Appendix D: **Radiological Environmental Monitoring Program Supplemental Information**

Negative values are reported in tables in this appendix. Background counts are subtracted from the sample counts. Negative values occur when the background count is greater than the sample count. Background counts reflect naturally occurring radionuclides and cosmic radiation that is detected by laboratory instrumentation.

Appendix Table D-1 Summary of Radioactive Atmospheric Releases by Source

All values under the "Calculated" column through "Totals" column are reported in curies.[a]

In the Calculated column, blanks indicate the radionuclide is not present. In the facility (Reactors, Separations, SRNL) columns, a blank indicates the radionuclide was not analyzed. A 0.00E+00 in the facility columns indicates the result was not detected .

Radioactive Atmospheric Releases by Source (Curies)[a]

Radionuclide	Half-Life[b]		Calculated[c]	Reactors	Separations[d]	SRNL	Total
Gases and Vapors							
H-3 (oxide)	12.3	y	1.03E+02	1.03E+02	6.29E+03		6.49E+03
H-3 (elemental)	12.3	y			3.10E+03		3.10E+03
H-3 Total	12.3	y	1.03E+02	1.03E+02	9.38E+03		9.59E+03
C-14	5700	y	3.33E-07		4.10E-02		4.10E-02
Hg-203	46.6	d	4.02E-10				4.02E-10
Kr-85	10.8	y			1.30E+04		1.30E+04
I-129	1.57E+07	y	7.48E-05		7.01E-03	7.48E-07	7.08E-03
I-131	8.02	d	6.67E-10				6.67E-10
Particles							
Ag-110m	250	d	1.48E-11				1.48E-11
Am-241	432	y	1.12E-05	0.00E+00	3.48E-06	3.10E-09	1.47E-05
Am-243	7370	y	3.69E-09				3.69E-09
Ba-133	10.5	y	1.01E-08				1.01E-08
Be-7	53	d	1.17E-11				1.17E-11
Cd-109	461	d	0.00E+00				0.00E+00
Ce-139	138	d	3.78E-10				3.78E-10
Ce-141	32.5	d	4.94E-11				4.94E-11
Ce-144	285	d	2.00E-08				2.00E-08
Cm-243	29.1	y	1.47E-08				1.47E-08
Cm-244	18.1	y	2.75E-07	1.07E-09	1.11E-08	2.46E-08	3.12E-07
Co-56	77.23	d	1.20E-10				1.20E-10
Co-57	272	d	5.12E-07				5.12E-07
Co-58	70.9	d			0.00E+00		
Co-60	5.27	y	2.65E-06	0.00E+00	0.00E+00	0.00E+00	2.65E-06
Cs-134	2.06	y	3.42E-10				3.42E-10
Cs-137	30.2	y	3.98E-03	0.00E+00	1.00E-02	0.00E+00	1.40E-02
Eu-152	13.5	y	8.82E-09				8.82E-09
Eu-154	8.59	y	3.56E-07				3.56E-07
Eu-155	4.76	y	1.18E-07				1.18E-07
F-18	1.83	h	0.00E+00				0.00E+00
Fe-55	2.74	y	7.09E-09				7.09E-09

Radioactive Atmospheric Releases by Source (Curies)[a] (continued)

Radionuclide	Half-Life[b]		Calculated[c]	Reactors	Separations	SRNL	Total
K-40	1.25E+09	y	7.47E-09				7.47E-09
La-140	1.6781	d	5.00E-06				5.00E-06
Mn-54	312	d	2.91E-07				2.91E-07
Na-22	2.6019	y	1.50E-05				1.50E-05
Nb-94	2.03E+04	y	2.42E-07				2.42E-07
Nb-95	35.0	d	3.63E-07				3.63E-07
Ni-59	1.01E+05	y	5.76E-11				5.76E-11
Ni-63	100	y	5.56E-09				5.56E-09
Np-237	2.14E+06	y	1.54E-06	0.00E+00	1.04E-07	0.00E+00	1.64E-06
Pa-233	27.0	d	1.42E-06				1.42E-06
Pb-212	10.6	h	8.43E-07				8.43E-07
Pm-147	2.62	y	2.89E-06				2.89E-06
Pm-148m	41.3	d	1.90E-12				1.90E-12
Pr-144	17.3	m	2.00E-08				2.00E-08
Pu-236	2.86	y	4.21E-10				4.21E-10
Pu-238	87.7	y	3.13E-05	1.73E-11	1.55E-05	2.74E-09	4.68E-05
Pu-239	2.41E+04	y	6.92E-05	3.20E-10	4.90E-05	2.41E-09	1.18E-04
Pu-240	6560	y	7.68E-06				7.68E-06
Pu-241	14.4	y	2.07E-04				2.07E-04
Pu-242	3.75E+05	y	2.67E-08				2.67E-08
Ra-226	1600	y	2.66E-07				2.66E-07
Ra-228	5.75	y	2.65E-07				2.65E-07
Rh-106[e]	29.8	s	3.04E-06		1.38E-05		1.68E-05
Ru-103	39.3	d	5.11E-10				5.11E-10
Ru-106	374	d	3.04E-06		1.38E-05		1.68E-05
Sb-125	2.76	y	1.18E-06				1.18E-06
Sb-126[e]	12.4	d	1.70E-07				1.70E-07
Sc-46	83.79	d	1.72E-10				1.72E-10
Se-79	2.95E+05	y	4.90E-09				4.90E-09
Sm-151	90	y	2.89E-06				2.89E-06
Sn-113	115	d	4.56E-10				4.56E-10
Sn-123	129	d	6.66E-12				6.66E-12
Sn-126	2.30E+05	y	1.70E-07				1.70E-07
Sr-85	64.8	d	4.68E-10				4.68E-10
Sr-89	50.5	d	4.93E-10				4.93E-10
Sr-90	28.8	y	3.09E-03	0.00E+00	4.30E-05		3.13E-03

Radioactive Atmospheric Releases by Source (Curies)[a] (continued)

Radionuclide	Half-Life[b]		Calculated[c]	Reactors	Separations	SRNL	Total
Tc-99	2.11E+05	y	6.02E-05				6.02E-05
Te-127	9.35	h	1.04E-11				1.04E-11
Te-129	69.6	m	1.05E-12				1.05E-12
Th-228	1.91	y	8.66E-09	2.76E-09			1.14E-08
Th-229	7340	y	1.05E-09				1.05E-09
Th-230	7.54E+04	y	5.70E-11	5.89E-09			5.95E-09
Th-231	25.5	h	2.12E-04				2.12E-04
Th-232	1.41E+10	y	9.06E-12	1.72E-09			1.73E-09
Tl-208	3.05	m	1.41E-06				1.41E-06
U-232	68.9	y	5.48E-09				5.48E-09
U-233	1.59E+05	y	1.24E-08				1.24E-08
U-234	2.46E+05	y	5.95E-07	2.71E-09	2.31E-05	7.57E-09	2.37E-05
U-235	7.04E+08	y	3.84E-08	0.00E+00	1.35E-06	3.15E-10	1.38E-06
U-236	2.34E+07	y	3.97E-08				3.97E-08
U-238	4.47E+09	y	1.62E-06	2.21E-09	2.97E-05	1.04E-08	3.13E-05
Y-88	107	d	3.60E-10				3.60E-10
Y-90[(e)]	64.1	h	3.09E-03	0.00E+00	4.30E-05		3.13E-03
Y-91	58.5	d	7.98E-10				7.98E-10
Zn-65	244	d	1.64E-06				1.64E-06
Zr-95	64.0	d	1.22E-07				1.22E-07
Unidentified alpha	N/A		9.82E-05	2.46E-06	2.16E-06	3.41E-07	1.03E-04
Unidentified beta	N/A		6.09E-04	5.44E-05	7.25E-05	1.24E-06	7.38E-04
TOTAL	N/A		1.03E+02	1.03E+02	2.24E+04	2.37E-06	2.26E+04

[a] One curie equals 3.7E+10 Becquerels

[b] ICRP 107, *Nuclear Decay Data for Dosimetric Calculations (2008);* Half-life time intervals are given in seconds (s), hours (h), days (d), months (m), and years (y).

[c] Estimated releases from unmonitored sources. Beginning in 2016, individual isotope annual releases below 1E-12 Ci (1 pCi) are no longer reported in this table; therefore, they were not used in the dose calculations.

[d] Includes separations, waste management, and tritium facilities

[e] Daughter products (Sb-126, Rh-106 & Y-90) in secular equilibrium with source terms (Sn-126, Ru-106 & Sr-90, respectively). In MAXDOSE/POPDOSE, they are included in the source term and their ingrowth is included in their parents' source term.

Appendix Table D-2 Summary of Air Effluent DOE DCS Sum of Fractions

As discussed in Chapter 5, SRS evaluates the effluent monitoring program by comparing the annual average concentrations to the U.S. Department of Energy (DOE)-derived concentration standards (DCSs). DOE's *Derived Concentration Technical Standard*, DOE-STD-1196-2011 (DOE 2011), establishes numerical standards for DCSs to support implementing DOE Order 458.1. This document was updated in 2022 (DOE 2022). This table presents the air effluent DCS sums of fractions for continuously monitored sources where at least one analyte had at least one detected value. These sums of fractions determined by using both the 2011 and the 2022 standards are included. Discussion regarding the 291-F sum of fractions exceedance can be found in Section 5.3.2.1.

Facility (Sampling Location)	Radionuclides Included in the DCS Sum of Fractions	2011 DCS Sum of Fractions	2011 DCS Sum of Fractions Excluding Tritium	2022 DCS Sum of Fractions	2022 DCS Sum of Fractions Excluding Tritium
A Area (791-A Sandfilter Discharge)	I-129	7.16E-05	7.16E-05	4.69E-05	4.69E-05
C Area (C-Area Main Stack)	H-3 (oxide)	3.60E-01	0.00E+00	5.82E-01	0.00E+00
F Area (235-F Sandfilter Discharge)	U-234, U-238, Am-241, Pu-239	1.79E-03	1.79E-03	2.05E-03	2.05E-03
F Area (292-F Main Stack)	I-129, Cs-137, U-234, U-235, Np-237, U-238, Pu-238, Pu-239, Am-241, Cm-244, Sr-90	1.59E+00	1.59E+00	6.93E-01	6.93E-01
F Area (772-4F Stack)	U-234, U-238, Pu-238, Pu-239, Am-241	8.50E-04	8.50E-04	7.30E-04	7.30E-04
H Area (292-H Main Stack)	H-3 (oxide), C-14, Kr-85, I-129, Cs-137, U-234, U-235, U-238, Pu-238, Pu-239, Am-241, Cm-244, Np-237, Sr-90	1.27E+00	1.12E+00	2.97E+00	2.72E+00
K Area (K-Area Main Stack)	H-3 (oxide)	2.39E-01	0.00E+00	3.86E-01	0.00E+00
L Area (L-Area Disassembly)	H-3 (oxide)	2.28E-01	0.00E+00	3.68E-01	0.00E+00
L Area (L-Area Main Stack)	H-3 (oxide)	1.40E-01	0.00E+00	2.26E-01	0.00E+00
Tritium (232-H Stack)	H-3 (elemental), H-3 (oxide)	2.04E+01	0.00E+00	3.30E+01	0.00E+00
Tritium (233-H)	H-3 (elemental), H-3 (oxide)	3.77E+00	0.00E+00	6.09E+00	0.00E+00
Tritium (234-H)	H-3 (oxide)	3.20E+00	0.00E+00	5.19E+00	0.00E+00
Tritium (238-H)	H-3 (oxide)	8.43E-02	0.00E+00	1.36E-01	0.00E+00
Tritium (264-H Stack)	H-3 (elemental), H-3 (oxide)	1.34E+01	0.00E+00	2.17E+01	0.00E+00

Appendix Table D-3 Summary of Tritium in Environmental Air

Samples were collected approximately every 2 weeks at each of the 16 locations. One sample was invalidated at site Barnwell Gate in November due to unexpected power loss. Bolded minimum and maximum concentration results were reported as detected. Minimum and maximum concentrations not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large. The results at the following locations were all not detected: 25-Mile Radius (Augusta Lock & Dam and Highway 301 @ State Line). The Highway 301 @ State Line location is the control location.

Location	Number of Detected Results	Mean Concentration (pCi/m^3)	Minimum Concentration (pCi/m^3)	Maximum Concentration (pCi/m^3)
Onsite				
Burial Ground North	27 of 27	2.76E+02	**3.49E+01**	**6.25E+02**
Site Perimeter				
A-14	1 of 26	3.60E+00	-4.19E+00	1.36E+01
Allendale Gate	1 of 26	1.95E+00	-6.92E+00	**1.27E+01**
Barnwell Gate	1 of 25	2.93E+00	-3.68E+00	**8.14E+00**
Barricade 8	2 of 26	4.29E+00	-6.84E+00	1.56E+01
D Area	2 of 26	5.91E+00	-5.46E+00	1.51E+01
Darkhorse @ Williston Gate	3 of 26	4.81E+00	-3.41E+00	**1.98E+01**
East Talatha	3 of 27	4.27E+00	-2.44E+00	**1.94E+01**
Green Pond	1 of 26	4.00E+00	-3.81E+00	1.33E+01
Highway 21/167	2 of 26	4.49E+00	-3.59E+00	**1.74E+01**
Jackson	1 of 26	3.73E+00	-4.65E+00	1.63E+01
Patterson Mill Road	1 of 26	2.92E+00	-3.65E+00	1.26E+01
Talatha Gate	6 of 26	6.03E+00	-2.68E+00	**1.61E+01**
25-Mile Radius				
Aiken Airport	1 of 26	2.34E+00	-4.19E+00	1.33E+01

Appendix Table D-4 Summary of Tritium in Rainwater

Samples were collected approximately every 4 weeks at each of the 16 air surveillance locations. Bolded minimum and maximum concentration results were reported as detected. Minimum and maximum concentrations not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large. The results at the following locations were all not detected: Site Perimeter (A-14, Allendale Gate, Barnwell Gate, East Talatha, Green Pond, Hwy 21/167, Jackson, Patterson Mill Road, and Talatha Gate) and 25-Mile Radius (Augusta Lock & Dam, Aiken Airport, and Highway 301 @ State Line). The Highway 301 @ State Line location is the control location.

Location	Number of Detected Results	Mean Concentration (pCi/L)	Minimum Concentration (pCi/L)	Maximum Concentration (pCi/L)
Onsite				
Burial Ground North	13 of 13	2.85E+03	**5.35E+02**	**7.76E+03**
Barricade 8	1 of 13	1.23E+02	-1.61E+02	3.86E+02
D Area	1 of 13	1.35E+02	-1.30E+02	3.42E+02
Darkhorse @ Williston Gate	1 of 13	1.24E+02	-2.14E+02	**8.78E+02**

Appendix Table D-5 Summary of Radionuclides in Environmental Air

Glass fiber filter samples were collected approximately every 2 weeks at each of the 16 locations. Samples from all locations were analyzed biweekly for gamma emitting radionuclides, gross alpha, and gross beta. The onsite location Burial Ground North is the only location where samples were analyzed for actinides and strontium-89/90 biweekly. Due to lab prep and analysis errors, the sample collected January 12 to January 26 at Burial Ground North is missing results for Curium-244 and Americium-241, and all media collected October 19 to November 2nd was invalidated due to a pump failure at Barnwell Gate.

One sample from every perimeter location and 25-mile radius location was chosen for actinide and strontium-89/90 (Sr-89/90) analysis based on elevated releases at F-Area stacks during 2022. Highway 301 @ State Line is the control location.

Bolded concentration results were reported as detected. Concentrations not bolded indicate the result was less than the analytical method detection limit or that the uncertainty is large.

Cobalt-60 and cesium-137 results were not detected for any samples collected biweekly.

Biweekly Samples: All Locations

Radionuclide	Number of Detected Results	Location of Minimum Concentration	Minimum Concentration (pCi/m^3)	Location of Maximum Concentration	Maximum Concentration (pCi/m^3)
Gross Alpha	412 of 415	Highway 21/167	1.16E-04	East Talatha	**7.70E-03**
Gross Beta	415 of 415	Darkhorse@Williston Gate	**2.84E-03**	Green Pond	**2.89E-02**

Sr-89/90, Pu-239, Am-241, and U-235 results were not detected for site Burial Ground North; therefore, they were not reported in the table Biweekly Actinide and Sr-89/90 Samples.

Biweekly Actinide and Sr-89/90 Samples

Location: Burial Ground North				
Radionuclide	Number of Detected Results	Mean Concentration (pCi/m^3)	Minimum Concentration (pCi/m^3)	Maximum Concentration (pCi/m^3)
U-234	24 of 26	1.72E-05	-3.54E-06	**3.28E-05**
U-238	25 of 26	1.75E-05	-2.63E-06	**3.57E-05**
Pu-238	3 of 26	4.03E-06	-1.82E-06	**3.70E-05**
Cm-244	6 of 25	1.18E-06	-2.65E-06	**6.62E-06**

Pu-238 and Cm-244 results were not detected for the annual sites; therefore, they were not reported in the table Annual Actinide and Strontium-89/90 Samples.

Appendix Table D-5 Summary of Radionuclides in Environmental Air (continued)

Annual Actinide and Strontium-89/90

		U-234	U-238	Am-241	Pu-239	Sr-89/90	U-235
Location	**Number of Samples**	**Conc. (pCi/m3)**	**Conc. (pCi/m3)**	**Conc. (pCi/m3)**	**Conc. (pCi/m3)**	**Conc. (pCi/m3)**	**Conc. (pCi/m3)**
A-14	1	1.33E-05	8.84E-06	2.60E-06	-2.60E-07	7.14E-04	3.39E-07
Allendale Gate	1	7.38E-06	1.05E-05	6.29E-06	-1.83E-07	1.73E-04	-1.08E-06
Barnwell Gate	1	1.68E-05	7.16E-06	2.96E-06	4.66E-06	1.27E-04	3.38E-07
Barricade 8	1	7.92E-06	9.42E-06	-6.09E-07	-2.26E-07	**8.84E-04**	1.63E-06
D Area	1	8.06E-06	**1.77E-05**	**5.96E-06**	2.55E-06	1.94E-04	2.61E-07
Darkhorse@ Williston Gate	1	4.96E-06	**1.56E-05**	-1.40E-06	5.01E-07	1.18E-03	**6.98E-06**
East Talatha	1	1.53E-05	**2.61E-05**	7.99E-07	3.25E-06	1.15E-03	5.08E-07
Green Pond	1	1.59E-05	**1.96E-05**	-1.37E-06	-2.16E-06	5.95E-04	2.64E-06
Highway 21/167	1	**2.31E-05**	**2.26E-05**	2.62E-07	6.15E-07	6.48E-05	3.19E-07
Jackson	1	**1.92E-05**	1.01E-05	7.64E-07	1.96E-06	3.16E-04	4.34E-07
Patterson Mill Road	1	5.20E-06	9.60E-06	6.97E-07	**5.45E-06**	5.21E-04	-1.21E-06
Talatha Gate	1	1.34E-05	**2.86E-05**	2.01E-06	2.25E-06	5.42E-04	**4.81E-06**
Aiken Airport	1	2.03E-05	**2.32E-05**	-3.01E-07	2.79E-06	1.55E-03	2.09E-06
Augusta Lock and Dam 614	1	1.12E-05	1.53E-05	8.56E-07	-3.47E-07	6.06E-05	4.18E-07
Highway 301 @State Line (Control Location)	1	1.13E-05	1.07E-05	-1.63E-06	-1.27E-06	1.30E-03	-1.07E-06

Appendix Table D-6 Summary of Gamma Surveillance

Samples were collected approximately every quarter (13 weeks) at each of the 52 locations. Typically, two samples are collected from each location. This was the case in 2022 except for Plant Vogtle location NRC_1, which had a damaged badge for one sample for the fourth quarter, and Population Center location McBean, which was missing one first quarter sample. Also, SRS was not able to retrieve any OSLDs for Population Center location Windsor during the fourth quarter. Please reference Environmental Maps, SRS Optically Stimulated Luminescent Dosimeter [OSLD] Sampling Locations.

Station Location Type	Number of Stations	Quarter 1 Average mR/day	Quarter 2 Average mR/day	Quarter 3 Average mR/day	Quarter 4 Average mR/day	Annual Total Average mR/year	Annual Minimum mR/year	Annual Maximum mR/year
Population Centers	9	0.40	0.32	0.35	0.39	131.89	110	157
Site Perimeter	9	0.31	0.27	0.27	0.33	107.08	93	122
Air Surveillance Stations	16	0.33	0.28	0.29	0.34	113.62	93	147
Plant Vogtle Vicinity	18	0.31	0.26	0.29	0.33	108.40	91	132

Appendix D-7 Summary of Radionuclides in Soil

Soil samples were collected from 24 locations in 2022. Bolded values are detected results. Values not bolded indicate the result was less than the analytical method detection limit, or the uncertainty is large.

The following locations were sampled: F Area (2,000 feet West), H Area (2,000 feet East), Z Area (#3), Burial Ground Locations (643-26E-2 and Burial Ground North), Plant Perimeter Locations (A-14, Allendale Gate, Barnwell Gate, Barricade 8, D Area, Darkhorse @ Williston Gate, East Talatha, Green Pond, Highway 21/167, Jackson, Patterson Mill Road, and Talatha Gate), 25-Mile Radius Locations (Aiken Airport, Augusta Lock and Dam 614, and Highway 301 @ State Line), and Creek Plantation Trail 1 (1175', 1600', 1805') and Trail 6 (2300'). The Highway 301 @ State Line is the control location.

All Co-60 results were not detected; therefore, they were not reported in this table.

Radionuclide	Number of Detected Results	Control Hwy 301 Concentration (pCi/g)	Location of Minimum Concentration	Minimum Concentration (pCi/g)	Location of Maximum Concentration	Maximum Concentration (pCi/g)
Cs-137	22 of 24	**1.50E-01**	Burial Ground North	4.03E-02	Trail 1 1805'	**3.59E+01**
U-234	20 of 20	**1.65E+00**	Allendale Gate	**4.62E-01**	Burial Ground North	**1.87E+00**
U-235	20 of 20	**9.22E-02**	Allendale Gate	**1.73E-02**	Burial Ground North	**9.43E-02**
U-238	20 of 20	**1.67E+00**	Allendale Gate	**4.59E-01**	Burial Ground North	**1.74E+00**
Pu-238	2 of 20	7.95E-04	Allendale Gate	-7.00E-04	F Area (2000 feet west)	**7.19E-02**
Pu-239	19 of 20	**2.29E-03**	A-14	8.59E-04	F Area (2000 feet west)	**5.62E-02**
Np-237	1 of 20	**1.64E-03**	Aiken Airport	-8.73E-04	Z Area (#3)	5.51E-04
Sr-89/90	1 of 24	-1.48E-02	Aiken Airport	-3.73E-02	Burial Ground (643-26E-2)	1.72E-01
Am-241	13 of 20	**9.57E-03**	Allendale Gate	7.43E-04	F Area (2000 feet west)	**6.11E-03**
Cm-244	2 of 20	1.48E-03	Patterson Mill Road	-2.84E-04	Augusta Lock and Dam 614	**3.57E-03**
Gross Beta	20 of 20	**1.65E+01**	Jackson	5.19E+00	A-14	**1.70E+01**
Gross Alpha	19 of 20	**1.92E+01**	Allendale Gate	1.31E+00	A-14	**2.48E+01**

Appendix Table D-8 Summary of Radionuclides in Grassy Vegetation

Vegetation samples were collected from 16 locations in 2022. Bolded values are detected results. Values not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large. All results for Co-60, Cm-244, Pu-239, Gross Alpha, and U-235 were not detected; therefore, they were not reported in this table.

The following locations are sampled: Onsite location (Burial Ground North), Site Perimeter locations (A-14, Allendale Gate, Barnwell Gate, Barricade 8, D Area, Darkhorse @ Williston Gate, East Talatha, Green Pond, Highway 21/167, Jackson, Patterson Mill Road, Talatha Gate), and 25-Mile Radius Locations (Aiken Airport, Augusta Lock and Dam 614, and Highway 301 @ State Line). Highway 301 @ State Line is the control location.

Radionuclide	Number of Detected Results	Control (Highway 301) Concentration (pCi/g)	Location of Minimum Concentration	Minimum Concentration (pCi/g)	Location of Maximum Concentration	Maximum Concentration (pCi/g)
H-3	4 of 16	2.01E-02	Darkhorse @ Williston Gate	-2.65E-03	East Talatha	**9.57E-02**
Cs-137	8 of 16	1.11E-01	Burial Ground North	5.49E-03	Barnwell Gate	**4.65E-01**
Sr-89/90	14 of 16	**9.92E-02**	Augusta Lock & Dam 614	1.72E-02	Jackson	**2.08E-01**
U-234	16 of 16	**2.04E-03**	Darkhorse @ Williston Gate	**4.97E-04**	East Talatha	**7.27E-03**
U-238	16 of 16	**2.50E-03**	Darkhorse @ Williston Gate	**6.81E-04**	Burial Ground North	**6.78E-03**
Np-237	1 of 16	-2.26E-04	Barnwell Gate	-1.87E-04	Burial Ground North	**6.16E-04**
Pu-238	4 of 16	1.12E-04	Patterson Mill Road	-5.41E-06	Green Pond	**1.00E-03**
Am-241	1 of 16	9.30E-05	Patterson Mill Road	-4.35E-05	A-14	**5.24E-04**
Tc-99	1 of 16	-4.35E-02	Barnwell Gate	-8.51E-02	Green Pond	**1.69E-01**
Gross Beta	16 of 16	**8.62E+00**	Patterson Mill Road	**3.41E+00**	Barricade 8	**2.04E+01**

Appendix Table D-9 Summary of Radionuclides in Foodstuffs

Samples of five foodstuffs are collected annually from five regions surrounding SRS. Beef, greens, and fruit are collected each year. Six foodstuffs are collected on a rotating three-year cycle. Cabbage and wheat were the rotational crop samples for 2022. Bolded minimum and maximum concentration results were reported as detected. Minimum and maximum concentrations not bolded indicate the result was less than the analytical method detection limit, or the uncertainty is large.

Food Type	Nuclide	Number of Samples	Number of Results > Detection Limit	Mean Sample Conc. (pCi/g)	Minimum Sample Conc. (pCi/g)	Maximum Sample Conc. (pCi/g)
Beef	Cesium-137	5	1	6.16E-03	-6.05E-03	**2.18E-02**
	Nonvolatile Beta	5	5	7.80E-01	**6.63E-01**	**9.08E-01**
	Strontium-90	5	1	2.34E-03	3.77E-04	**5.83E-03**
	Uranium-233/234	5	3	7.97E-05	-3.17E-05	**1.56E-04**
	Uranium-238	5	3	1.10E-04	4.80E-05	**1.76E-04**
Americium-241, Cobalt-60, Curium-243/244, Gross Alpha, Neptunium-237, Plutonium-238, Plutonium-239/240, technetium-99, Tritium, and Uranium-235 were not detected in beef.						
Cabbage	Cesium-137	4	3	2.93E-02	9.51E-03	4.80E-02
	Curium-243/244	4	1	1.44E-04	3.05E-05	4.23E-04
	Nonvolatile Beta	4	4	1.24E+01	6.56E+00	2.04E+01
	Strontium-90	4	3	4.58E-02	1.74E-02	7.60E-02
	Tritium	5	1	1.48E-02	-6.23E-03	3.23E-02
	Uranium-233/234	4	4	1.16E-02	**3.91E-03**	3.15E-02
	Uranium-235	4	2	5.95E-04	4.77E-04	7.73E-04
	Uranium-238	4	4	1.22E-02	**3.40E-03**	3.39E-02
Americium-241, Cobalt-60, Gross Alpha, Neptunium-237, Plutonium-238, Plutonium-239/240, and Technetium-99 were not detected in cabbage.						
Fruit	Americium-241	5	1	6.48E-05	7.91E-06	**1.47E-04**
	Nonvolatile Beta	5	5	1.11E+00	**9.46E-01**	**1.23E+00**
	Plutonium-238	5	4	1.21E-04	7.60E-05	**1.78E-04**
	Strontium-90	5	1	2.72E-03	1.30E-03	**6.78E-03**
	Uranium-233/234	5	3	7.93E-05	2.67E-06	**1.22E-04**
	Uranium-238	5	1	6.01E-05	0.00E+00	**1.06E-04**
Cesium-137, Cobalt-60, Curium-243/244, Gross Alpha, Neptunium-237, Plutonium-239/240, Technetium-99, Tritium, and Uranium-235 were not detected in fruit.						
Greens	Americium-241	5	2	1.30E-03	-1.79E-04	**5.84E-03**
	Cesium-137	5	5	2.55E-02	**1.40E-02**	**3.84E-02**
	Neptunium-237	5	1	6.24E-04	1.12E-05	**2.68E-03**
	Nonvolatile Beta	5	5	2.31E+00	**1.65E+00**	**3.07E+00**
	Plutonium-238	5	1	2.75E-04	1.10E-04	**5.89E-04**
	Plutonium-239/240	5	1	2.72E-04	8.52E-05	**5.88E-04**
	Strontium-90	5	4	1.09E-01	1.91E-02	**1.96E-01**
	Tritium	5	1	8.62E-03	1.15E-03	**2.97E-02**

Food Type	Nuclide	Number of Samples	Number of Results > Detection Limit	Mean Sample Conc. (pCi/g)	Minimum Sample Conc. (pCi/g)	Maximum Sample Conc. (pCi/g)
	Uranium-233/234	5	5	1.35E-02	**2.51E-03**	**5.08E-02**
	Uranium-235	5	1	9.01E-04	1.15E-04	**3.39E-03**
	Uranium-238	5	5	1.39E-02	**2.45E-03**	**5.08E-02**
Cobalt-60, Curium-243/244, Gross Alpha, and Technetium-99 were not detected in greens.						
Wheat	Americium-241	5	1	4.72E-04	1.24E-04	**1.28E-03**
	Curium-243/244	5	1	5.81E-04	-7.86E-05	**2.85E-03**
	Nonvolatile Beta	5	5	3.74E+00	**3.18E+00**	**4.42E+00**
	Plutonium-238	5	1	4.41E-04	2.59E-04	**8.47E-04**
	Plutonium-239/240	5	1	4.27E-04	2.09E-04	**7.12E-04**
	Strontium-90	5	1	2.42E-02	9.32E-03	**5.30E-02**
Cesium-137, Cobalt-60, Gross Alpha, Neptunium-237, Technetium-99, Tritium, and Uranium-235 were not detected in wheat.						

Appendix Table D-10 Summary of Radionuclides in Dairy

SRS collects cow and goat milk samples from dairies in communities surrounding the Site. The number listed in parentheses in the "location" column indicates the number of dairies in the named state that provide samples to SRS.

Bolded minimum and maximum concentration results were reported as detected. Minimum and maximum concentrations not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large. All Co-60 and H-3 results were not detected; therefore, they were not reported in this table.

Location	Nuclide	Number of Samples	Number of Results > Detection Limit	Mean Sample Concentration (pCi/L)	Minimum Sample Concentration (pCi/L)	Maximum Sample Concentration (pCi/L)
SC–Dairies (4) Cow Milk	Cs-137	16	3	1.90E+00	-2.08E-01	**7.32E+00**
SC–Dairies (4) Cow Milk	Sr-90	16	2	5.09E-01	-8.08E-01	**2.67E+00**
GA–Dairies (3) Cow Milk	Cs-137	12	1	1.26E+00	-5.51E-01	**3.24E+00**
GA–Dairies (3) Cow Milk	Sr-90	12	1	2.25E-01	-5.89E-01	**6.73E-01**

Appendix Table D-11 Radiation in Liquid Source Releases

All values under the "Reactors," "Separations," "SRNL," and the "Totals" column are reported in curies.[a]

Tritium is the main contributing radionuclide in liquid source releases. Although the remaining radionuclides are contributors, their contributions in liquid source releases are minimal.

In the facility (Reactor, Separations, and SRNL) columns, a blank indicates the radionuclide was not analyzed. A 0.00E+00 in the facility columns indicates the result was not significant.

All Co-60 results were not detected; therefore, they were not reported in this table.

Radionuclide	Half-Life Time Interval[b]		Reactors (Ci)	Separations[c] (Ci)	SRNL (Ci)	Totals (Ci)
H-3[d]	12.3	y	1.07E+02	2.41E+02	6.70E-03	3.48E+02
C-14	5,700	y		7.09E-03	0.00E+00	7.09E-03
Sr-90	1.94E-01	y	1.48E-04	1.61E-02		1.63E-02
Tc-99	28.8	y	0.00E+00	1.22E-02	0.00E+00	1.22E-02
I-129	2.11E+05	y	0.00E+00	1.30E-02	0.00E+00	1.30E-02
Cs-137[e]	1.57E+07	y	0.00E+00	9.59E-03	0.00E+00	9.59E-03
Eu-154	30.2	y	0.00E+00	3.49E-03	9.47E-04	4.44E-03
U-234	2.46E+05	y	1.97E-04	6.33E-02	5.06E-05	6.35E-02
U-235	7.04E+08	y	0.00E+00	3.73E-03	3.65E-06	3.73E-03
U-238	4.47E+09	y	5.21E-04	7.15E-02	4.46E-05	7.20E-02
Np-237	2.14E+06	y		9.07E-05		9.07E-05
Pu-238	87.7	y	0.00E+00	2.53E-04	1.70E-07	2.53E-04
Pu-239	2.41E+04	y	0.00E+00	2.72E-05	0.00E+00	2.72E-05
Am-241	432	y	0.00E+00	2.60E-05		2.60E-05
Cm-244	18.1	y	0.00E+00	1.02E-05		1.02E-05
Alpha [f]	N/A		4.09E-03	6.17E-03	1.18E-04	1.04E-02
Beta-Gamma [g]	N/A		3.97E-02	4.20E-03	0.00E+00	4.39E-02
					Sum	**3.48E+02**

[a] One curie equals 3.7E+10 becquerels

[b] ICRP 107, *Nuclear Decay Data for Dosimetric Calculations* (2008). Half-life time intervals are given in years (y).

[c] Includes separations, waste management, and tritium processing facilities

[d] The tritium release total, which includes direct + migration releases, is used in the dose calculations for SRS impacts.

[e] Depending on which value is higher, the Cs-137 release total is based on concentrations measured in Steel Creek mouth fish near RM 141.5 or on the actual measured effluent release total from the Site. Refer to Chapter 6, *Radiological Dose Assessment*, for more information.

[f,g] For dose calculations, unidentified alpha and beta/gamma releases are assumed to be Pu-239 and Sr-90, respectively.

Appendix Table D-12 Summary of Liquid Effluent DOE DCS Sum of Fractions by Facility

As discussed in Chapter 5, SRS evaluates the effluent monitoring program by comparing the annual average concentrations to the U.S. Department of Energy (DOE)-derived concentration standards (DCSs). DOE's *Derived Concentration Technical Standard*, DOE-STD-1196-2011 (DOE 2011), establishes numerical standards for DCSs to support implementing DOE Order 458.1. This document was updated in 2022 (DOE 2022). This table presents the liquid effluent DCS sum of fractions for continuously monitored sources where at least one analyte had at least one detected value. These sums of fractions determined by using both the 2011 and the 2022 standards are included.

Facility (Sampling Location)	Radionuclides Included in the Sum of Fractions	2011 DCS Sum of Fractions	2011 DCS Sum of Fractions Excluding Tritium	202 DCS Sum of Fractions	2022 DCS Sum of Fractions Excluding Tritium
A Area (TB-2 Outfall at Road 1A)	H-3, U-234, U-235, U-238, Pu-238	6.37E-04	5.73E-04	3.60E-04	3.13E-04
F Area (F-05)	H-3, C-14, Sr-89/90, Tc-99, U-234, U-235, U-238, Pu-238, Pu-239, Am-241, Cm-244	3.01E-03	2.74E-03	1.83E-03	1.63E-03
F Area (FM-3 F-Area Effluent)	H-3, Tc-99, I-129, U-234, U-235, U-238 Pu-238, Pu-239, Am-241, Cm-244	9.56E-03	9.31E-03	2.06E-03	1.87E-03
G-010 (Central Sanitary Wastewater Treatment Facility)	H-3, Sr-89/90, U-234 U-238, Pu-238, Am-241	3.56E-03	3.25E-03 3.12E-03	2.36E-03 2.29E-03	2.04E-03 1.96E-03
H Area (FM-1C H-Area Effluent)	H-3, Sr-89/90, Cs-137, U-234, U-235, U-238, Np-237, Pu-238, Pu-239, Am-241, Cm-244,	1.90E-02	1.85E-02	1.20E-02	1.16E-02
H Area (H-004)	H-3, Sr-89/90, U-234 U-235, U-238, Pu-238, Pu-239	6.51E-03	4.64E-03	3.90E-03	2.53E-03
H-Tank Farm (HP-52 H-Area Tank Farm)	H-3, U-234, U-238, Pu-238, Am-241	7.37E-04	1.69E-04	4.90E-04	7.46E-05
K Area (K Canal)	H-3, Sr-89/90	1.14E-03	2.56E-04	8.12E-04	1.66E-04
S Area (S-004)	H-3, Sr-89/90, U-234 U-235, U-238, Pu-238	2.54E-03	9.21E-04	1.76E-03	5.74E-04
Tritium (HP-15 Tritium Facility Outfall)	H-3	1.48E-02	0.00E+00	1.08E-02	0.00E+00

Appendix Table D-13 Summary of Radionuclides in Sediments

SRS collected annual sediment samples at 40 locations in 2022—11 Savannah River, 21 stream, and 8 stormwater basins—totaling 457 analytes. Qualitative results for Americium-241 and Curium-244 at Beaver Dam Creek [BDC], L3R-1A, and Steel Creek [SC] are reported. Locations sampled are as follows: Savannah River locations (mouths of Beaver Dam Creek [BDC] and Steel Creek [SC], River Miles [RM] 118.7, 129, 134, 141, 150.2, 150.4 and 157.2), SRS Stream locations (downstream of R-1, FM-2, FM-3A, FM-6, FM-A7, FM-A7A, FMC @ Rd A, FMC Swamp, L3R-1A , L3R-2, McQB @ MO,, PB @ Rd A, PB Swamp, SC-2A, SC-4, TB-5, U3R-3, and U3R-4), and SRS Stormwater Basin locations (E-001, E-002, E-003, E-004, E-05, E-06, Pond 400, and Z-Basin). 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.

Bolded concentration results were reported as detected. Concentrations not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large.

River Sediment Results

10 River Locations Plus 1 Control
(Some locations only analyzed for Cs-137, Co-60, gross alpha, and nonvolatile beta)

Analyte	Number > DL	Control RM 161.0 (pCi/g)	Location of Maximum Result	Maximum Result (pCi/g)
Americium-241	3 of 9	**2.33E-03**	RM-161.0	**2.33E-03**
Cesium-137	7 of 11	< 6.65E-02	SC-RM	**1.54E+00**
Cobalt-60	0 of 11	< 6.34E-02	All < MDA	All < MDA
Curium-243/244	3 of 9	< 9.03E-04	RM-129	**1.56E-03**
Gross Alpha	11 of 11	**1.31E+01**	RM-157.2	**4.06E+01**
Neptunium-237	0 of 9	< 2.6E-03	All < MDA	All < MDA
Nonvolatile Beta	11 of 11	**2.14E+01**	RM-157.2	**3.24E+01**
Plutonium-238	0 of 9	< 2.67E-03	All < MDA	All < MDA
Plutonium-239/240	3 of9	< 2.19E-03	RM-157.2	**1.17E-02**
Strontium-90	0 of 9	< 9.02E-02	All < MDA	All < MDA
Uranium-233/234	9 of 9	**1.95E+00**	BDC RM	**2.26E+00**
Uranium-235	9 of 9	**9.09E-02**	BDC RM	**1.04E-01**
Uranium-238	9 of 9	**1.87E+00**	BDC RM	**2.34E+00**

Appendix Table D-13 Summary of Radionuclides in Sediments (continued)

Stream Sediment Results

19 Stream Locations Plus 2 Controls
(Some locations only sampled for Cs-137, Co-60, gross alpha and nonvolatile beta)

Analyte	Number >DL	Control TC-1 (pCi/g)	Control U3R-1A (pCi/g)	Location of Maximum Result	Maximum Result (pCi/g)
Americium-241	14 of 18	**3.19E-03**	**1.87E-03**	FM-2	**6.96E-01**
Cesium-137	20 of 23	< 4.66E-02	**8.05E-02**	FM-2	**3.37E+01**
Cobalt-60	0 of 23	< 4.04E-02	< 6.46E-02	All < MDA	All < MDA
Curium-243/244	5 of 18	< 1.07E-03	< 1.05E-03	FM-2	**5.87E-01**
Gross Alpha	23 of 23	**8.99E+00**	**2.86E+01**	U3R-3	**4.12E+01**
Neptunium-237	3 of 18	< 1.78E-03	< 1.32E-03	Downstream of R-1	**6.37E-02**
Nonvolatile Beta	23 of 23	**6.30E+00**	**1.87E+01**	Downstream of R-1	**4.11E+01**
Plutonium-238	14 of 18	**3.30E-03**	< 1.11E-03	Downstream of R-1	**2.01E+00**
Plutonium-239/240	14 of 18	**2.98E-03**	< 3.87E-03	Downstream of R-1	**2.01E+00**
Strontium-90	6 of 18	< 9.05E-02	**7.58E-02**	Downstream of R-1	**1.92E+00**
Uranium-233/234	17 of 18	**7.97E-01**	**1.07E+00**	SC-2A	**3.54E+00**
Uranium-235	16 of 18	**3.03E-02**	**7.75E-02**	Downstream of R-1	**5.14E-01**
Uranium-238	17 of 18	**7.09E-01**	**1.11E+00**	SC-2A	**3.62E+00**

Stormwater Basin Sediment Results

Eight Basin Locations Compared to Two Stream Control Locations

Analyte	Number >DL	Control TC-1 (pCi/g)	Control U3R-1A (pCi/g)	Location of Maximum Result	Maximum Result (pCi/g)
Americium-241	8of 10	**3.19E-03**	**1.87E-03**	Z-Basin	**4.24E-01**
Cesium-137	6 of 10	< 4.66E-02	**8.05E-02**	Z-Basin	**1.43E+03**
Cobalt-60	0 of 10	< 4.04E-02	< 6.46E-02	All < MDA	All < MDA
Curium-243/244	3 of 10	< 1.07E-03	< 1.05E-03	Z-Basin	**4.92E-01**
Gross Alpha	10 of 10	**8.99E+00**	**2.86E+01**	Pond 400	**2.66E+01**
Neptunium-237	1 of 10	< 1.78E-03	< 1.32E-03	Z-Basin	**5.44E-02**
Nonvolatile Beta	10 of 10	**6.30E+00**	**1.87E+01**	Z-Basin	**1.21E+03**
Plutonium-238	6 of 10	**3.30E-03**	< 1.11E-03	Z-Basin	**8.42E-01**
Plutonium-239/240	8 of 10	**2.98E-03**	**3.87E-03**	Z-Basin	**7.78E-01**
Strontium-90	2 of 10	< 9.05E-02	< 9.01E-02	E-003	**1.90E+00**
Uranium-233/234	9 of 10	**7.97E-01**	**1.07E+00**	Pond 400	**2.13E+00**
Uranium-235	9 of 10	**3.03E-02**	**7.75E-02**	Z-Basin	**5.11E-01**
Uranium-238	9 of 10	**7.09E-01**	**1.11E+00**	Pond 400	**2.06E+00**

Appendix Table D-14 Summary of Radionuclides in Drinking Water

Bolded minimum and maximum concentration results were reported as detected. Minimum and maximum concentrations not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large.

Samples at the treatment plants are collected monthly. These samples are analyzed for tritium, Co-60, Cs-137, gross alpha, and gross beta. For the treatment plants samples, all results for Co-60 and Cs-137 were below detection limits; therefore, they were not reported in the table below. Samples are collected onsite annually for tritium, Co-60, Cs-137, gross beta, gross alpha, Am-241, Sr-89/90, U-234, U-235, U-238, Pu-238, Pu-239, and Cm-244. For the onsite annual samples, all results for tritium, Co-60, Cs-137, Sr-89/90, U-235, Pu-239, and Cm-244 were below detection limits; therefore, they were not reported in this table.

Treatment Plants—Finished Water Summary

	Tritium				
Locations	**Number of Samples**	**Number of Detects**	**Mean Concentration (pCi/L)**	**Minimum Concentration (pCi/L)**	**Maximum Concentration (pCi/L)**
BJWSA Purrysburg WTP	12	5	1.65E+02	6.76E+01	**3.74E+02**
North Augusta Public Water Works	12	2	5.40E+01	-2.64E+01	**1.48E+02**

	Gross Beta				
Locations	**Number of Samples**	**Number of Detects**	**Mean Concentration (pCi/L)**	**Minimum Concentration (pCi/L)**	**Maximum Concentration (pCi/L)**
BJWSA Purrysburg WTP	12	12	1.90E+00	**1.49E+00**	**2.32E+00**
North Augusta Public Water Works	12	12	1.92E+00	**1.52E+00**	**2.81E+00**

	Gross Alpha				
Locations	**Number of Samples**	**Number of Detects**	**Mean Concentration (pCi/L)**	**Minimum Concentration (pCi/L)**	**Maximum Concentration (pCi/L)**
BJWSA Purrysburg WTP	12	1	1.24E-01	-5.94E-02	**5.46E-01**
North Augusta Public Water Works	12	0	3.81E-02	-9.22E-02	9.98E-02

Appendix Table D-14 Summary of Radionuclides in Drinking Water (continued)

Onsite Location Summary—Annual Samples

		U-234	U-238	Am-241
Location	**Number of Samples**	**Concentration (pCi/L)**	**Concentration (pCi/L)**	**Concentration (pCi/L)**
617-8G	1	6.70E-03	5.54E-04	6.65E-03
681-3G	1	4.07E-03	-1.85E-03	1.45E-03
704-16G	1	7.95E-03	6.05E-04	1.45E-02
709-1G	1	2.78E-03	**1.22E-02**	**1.29E-02**
737-G	1	-6.54E-06	-1.58E-03	6.24E-04
782-3A	1	**2.24E-02**	**3.35E-02**	9.00E-03
905-113G Well	1	7.89E-03	**3.78E-02**	2.78E-03
905-125B	1	5.97E-03	3.24E-03	9.49E-03
905-67B	1	**9.57E-03**	4.03E-03	3.00E-03

Onsite Location Summary—Annual Samples (continued)

		Pu-238	Gross Beta	Gross Alpha
Location	**Number of Samples**	**Concentration (pCi/L)**	**Concentration (pCi/L)**	**Concentration (pCi/L)**
617-8G	1	**2.33E-02**	**9.00E-01**	2.00E-01
681-3G	1	-4.14E-04	**3.43E+00**	**1.19E+00**
704-16G	1	1.53E-03	**1.65E+00**	**1.74E+00**
709-1G	1	2.09E-03	**1.49E+00**	9.89E-03
737-G	1	4.89E-03	**1.45E+00**	1.94E-01
782-3A	1	-1.05E-03	**1.65E+00**	**6.76E-01**
905-113G Well	1	1.14E-02	**1.16E+00**	**1.06E+00**
905-125B	1	**2.97E-02**	**1.62E+00**	**1.39E+00**
905-67B	1	4.41E-03	**1.16E+00**	**1.10E+00**

Appendix Table D-15 Summary of Radionuclides in Freshwater Fish

Bolded minimum and maximum concentration results were reported as detected. Minimum and maximum concentrations not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large. Sr-89/90 is the only analysis performed in both flesh (edible) and bone (nonedible) samples. All Co-60, I-129, and gross alpha results were not detected; therefore, they were not reported in this table.

The analyte mean is set to zero if all composite values per fish species at a single location are less than the MDL or the uncertainty is large. Three composite samples were analyzed for each fish type from each location, except flathead catfish and panfish from Upper Three Runs Creek River Mouth, respectively.

Cs-137 (Edible)												
	Bass			Catfish			Flathead			Panfish		
Location	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**
Augusta L&D	**2.89*E+01**	**1.30E+01**	**5.26E+01**	1.45E+01	1.13E+01	**1.70E+01**	N /A	N/A	N/A	**6.52E+01**	**1.96E+01**	**9.08E+01**
Four Mile Creek River Mouth	**8.24E+01**	**5.45E+01**	**1.22E+02**	**4.33E+01**	**3.49E+01**	**5.67E+01**	3.12E+01	1.66E+01	**4.83E+01**	**7.75E+01**	**3.18E+01**	**1.27E+02**
Hwy 301 Bridge Area	**1.62E+01**	**1.38E+01**	**2.00E+01**	**1.77E+01**	**1.41E+01**	**2.15E+01**	**2.10E+01**	**1.90E+01**	**2.48E+01**	9.93E+00	6.83E+00	**1.40E+01**
Lower Three Runs Creek River Mouth	2.52E+01	1.62EE+01	**3.12E+01**	**4.79E+02**	**2.79E+02**	**8.15E+02**	**6.12E+01**	**3.48E+01**	**1.03E+02**	**2.47E+02**	**1.02E+02**	**5.01E+02**
Steel Creek River Mouth	**1.35E+02**	**9.79E+01**	**1.68E+02**	**7.66E+01**	**6.19E+01**	**9.93E+01**	**7.62E+01**	**4.57E+01**	**1.36E+02**	**6.71E+01**	**5.19E+01**	**9.10E+01**
Upper Three Runs Creek River Mouth	**3.69E+01**	**1.64E+01**	**6.73E+01**	0.00E+00	1.09E+01	1.44E+01	**6.38E+01**	**3.45E+01**	**9.17+01**	0.00E+00	7.50E+00	9.91E+00

Appendix Table D-15 Summary of Radionuclides in Freshwater Fish (continued)

Sr-89/90 (Edible)												
	Bass			Catfish			Flathead			Panfish		
Location	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**
Augusta L&D	0.00E+00	5.17E-01	2.93E+00	0.00E+00	-1.86E+00	4.18E+00	N/A	N/A	N/A	0.00E+00	1.24E+00	2.55E+00
Four Mile Creek River Mouth	2.44E+00	2.20+00	2.57+00	2.49E+00	5.91E-01	**5.75E+00**	1.72E+00	2.16E-02	**4.31E+00**	0.00E+00	1.17E+00	1.82E+00
Hwy 301 Bridge Area	0.00E+00	6.07E-01	1.36E+00	0.00E+00	1.95E+00	2.32E+00	0.00E+00	-2.81E-01	2.13E+00	0.00E+00	-3.50E+00	4.93E+00
Lower Three Runs Creek River Mouth	0.00E+00	-5.71E-01	3.02E+00	0.00E+00	1.22E+00	2.13E+00	0.00E+00	-2.89E-01	1.90E+00	0.00E+00	-5.82E-01	4.22E+00
Steel Creek River Mouth	0.00E+00	-5.28E-01	1.62E+00	0.00E+00	-6.92E-01	1.95E+00	0.00E+00	-1.86E-01	1.74E+00	0.00E+00	-6.38E-01	4.87E+00
Upper Three Runs Creek River Mouth	2.29E+00	1.16E+00	**3.78E+00**	0.00E+00	5.90E-02	1.22E+00	0.00E+00	7.37E-01	1.70E-00	1.88E+00	1.51E-01	**3.61E+00**

Sr-89/90 (Nonedible)												
	Bass			Catfish			Flathead			Panfish		
Location	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**
Augusta L&D	**1.02E+02**	**9.22E+01**	**1.18E+02**	**8.04E+01**	**6.22E+01**	**1.03E+02**	N/A	N/A	N/A	**1.16E+02**	**8.51E+01**	**1.37E+02**
Four Mile Creek River Mouth	**5.07E+02**	**1.76E+02**	**1.11E+03**	**1.15E+02**	**7.65E+01**	**1.50E+02**	**8.31E+01**	**5.67E+01**	**1.02E+02**	**3.73E+02**	**1.63E+02**	**5.58E+02**
Hwy 301 Bridge Area	**7.40E+01**	**4.99E+01**	**1.01E+02**	**9.39E+01**	**7.16E+01**	**1.05E+02**	**8.00E+01**	**5.32E+01**	**9.54E+01**	**9.49E+01**	**8.08E+01**	**1.21E+02**
Lower Three Runs Creek River Mouth	**9.36E+01**	**8.37E+01**	**1.02E+02**	**8.53E+01**	**5.98E+01**	**1.02E+02**	**9.54E+01**	**6.59E+01**	**1.25E+02**	**1.13E+02**	**9.28E+01**	**1.34E+02**
Steel Creek River Mouth	**1.54E+02**	**1.06E+02**	**2.12E+02**	**9.38E+01**	**7.49E+01**	**1.15E+02**	**9.20E+01**	**6.53E+01**	**1.15E+02**	**9.53E+01**	**9.13E+01**	**9.75E+01**
Upper Three Runs Creek River Mouth	**1.02E+02**	**7.35E+01**	**1.40E+02**	5.82E+01	5.65E+01	**5.97E+01**	**7.34E+01**	**1.05E-02**	**1.07E+02**	**1.24E+02**	**8.98E+01**	**1.48E+02**

Appendix Table D-15 Summary of Radionuclides in Freshwater Fish (continued)

Tc-99 (Edible)

Location	Bass			Catfish			Flathead			Panfish		
	Mean (pCi/kg)	Minimum (pCi/kg)	Maximum (pCi/kg)	Mean (pCi/kg)	Minimum (pCi/kg)	Maximum (pCi/kg)	Mean (pCi/kg)	Minimum (pCi/kg)	Maximum (pCi/kg)	Mean (pCi/kg)	Minimum (pCi/kg)	Maximum (pCi/kg)
Augusta L&D	0.00E+00	2.22E+01	3.22E+01	0.00E+00	-8.87E+00	2.42E+01	N/A	N/A	N/A	0.00E+00	6.04E+00	3.75E+01
Four Mile Creek River Mouth	0.00E+00	-2.76E+01	3.02E+01	0.00E+00	-1.24E+01	1.74E+01	0.00E+00	2.88E+00	6.20E+00	0.00E+00	1.50E-04	1.78E+01
Hwy 301 Bridge Area	0.00E+00	-2.55E+01	1.90E+01	0.00E+00	2.40E+01	3.23E+01	0.00E+00	-1.90E+00	1.64E+01	0.00E+00	-5.33E+00	1.56E+01
Lower Three Runs Creek River Mouth	5.20E+01	3.03E+01	**6.81E+01**	0.00E+00	2.27E+01	4.29E+01	0.00E+00	1.64E+01	3.24E+01	0.00E+00	1.05E+01	5.67E+01
Steel Creek River Mouth	0.00E+00	3.29E+01	5.16E+01	0.00E+00	2.25E+01	5.39E+01	0.00E+00	2.16E+01	3.51E+01	0.00E+00	3.75E+01	5.06E+01
Upper Three Runs Creek River Mouth	0.00E+00	-1.43E+01	1.64E+00	0.00E+00	-2.28E+01	2.61E+01	0.00E+00	-2.89E-01	7.85E+00	0.00E+00	-8.57E+00	8.14E+00

Gross Beta (Edible)

Location	Bass			Catfish			Flathead			Panfish		
	Mean (pCi/kg)	Minimum (pCi/kg)	Maximum (pCi/kg)	Mean (pCi/kg)	Minimum (pCi/kg)	Maximum (pCi/kg)	Mean (pCi/kg)	Minimum (pCi/kg)	Maximum (pCi/kg)	Mean (pCi/kg)	Minimum (pCi/kg)	Maximum (pCi/kg)
Augusta L&D	**1.31E+03**	**1.15E+03**	**1.51E+03**	**1.23E+03**	**1.03E+03**	**1.39E+03**	N/A	N/A	N/A	**1.25E+03**	**1.12E+03**	**1.42E+03**
Four Mile Creek River Mouth	**1.32E+03**	**1.21E+03**	**1.51E+03**	**1.31E+03**	**1.19E+03**	**1.37E+03**	**1.35E+03**	**1.12E+03**	**1.53E+03**	**1.21E+03**	**1.08E+03**	**1.28E+03**
Hwy 301 Bridge Area	**8.59E+02**	**7.85E+02**	**9.39E+02**	**7.92E+02**	**6.40E+02**	**9.56E+02**	**8.96E+02**	**7.28E+02**	**9.86E+02**	**1.01E+03**	**9.46E+02**	**1.06E+03**
Lower Three Runs Creek River Mouth	**9.84E+02**	**7.86E+02**	**1.28E+03**	**8.31E+02**	**7.81E+02**	**9.11E+02**	**8.12E+02**	**7.32E+02**	**9.08E+02**	**8.94E+02**	**7.76E+02**	**1.11E+03**
Steel Creek River Mouth	**7.68E+02**	**6.58E+02**	**8.35E+02**	**7.91E+02**	**5.78E+02**	**9.27E+02**	**9.09E+02**	**8.79E+02**	**9.32E+02**	**7.78E+02**	**6.20E+02**	**8.73E+02**
Upper Three Runs Creek River Mouth	**1.08E+03**	**9.77E+02**	**1.21E+03**	**1.22E+03**	**1.16E+03**	**1.35E+03**	**1.30E+03**	**1.20E+03**	**1.46E+03**	**9.82E+02**	**8.14E+02**	**1.15E+03**

Appendix Table D-16 Summary of Radionuclides in Saltwater Fish

Bolded minimum and maximum concentration results were reported as detected. Minimum and maximum concentrations not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large. Sr-89/90 is the only analysis performed in both flesh (edible) and bone (nonedible) samples. Results of all samples for Cs-137, Co-60, gross alpha, I-129, and Tc-99 were below method detection limits.

All saltwater fish are collected at the location designated as RM 0–8 (mouth of Savannah River).

	Marine Mullet				
Analyte	**Number of Samples**	**Number of Results > Detection Limit**	**Mean (pCi/kg)**	**Minimum (pCi/kg)**	**Maximum (pCi/kg)**
Gross Beta	3	3	**7.94E+02**	**6.34E+02**	**9.67E+02**
Sr-89/90 (Edible)	3	1	3.06E+00	5.62E-01	**4.78E+00**
Sr-89/90 (Nonedible)	3	1	2.72E+01	7.68E+00	**5.55E+01**

Appendix Table D-17 Summary of Radionuclides in Shellfish

Bolded minimum and maximum concentration results were reported as detected. Minimum and maximum concentrations not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large. All Cs-137, Co-60, Gross Alpha, I-129, Sr-89/90, and Tc-99 results were not detected; therefore, they were not reported in this table.

All shellfish are collected at the location designated as RM 0-8 (at the mouth of Savannah River).

The species of shellfish collected in 2022 were crab and shrimp

Specie	Nuclide	Number of Samples	Number of Results > Detection Limit	Mean Concentration (pCi/kg)	Minimum Concentration (pCi/kg)	Maximum Concentration (pCi/kg)
Crab	Gross Beta	1	1	**8.11E+02**	**8.11E+02**	**8.11E+02**
Shrimp	Gross Beta	1	1	**8.42E+02**	**8.42E+02**	**8.42E+02**

Appendix Table D-18 Summary of Radionuclides in Wildlife

Bolded concentration results were reported as detected. Minimum and maximum concentrations not bolded indicate the result was less than the analytical method detection limit or the uncertainty is large. All Co-60 results were below detection limits; therefore, they are not reported in this table.

Sample Type	Nuclide	Number of Samples	Number of Results > Detection Limit	Mean Sample Concentration (pCi/g)	Minimum Sample Concentration (pCi/g)	Maximum Sample Concentration (pCi/g)
Deer Flesh	Cs-137	34	34	1.02E+00	**2.58E-01**	**2.90E+00**
Hog Flesh	Cs-137	6	6	1.39E+00	**6.80E-01**	**3.05E+00**
Deer Flesh	Sr-89/90	34	1	2.14E-03	-2.52E-03	**9.44E-03**
Hog Flesh	Sr-89/90	6	0	1.09E-03	-9.27E-04	5.57E-03
Deer Bone	Sr-89/90	34	34	2.41E+00	**5.48E-01**	**5.83E+00**
Hog Bone	Sr-89/90	6	6	4.36E+00	**1.77E+00**	**1.11E+01**

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