</b>	<b>SQL (µg/g)</b>	<b>MDC (µg/g)</b>	<b>Fish Type with Maximum Concentration</b>	<b>Location of Maximum Concentration</b>
<b>Arsenic</b>	22	22	2.51	10.1	1.01	Catfish	Upper Three Runs Creek River Mouth
<b>Cadmium</b>	4	4	0.142	0.484	0.0484	Catfish	Highway 301 Bridge Area
<b>Copper</b>	87	87	0.543	2.03	0.203	Catfish	Augusta Lock and Dam 614
<b>Manganese</b>	99	98	2.06	0.998	0.0998	Panfish	Lower Three Runs Creek River Mouth
<b>Mercury</b>	168	69	1.05	0.2	0.02	Bass	Upper Three Runs Creek River Mouth
<b>Zinc</b>	168	6	16.9	4.07	0.407	Flathead Catfish	Highway 301 Bridge Area

Note:

175 freshwater tissue samples were collected and analyzed for metals and mercury.

MDC = Maximum Detected Concentration

SQL = Standard Quantification Limit

**Appendix Table C-4 Summary of Detected Metal Results for Saltwater Fish Tissue Collected from the Savannah River between River Miles 0–8, Near Savannah, Georgia**

Antimony, lead, and mercury results were not detected; therefore, they were not reported in this table. All results are for mullet.

<b>Analyte</b>	<b>Number of Detected Values (above the MDC)</b>	<b>Number of Estimated Values (above the MDC, below the SQL)</b>	<b>Maximum Detected Concentration (µg/g)</b>	<b>SQL (µg/g)</b>	<b>MDC (µg/g)</b>
<b>Arsenic</b>	3	3	1.7	10	1
<b>Cadmium</b>	3	3	0.27	0.532	0.0532
<b>Chromium</b>	1	1	0.233	2.13	0.213
<b>Copper</b>	3	3	0.261	2	0.2
<b>Manganese</b>	1	1	0.115	1.06	0.106
<b>Nickel</b>	1	1	0.444	3.19	0.319
<b>Zinc</b>	7	5	4.16	4	0.4

Note:

Seven freshwater tissue samples were collected and analyzed for metals and mercury.

MDC = Maximum Detected Concentration

SQL = Standard Quantification Limit