Appendix C: Nonradiological Environmental Monitoring Program Supplemental Information

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

SRS collected monthly water quality samples at 5 Savannah River and 10 stream locations in 2022, 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 exceeding standards are shown in **red** text. Field duplicates are not included in the generation of these tables.

DL-Detection Limit
DO-Dissolved Oxygen
TOC-Total Organic Carbon
TSS-Total Suspended Solids

Notes:

1. The 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.

Four River Locations Plus One Control

Analyte	SC Freshwater Quality Std.	Unit	No. of Results Outside Std.	No. of Results > DL	Control RM 161.0 Avg.[a]	Control RM 161.0 Max.[b]	Highest River Location	Avg.[a]	Highest River Location	Max.[b]	Comments
DO [c]	min. 4.0	mg/L	0 of 57		8.9	7.0	RM-129.1	7.8	RM-150.4	5.3	All samples met standard
pH [d]	6.0-8.5	SU	1 of 57		**5.9**	7.2	RM-150.4	6.2	RM-118.8	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 57		18.3	23.7	RM-129.1	20.1	RM-129.1	29.3	All samples met standard
Aluminum	87 [e]	µg/L	53 of 57	57 of 57	**309**	**1,260**	RM-118.8	**310**	RM-150.4	**997**	
Beryllium	4 [f]	µg/L	0 of 57	1 of 57	< DL	< DL	RM-118.8	0.1	RM-118.8	0.1	All samples met standard
Cadmium	0.25	µg/L	1 of 57	2 of 57	< DL	< DL	RM-150.4	0.11	RM-150.4	**0.25**	All averages met standard
Chromium	11	µg/L	0 of 57	42 of 57	2	4	RM-118.8	2	RM-118.8	6	All samples met standard
Copper	2.9	µg/L	1 of 57	53 of 57	1.4	**3.0**	RM-141.5	1.4	RM-129.1	2.7	All averages met standard
Hardness (total)	none	mg/L	no std.	57 of 57	19	26	RM-129.1	26	RM-129.1	42	
Iron	1,000 [g]	µg/L	1 of 57	57 of 57	433	834	RM-118.8	658	RM-118.8	**1,110**	All averages met standard
Lead	0.54	µg/L	0 of 57	56 of 57	0.25	0.51	RM-118.8	0.28	RM-150.4	0.47	All samples met standard
Manganese	none	µg/L	no std.	57 of 57	85	153	RM-118.8	82	RM-118.8	159	
Mercury	0.91	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	36 of 57	1	2	RM-129.1	1	RM-129.1	1	All samples met standard
Nitrate-Nitrogen	1 [h]	mg/L	0 of 57	57 of 57	0.3	0.4	RM-141.5	0.3	RM-150.4	0.4	All samples met standard
Nitrite-Nitrogen	1 [h]	mg/L	0 of 57	56 of 57	0.01	0.03	RM-150.4	0.01	RM-150.4	0.02	All samples met standard
Thallium	0.24 [f]	µg/L	0 of 57	0 of 57	< DL	< DL	< D	< DL	< DL	< DL	All samples met standard
TOC	none	mg/L	no std.	57 of 57	3.2	4.9	RM-129.1	4.6	RM-129.1	13.0	
Phosphorus	0.06	mg/L	50 of 57	53 of 57	**0.13**	**0.32**	RM-141.5	**0.15**	RM-141.5	**0.34**	
TSS	none	mg/L	no std.	56 of 57	5	11	RM-118.8	9	RM-118.8 & RM-129.1	16	
Zinc	37	µg/L	0 of 57	56 of 57	4	9	RM-150.4	5	RM-150.4	29	All samples met standard

Eight Stream Locations Plus Two Controls

					Control TC-1		Control U3R-1A		Highest Stream Location				
Analyte	**SC Freshwater Quality Std.**	**Unit**	**No. of Results Outside Std.**	**Number of Results > DL**	**Avg.[a]**	**Max.[b]**	**Avg.[a]**	**Max.[b]**		**Avg.[a]**		**Max.[b]**	**Comments**
DO [c]	min. 4.0	mg/L	6 of 120		8.8	6.9	8.5	7.5	FMC-2	4.5	FMC-2	**1.6**	All averages met standard
pH [d]	6.0-8.5	SU	8 of 120		**5.6**	7.3	**4.9**	7.3	U3R-4	**5.2**	U3R-4	7.6	All maximums met standard
Temperature	< 5° F (2.8° C) above nat. cond. and not > 90° F (32.2° C)	° C	3 of 120		19	27	17	24	SC-4	20	PB-3	**39**	All averages met standard
Aluminum	87 [e]	µg/L	79 of 120	118 of 120	**142**	**607**	**146**	**513**	U3R-4	**235**	FM-6	**978**	
Beryllium	4 [f]	µg/L	0 of 120	8 of 120	< DL	< DL	0.1	0.1	L3R-2	0.1	L3R-2	0.2	All samples met standard
Cadmium	0.25	µg/L	0 of 120	3 of 120	< DL	< DL	< DL	< DL	TB-5	0.11	TB-5	0.19	All samples met standard
Chromium	11	µg/L	0 of 120	48 of 120	1.5	4.7	0.9	2.9	FMC-2	1.4	L3R-2	4.8	All samples met standard
Copper	2.9	µg/L	5 of 120	54 of 120	1.2	**7.3**	0.6	0.7	FMC-2	1.6	L3R-2	**6.0**	All averages met standard
Hardness (total)	none	mg/L	no std.	84 of 120	13	20	4	10	L3R-2	41	L3R-2	59	
Iron	1,000 [g]	µg/L	37 of 120	120 of 120	489	915	401	693	FM-2B	**3,081**	FM-2B	**6,790**	
Lead	0.54	µg/L	12 of 120	111 of 120	0.32	**1.34**	0.24	**0.57**	FM-6	0.30	L3R-2	**1.33**	All averages met standard
Manganese	none	µg/L	no std.	120 of 120	21	43	10	16	FM-2B	197	L3R-2	930	
Mercury	0.91	µg/L	0 of 120	6 of 120	< DL	< DL	< DL	< DL	SC-4	0.02	SC-4	0.04	All samples met standard
Nickel	16	µg/L	0 of 120	90 of 120	1	1	1	1	TB-5	4	TB-5	8	All samples met standard
Nitrate-Nitrogen	1 [h]	mg/L	1 of 120	119 of 120	0.1	0.2	0.4	0.4	FM-6	0.7	FM-6	**1.3**	All averages met standard
Nitrite-Nitrogen	1 [h]	mg/L	0 of 120	85 of 120	0.005	0.017	0.004	0.017	PB-3	0.006	PB-3	0.020	All samples met standard
Thallium	0.24 [f]	µg/L	1 of 120	3 of 120	< DL	< DL	< DL	< DL	U3R-4	0.09	U3R-4	**0.5**	All averages met standard

Analyte	SC Freshwater Quality Std.	Unit	No. of Results Outside Std.	Number of Results > DL	Control TC-1 Avg.[a]	Control TC-1 Max.[b]	Control U3R-1A Avg.[a]	Control U3R-1A Max.[b]	Highest Stream Location Avg.[a]		Highest Stream Location Max.[b]		Comments
TOC	none	mg/L	no std.	120 of 120	4	8	2	6	FMC-2	11	FMC-2	55	
Phosphorus	0.06	mg/L	38 of 120	48 of 120	**0.06**	**0.12**	0.03	**0.13**	FM-6	**0.11**	TB-5	**0.23**	
TSS	none	mg/L	no std.	115 of 120	6	15	4	7	FM-2B	9	L3R-2	66	
Zinc	37	µg/L	0 of 120	115 of 120	3	13	3	6	FMC-2	11	FMC-2	31	All samples met standard

[a] When results fell below the detection limit, the detection limit value was used to determine average.
[b] Maximum detected value
[c] Min. (versus Max.) value reported
[d] Min. (versus Avg.) value reported
[e] EPA Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018 Update
[f] Standard from Human Health vs. Freshwater Aquatic Life (which has no standard)
[g] EPA National Recommended Water Quality Criteria - Aquatic Life
[h] Per SCDHEC Environmental Surveillance and Oversight Program 2020 Data Report (CR-004111 11/21)

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 24 locations in 2022: 9 Savannah River, 12 stream, and 3 stormwater basins, totaling 384 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.

The table compares all results to EPA Region 4 Refinement Screening Values (RSVs) for sediment and shows the maximum value of each analyte for the river, stream, and stormwater basin samples. Locations exceeding RSVs are shown in **red** text.

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
Aluminum	9 of 9	16,000	RM-157.2	37,000	58,000	0	All samples met std.
Antimony	0 of 9	**<DL**	All < DL	All < DL	25	0	All samples met std.
Arsenic	9 of 9	2	RM-157.2	4	33	0	All samples met std.
Barium	9 of 9	**110**	RM-141.0 SC Landing	**160**	60	9	
Cadmium	0 of 9	**<DL**	All < DL	All < DL	5	0	All samples met std.
Chromium	0 of 9	22	RM-157.2	38	111	0	All samples met std.
Copper	9 of 9	13	RM-157.2	24	149	0	All samples met std.
Iron	9 of 9	18,000	RM-141.0 SC Landing	33,000	40,000	0	All samples met std.
Lead	9 of 9	11	RM-157.2	25	128	0	All samples met std.
Manganese	9 of 9	**1,200**	RM-141.0 SC Landing	**1,900**	1,100	3	
Mercury	0 of 9	**<DL**	All < DL	All < DL	1.1	0	All samples met std.
Nickel	9 of 9	9	RM-157.2	21.0	48.6	0	All samples met std.
Selenium	0 of 9	**<DL**	All < DL	All < DL	2.9	0	All samples met std.
Silver	0 of 9	**<DL**	All < DL	All < DL	2.2	0	All samples met std.
Uranium	0 of 9	**<DL**	All < DL	All < DL	1,000	0	All samples met std.
Zinc	9 of 9	46	RM-157.2	110	459	0	All samples met std.

Stream Sediment Results

10 Stream Locations Plus 2 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	12 of 12	6,000	4,600	BDC	26,000	58,000	0	All samples met std.
Antimony	0 of 12	**<DL**	**<DL**	All < DL	All < DL	25	0	All samples met std.
Arsenic	6 of 12	**<DL**	**<DL**	L3R-2	5	33	0	All samples met std.
Barium	12 of 12	**110**	42	U3R-3	**96**	60	2	
Cadmium	4 of 12	**<DL**	**<DL**	SC-4	0.8	5	0	All samples met std.
Chromium	12 of 12	9	7	BDC	17	111	0	All samples met std.
Copper	12 of 12	4	4	BDC	10	149	0	All samples met std.
Iron	12 of 12	4,100	2,400	BDC	9,800	40,000	0	All samples met std.
Lead	11 of 12	8	8	BDC	13	128	0	All samples met std.
Manganese	12 of 12	170	19	SC-4	186	1,100	0	All samples met std.
Mercury	5 of 12	**<DL**	**<DL**	L3R-1A	0.2	1.1	0	All samples met std.
Nickel	11 of 12	4.5	**<DL**	U3R-3	8.9	48.6	0	All samples met std.
Selenium	6 of 12	**<DL**	**<DL**	PB @ Rd A	2.0	2.9	0	All samples met std.
Silver	2 of 12	**<DL**	**<DL**	U3R-3	0.93	2.2	0	All samples met std.
Uranium	0 of 12	**<DL**	**<DL**	All < DL	All < DL	1,000	0	All samples met std.
Zinc	12 of 12	15	10	U3R-3	29	459	0	All samples met std.

Stormwater Basin Sediment Results

Three Basin Locations Compared to Two Stream Controls

Analyte	Number 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)	Number of Results > RSV	Comments
Aluminum	5 of 5	6,000	4,600	E-001	38,000	58,000	0	All samples met std.
Antimony	0 of 5	**<DL**	**<DL**	All < DL	All < DL	25	0	All samples met std.
Arsenic	3 of 5	**<DL**	**<DL**	E-003	8	33	0	All samples met std.
Barium	5 of 5	**110**	42	E-001	**72**	60	2	
Cadmium	0 of 5	**<DL**	**<DL**	All < DL	All < DL	5	0	All samples met std.
Chromium	5 of 5	9	7	E-003	39	111	0	All samples met std.
Copper	5 of 5	4	4	E-003	16	149	0	All samples met std.
Iron	5 of 5	4,100	2,400	E-003	38,000	40,000	0	All samples met std.
Lead	5 of 5	8	8	E-001	18	128	0	All samples met std.
Manganese	5 of 5	170	19	E-003	210	1,100	0	All samples met std.
Mercury	0 of 5	**<DL**	**<DL**	All < DL	All < DL	1.1	0	All samples met std.
Nickel	4 of 5	5	**<DL**	E-001	10.0	48.6	0	All samples met std.
Selenium	0 of 5	**<DL**	**<DL**	All < DL	All < DL	2.9	0	All samples met std.
Silver	0 of 5	**<DL**	**<DL**	All < DL	All < DL	2.2	0	All samples met std.
Uranium	0 of 5	**<DL**	**<DL**	All < DL	All < DL	1,000	0	All samples met std.
Zinc	5 of 5	15	10	E-003	83	459	0	All samples met std.

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

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

Analyte	Number of Detected Values (above the MDC)	Number of Estimated Values (above the MDC, below the SQL)	Maximum Detected Concentration (µg/g)	SQL (µg/g)	MDC (µg/g)	Fish Type with Maximum Concentration	Location of Maximum Concentration
Arsenic	29	29	1.87	0.37	3.7	Catfish	Steel Creek River Mouth
Cadmium	53	53	0.147	0.0492	0.492	Bass	Augusta Lock and Dam 614
Chromium	3	3	0.293	0.163	1.63	Bass	Lower Three Runs Creek River Mouth
Copper	92	90	0.741	0.196	1.96	Flathead Catfish	Fourmile Creek River Mouth
Manganese	88	88	0.544	0.867	0.0867	Panfish	Upper Three Runs Creek River Mouth
Mercury	165	52	0.984	0.2	0.02	Bass	Highway 301 Bridge Area
Zinc	165	0	21.4	1.96	0.196	Flathead Catfish	Fourmile Creek River Mouth

Note:

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

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

Analyte	Number of Detected Values (above the MDC)	Number of Estimated Values (above the MDC, below the SQL)	Maximum Detected Concentration (µg/g)	SQL (µg/g)	MDC (µg/g)
Arsenic	3	3	1.78	4.82	0.482
Cadmium	3	3	0.0536	0.48	0.048
Chromium	1	1	0.202	1.93	0.193
Copper	3	3	0.266	1.92	0.192
Manganese	4	4	0.122	0.963	0.0963
Zinc	7	0	14	1.93	0.193

Note:
Seven saltwater tissue samples were collected and analyzed for metals and mercury.

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