ESOP

Environmental Surveillance and Oversight Program

2024 DATA REPORT

SC DEPARTMENT *of* ENVIRONMENTAL SERVICES

Aiken Environmental Affairs Office
206 Beaufort Street, NE
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CR-004111 12/25

Acknowledgements

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On July 1st, 2024, the South Carolina Department of Health and Environmental Control (DHEC) split into two new state agencies. These agencies are the South Carolina Department of Public Health (SCDPH) and the South Carolina Department of Environmental Services (SCDES). The Environmental Surveillance and Oversight Program transitioned to SCDES and this report is published under this agency. For the 2024 monitoring year, the program was under DHEC for the first half of the year and SCDES for the second half. The monitoring and results from 2024 are considered from SCDES in this data report.

ESOP acknowledges the efforts of the following individuals that provided valuable support for publishing the 2024 ESOP Data Report:

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Cover photo provided by Hannah Herlong, SCDES Federal Facilities Agreement Program Compliance Inspector

Special Notes:

*Bethany Holt joined the ESOP team in May 2024 and became the Soil, Terrestrial Vegetation, Edible Vegetation, and Milk Project Manager.

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Purpose

PURPOSE OF THIS REPORT

WHAT: South Carolina's Department of Environmental Services (SCDES) monitors the Department of Energy's Savannah River Site (SRS) for potential contaminants and produces a report of all its annual findings.

WHY: Due to nuclear material testing and lack of environmental regulations during the Cold War era, radioactive and non-radioactive constituents are present on SRS property. SRS personnel have been sampling multiple media for many years. However, to verify the data being collected on and around SRS, SCDES conducts independent monitoring associated with the site to provide a second set of results for comparison.

HOW: In order to have a verification system for SRS's annual data, the Department of Energy-Savannah River (DOE-SR) partnered with SCDES as part of a 1995 Agreement in Principle (AIP) to create the Environmental Surveillance and Oversight Program (ESOP). ESOP is a division of SCDES specific to the Midlands Aiken Environmental Affairs Office. There are 9 team members with varying expertise working in ESOP that collect and analyze samples of air, water, soil, sediment, vegetation, milk, fish, and game for radiological and nonradiological constituents.

WHERE: Samples are collected on site property, around its perimeter, and in background locations. Depending upon the media, some SCDES sample locations coincide with those of DOE-SR. These locations are compared in our report.

WHEN: Samples are collected weekly, quarterly, biannually, and annually and are dependent upon the type of media and can be affected by availability of the resource, accessibility, and weather.

Basic Radiation Overview

RADIATION – Occurs when an unstable atom tries to become stable by releasing some of its energy in the form of an alpha or beta particle or gamma wave.

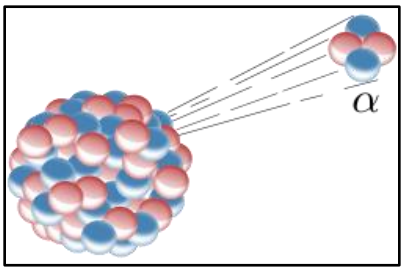
TYPES OF RADIATION

ALPHA – results when the nucleus of an atom releases two protons and two neutrons. Due to this particle being heavier in mass, it can be stopped by the air, skin, or paper. External exposure is not dangerous, but if swallowed, breathed in, or enters a person through a cut, it can harm the human body.

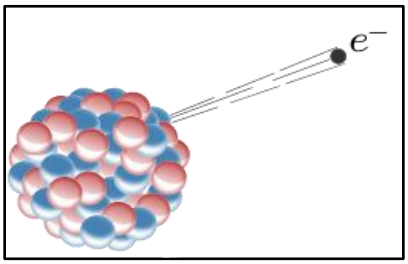
BETA – occurs when an atom releases an electron (negative charge). Since it is lighter in mass and faster moving, it can travel greater distances and can be stopped by a layer of wood or metal but can penetrate the outer layer of skin. It can cause skin burns.

GAMMA – is the release of pure energy that is fast moving and able to travel longer distances until it hits either concrete or lead. It will pass through the human body resulting in internal and external bodily damage.

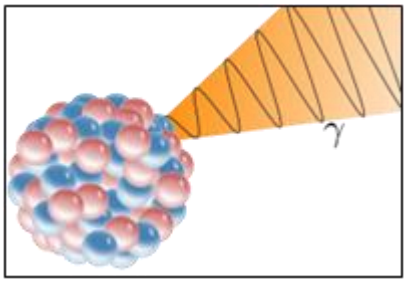
ALPHA RADIATION:



BETA RADIATION:



GAMMA RADIATION:



RADIATION:

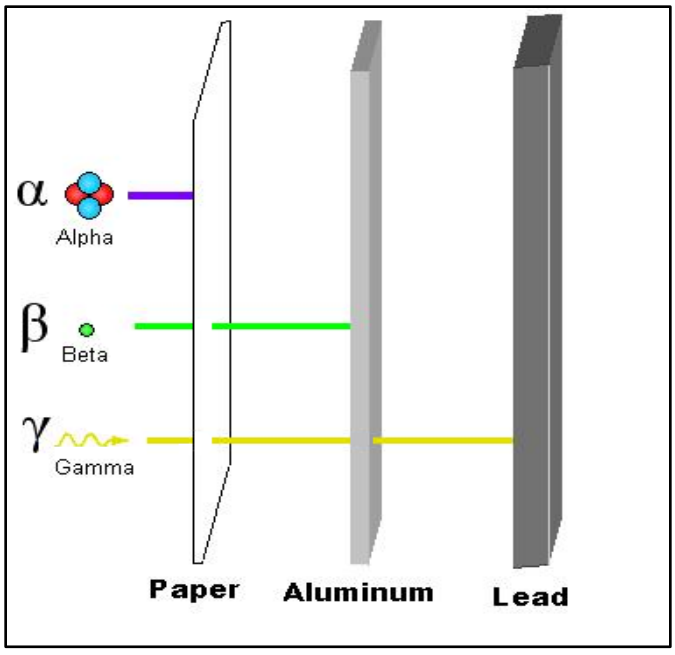


Table of Content

Table of Content

Table of Content

Table of Content

List of Analytes

Table 1. Gamma Analytes

Radioisotope	Abbreviation
Actinium-228	Ac-228
Americium-241	Am-241
Beryllium-7	Be-7
Cerium-144	Ce-144
Cobalt-58	Co-58
Cobalt-60	Co-60
Cesium-134	Cs-134
Cesium-137	Cs-137
Curium-243/244	Cm-243/244
Europium-152	Eu-152
Europium-154	Eu-154
Europium-155	Eu-155
Hydrogen-3 (Tritium)	H-3
Iodine-129	I-129
Iodine-131	I-131
Potassium-40	K-40
Plutonium-238	Pu-238
Plutonium-239/240	Pu-239/240
Manganese-54	Mn-54
Sodium-22	Na-22
Lead-212	Pb-212
Lead-214	Pb-214
Radium-226	Ra-226
Ruthenium-103	Ru-103
Antimony-125	Sb-125
Strontium-89/90	Sr-89/90
Technetium-99	Tc-99
Thorium-234	Th-234
Thallium-234	Tl-234
Uranium-233/234	U-233/234
Uranium-235	U-235
Uranium-238	U-238
Yttrium-88	Y-88
Zinc-65	Zn-65
Zirconium-95	Zr-95

Table 2. Metal Analytes

Analyte	Abbreviation
Aluminum	Al
Barium	Ba
Beryllium	Be
Cadmium	Cd
Calcium	Ca
Chromium	Cr
Copper	Cu
Iron	Fe
Lead	Pb
Magnesium	Mg
Manganese	Mn
Mercury	Hg
Nickel	Ni
Thallium	Tl
Zinc	Zn

Acronyms and Units of Measure

LIST OF ACRONYMS

ABR	Allendale Barricade
AEI	Average Exposed Individual
AIK	Aiken
AIP	Agreement in Principle
AKN	Sample locations in Aiken County
ALD	Sample locations in Allendale County
ALN	Allendale
ARESD	Analytical and Radiological Environmental Services Division
ATSDR	Agency for Toxic Substances and Disease Registry
BGN	Burial Grounds North
B/J	Beaufort-Jasper Water and Sewer Authority
BKG	Background
BOD	Biochemical Oxygen Demand
BWL	Sample locations in Barnwell County
CDC	Centers for Disease Control and Prevention
DHEC	South Carolina Department of Health and Environmental Control
DIL	Derived Intervention Level
DKH	Dark Horse at the Williston Barricade
DNR	South Carolina Department of Natural Resources
DO	Dissolved Oxygen
DOE	Department of Energy
DOE-SR	Department of Energy-Savannah River
DW	Drinking Water
ESOP	Environmental Surveillance and Oversight Program
EPA	United States Environmental Protection Agency
ESV	Ecological Screening Value
FDA	United States Food and Drug Administration
GW	Groundwater
HLW	High Level Waste
Hwy. 17	United States Highway 17
Hwy. 301	United States Highway 301
IAEA	International Atomic Energy Agency
JAK	Jackson
LLD	Lower Limit of Detection
LLW	Low Level Waste
MCL	Maximum Contaminant Level
MDA	Minimum Detectable Activity
MDC	Minimum Detectable Concentration
MDL	Minimum Detection Level
MEI	Maximum Exposed Individual
MPN	Most Probable Number
NA	Not Applicable
ND	Not Detected
NEL	New Ellenton
NORM	Naturally Occurring Radioactive Material
NRC	National Regulatory Commission
NS	No Sample

Return to TOC

NSBLD	New Savannah Bluff Lock & Dam
PCB	Polychlorinated Biphenyls
PRG	Preliminary Remediation Goals
RM	River Mile
RSL	Regional Screening Level
RSW	Radiological Surface Water
SCAT	South Carolina Advanced Technology
SCDES	South Carolina Department of Environmental Services
SRNL	Savannah River National Laboratory
SRNS	Savannah River Nuclear Solutions
SRS	Savannah River Site
SSL	Soil Screening Level
SW	Surface Water
TKN	Total Kjeldahl Nitrogen
TLD	Thermoluminescent Dosimeter
TSP	Total Suspended Particulates
TSS	Total Suspended Solid
USFS	United States Forestry Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound

UNITS OF MEASURE

<	Less than
±	Plus or minus. Refers to one standard deviation unless otherwise stated
±2	Plus or minus 2 standard deviations.
°C	Temperature in Celsius
Ci	Curie
cnt	Counts
g/mL	Grams per milliliter
hrs/yr	Hours per year
kg/yr	Kilograms per year
L/yr	Liters per year
m^3/yr	Cubic meters per year
mg/day	Milligrams per day
mg/kg	Milligrams per kilogram
mg/L	Milligrams Per Liter
mL	Milliliter
mL/L	Milliliter per liter
MPN	Most Probable Number
mrem	Millirem or milliroentgen equivalent man
NTU	Nephelometric Turbidity Unit
pCi/g	Picocuries per gram
pCi/L	Picocuries per liter
pCi/m^3	Picocuries per cubic meter
pCi/mL	Picocuries per milliliter
SU	Standard units

Return to TOC

Introduction

In 1950, the U.S. Atomic Energy Commission established the Savannah River Site (SRS) (1954-1992) with the mission of producing nuclear materials, primarily tritium and plutonium. SRS is a Department of Energy (DOE) facility located approximately 20 miles from Aiken, South Carolina. SRS boundaries lie within Aiken, Allendale, and Barnwell counties and span approximately 310 square miles. During legacy operations, radionuclides were released into the surface water, groundwater, soils, and atmosphere. Although the reactors are no longer operating, work continues at SRS with the primary focus being on cleaning up legacy wastes and remediating areas associated with former operations.

Due to the large number of contaminants that could potentially be released from SRS, the Centers for Disease Control and Prevention (CDC) performed a site assessment to determine the potential health effects of any discharged radionuclides to the off-site public. Most of the radiological releases originated from processes associated with the reactor areas (R, K, P, L, and C) and the separations areas (F and H), but there are other areas of releases as a result of the varied processes at SRS.

P Reactor at SRS – No longer in operation

Tritium was one of the principle nuclear materials produced at SRS to multiply the firepower of plutonium in nuclear weapons (Till et al., 2001). Tritium releases originated from processes associated with the reactors, separations areas, D-Area, and tritium facilities. The two main types of tritium releases came from direct site facility releases and migration from seepage basins in the separation areas, the burial ground, and the K-Area containment basin. In the early operational years, nearly 100 percent of the discharges to streams were related to direct releases. Tritiated water's ability to react chemically like nonradioactive water in living cells lends itself to be more hazardous biologically than tritium gas (CDC SRSHES, 1997).

Alpha-emitting and beta-emitting radionuclides were also released to liquid effluent. Alpha-emitting radionuclide releases from M-Area primarily affected Tims Branch, which ultimately flows into Upper Three Runs Creek. Fourmile Branch is the stream most affected by alpha- and beta-emitting releases coming from the separation areas, and releases from the reactor areas affected all streams except for Upper Three Runs Creek (Till et al., 2001). Steel Creek, Pen Branch, and Lower Three Runs Creek were mainly affected by beta-emitting releases from the reactors. Strontium-90 (Sr-90) is a main contributor of beta activity and came primarily from the reactors (Till et al., 2001).

Plutonium was manufactured at SRS in H-Area from fuel rods and in F-Area from targets (Till et al., 2001). Releases at SRS occurred primarily through the discharge of liquid waste into streams. Iodine-129 (I-129) is a fission product of reactor fuel that has a very long half-life. Most occurred during fuel processing (Till et al., 2001). Technetium-99 (Tc-99) was produced in SRS production reactors as a fission by-product of uranium and plutonium. This radionuclide was released to the environment from the separations areas ventilation systems, the aqueous

Return to TOC

environment from liquid waste in waste tanks, and the Solid Waste Disposal Facility (Westinghouse Savannah River Company [WSRC], 1993).

Strontium was a fission product in SRS reactors, subsequently released from F-Area and H-Area (WSRC, 1998). SRS operations have also released strontium into the environment through normal site operations and equipment failures.

H Canyon at SRS – Still in operation at the site
Photo by DOE-SR. CC BY 2.0

Routine operations at SRS have released cesium-137 (Cs-137) to the regional environment surrounding SRS. The most significant releases occurred during the early years of site operation when Cs-137 was released to seepage basins and site streams. The SRS facilities that have documented Cs-137 releases are the production reactors, separations areas, liquid waste facilities, solid waste disposal facility, central shops, heavy water rework facility, Saltstone Facility, and the Savannah River National Laboratory (SRNL).

Historically, the Department of Energy-Savannah River (DOE-SR) has been self-regulating regarding environmental monitoring. Until 1995, the public had to rely solely on DOE-SR to ensure their health and the environment was protected. DOE-SR formed an Agreement in Principle (AIP) with the South Carolina Department Health and Environmental Control (DHEC) to perform independent environmental surveillance and oversight of SRS. On July 1st, 2024, DHEC split into two agencies and the AIP was continued through the South Carolina Department of Environmental Services (SCDES). This partnership provides an extra source of information to the public regarding the effectiveness of the DOE-SR monitoring activities. From this agreement, the Environmental Surveillance and Oversight Program (ESOP) of SCDES was initiated to supplement and compliment monitoring functions of this unique facility. SCDES monitoring provides an added protection due to the potential for environmental releases that pose a threat to the state.

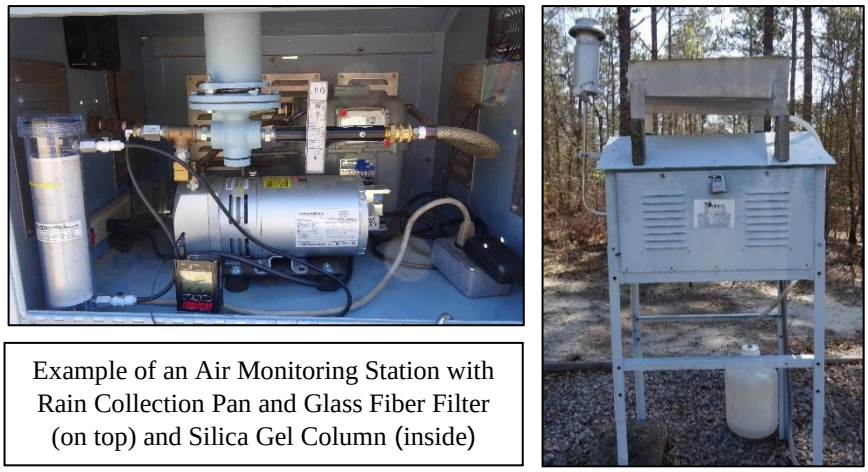
Program development at SRS is stable and evolves based on changing missions. The foremost focus is on legacy waste and materials that are stored or have been disposed of on-site and pose a current risk of release to the environment. Some of DOE-SR's primary activities are concerned with identifying concentrations and migration of radionuclides in the aquatic environment, detecting and verifying accidental releases, characterizing concentration trends, and determining associated impacts on human health and the environment. This report provides results of samples collected by SCDES related to SRS, trending data to document how contaminants are changing, and information on how these changes may impact the surrounding communities. The data reported by SCDES is based on detections only. DOE-SR provides raw data to SCDES to evaluate and compare results between the programs. SCDES's ESOP will continue its mission of monitoring and oversight around SRS to ensure the site's on-going activities continue to be safe for the public and the environment.

Chapter 1 Radiological Atmospheric Monitoring on and Adjacent to SRS

Return to TOC

1.1.0 PROJECT SUMMARY

Atmospheric transport has the potential to impact the citizens of South Carolina from releases associated with activities at SRS. The Atmospheric Monitoring Project conducts routine, quantitative monitoring of atmospheric radionuclide releases associated with SRS, which it uses to identify concentration trends that could require further investigation. Air monitoring capabilities in 2024 included nineteen dosimeter monitoring locations and seven air monitoring stations that collected samples using glass fiber filters, rain collection pans, and silica gel columns. Glass fiber filters are used to collect total suspended particulates (TSP) in the air. Particulates are collected weekly and analyzed for gross alpha and beta-emitting activity. Precipitation, when present, and silica gel distillates of atmospheric moisture are sampled and analyzed monthly for tritium. Dosimeters are collected and analyzed every quarter for ambient beta/gamma levels. Radiological atmospheric monitoring sites were established to provide spatial coverage of the project area (Sections 1.4.0, Map and 1.5.0, Table 1). One air monitoring station is located at the center of the site, three are at the SRS perimeter, and three are found outside of the site boundary within public areas. The Air Stations in Jackson, S.C. (JAK) and New Ellenton, S.C. (NEL) are considered perimeter locations due to their proximity to the SRS boundary. The Aiken Elementary Water Tower (AIK) Air Station is within a 25-mile radius from SRS and is not considered a perimeter location. Thirteen of the dosimeters are on or near the site perimeter, one is in the center of the site, and five are within 25 miles of the site in surrounding population centers. SCDES emphasizes monitoring SRS perimeter locations for radionuclides in atmospheric media for potential public exposure. Section 1.5.0, Table 1 includes sample ID, location, and sampling station proximity to SRS for all SCDES air and dosimeter monitoring locations. Some SCDES monitoring locations are collocated with the DOE-SR. Though the SCDES and DOE-SR equivalent Jackson, S.C (JAK) Air Stations are not directly collocated, they are considered collocated due to the proximity to one another for comparison purposes. Additionally, TLD-02, TLD-11, and TLD-18 are not directly collocated, but they are considered collocated due to their proximity to corresponding DOE-SR OSLDs. Analytical comparisons made between SCDES and DOE-SR are from collocated monitoring locations except for yearly average dosimeter comparisons.



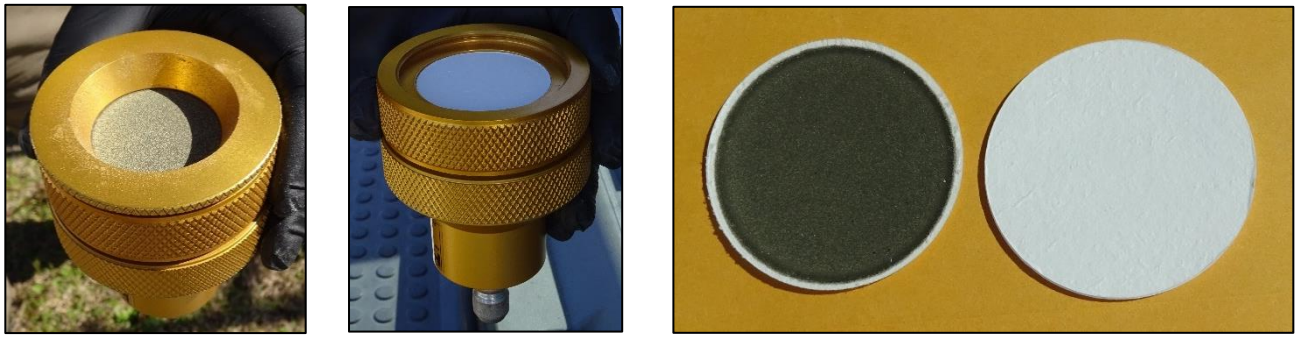
Example of an Air Monitoring Station with Rain Collection Pan and Glass Fiber Filter (on top) and Silica Gel Column (inside)

1.2.0 RESULTS AND DISCUSSION

Air Monitoring Summary Statistics can be found in Section 1.6.0 and all Air Monitoring Data can be found in the 2024 SCDES Data File.

1.2.1 Total Suspended Particulates

SCDES and DOE-SR had both gross alpha and gross beta detections in 2024. Small seasonal variations at each monitoring location have been consistent with historically reported SCDES



Glass fiber filter being collected for total suspended particulates: Used filter (left) vs. unused filter (right)

values. Section 1.5.0 illustrates trends for the last five years for average gross alpha activity (Figure 1) and average gross beta activity (Figure 2) at collocated SRS perimeter locations.

1.2.2 Ambient Beta/Gamma

SCDES conducts ambient beta/gamma monitoring through the deployment of dosimeters at the center of and around the perimeter of SRS. In 2024, SCDES ambient beta/gamma average quarterly totals ranged from 22.00 (TLD-04 & TLD-07) to 32.25 (TLD-02) mrem. Section 1.5.0, Figure 3 shows the yearly average data trends for ambient beta/gamma values in off-site dosimeters for SCDES and DOE-SR.

Example of dosimeters present at 19 locations

1.2.3 Tritium

Tritium continues to be the predominant radionuclide detected in the perimeter samples. Most of the tritium detected in SCDES perimeter samples may be attributed to the release of tritium from tritium facilities, separation areas, and from wide-spread and fleeting sources (SRNS, 2025).

Tritium in Air

Tritium in air values reported by SCDES are the result of using the historical method of calculating an air concentration of tritium based on the upper limit value of absolute humidity (11.5 grams of atmospheric moisture per cubic meter) in the geographic region (NCRP, 1984). This number is a dose equivalent concentration that would yield approximately 10 mrem to a member of the public at the site boundary (EPA, 2025a).

The collocated perimeter average for SCDES tritium in air activity (4.77 pCi/m^3) was lower than the DOE-SR collocated perimeter average activity (15.49 pCi/m^3) (SNRN, 2025). These variations could be caused by different sample location frequencies and method of calculating air concentration. The overall perimeter average for SCDES tritium in air activity was 4.76 pCi/m^3.

Average tritium in air activity at the SRS perimeter reported by SCDES and DOE-SR for 2024 was higher than average reported in 2023. These levels have fluctuated over the last five years. Section 1.5.0, Figure 4 illustrates data trends of atmospheric tritium activity for SCDES and DOE-SR as measured and calculated at the SRS perimeter.

Collecting atmospheric moisture from silica gel through distillation

Silica Gel Column

Tritium in Precipitation

In 2024, SCDES and DOE-SR averages for tritium activity in precipitation were well below the Environmental Protection Agency standard of 20,000 pCi/L for drinking water (EPA, 2025b). Section 1.5.0, Figure 5 shows average tritium in precipitation activity for SRS perimeter collocations and illustrates trending tritium in precipitation values for SCDES and DOE-SR from the last five years.

During the 2024 sampling period, tritium detected in precipitation ranged from 308.74 pCi/L (New Ellenton, S.C. Air Station (NEL)) to 11,345.00 pCi/L (Burial Grounds North, SRS (BGN)) in SCDES samples. The maximum reported value for SCDES perimeter locations was collected at the Jackson, S.C. Air Station (JAK) with 751.00 pCi/L. The SCDES average measured activity for collocated perimeter locations above the lower limit of detection for tritium in precipitation was 549.70 pCi/L while the average for all perimeter locations was 469.38 pCi/L. DOE-SR did not detect tritium in precipitation above the lower limit of detection for any collocated perimeter locations (SRNS, 2025).

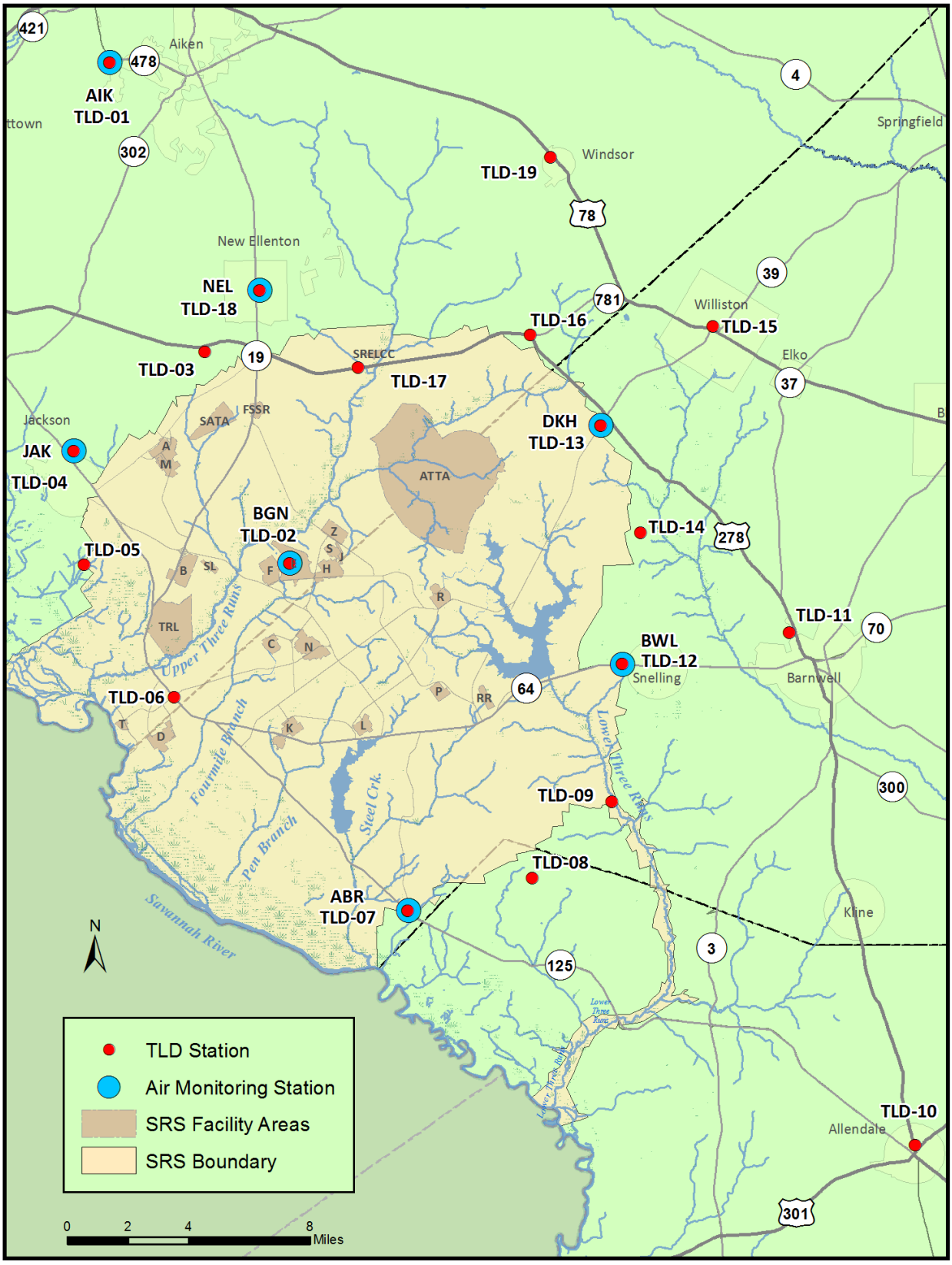
1.3.0 CONCLUSIONS AND RECOMMENDATIONS

All SCDES data collected in 2024 confirmed reported DOE-SR values for gross alpha/beta, ambient beta/gamma, and tritium in the environment at the SRS boundary with no anomalous data noted for any monitored parameters.

Due to continued potential releases from site facilities (tritium facilities, separations areas, etc.), SCDES will continue to collect weekly TSP for gross alpha/beta, monthly atmospheric and precipitation tritium samples, and quarterly ambient beta/gamma samples.

1.4.0 MAP

Radiological Atmospheric Monitoring Locations



2024 ESOP Radiological Atmospheric Monitoring Map www.des.sc.gov

Return to TOC

1.5.0 TABLES AND FIGURES

Table 1. 2024 SCDES Radiological Atmospheric Monitoring Locations

Dosimeter Monitoring Locations

Sample ID	Location	Proximity to SRS
TLD-01	Collocated with AIK Air Station	Within 25 miles of SRS
TLD-02*	Collocated with BGN Air Station	Center of SRS
TLD-03	Savannah River Research Park	SRS Perimeter
TLD-04*	Collocated with JAK Air Station	SRS Perimeter
TLD-05	Crackerneck Gate	SRS Perimeter
TLD-06	Ellenton Memorial on SC-125	SRS Perimeter
TLD-07*	Collocated with ABR Air Station	SRS Perimeter
TLD-08	Junction of Millet Road and Round Tree Road	SRS Perimeter
TLD-09	Patterson Mill Road at Lower Three Runs Creek	SRS Perimeter
TLD-10	Collocated with ALN Air Station	Within 25 miles of SRS
TLD-11*	Barnwell Health Department	Within 25 miles of SRS
TLD-12*	Collocated with BWL Air Station	SRS Perimeter
TLD-13*	Collocated with DKH Air Station	SRS Perimeter
TLD-14	Seven Pines Road	SRS Perimeter
TLD-15*	Williston Police Department	Within 25 miles of SRS
TLD-16	Junction of US-278 and SC-781	SRS Perimeter
TLD-17	SREL Conference Center on US-278	SRS Perimeter
TLD-18*	Collocated with NEL Air Station	SRS Perimeter
TLD-19*	Windsor Post Office	Within 25 miles of SRS

Note: * Denotes a collocated TLD to a corresponding DOE-SR OSLD. Though TLD-02, TLD-11, and TLD-18 are not directly collocated, they are considered collocated due to their proximity to corresponding DOE-SR OSLDs.

Return to TOC

1.5.0 TABLES AND FIGURES

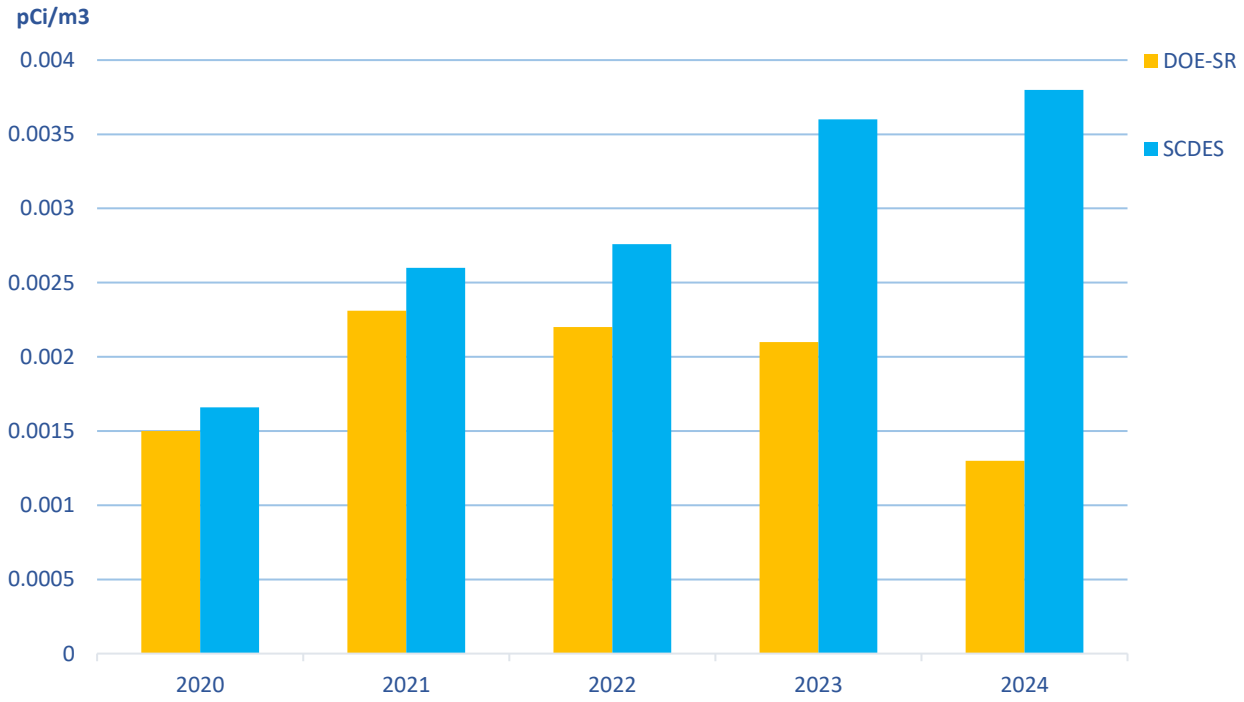
Table 1. 2024 SCDES Radiological Atmospheric Monitoring Locations

Air Monitoring Stations

Sample ID	Location	Proximity to SRS
BGN*	Burial Grounds North, SRS	Center of SRS
BWL*	Barnwell Barricade	SRS Perimeter
ABR*	Allendale Barricade	SRS Perimeter
DKH*	Dark Horse	SRS Perimeter
NEL	New Ellenton, S.C.	SRS Perimeter/ Population Area
JAK*	Jackson, S.C.	SRS Perimeter/ Population Area
AIK	Aiken Elementary Water Tower	Within 25 miles of SRS/ Population Area

Note: * Denotes a location that is collocated with DOE-SR. Though the SCDES and DOE-SR equivalent Jackson, S.C (JAK) Air Stations are not directly collocated, they are considered collocated due to the proximity to one another for comparison purposes.

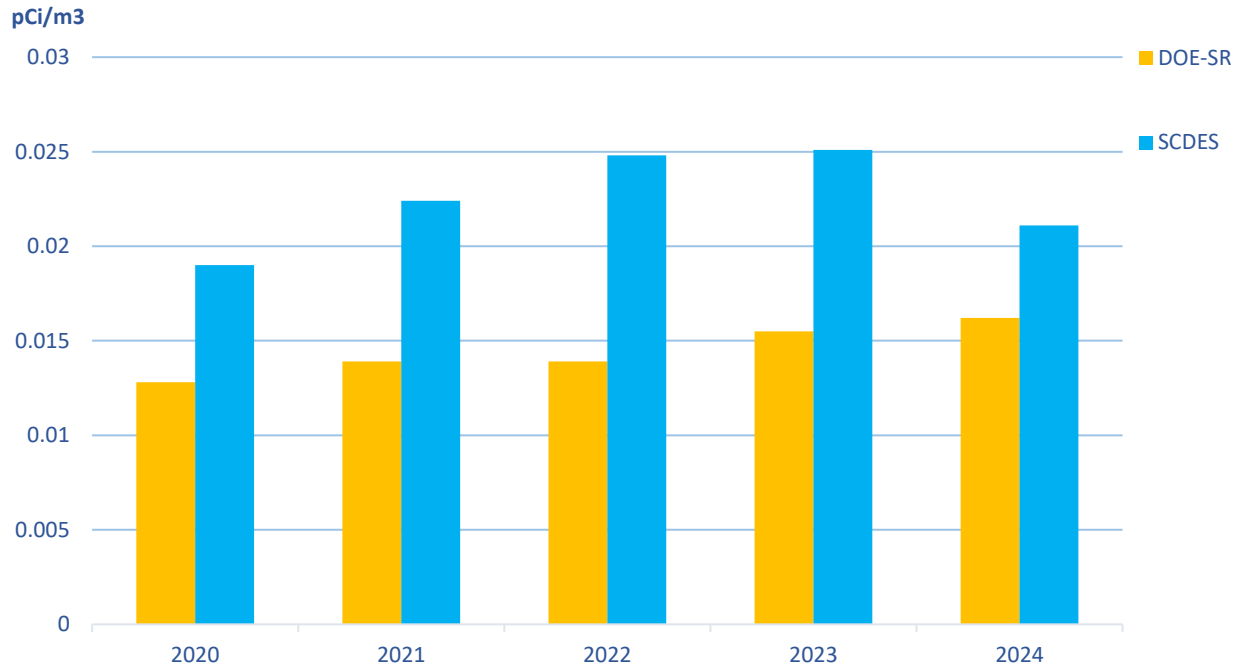
Figure 1. 2020-2024 Collocated DOE-SR and SCDES Comparison of Average Gross Alpha for Total Suspended Particulates at the SRS Perimeter (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)



Return to TOC

1.5.0 TABLES AND FIGURES

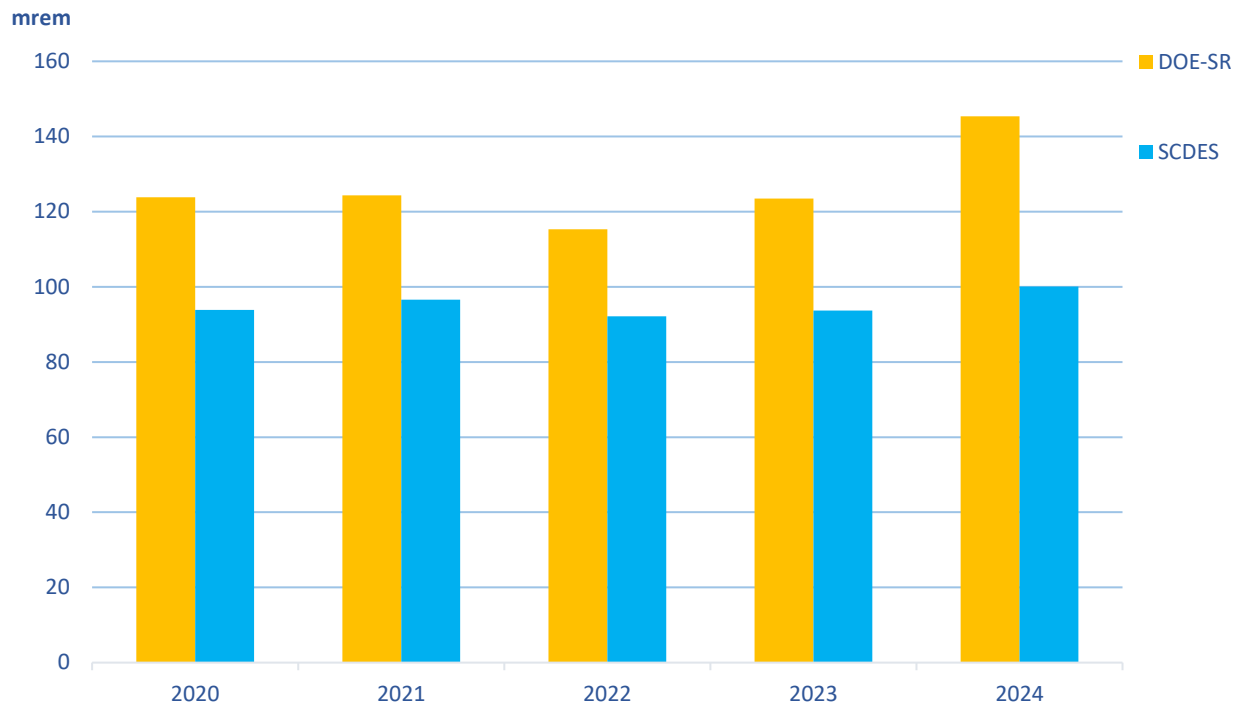
Figure 2. 2020-2024 Collocated DOE-SR and SCDES Comparison of Average Gross Beta for Total Suspended Particulates at the SRS Perimeter (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)



Return to TOC

1.5.0 TABLES AND FIGURES

Figure 3. 2020-2024 DOE-SR and SCDES Comparison of Yearly Average Ambient Beta/Gamma Dose for Dosimeters Off-site of SRS (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)

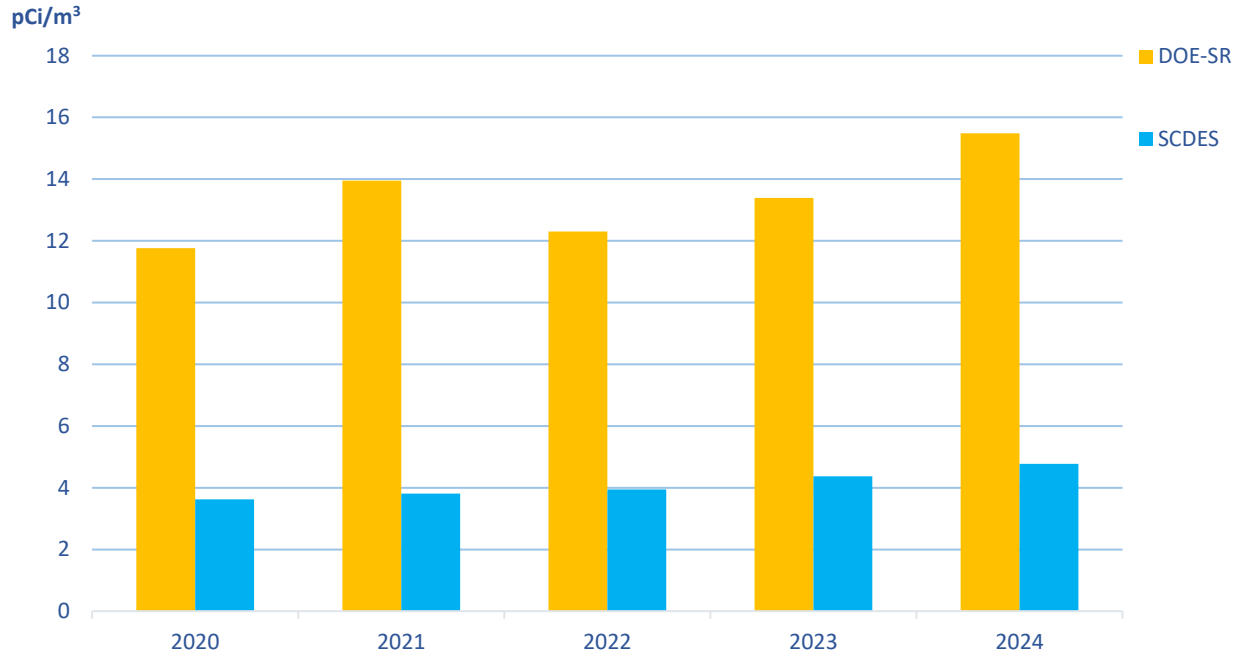


Note: The yearly average results for DOE-SR are based on population centers within proximity to SRS, site perimeter stations, and perimeter air surveillance stations within South Carolina. The yearly average results for SCDES are based on all off-site (SRS Perimeter and Within 25 miles of SRS) locations (not limited to collocations).

Return to TOC

1.5.0 TABLES AND FIGURES

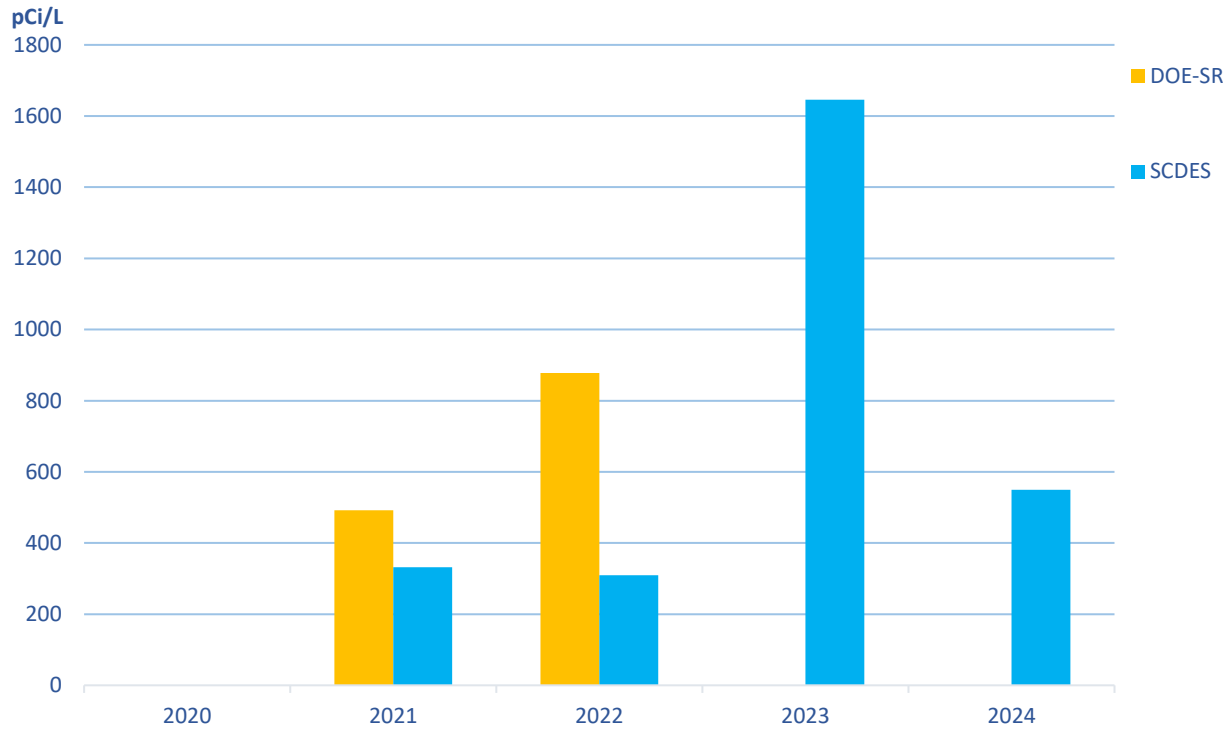
Figure 4. 2020-2024 Collocated DOE-SR and SCDES Comparison of Average Tritium in Air at the SRS Perimeter (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)



Return to TOC

1.5.0 TABLES AND FIGURES

Figure 5. 2020-2024 Collocated DOE-SR and SCDES Comparison of Average Tritium in Precipitation at the SRS Perimeter (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)



Note: Neither SCDES nor DOE-SR had detections above the LLD for tritium in 2020. DOE-SR had no detections above the LLD for tritium in 2023 & 2024.

Return to TOC

1.6.0 SUMMARY STATISTICS

2024 SCDES Quarterly Averages of Ambient Dosimeter Beta/Gamma Data

Sample ID	Average (mrem)	Standard Deviation (mrem)	Median (mrem)	Minimum (mrem)	Maximum (mrem)
TLD-01	22.25	0.96	22.50	21.00	23.00
TLD-02*	32.25	3.10	33.00	28.00	35.00
TLD-03	26.00	0.00	26.00	26.00	26.00
TLD-04*	22.00	2.16	21.50	20.00	25.00
TLD-05	27.50	2.38	28.50	24.00	29.00
TLD-06	22.75	1.89	23.50	20.00	24.00
TLD-07*	22.00	1.41	22.50	20.00	23.00
TLD-08	27.25	2.36	28.00	24.00	29.00
TLD-09	26.75	2.36	26.00	25.00	30.00
TLD-10	24.25	1.26	24.00	23.00	26.00
TLD-11*	28.25	0.96	28.50	27.00	29.00
TLD-12*	24.75	2.36	24.00	23.00	28.00
TLD-13*	22.50	1.29	22.50	21.00	24.00
TLD-14	27.50	1.00	28.00	26.00	28.00
TLD-15*	29.25	1.71	29.50	27.00	31.00
TLD-16	26.25	0.96	26.50	25.00	27.00
TLD-17	26.00	1.83	26.00	24.00	28.00
TLD-18*	26.50	1.29	26.50	25.00	28.00
TLD-19*	25.25	0.50	25.00	25.00	26.00

Note: * Denotes a collocated TLD to a corresponding DOE-SR OSLD. Though TLD-02, TLD-11, and TLD-18 are not directly collocated, they are considered collocated due to their proximity to corresponding DOE-SR OSLDs.

1.6.0 SUMMARY STATISTICS

2024 SCDES and DOE-SR Collocated Quarterly Averages of Ambient Dosimeter Beta/Gamma Data (SRNS, 2025)

Sample ID	Quarter 1 (mrem/day)	Quarter 2 (mrem/day)	Quarter 3 (mrem/day)	Quarter 4 (mrem/day)	Year (mrem/year)
Burial Ground North (TLD-02)	0.31	0.39	0.35	0.34	129
	0.60	0.43	0.46	0.46	178
Jackson (TLD-04)	0.22	0.25	0.21	0.27	88
	0.55	0.37	0.39	0.33	148
Allendale Barricade (TLD-07)	0.22	0.26	0.23	0.24	88
	0.46	0.28	0.31	0.33	127
Barnwell (TLD-11)	0.32	0.30	0.29	0.32	113
	0.57	0.40	0.46	0.32	159
Barnwell Barricade (TLD-12)	0.26	0.26	0.26	0.30	99
	0.46	0.35	0.35	0.36	139
Darkhorse Barricade (TLD-13)	0.23	0.25	0.24	0.25	90
	0.45	0.33	0.34	0.35	134
Williston (TLD-15)	0.32	0.32	0.32	0.31	117
	0.61	0.46	0.43	0.40	173
New Ellenton (TLD-18)	0.28	0.29	0.29	0.29	106
	0.54	0.44	0.46	0.38	165
Windsor (TLD-19)	0.30	0.27	0.26	0.27	101
	0.54	0.38	0.38	0.31	145

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) Though TLD-02, TLD-11, and TLD-18 are not directly collocated, they are considered collocated due to their proximity to corresponding DOE-SR OSLDs.
3) Variations in results between DOE-SR and SCDES may be attributed to varying deployment and collection dates for TLDs/OSLDs.

1.6.0 SUMMARY STATISTICS

2024 SCDES and DOE-SR Collocated Air Station Gross Alpha Data in pCi/m^3 (SRNS, 2025)

Location	Average	Standard Deviation	Median	Minimum	Maximum	Number of Detects	Number of Samples
Allendale Barricade (ABR)*	0.0041	0.0019	0.0039	0.0010	0.0107	50	50
	0.0013	0.0006	0.0012	0.0006	0.0027	26	26
Dark Horse (DKH)*	0.0031	0.0014	0.0033	0.0009	0.0065	50	50
	0.0015	0.0008	0.0014	0.0004	0.0037	25	26
Jackson, S.C. (JAK)*	0.0041	0.0022	0.0038	0.0014	0.0101	50	50
	0.0013	0.0008	0.0010	0.0004	0.0033	25	25
Barnwell Barricade (BWL)*	0.0038	0.0022	0.0033	0.0007	0.0124	50	50
	0.0011	0.0006	0.0010	0.0006	0.0033	26	26
Burial Ground North (BGN)	0.0033	0.0013	0.0030	0.0013	0.0065	50	50
	0.0011	0.0006	0.0010	0.0005	0.0032	26	26

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) * Denotes a perimeter location
3) SCDES collects glass fiber filter weekly while DOE-SR collects them biweekly which may cause variations in data.
4) SCDES only collected 50 samples for all collocations in 2024 due to sampling safety concerns in early October 2024 after Hurricane Helene made landfall in South Carolina. Additionally, one of the three glass fiber filters deployed for sampling in December collected two weeks' worth of samples rather than one week.
5) DOE-SR only collected 25 samples for Jackson, S.C. (JAK) in 2024 due to pump failure from April 30 to May 15 (SRNS, 2025).

1.6.0 SUMMARY STATISTICS

2024 SCDES and DOE-SR Collocated Air Station Gross Beta Data in pCi/m^3 (SRNS, 2025)

Location	Average	Standard Deviation	Median	Minimum	Maximum	Number of Detects	Number of Samples
Allendale Barricade (ABR)*	0.0237	0.0086	0.0225	0.0094	0.0514	50	50
	0.0163	0.0073	0.0143	0.0060	0.0407	26	26
Dark Horse (DKH)*	0.0177	0.0057	0.0175	0.0071	0.0355	50	50
	0.0163	0.0063	0.0146	0.0081	0.0359	25	26
Jackson, S.C. (JAK)*	0.0213	0.0086	0.0191	0.0081	0.0551	50	50
	0.0173	0.0090	0.0149	0.0072	0.0459	25	25
Barnwell Barricade (BWL)*	0.0217	0.0101	0.0190	0.0088	0.0698	50	50
	0.0150	0.0045	0.0136	0.0079	0.0244	26	26
Burial Ground North (BGN)	0.0190	0.0061	0.0190	0.0074	0.0382	50	50
	0.0149	0.0055	0.0139	0.0074	0.0260	26	26

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) * Denotes a perimeter location
3) SCDES collects glass fiber filter weekly while DOE-SR collects them biweekly which may cause variations in data.
4) SCDES only collected 50 samples for all collocations in 2024 due to sampling safety concerns in early October 2024 after Hurricane Helene made landfall in South Carolina. Additionally, one of the three glass fiber filters deployed for sampling in December collected two weeks' worth of samples rather than one week.
5) DOE-SR only collected 25 samples for Jackson, S.C. (JAK) in 2024 due to pump failure from April 30 to May 15 (SRNS, 2025).

1.6.0 SUMMARY STATISTICS

2024 SCDES and DOE-SR Collocated Air Station Tritium in Air Data in pCi/m^3 (SRNS, 2025)

Location	Average	Standard Deviation	Median	Minimum	Maximum	Number of Detects	Number of Samples
Allendale Barricade (ABR)*	3.88	NA	3.88	3.88	3.88	1	12
	17.26	0.44	17.26	16.94	17.57	2	26
Dark Horse (DKH)*	4.77	1.16	5.15	3.46	5.69	3	12
	17.70	NA	17.70	17.70	17.70	1	26
Jackson, S.C. (JAK)*	4.14	0.90	3.95	3.16	5.56	5	12
	20.64	NA	20.64	20.64	20.64	1	25
Barnwell Barricade (BWL)*	8.76	NA	8.76	8.76	8.76	1	12
	10.06	1.02	10.06	9.33	10.78	2	26
Burial Ground North (BGN)	280.98	155.12	268.07	121.19	714.10	12	12
	323.51	187.87	274.96	102.61	867.66	28	28

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) * Denotes a perimeter location
3) SCDES collects silica gel columns monthly while DOE-SR collects them biweekly which may cause variations in data.
4) NA is Not Applicable
5) DOE-SR only collected 25 samples for Jackson, S.C. (JAK) in 2024 due to pump failure from April 30 to May 15 (SRNS, 2025).
6) Additional samples for Burial Ground North (BGN) were collected by DOE-SR due to H Area operations in 2024 (SRNS, 2025).

1.6.0 SUMMARY STATISTICS

2024 SCDES and DOE-SR Collocated Air Station Tritium in Precipitation Data in pCi/L (SRNS, 2025)

Location	Average	Standard Deviation	Median	Minimum	Maximum	Number of Detects	Number of Samples
Allendale Barricade (ABR)*	ND	ND	ND	ND	ND	0	12
	ND	ND	ND	ND	ND	0	14
Dark Horse (DKH)*	348.40	NA	348.40	348.40	348.40	1	12
	ND	ND	ND	ND	ND	0	14
Jackson, S.C. (JAK)*	751.00	NA	751.00	751.00	751.00	1	12
	ND	ND	ND	ND	ND	0	14
Barnwell Barricade (BWL)*	ND	ND	ND	ND	ND	0	12
	ND	ND	ND	ND	ND	0	14
Burial Ground North (BGN)	4673.47	2750.39	4084.85	613.85	11345.00	12	12
	3876.92	2452.56	3250.00	1120.00	9140.00	13	14

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) * Denotes a perimeter location
3) ND is Not Detected
4) NA is Not Applicable
5) DOE-SR collected 2 samples for the months of January & October in 2024. DOE-SR collected 1 sample for the remaining months in 2024 (SRNS, 2025).

1.6.0 SUMMARY STATISTICS

2024 SCDES Air Station Gross Alpha Data in pCi/m^3

Location	Average	Standard Deviation	Median	Minimum	Maximum	Number of Detects	Number of Samples
Allendale Barricade (ABR)*	0.0041	0.0019	0.0039	0.0010	0.0107	50	50
Dark Horse (DKH)*	0.0031	0.0014	0.0033	0.0009	0.0065	50	50
Aiken Elementary Water Tower (AIK)	0.0034	0.0014	0.0033	0.0009	0.0068	50	50
New Ellenton, S.C. (NEL)*	0.0041	0.0018	0.0037	0.0011	0.0092	50	50
Jackson, S.C. (JAK)*	0.0041	0.0022	0.0038	0.0014	0.0101	50	50
Burial Ground North (BGN)	0.0033	0.0013	0.0030	0.0013	0.0065	50	50
Barnwell Barricade (BWL)*	0.0038	0.0022	0.0033	0.0007	0.0124	50	50

Note:
1) * Denotes a perimeter location. Aiken Elementary Water Tower (AIK) is within a 25-mile radius and is not considered a perimeter location.
2) SCDES only collected 50 samples for all collocations in 2024 due to sampling safety concerns in early October 2024 after Hurricane Helene made landfall in South Carolina. Additionally, one of the three glass fiber filters deployed for sampling in December collected two weeks' worth of samples rather than one week.

1.6.0 SUMMARY STATISTICS

2024 SCDES Air Station Gross Beta Data in pCi/m^3

Location	Average	Standard Deviation	Median	Minimum	Maximum	Number of Detects	Number of Samples
Allendale Barricade (ABR)*	0.0237	0.0086	0.0225	0.0094	0.0514	50	50
Dark Horse (DKH)*	0.0177	0.0057	0.0175	0.0071	0.0355	50	50
Aiken Elementary Water Tower (AIK)	0.0186	0.0061	0.0177	0.0077	0.0361	50	50
New Ellenton, S.C. (NEL)*	0.0224	0.0076	0.0216	0.0088	0.0435	50	50
Jackson, S.C. (JAK)*	0.0213	0.0086	0.0191	0.0081	0.0551	50	50
Burial Ground North (BGN)	0.0190	0.0061	0.0190	0.0074	0.0382	50	50
Barnwell Barricade (BWL)*	0.0217	0.0101	0.0190	0.0088	0.0698	50	50

Note:
1) * Denotes a perimeter location. Aiken Elementary Water Tower (AIK) is within a 25-mile radius and is not considered a perimeter location.
2) SCDES only collected 50 samples for all collocations in 2024 due to sampling safety concerns in early October 2024 after Hurricane Helene made landfall in South Carolina. Additionally, one of the three glass fiber filters deployed for sampling in December collected two weeks' worth of samples rather than one week.

Return to TOC

1.6.0 SUMMARY STATISTICS

2024 SCDES Air Station Tritium in Air Data in pCi/m^3

Location	Average	Standard Deviation	Median	Minimum	Maximum	Number of Detects	Number of Samples
Allendale Barricade (ABR)*	3.88	NA	3.88	3.88	3.88	1	12
Dark Horse (DKH)*	4.77	1.16	5.15	3.46	5.69	3	12
Aiken Elementary Water Tower (AIK)	5.78	3.35	5.78	3.40	8.15	2	12
New Ellenton, S.C. (NEL)*	4.72	1.22	4.72	3.86	5.59	2	12
Jackson, S.C. (JAK)*	4.14	0.90	3.95	3.16	5.56	5	12
Burial Ground North (BGN)	280.98	155.12	268.07	121.19	714.10	12	12
Barnwell Barricade (BWL)*	8.76	NA	8.76	8.76	8.76	1	12

Note:
1) * Denotes a perimeter location. Aiken Elementary Water Tower (AIK) is within a 25-mile radius and is not considered a perimeter location.
2) NA is Not Applicable

1.6.0 SUMMARY STATISTICS

2024 SCDES Air Station Tritium in Precipitation Data in pCi/L

Location	Average	Standard Deviation	Median	Minimum	Maximum	Number of Detects	Number of Samples
Allendale Barricade (ABR)*	ND	ND	ND	ND	ND	0	12
Dark Horse (DKH)*	348.40	NA	348.40	348.40	348.40	1	12
Aiken Elementary Water Tower (AIK)	666.00	NA	666.00	666.00	666.00	1	12
New Ellenton, S.C. (NEL)*	308.74	NA	308.74	308.74	308.74	1	12
Jackson, S.C. (JAK)*	751.00	NA	751.00	751.00	751.00	1	12
Burial Ground North (BGN)	4673.47	2750.39	4084.85	613.85	11345.00	12	12
Barnwell Barricade (BWL)*	ND	ND	ND	ND	ND	0	12

Note:
1) * Denotes a perimeter location. Aiken Elementary Water Tower (AIK) is within a 25-mile radius and is not considered a perimeter location.
2) ND is Not Detected
3) NA is Not Applicable

Chapter 2 Monitoring of Ambient Groundwater Adjacent to SRS

Return to TOC

2.1.0 PROJECT SUMMARY

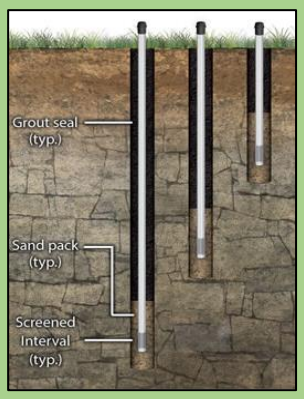
SCDES utilizes a regional groundwater monitoring well network consisting of cluster wells (C-wells) and network wells (private wells and public water systems). This groundwater well network consists of approximately 116 wells that are cyclically sampled every five years by SCDES. The C-wells are owned and maintained by the South Carolina Department of Natural Resources (DNR). These cluster wells are screened from shallow surficial aquifers to deeper aquifers up to depths exceeding 1,400 feet below ground surface. The C-wells are situated around the perimeter of SRS.

Groundwater samples are collected from wells within a 20-mile site boundary. A 20-mile sampling perimeter was selected based on regional well availability and comparative review of known or suspected sources of groundwater contamination and local groundwater flow patterns. One background groundwater sample was collected from Pinckney Island National Wildlife Refuge in 2024. The project map in Section 2.4.0 depicts the network groundwater well locations, the extent of the study area, and the wells sampled in 2024. SCDES evaluates six aquifer zones (Upper Three Runs, Gordon, Crouch Branch, Steel Pond, McQueen Branch, Upper Floridian).

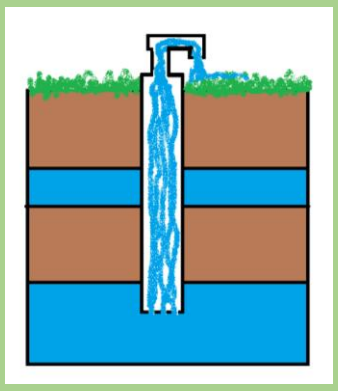
An **AQUIFER** is soil and/or rock containing water below the ground surface.

CLUSTER WELLS vs. NETWORK WELLS

CLUSTER WELLS are multiple wells that are at the same location but are drilled to varying depths to screen different aquifers.



NETWORK WELLS are single wells at a specific location screened in a specific aquifer.



2.2.0 RESULTS AND DISCUSSION

Groundwater Monitoring Data can be found in Section 2.6.0 and in the 2024 SCDES Data File.

SCDES collected groundwater from 13 wells in 2024. Based on a review of the tritium, gross alpha, non-volatile beta, and gamma-emitting radioisotope analytical data provided by the SCDES Analytical and Radiological Environmental Services Division (ARESD) laboratories, the only gamma-emitting radioisotope detected was lead-214 (Pb-214). Pb-214 is a naturally occurring radioactive or NORM contaminant and was detected in 1 out of the 13 groundwater wells sampled. See Section 2.5.0, Table 1 for a list of the network of sampling wells with their assigned aquifer.

Groundwater investigations performed by state and federal agencies such as SCDES, DNR, and the United States Geological Survey (USGS) have confirmed the presence of naturally occurring radionuclides in groundwater across South Carolina (ATSDR, 2007). If contaminants are found

Residential Well

in wells located within the SCDES sampling network, the affected wells would be investigated further to help determine the source.

The United States Environmental Protection Agency (EPA) has a drinking water Maximum Contaminant Level (MCL) of 20,000 pCi/L for tritium, 15 pCi/L for gross alpha, and 50 pCi/L minus natural potassium-40 (K-40) for non-volatile beta (EPA, 2025b). In 2024, SCDES did not detect tritium in any wells. Three wells in two different aquifers (McQueen Branch and Upper Three Runs) had gross alpha detects below the EPA MCL. Six wells in four different aquifers (McQueen Branch, Gordon, Crouch Branch, and Upper Floridian) had non-volatile beta detects well below the EPA MCL.

With groundwater locations having a five-year collection cycle, the wells sampled in 2024 were last sampled in 2019. The background sampling location at Pinckney Island National Wildlife Refuge was not sampled in 2019. Wells that were sampled in both 2019 and 2024 were found to have comparable data which can be found in the tables in Section 2.6.0. Fluctuations in Groundwater results between 2019 and 2024 may be due to natural fluctuations in the environment. Scheduled wells that were not sampled in 2024 were due to groundwater pump failures.

2.3.0 CONCLUSIONS AND RECOMMENDATIONS

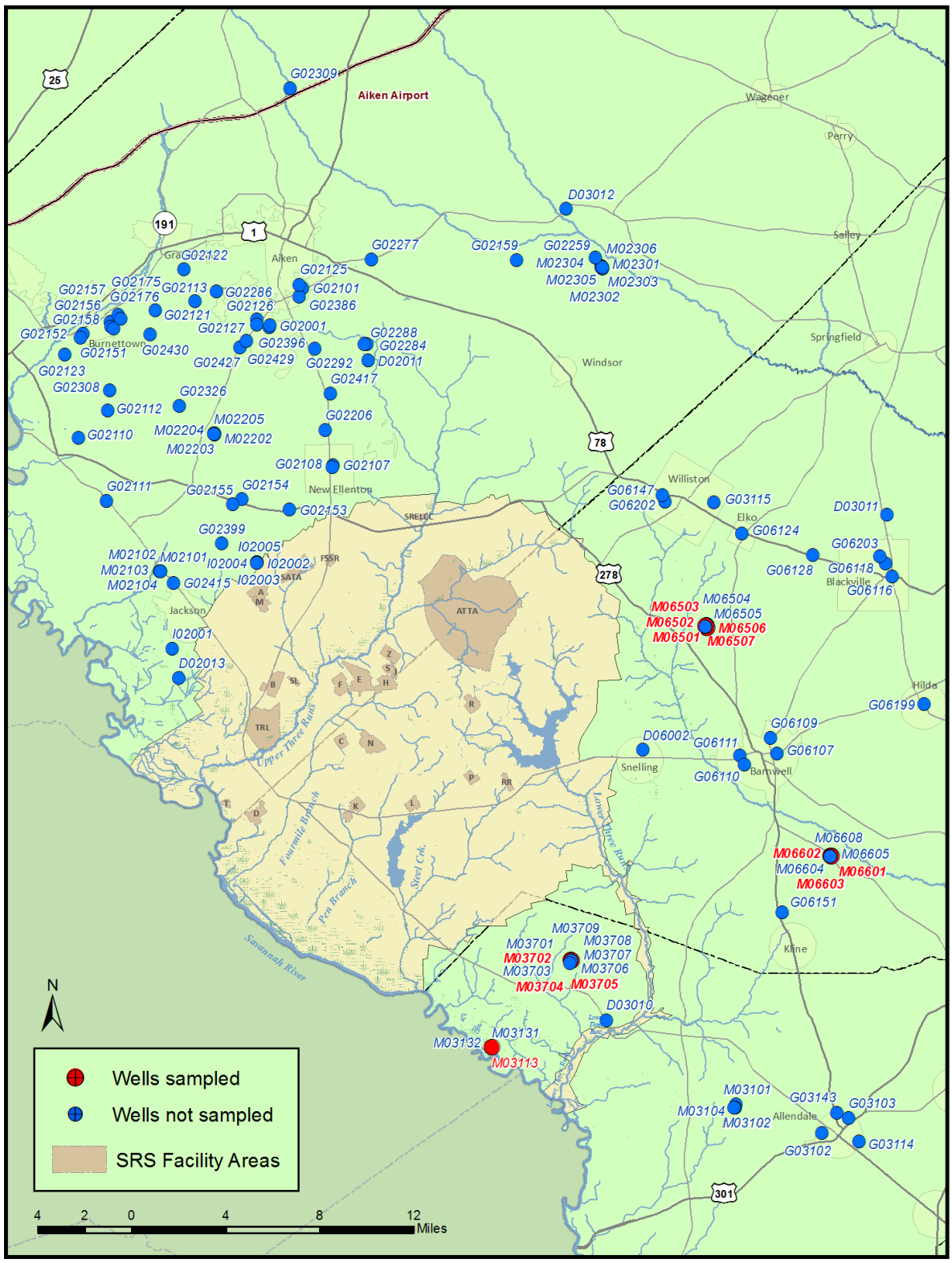
DOE-SR collects groundwater samples from a separate on-site monitoring well network; therefore, direct SCDES off-site groundwater comparisons could not be made. However, the 2024 SRNS report identifies various contaminants such as volatile organic compounds (VOCs), tritium, and gross alpha/beta radionuclides in numerous areas of groundwater throughout the SRS property (SRNS, 2025).

Collecting well water for analysis

Return to TOC

2.4.0 MAP

Groundwater Monitoring Locations



2024 ESOP Groundwater Monitoring Map www.des.sc.gov

Return to TOC

2.5.0 TABLES AND FIGURES

Table 1. SCDES Ambient Groundwater Monitoring Locations

Well No.	Well Name	Sample Year	Top of Casing Elevation (ft amsl)	Total Depth (ft bgs)	Aquifer
M06501	**SCDNR Cluster C-05, BRN-360**	**2024**	**264.3**	**140**	**UTR**
M06502	**SCDNR Cluster C-05, BRN-359**	**2024**	**265.5**	**214**	**GOR**
M06503	**SCDNR Cluster C-05, BRN-367**	**2024**	**263.8**	**285**	**GOR**
M06504**	**SCDNR Cluster C-05, BRN-368**	**2024**	**265.1**	**443**	**CB**
M06505**	**SCDNR Cluster C-05, BRN-365**	**2024**	**263.5**	**539**	**CB**
M06506	**SCDNR Cluster C-05, BRN-366**	**2024**	**266.7**	**715**	**MB**
M06507	**SCDNR Cluster C-05, BRN-358**	**2024**	**265.6**	**847**	**MB**
M03706**	**SCDNR Cluster C-07, ALL-368**	**2024**	**246.6**	**691**	**CB**
M03707**	**SCDNR Cluster C-07, ALL-369**	**2024**	**242.1**	**800**	**CB**
M03708**	**SCDNR Cluster C-07, ALL-370**	**2024**	**245.1**	**975**	**MB**
M03709**	**SCDNR Cluster C-07, ALL-358**	**2024**	**243.1**	**1123**	**MB**
M03701**	**SCDNR Cluster C-07, ALL-363**	**2024**	**246.1**	**105**	**UTR**
M03702	**SCDNR Cluster C-07, ALL-364**	**2024**	**245.2**	**225**	**UTR**
M03703**	**SCDNR Cluster C-07, ALL-365**	**2024**	**244.3**	**333**	**GOR**
M03704	**SCDNR Cluster C-07, ALL-366**	**2024**	**243.5**	**400**	**GOR**
M03705	**SCDNR Cluster C-07, ALL-367**	**2024**	**245.7**	**566**	**CB**
M06601	**SCDNR Cluster C-06, BRN-351**	**2024**	**207.3**	**95**	**UTR**
M06602	**SCDNR Cluster C-06, BRN-350**	**2024**	**207.4**	**170**	**UTR**
M06603	**SCDNR Cluster C-06, BRN-352**	**2024**	**207.1**	**293**	**GOR**
M06604**	**SCDNR Cluster C-06, BRN-354**	**2024**	**207.6**	**411**	**GOR**
M06605**	**SCDNR Cluster C-06, BRN-353**	**2024**	**207.7**	**588**	**CB**
M06608**	**SCDNR Cluster C-06, BRN-349**	**2024**	**208.6**	**1045**	**MB**
M03101**	**SCDNR Cluster C-10, ALL-347**	**2024**	**281.6**	**1423**	**MB**
M03102**	**SCDNR Cluster C-10 ALL-372**	**2024**	**282**	**155**	**UTR**
M03103**	**SCDNR Cluster C-10 ALL-371**	**2024**	**282.2**	**217**	**UTR**
M03113	**SCDNR Cluster C-13 (Artesian)**	**2024**	**73**	*****	**GOR**
M03132**	**SCDNR Cluster C-13 ALL-378**	**2024**	**90**	**1060**	**MB**
M03131**	**SCDNR Cluster C-13, Artesian**	**2024**	**80**	*****	**GOR**
M03104**	**SCDNR Cluster C-10, ALL-374**	**2024**	**280.9**	**580**	**GOR**
PKNY BKG	**Pinckney Island National Wildlife Refuge Background**	**2024**	**8**	**105**	**UF**
G02206	Oak Hill Subdivision	2025	445	240	SP
G06124	Elko	2025	351	353	UTR
G06116	Blackville Lartique St.	2025	295	380	UTR
G06118	Blackville Greene Well	2025	292	620	GOR
G06203	Blackville Industrial Park	2025	273	425	UTR
G06199	Hilda	2025	271	345	UTR
G02309	Aiken Shiloh Springs	2025	362	50	SP
G02101	Aiken Pine Log Road	2025	483	407	MB
G02126	Aiken Town Creek	2025	508	400	MB
G02427	Aiken Silver Bluff	2025	467	*	MB
G02121	Vally PSA Gloverville	2025	413	242	CB
G02286	Vally PSA Walker	2025	471	400	MB
G02122	Vally PSA Howlandville	2025	483	323	CB
G02123	Valley PSA Johnstown	2025	259	150	CB
G02259	Aiken State Park	2025	262	*	SP
G02153	Talatha well #1	2025	420	280	SP

G02154	Talatha Well #2	2025	250	185	CB
G02155	Talatha Well #3	2025	343	240	SP
G02399	Jackson Well #3`	2025	405	450	CB
G02415	Jackson Well #4	2025	339	400	CB
G02110	Beech Island Well #2	2025	417	468	CB
G02111	Beech Island Well #3	2025	369	460	MB
G02112	Beech Island Well #4	2025	380	600	MB
G02113	Beech Island Well #5	2025	508	438	CB
G02308	Beech Island Well #6	2025	448	400	CB
G02430	Beech Island Well Piney Hieghts	2025	453	490	CB
G02326	Boyd Pond (Former ORA)	2025	300	397	MB
D02013	Cowden Plantation, Well 2	2025	124	*	SP
I02001	Cowden Plantation, Well 1	2025	132	*	CB
D02011	Mettlen Well	2025	400	180	SP
G02108	New Elenton Well #1	2025	422	427	CB
G02107	New Elenton Well #2	2025	422	425	CB
G02417	New Ellenton Well #4	2025	488	565	MB
G02277	Montmorenci WD Office Well	2025	504	363	CB
G02159	Montmorenci Well 1	2025	504	330	CB
G06110	Barnwell #10 Shuron	2025	190	276	UTR
G02292	Hunter's Glen	2025	487	210	SP
G06109	Barnwell, Hwy. 3	2026	230	146	UTR
G06111	Barnwell, Rose St.	2026	220	166	UTR
G06107	Barnwell Shop Well	2026	224	314	GOR
D03011	Healing Springs	2026	240	*	CB
D03012	Cedar Creek Spring	2026	271	*	CB
G06128	Edisto Station	2026	322	360	GOR
G06202	Williston, Schuler St.	2026	352	220	GOR
G06147	Williston, Halford St.	2026	352	530	CB
D06002	Moore Well	2026	240	*	UTR
G02125	Aiken Douglas Dr	2027	483	480	MB
G02127	Aiken Woodside	2027	491	407	MB
G02429	Aiken Silver Bluff 2	2027	451	*	MB
G02386	Aiken Robin Rd	2027	492	430	MB
G02396	Aiken Hidden Haven 1	2027	494	504	MB
G02001	Hidden Haven 2	2027	471	484	MB
G02284	Aiken Vale 2	2027	435	300	CB
G02288	Aiken Vale/Tank	2027	439	363	CB
D03010	Martin Post Office	2027	108	105	UTR
G03102	Allendale, Water St.	2027	201	343	UTR
G03103	Allendale, Googe St.	2027	180	347	UTR
G03114	Allendale Patterson Street	2027	172	308	UTR
G03143	Allendale Spruce Street	2027	185	335	UTR
G06151	Chappels Labor Camp	2027	250	260	UTR
G02151	Bath Well One - Tank Well	2027	194	150	SP
G02152	Bath Well Two -Hill Well	2027	217	100	SP
G02157	Burnettown Well Two	2027	272	173	SP
G02156	Burnettown Well One	2027	306	245	SP
G02158	Burnettown Well Three	2027	312	180	SP
G02175	Langley Well One	2027	206	100	SP
G02176	Langley Well Two	2027	249	105	SP
G03115	Martin District Fire Department	2027	95	*	*
I02002	Greene Irrigation 1	2028	381	278	SP

I02003	Greene Irrigation 2	2028	381	280	SP
I02004	Greene Irrigation 3	2028	373	276	SP
I02005	Greene Irrigation 4	2028	373	236	SP
M02101	SCDNR Cluster C-01, AIK-2378	2028	220.3	185	CB
M02102	SCDNR Cluster C-01, AIK-2379	2028	224.2	266	CB
M02103	SCDNR Cluster C-01, AIK-2380	2028	228.9	385	MB
M02104	SCDNR Cluster C-01, AIK-902	2028	231.9	511	MB
M02202	SCDNR Cluster C-02, AIK-825	2028	418.8	231	CB
M02203	SCDNR Cluster C-02, AIK-824	2028	418.6	365	CB
M02204	SCDNR Cluster C-02, AIK-818	2028	418.3	425	MB
M02205	SCDNR Cluster C-02, AIK-817	2028	418.9	535	MB
M02301	SCDNR Cluster C-03, AIK-849	2028	301.6	97	SP
M02302	SCDNR Cluster C-03, AIK-848	2028	299.7	131	CB
M02303	SCDNR Cluster C-03, AIK-847	2028	299	193	CB
M02304	SCDNR Cluster C-03, AIK-846	2028	297.8	255	CB
M02305	SCDNR Cluster C-03, AIK-845	2028	296.9	356	MB
M02306	SCDNR Cluster C-03, AIK-826	2028	294.9	500	MB

Note:
1) ft amsl is feet above mean sea level
2) ft bgs is feet below ground surface
3) In 2024, PKNY BKG was introduced as the background sample location for Ambient Groundwater Monitoring. It is the only sample location that is sampled annually.
4) CB is Crouch Branch
5) MB is McQueen Branch
6) SP is Steeds Pond
7) UTR is Upper Three Runs
8) GOR is Gordon
9) UF is Upper Floridian
10) * is total depth/top of casing information unknown.
11) ** Well was unable to be sampled during the sampling cycle; however, it will remain in the network.

2.6.0 SUMMARY STATISTICS

2024 SCDES Alpha Detects in Groundwater Data in pCi/L

Location Description	2024 Result	2019 Result	Aquifer
M06502	<LLD	8.86	GOR
M06501	2.24	2.46	UTR
M06503	<LLD	<LLD	GOR
M06506	2.38	2.60	MB
M06602	<LLD	<LLD	UTR
M06601	<LLD	<LLD	UTR
M06603	<LLD	<LLD	GOR
M06507	2.93	2.67	MB
M03704	<LLD	<LLD	GOR
M03705	<LLD	4.77	CB
M03702	<LLD	<LLD	UTR
M03113	<LLD	<LLD	GOR
PKNY BKG	<LLD	NS	UF

Note:
1) NS means Not Sampled
2) <LLD means Less than the Lower Limit of Detection
3) 2019 results are found in the *2019 ESOP Data Report* (DHEC, 2020)

2.6.0 SUMMARY STATISTICS

2024 SCDES Beta Detects in Groundwater Data in pCi/L

Location Description	2024 Result	2019 Result	Aquifer
M06502	<LLD	<LLD	GOR
M06501	<LLD	3.17	UTR
M06503	5.85	2.68	GOR
M06506	<LLD	2.97	MB
M06602	<LLD	<LLD	UTR
M06601	<LLD	<LLD	UTR
M06603	3.78	<LLD	GOR
M06507	7.27	3.83	MB
M03704	<LLD	6.32	GOR
M03705	4.70	<LLD	CB
M03702	<LLD	<LLD	UTR
M03113	3.75	<LLD	GOR
PKNY BKG	5.77	NS	UF

Note:
1) NS means Not Sampled
2) <LLD means Less than the Lower Limit of Detection
3) 2019 results are found in the *2019 ESOP Data Report* (DHEC, 2020)

Chapter 3 Radiological Monitoring of Drinking Water Adjacent to SRS

3.1.0 PROJECT SUMMARY

SCDES evaluates drinking water quality to provide information on the radiological impact of SRS to community drinking water systems adjacent to and downstream of the site. SCDES samples five drinking water systems. Monthly composite samples are taken from three Savannah River-fed systems: one upstream location (North Augusta) and two downstream of SRS (Purrysburg Beaufort/Jasper (B/J) and Chelsea B/J). Additionally, two public drinking water systems that are not primarily served by the Savannah River but draw from surface water sources were sampled each month (Aiken Public Shaw Creek Water Works Treatment Plant and Breezy Hill Water Treatment Plant). These systems are located outside of the SRS perimeter and are up to 30 miles from the center of the site (Map, Section 3.4.0).

SURFACE WATER – water that collects on the surface of the ground in the form of streams, ponds, lakes, rivers, or the ocean.

GROUNDWATER– water stored underground in sediment pores or crevices in rock. It may eventually be used by plants, taken up through wells by humans, or discharge into another body of water.

DRINKING WATER – surface water or groundwater that has been treated through a cleaning process to be available for healthy consumption by humans.

In 2024, DOE-SR collected drinking water from two surface water-fed systems (North Augusta and Purrysburg B/J) that are collocated with the SCDES Savannah River-fed systems. Currently, DOE-SR does not conduct drinking water sampling from other public systems off SRS property. SCDES and DOE-SR analyze and compare all samples for gross alpha, non-volatile beta, gamma-emitting radionuclides, and tritium.

3.2.0 RESULTS AND DISCUSSION

Three locations' samples waiting to be analyzed

Gross alpha, tritium, and non-volatile beta sample results are presented in the following tables in Section 3.5.0 and can be found in the 2024 SCDES Data File. All results are below their respective EPA MCLs.

In 2024, SCDES and DOE-SR detected tritium above the lower limit of detection (LLD) in the Savannah River-fed systems downstream of SRS. These activities are well below the EPA established 20,000 pCi/L drinking water limit (EPA, 2025b).

Gamma-emitting radionuclides in the List of Analytes, Table 1, page ix, were not detected above the MDA for the drinking water samples collected by SCDES or in DOE-SR's collocated samples in 2024 except for Pb-214, which is a NORM decay product.

3.3.0 CONCLUSIONS AND RECOMMENDATIONS

Tritium continues to be the most abundant radionuclide detected in public drinking water supplies potentially affected by SRS. Observed tritium activities were low when compared to the EPA MCL for tritium in drinking water, which is 20,000 pCi/L. Detections of gross alpha and

Return to TOC

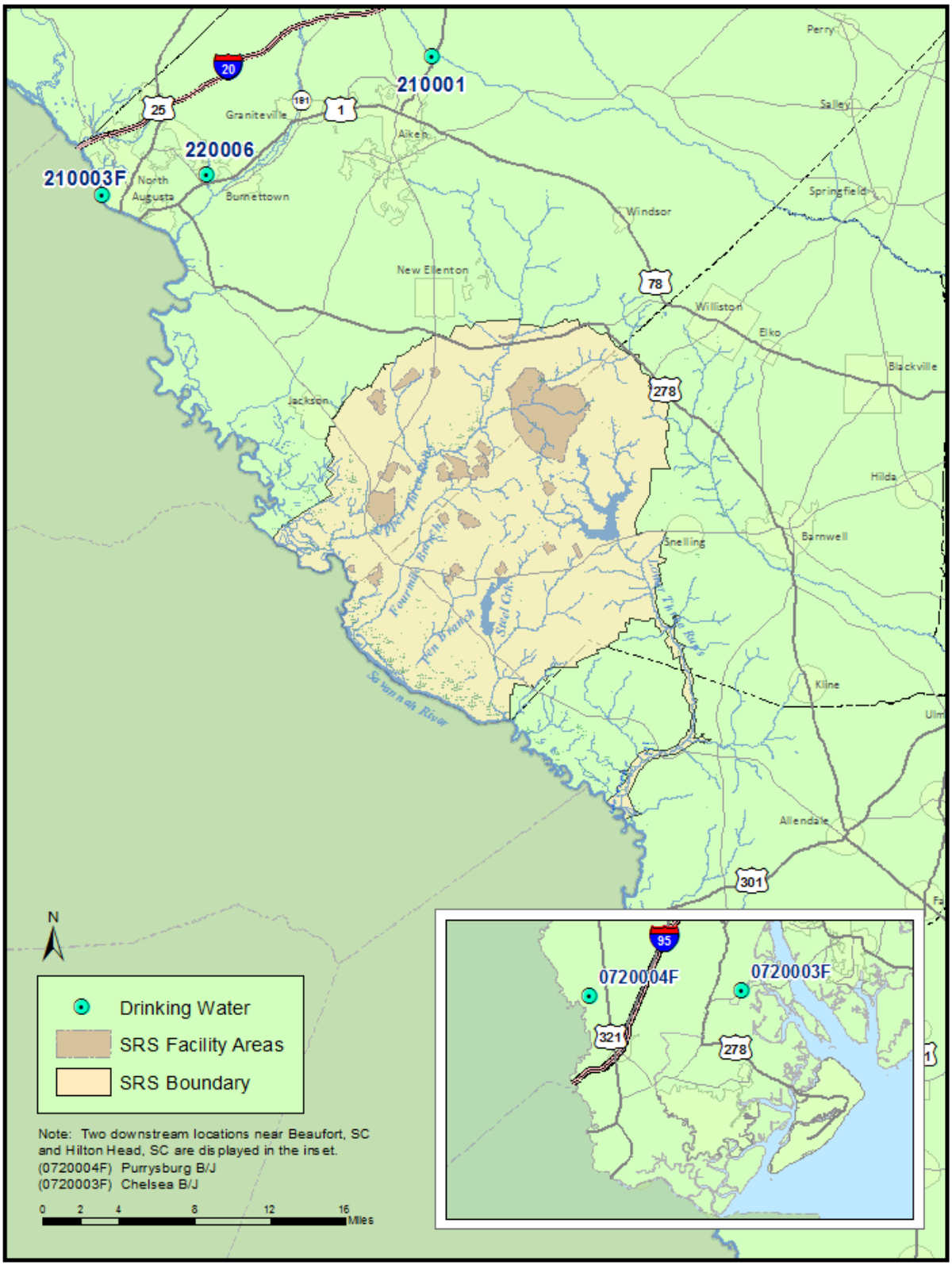
non-volatile beta were all below their respective MCLs. DOE-SR samples systems directly supplied by the Savannah River; therefore, SCDES will continue to monitor these off-site public water systems supplied by other surface water sources.

The SCDES Drinking Water Monitoring Project continues to be an important source of essential data for assessing human health exposure pathways. SCDES will continue to monitor drinking water quality due to the potential of elevated radionuclide concentrations in surface water on SRS and its potential to migrate, and potentially affect, drinking water systems downstream from SRS. Continued sampling will also provide the public with an independent source of radiological data for drinking water systems within the SRS study area.

SCDES continues to reevaluate the drinking water systems monitored by the drinking water project. Primary and background drinking water systems will be added and removed from the list of sampled drinking water systems as deemed necessary to maintain monitoring coverage.

3.4.0 MAP

Drinking Water Monitoring Locations



Return to TOC

3.5.0 TABLES AND FIGURES

Table 1. 2024 SCDES Drinking Water System Monitoring Locations

System Number	System Name	Number of Taps	Population
0210001	Aiken	21,035	49,222
0220006	Breezy Hill Water District	8,837	20,718
0210003F	North Augusta	12,597	30,862
0720003F	Chelsea B/J	38,748	102,012
0720004F	Purrysburg B/J	22,757	59,850
	Total		
	Savannah River-fed systems downstream from SRS	61,505	161,862
	Systems not fed from the Savannah River downstream of SRS	42,469	100,802

Note: Data was obtained from SCDES personnel within the Bureau of Water and from the Drinking Water System Locations.

Note for Tables 2-6: Summary statistics are not shown for locations whose analytes had either no detections or only one detection. If a location did have multiple detections for a specific analyte, the summary statistics are written as a note below its table. AE is Analytical Error and ND is Not Detected.

3.5.0 TABLES AND FIGURES

Table 2: 2024 SCDES and DOE-SR Drinking Water Data for North Augusta (DW0210003F) in pCi/L (SRNS, 2025)

Month	SCDES Total Alpha	SCDES Nonvolatile Beta	SCDES Tritium	DOE-SR Total Alpha	DOE-SR Nonvolatile Beta	DOE-SR Tritium
JAN	ND	ND	ND	ND	1.86	188
FEB	ND	ND	ND	ND	1.96	199
MAR	ND	ND	ND	ND	2.27	ND
APR	ND	ND	ND	ND	2.01	ND
MAY	ND	ND	ND	ND	1.65	ND
JUN	ND	ND	298	ND	1.78	ND
JUL	0.90	ND	ND	ND	1.84	255
AUG	ND	ND	ND	ND	1.56	242
SEP	ND	ND	284	ND	1.74	ND
OCT	ND	ND	ND	ND	1.34	ND
NOV	ND	ND	ND	ND	1.62	178
DEC	ND	ND	ND	ND	1.84	213

Note:
1) In pCi/L, SCDES Tritium summary statistics: Average = 291.09, Standard Deviation = 9.68, Median = 291.09, Minimum = 284.24, Maximum = 297.93, Number of Detections = 2, Number of Samples = 12.
2) In pCi/L, DOE-SR Nonvolatile Beta summary statistics: Average = 1.79, Standard Deviation = 0.24, Median = 1.81, Minimum = 1.34, Maximum = 2.27, Number of Detections = 12, Number of Samples = 12.
3) In pCi/L, DOE-SR Tritium summary statistics: Average = 212.50, Standard Deviation = 30.49, Median = 206.00, Minimum = 178.00, Maximum = 255.00, Number of Detections = 6, Number of Samples = 12.

Return to TOC

3.5.0 TABLES AND FIGURES

Table 3: 2024 SCDES and DOE-SR Drinking Water Data for Purrysburg B/J Water Treatment Plant (DW0720004F) in pCi/L (SRNS, 2025)

Month	SCDES Total Alpha	SCDES Nonvolatile Beta	SCDES Tritium	DOE-SR Total Alpha	DOE-SR Nonvolatile Beta	DOE-SR Tritium
JAN	1.87	ND	487	ND	1.55	363
FEB	ND	ND	468	ND	1.73	214
MAR	ND	ND	ND	ND	1.89	ND
APR	ND	ND	ND	ND	1.30	ND
MAY	ND	ND	ND	ND	1.48	164
JUN	ND	ND	ND	ND	1.54	260
JUL	ND	ND	684	ND	1.98	615
AUG	ND	ND	400	ND	2.14	332
SEP	1.78	ND	790	ND	2.14	645
OCT	ND	ND	412	ND	1.81	346
NOV	ND	ND	300	ND	2.06	ND
DEC	ND	ND	618	0.51	2.64	426

Note:
1) In pCi/L, SCDES Total Alpha summary statistics: Average = 1.83, Standard Deviation = 0.06, Median = 1.83, Minimum = 1.78, Maximum = 1.87, Number of Detections = 2, Number of Samples = 12.
2) In pCi/L, SCDES Tritium summary statistics: Average = 519.96, Standard Deviation = 163.63, Median = 477.77, Minimum = 300.25, Maximum = 790.19, Number of Detections = 8, Number of Samples = 12.
3) In pCi/L, DOE-SR Nonvolatile Beta summary statistics: Average = 1.86, Standard Deviation = 0.37, Median = 1.85, Minimum = 1.30, Maximum = 2.64, Number of Detections = 12, Number of Samples = 12.
4) In pCi/L, DOE-SR Tritium summary statistics: Average = 373.89, Standard Deviation = 165.68, Median = 346.00, Minimum = 164.00, Maximum = 645.00, Number of Detections = 9, Number of Samples = 12.

Return to TOC

3.5.0 TABLES AND FIGURES

Table 4: 2024 SCDES Drinking Water Data for Chelsea B/J Water Treatment Plant (DW0720003F) in pCi/L

Month	Total Alpha	Nonvolatile Beta	Tritium
JAN	ND	ND	266
FEB	ND	ND	ND
MAR	ND	ND	ND
APR	ND	ND	ND
MAY	ND	ND	ND
JUN	ND	ND	ND
JUL	ND	ND	338
AUG	ND	ND	732
SEP	ND	ND	597
OCT	ND	ND	571
NOV	ND	ND	295
DEC	ND	ND	391

Note: 1) In pCi/L, SCDES Tritium summary statistics: Average = 455.63, Standard Deviation = 177.63, Median = 391.16, Minimum = 266.40, Maximum = 731.59, Number of Detections = 7, Number of Samples = 12.

Table 5: 2024 SCDES Drinking Water Data for Aiken Public Shaw Creek Water Works Treatment Plant (DW0210001) in pCi/L

Month	Total Alpha	Nonvolatile Beta	Tritium
JAN	1.73	ND	ND
FEB	ND	ND	ND
MAR	ND	ND	ND
APR	ND	ND	ND
MAY	2.64	ND	ND
JUN	1.84	ND	ND
JUL	1.03	ND	ND
AUG	ND	ND	ND
SEP	1.60	ND	ND
OCT	ND	ND	ND
NOV	ND	ND	ND
DEC	ND	ND	ND

Note: 1) In pCi/L, SCDES Total Alpha summary statistics: Average = 1.77, Standard Deviation = 0.58, Median = 1.73, Minimum = 1.03, Maximum = 2.64, Number of Detections = 5, Number of Samples = 12.

3.5.0 TABLES AND FIGURES

Table 6: 2024 SCDES Drinking Water Data for Breezy Hill Water Treatment Plant (DW0220006) in pCi/L

Month	Total Alpha	Nonvolatile Beta	Tritium
JAN	ND	ND	ND
FEB	ND	ND	ND
MAR	ND	ND	ND
APR	ND	ND	ND
MAY	ND	ND	ND
JUN	ND	4.29	ND
JUL	ND	ND	ND
AUG	ND	ND	ND
SEP	1.16	ND	ND
OCT	ND	ND	ND
NOV	ND	ND	ND
DEC	ND	ND	ND

Return to TOC

Chapter 4 Radiological Monitoring of Surface Water on and Adjacent to SRS

Return to TOC

4.1.0 PROJECT SUMMARY

The focus of the Radiological Monitoring of Surface Water (RSW) Project is to surveil the streams and creeks on SRS as well as the Savannah River. Since the Savannah River is the primary drinking water source for some downstream communities, it is important to monitor radionuclide concentrations in the river. Surface water samples are collected and analyzed for radionuclides, and the results are compared to DOE-SR data. SCDES supports DOE-SR's objectives to ensure that the primary goal of drinking water safety is established and met.

Collecting a composite sample

SCDES collects surface water samples from 12 specific locations within and outside of the SRS boundary as part of an ambient sampling network along with 4 supplemental locations that are monitored separately to determine their potential to be added to the ambient sampling network based on ongoing SRS activities (Section 4.4.0, Map). Section 4.5.0, Table 1 identifies sample ID, location, rationale, and frequency. Some locations were chosen because they are considered public access locations. All but one of the public access locations are downstream of SRS, which provide a potential means for exposure to radionuclides. Jackson Boat Landing (SV-2010) is upstream from SRS activities and is a public access location.

Monthly samples are collected for tritium analysis from the 4 creek mouths that flow from SRS directly into the Savannah River (Upper Three Runs Creek, SV-2011; Fourmile Branch, SV-2015; Steel Creek, SV-2017; and Lower Three Runs Creek, SV-2020). Prior to 2023, creek mouth tritium samples were collected quarterly. Pen Branch is not sampled because the Savannah River Swamp interrupts the flow of this creek and there is no creek mouth access.

Example of a Grab Sample

An enhanced surface water monitoring component was implemented to provide downstream drinking water systems with advance notice of the potential for increased tritium levels in the Savannah River. This early detection facet is possible because of the continuous monitoring of the five SRS streams that flow to the Savannah River. Samples for tritium analysis are collected from six locations with automatic water samplers. Additionally, a grab sample is collected from Johnson's Boat Landing (SV-2080) and U.S. Highway 301 at the Savannah River (SV-118). The results for these samples are considered nonreportable results for this report.

In 2023, the Supplemental Surface Water Monitoring Program was modified to determine the need for routine sampling at select locations based on ongoing SRS activity. Locations along Mill Creek (SV-2032), Beaver Dam Creek (SV-2040), Steel Creek (SV-2064), and Mary's Branch (SV-2081) were

Supplemental Monitoring locations in 2024. SV-2040 (tritium only), SV-2064, and SV-2081 are collocated and compared with DOE-SR. DOE-SR does not consider their corresponding locations as supplemental locations.

Quarterly sampling for I-129 and Tc-99 is conducted at the SV-2044 ambient location due to concerns that these are possible constituents related to effluent from the burial grounds, which could enter the surface water.

4.2.0 RESULTS AND DISCUSSION

Radiological Monitoring of Surface Water Summary Statistics can be found in Section 4.6.0 and all Radiological Monitoring of Surface Water Data can be found in the 2024 SCDES Data File. The data presented in this section concerns the SCDES ambient sampling network including the Savannah River and on-site streams. The enhanced surface water monitoring program data is not displayed in the annual report and data file due to its sole purpose of serving as an early detection system for downstream drinking water users.

SCDES data from 2024 was compared to DOE-SR reported results (Section 4.6.0, Summary Statistics). The SCDES and DOE-SR collocated ambient sampling locations were Tims Branch at SRS Road C (SV-324), Upper Three Runs Creek at S.C. 125/SRS Road A (SV-325), Fourmile Branch at SRS Road A-12.2 (SV-2039), Pen Branch at SRS Road A-13.2 (SV-2047), Steel Creek at S.C. 125/SRS Road A (SV-327), Savannah River at U.S. Highway 301 Bridge (SV-118), and Lower Three Runs Creek at SRS Road B (SV-2053). SCDES and DOE-SR also have one collocated creek mouth sampling location at Steel Creek (SV-2017). DOE-SR sampled at several other locations along the Savannah River and on-site streams. However, the data comparisons are only for the collocated sampling locations.

Collecting composite and grab samples

Tritium

In 2024, SCDES and DOE-SR detected tritium at all collocated sample locations with the exception of SV-2053 and SV-324 where DOE-SR did not have any detections (Section 4.6.0, Summary Statistics). SCDES's average tritium activities at SV-2010 are not directly affected by SRS operations. This location is upstream from SRS impacts and is considered a background location. Samples were not collected in 2024 at Upper Three Runs Creek at United States Forestry Service (USFS) Road 2-1 (SV-2027) and Lower Three Runs Creek at Patterson Mill Road (SV-328) due to safety concerns, but these locations will remain in consideration for future years. SCDES and DOE-SR samples indicated that SV-2039 had the highest average tritium activity of all SRS streams in the collocated ambient sampling network with an average of 14,273 pCi/L for SCDES and 12,642 pCi/L for DOE-SR (SRNS, 2025). For supplemental locations, SV-2064 had the highest average

Return to TOC

tritium activity for both SCDES and DOE-SR with an average of 22,147 pCi/L for SCDES and 20,792 pCi/L for DOE-SR. The 2024 SCDES and DOE-SR tritium results appear to be consistent with historically reported data values (Section 4.5.0, Figures 2-9). Section 4.5.0, Figure 1 shows trending data for SCDES tritium averages for the past five years. Tritium activity in the Savannah River at the creek mouths of the four SRS streams are monitored monthly. Samples collected at SV-2015 had the highest average tritium activity of 4,477 pCi/L of all SCDES creek mouth locations. The average tritium activity at SV-2017 for SCDES was 936 pCi/L while DOE-SR detected an average of 368 pCi/L. Variations in results may be attributed to SCDES and DOE-SR collecting creek mouth tritium samples at varying times. Section 4.5.0, Figure 9 shows comparisons between SCDES and DOE-SR tritium averages for SV-2017 from the last five years.

Collecting grab samples during a boat run

Gamma

As part of a gamma spectroscopy analysis, samples were analyzed monthly for gamma-emitting radionuclides (List of Analytes, Table 1, page ix). K-40 was the only gamma-emitting radionuclide that SCDES and DOE-SR shared in analytical results. SCDES had detections of Cs-137 at SV-2044 with an average of 5.76 pCi/L and SV-2064 (Supplemental) with an average of 5.99 pCi/L while DOE-SR did not detect Cs-137 at any location in 2024. SCDES also had detects of Ac-228, Pb-212, and Pb-214 which are considered NORM decay products.

Iodine-129 and Technetium-99

SV-2044 is a collocated sampling location between SCDES and DOE-SR for I-129 and Tc-99. SCDES collects I-129 and Tc-99 samples on a quarterly basis while DOE-SR collects samples monthly. SCDES detected 3 quarterly I-129 samples above the MDA (average of 0.64 pCi/L) while DOE-SR did not detect I-129 above the MDA in any SV-2044 samples in 2024. DOE-SR had 3 monthly detects of Tc-99 with an average of 3.94 pCi/L while SCDES did not have any quarterly detects of Tc-99.

I-129 and Tc-99 are included under the EPA established MCL of 4 millirem per year. The average concentration of I-129, which is assumed to yield 4 millirem per year, is 1 pCi/L. If other radionuclides emitting beta particles and photon radioactivity are present in addition to I-129 and Tc-99, the sum of the annual dose from all the radionuclides shall not exceed 4 millirem/year (EPA, 2025b).

Preparing for tritium analysis in a Liquid Scintillation Counter

Alpha

Samples collected from SV-324 by SCDES exhibited the highest alpha activity of the collocated ambient sampling locations with an average of 3.59 pCi/L while SV-325 exhibited the highest alpha activity for DOE-SR's collocated ambient sampling locations with an average of 14.02 pCi/L (Section 4.6.0, Summary Statistics; SRNS, 2025). The location that exhibited the highest alpha activity from collocated supplemental locations for SCDES and DOE-SR was SV-2081 with an average of 5.70 pCi/L for SCDES and 34.33 pCi/L for DOE-SR. SV-2081 also had the highest alpha activity for all SCDES supplemental locations. Historically, SV-325 yields detections for alpha activity (DHEC, 2020-2023; SCDES 2024b). Isotopic analysis performed by DOE-SR revealed the source to be natural uranium (SRNS, 2013). This may contribute to the common occurrence of alpha detections at this location. The 2024 average alpha activity was below the EPA MCL for drinking water of 15 pCi/L (EPA, 2025b) at all locations except for DOE-SR's average alpha activity at SV-2081. Beginning in 2009, samples collected at SV-325 exhibited particles of sediment and detritus. This increase in turbidity seems to be related to storm events. Samples with high turbidity can have potential interferences during alpha/beta analysis. Alpha particles, and to a lesser extent, beta particles, are reduced by salts and solids dried onto a sampling planchet (Floeckher, 2000). Pump tubing is evaluated during each sample collection at all locations to ensure no blockage of sediment has occurred.

Beta

The location exhibiting the highest average gross beta activity for collocated ambient sampling locations for SCDES was SV-2039 with an average of 5.01 pCi/L while the highest average gross beta activity for DOE-SR ambient collocations was from SV-325 with an average of 8.25 pCi/L (SRNS, 2025). The location exhibiting the highest average gross beta activity for all SCDES ambient sampling locations was SV-2018 with an average of 5.32 pCi/L. SV-2064 had the highest gross beta activity for collocated supplemental sampling locations for SCDES with an average of 6.59 pCi/L. The highest average gross beta activity for DOE-SR collocated supplemental sampling locations was from SV-2081 with an average of 15.57 pCi/L. The location with the highest gross beta activity for all SCDES supplemental locations was SV- 2032 with an average of 7.15 pCi/L. EPA has established a Maximum Contaminant

Pipetting samples in preparation for tritium analysis

Return to TOC

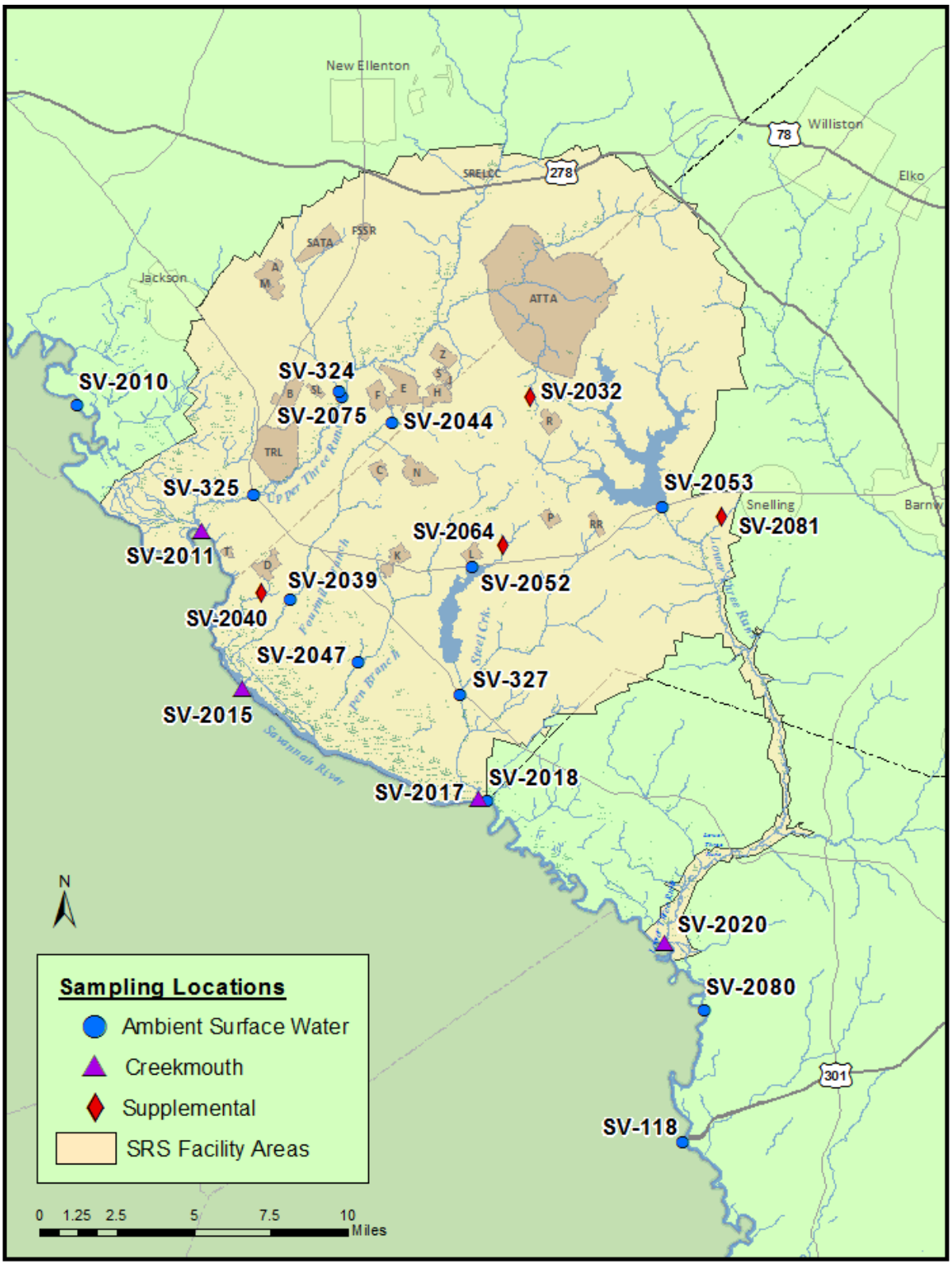
Level (MCL) of 4 millirem per year for beta particle and photon radioactivity from man-made radionuclides in drinking water (EPA, 2025b). The EPA screening MCL for gross beta-emitting particles for drinking water systems is 50 pCi/L minus natural potassium-40 (K-40). All averages were below this limit.

4.3.0 CONCLUSIONS AND RECOMMENDATIONS

Differences in average values between SCDES and DOE-SR could be attributed, in part, to the nature of the medium and the specific point and time of when the sample was collected. SCDES will continue independent collection and analysis of surface water on and adjacent to SRS. This monitoring effort will provide an improved understanding of radionuclide levels in SRS surface waters. SCDES will periodically evaluate modifying the monitoring activities to better accomplish the project's goals and objectives. Further refinement of the RSW project may result in additional sampling locations being incorporated into the ambient or enhanced monitoring regimes. Monitoring will continue for as long as there are activities at SRS that create the potential for contamination to enter the environment, as well as past radioactive contamination that still exists due to unexpired half-lives.

4.4.0 MAP

Radiological Surface Water Monitoring Locations



2024 ESOP Radiological Surface Water Monitoring Map www.des.sc.gov

Return to TOC

4.5.0 TABLES AND FIGURES

Table 1. 2024 SCDES Surface Water Monitoring Locations and Frequency

Ambient Monitoring Locations

ID	Location	Rationale	Frequency
SV-2010	Savannah River at RM 170.5 (Jackson Boat Landing)	Accessible to public; upstream all SRS operations; Near Jackson population center; Up-river control; River monitoring	Weekly tritium; Monthly Alpha, Beta, and Gamma composite
SV-324*	Tims Branch at SRS Road C	Within SRS perimeter; Downstream of SRS operations areas; Tributary monitoring	Weekly tritium; Monthly Alpha, Beta, and Gamma composite
SV-325*	Upper Three Runs Creek at SC-125/SRS Road A	Within SRS perimeter; Downstream of SRS operations areas; Tributary monitoring	Weekly tritium; Monthly Alpha, Beta, and Gamma composite
SV-2039*	Fourmile Branch at SRS Road A-12.2	Within SRS perimeter; Downstream of SRS operations areas; Tributary monitoring	Weekly tritium; Monthly Alpha, Beta, and Gamma composite
SV-2047*	Pen Branch at SRS Road A-13.2	Within SRS perimeter; Downstream of SRS operations areas; Tributary monitoring	Weekly tritium; Monthly Alpha, Beta, and Gamma composite
SV-327*	Steel Creek at SC-125/SRS Road A	Within SRS perimeter; Downstream of SRS operations areas; Tributary monitoring	Weekly tritium; Monthly Alpha, Beta, and Gamma composite
SV-2018	Savannah River at RM 141 (Steel Creek Boat Landing)	Accessible to the public; Adjacent to SRS perimeter; Downstream of SRS operations; River monitoring	Weekly tritium; Monthly Alpha, Beta, and Gamma composite
SV-2080	Savannah River at RM 125 (Johnson's Boat Landing)	Accessible to the public; Downstream of SRS operations and tributaries; River monitoring	Tri-weekly tritium grab
SV-118*	Savannah River at RM 118.8 (Hwy 301 Bridge)	Accessible to the public; Downstream of SRS operations and tributaries; River monitoring	Weekly tritium; Monthly Alpha, Beta, and Gamma composite
SV-328*	Lower Three Runs Creek at Patterson Mill Road	Within SRS perimeter; Downstream of SRS operations and Par Pond; Tributary monitoring	Weekly tritium grab
SV-2053*	Lower Three Runs Creek at SRS Road B	Within SRS perimeter; Downstream of SRS operations and Par Pond; Tributary monitoring	Weekly tritium; Monthly Alpha, Beta, and Gamma composite
SV-2027*	Upper Three Runs Creek at SRS Road 2-1	Within SRS perimeter; Upstream from SRS operations; Upstream control; Tributary monitoring	Weekly tritium grab
SV-2075*	Upper Three Runs Creek at SRS Road C	Downstream from F-and H-Areas HLW Tanks	Monthly gamma composite

Return to TOC

SV-2044*	Fourmile Branch at SRS Road C	Downstream from F-and H-Areas HLW I Tanks	Monthly gamma composite; Quarterly I-129 and Tc-99 grab
SV-2052	Steel Creek at the top of L-Lake	Downstream from P- and L- Areas	Weekly tritium; Monthly gamma composite

Creek Mouth Monitoring Locations

ID	Location	Rationale	Frequency
SV-2011	Upper Three Runs Creek at RM 157.4	Accessible to public; Adjacent to SRS; Downstream of SRS operation areas; Tributary monitoring	Monthly tritium
SV-2015	Fourmile Branch at RM 150.6	Accessible to public; Adjacent to SRS; Downstream of SRS operation areas; Tributary monitoring	Monthly tritium
SV-2017*	Steel Creek at RM 141.5	Accessible to public; Adjacent to SRS; Downstream of SRS operation areas; Tributary monitoring	Monthly tritium
SV-2020	Lower Three Runs Creek at RM 129.1	Accessible to public; Adjacent to SRS; Downstream of SRS operation areas; Tributary monitoring	Monthly tritium

Supplemental Monitoring Locations

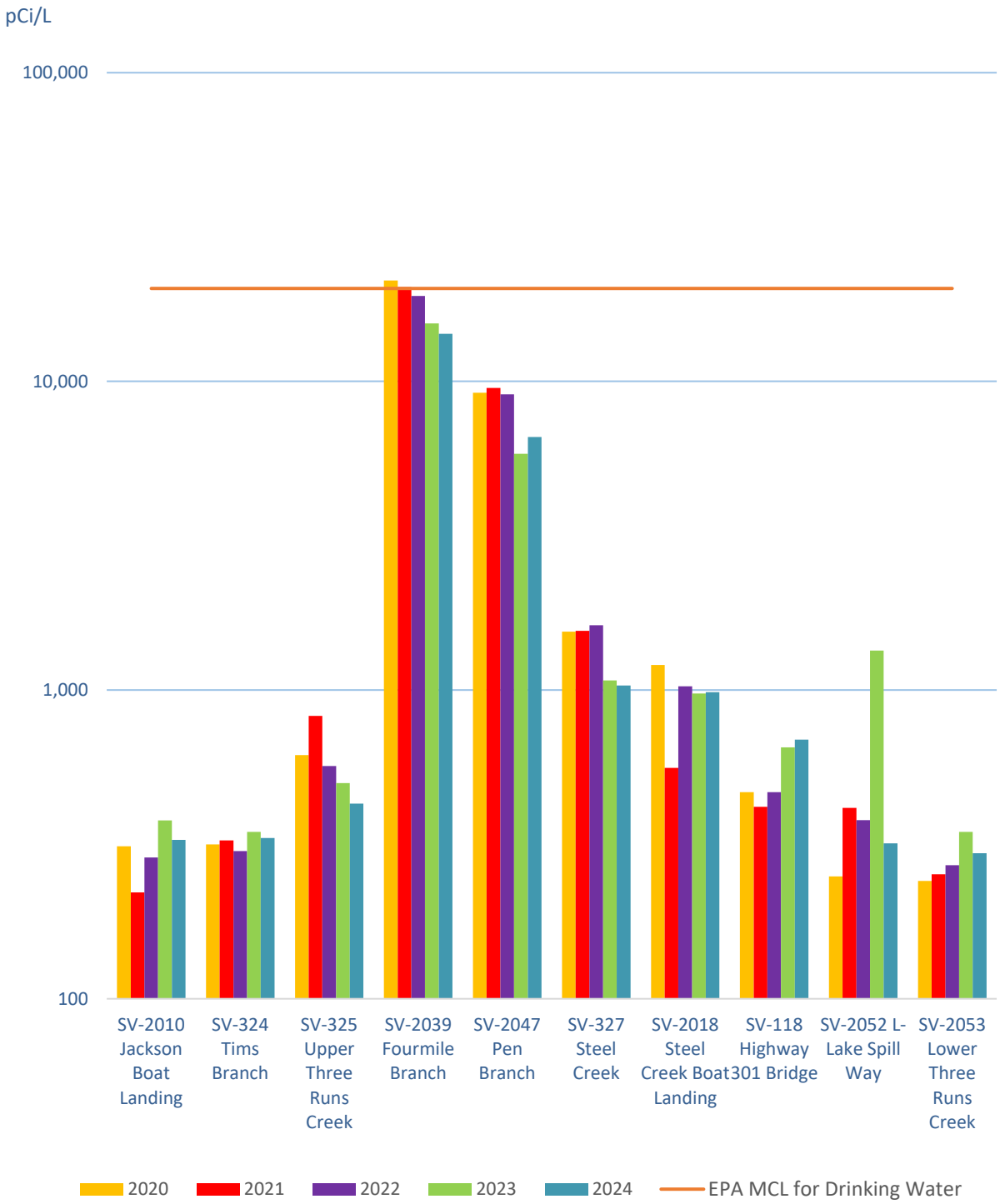
ID	Location	Rationale	Frequency
SV-2032	Mill Creek at Woodward Road, SRS Road E - ATTA	Downstream of past operations R area	Monthly Tritium, Alpha, Beta, and Gamma grab
SV-2040*	Beaver Dam Creek	Downstream of past operations in D Area	Monthly Tritium, Alpha, Beta, and Gamma grab
SV-2064*	Steel Creek off SRS Road C	Downstream of past operations in P area	Monthly Tritium, Alpha, Beta, and Gamma grab
SV-2081*	Mary's Branch near Barnwell Barricade, SRS Road B	Tributary monitoring related to potential impacts from adjacent off-site facility	Monthly Tritium, Alpha, Beta, and Gamma grab

Note:
1). ID is Sampling Location Identification Code Number
2). RM is River Mile
3). HLW is High-Level Waste
4). LLW is Low-Level Waste
5). Tri-Weekly Enhanced sample data is used for detection purposes only.
6). * Indicates a location that is collocated with DOE-SR sampling
7). SV-2027 and SV-328 were not sampled in 2024 due to safety concerns at the sampling locations, but these locations will remain in network for future consideration.
8) SV-2017 and DOE-SR's equivalent sampling location are not directly collocated but due to their identical location names and purposes to sample Steel Creek's Creek Mouth, they are considered collocated for comparison purposes.

Return to TOC

4.5.0 TABLES AND FIGURES

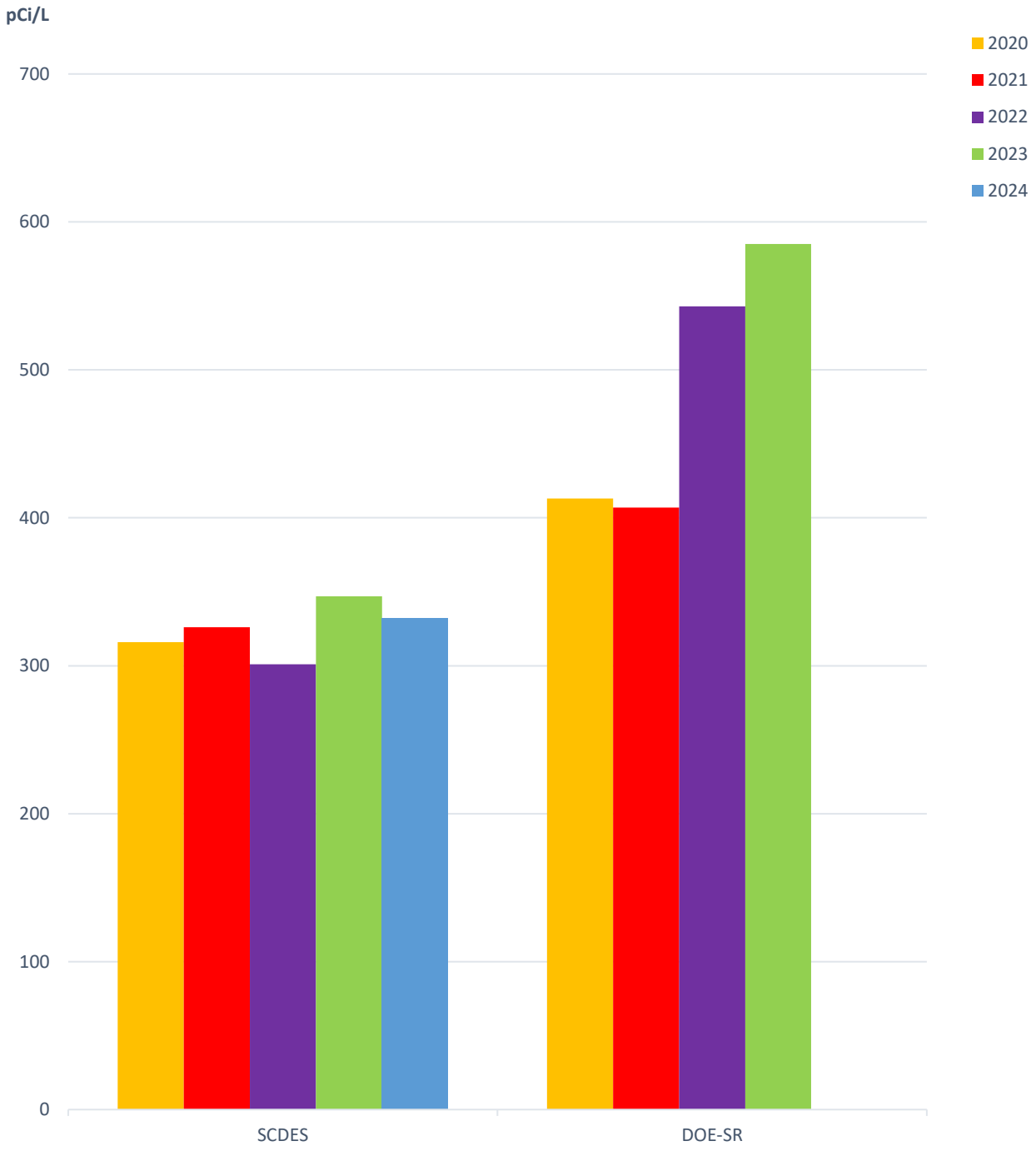
Figure 1. SCDES Average Tritium Data Trends for 2020-2024 Ambient Locations (DHEC, 2021-2023; SCDES, 2024b)



Return to TOC

4.5.0 TABLES AND FIGURES

Figure 2. 2020-2024 Average Tritium Data Trends for SCDES and DOE-SR for Tims Branch at SRS Road C (SV-324 – Ambient Location) (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)

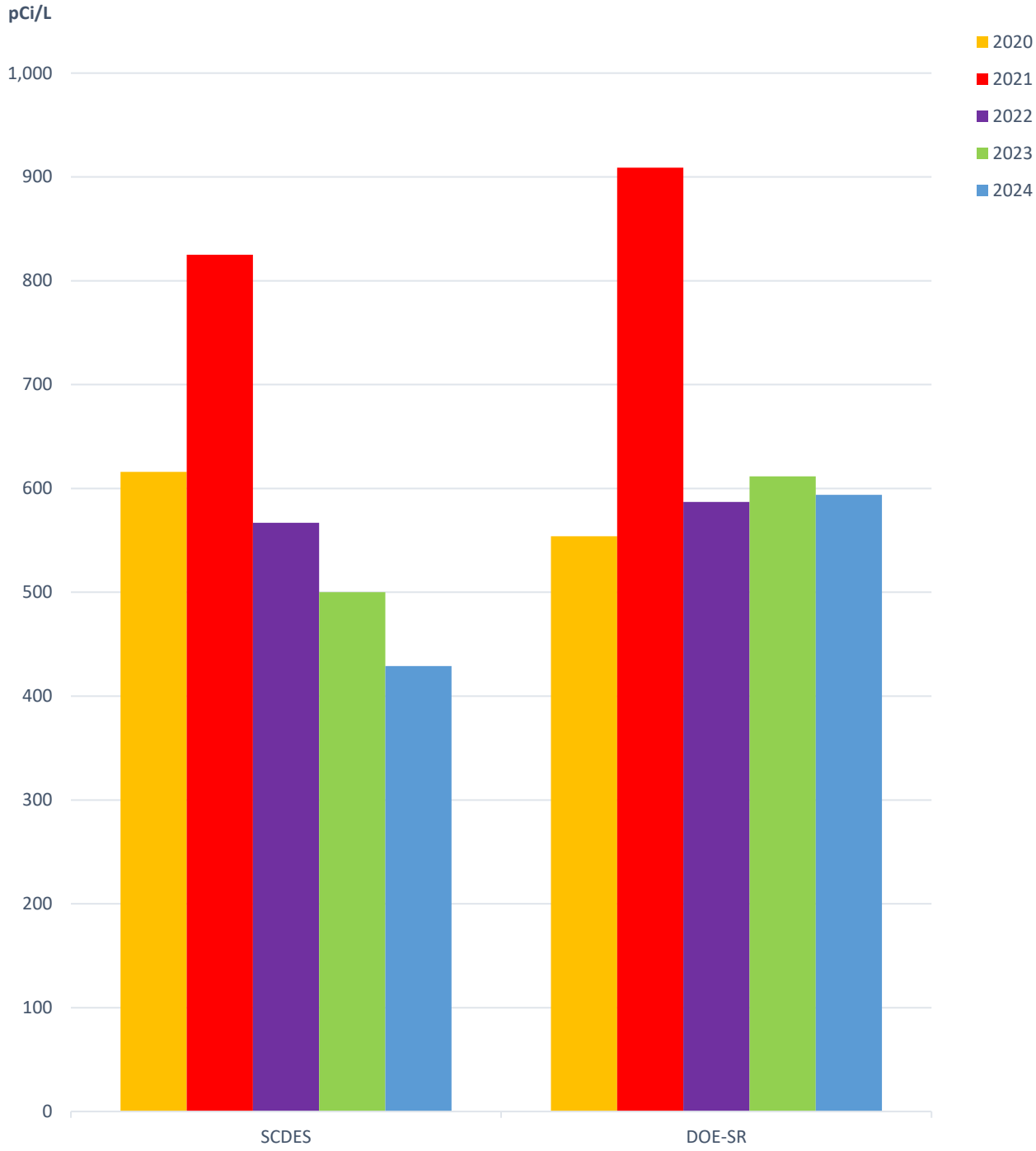


Note:
1) In 2023, DOE-SR's data is not an average due to there only being one detection during the year with a reading of 585 pCi/L**.**
2) In 2024, DOE-SR had no detections of tritium at Tims Branch at SRS Road C (SV-324).

Return to TOC

4.5.0 TABLES AND FIGURES

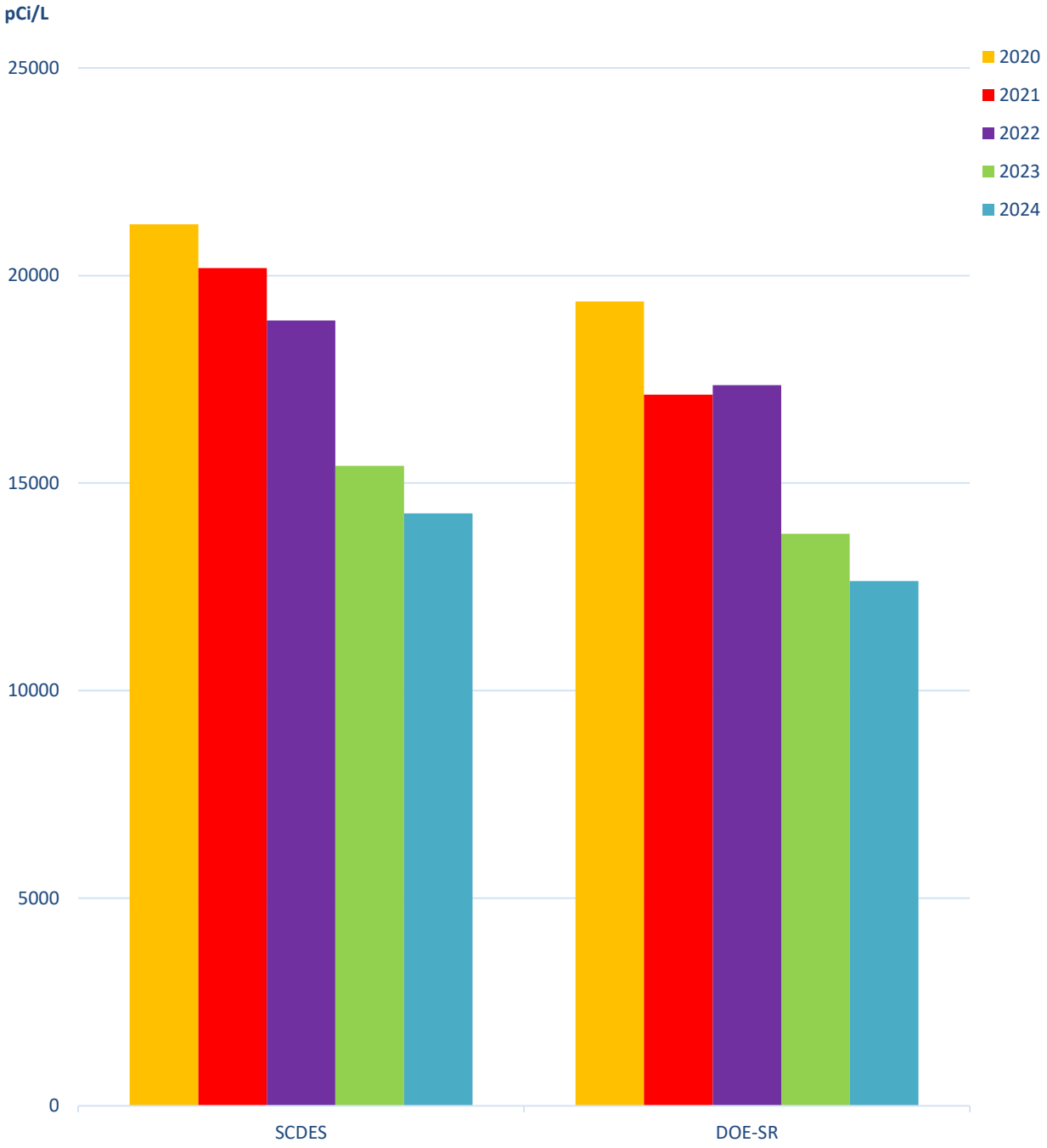
Figure 3. 2020-2024 Average Tritium Data Trends for SCDES and DOE-SR for Upper Three Runs Creek at S.C. 125/SRS Road A (SV-325 – Ambient Location) (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)



Return to TOC

4.5.0 TABLES AND FIGURES

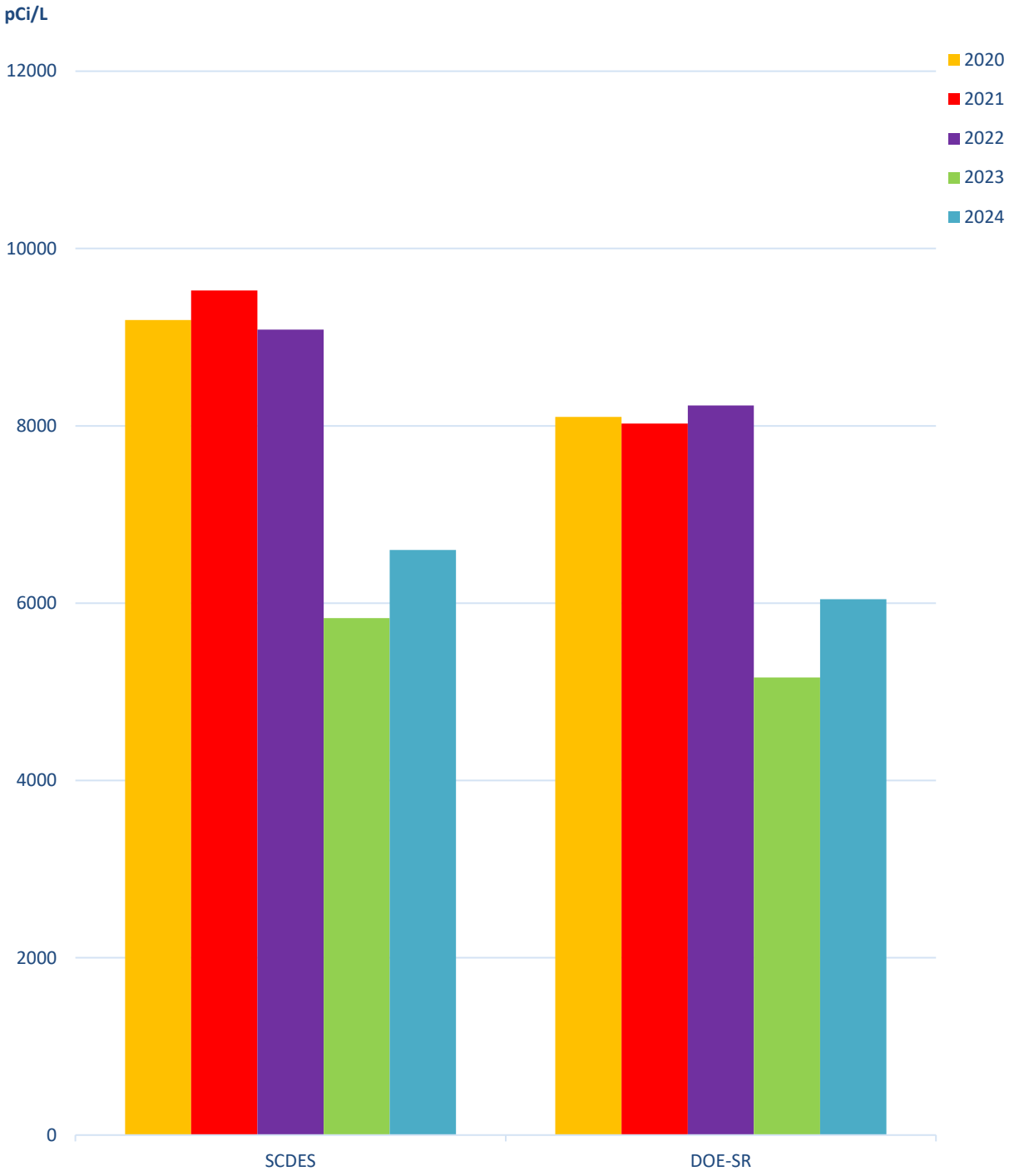
Figure 4. 2020-2024 Average Tritium Data Trends for SCDES and DOE-SR for Fourmile Branch at SRS Road A-12.2 (SV-2039 – Ambient Location) (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)



Return to TOC

4.5.0 TABLES AND FIGURES

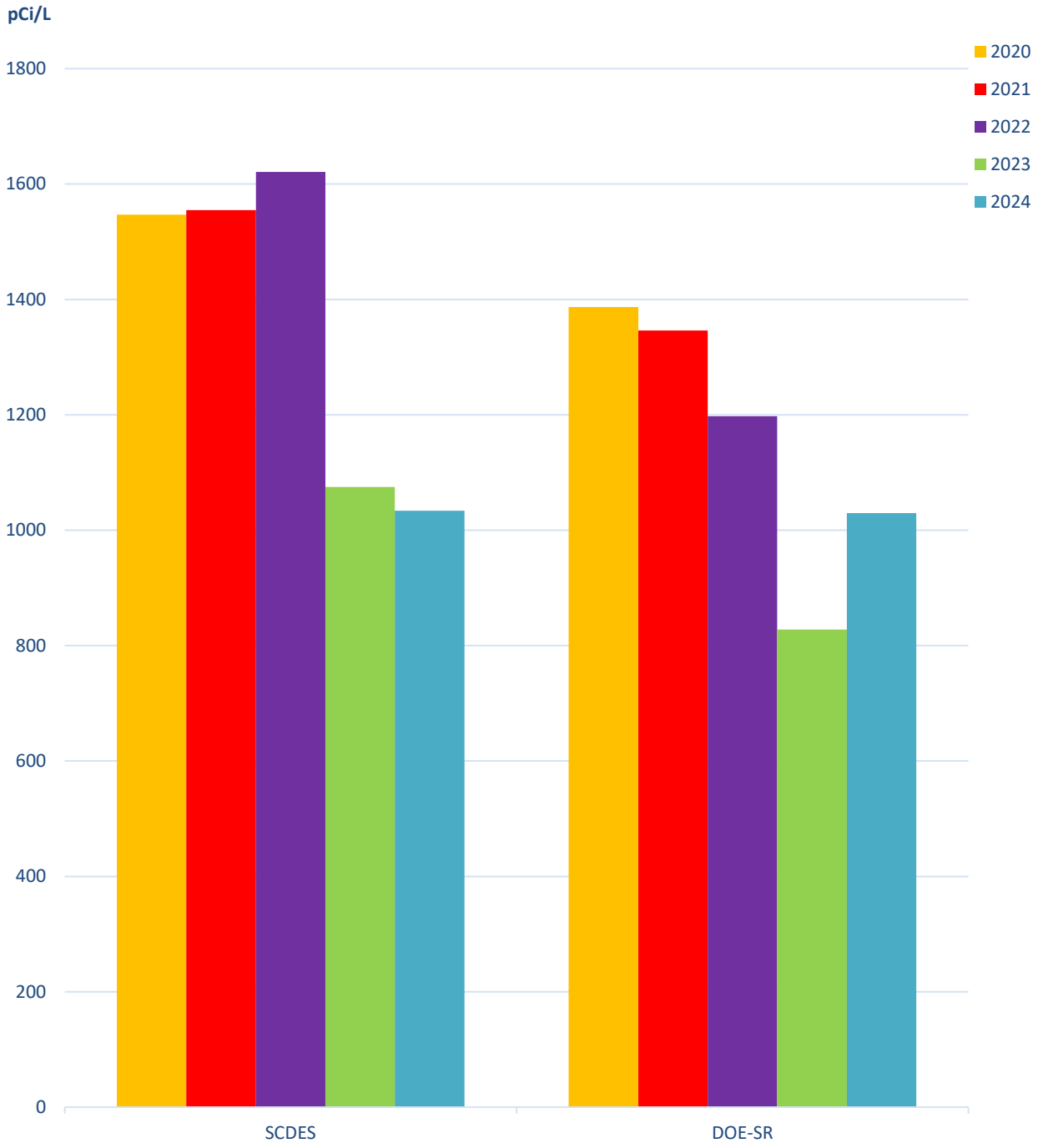
Figure 5. 2020-2024 Average Tritium Data Trends for SCDES and DOE-SR for Pen Branch at SRS Road A-13.2 (SV-2047 – Ambient Location) (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)



Return to TOC

4.5.0 TABLES AND FIGURES

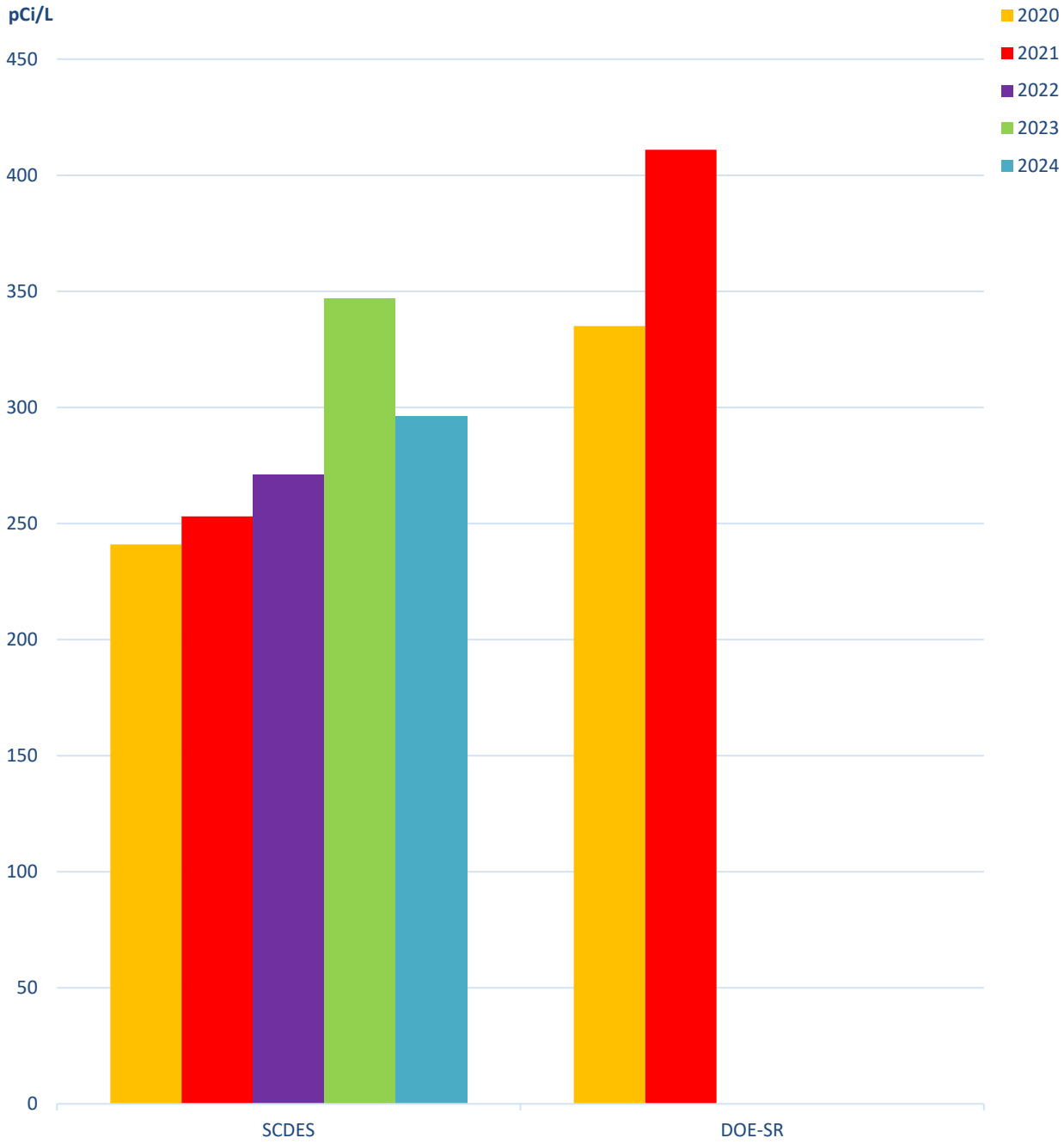
Figure 6. 2020-2024 Average Tritium Data Trends for SCDES and DOE-SR for Steel Creek at S.C. 125/SRS Road A (SV-327 – Ambient Location) (SRNS, 2021-2025; DHEC, 2021-2023; SCDES 2024b)



Return to TOC

4.5.0 TABLES AND FIGURES

Figure 7. 2020-2024 Average Tritium Data Trends for SCDES and DOE-SR for Lower Three Runs Creek at SRS Road B (SV-2053 – Ambient Location) (SRNS, 2021-2025; DHEC, 2021-2023; SCDES 2024b)

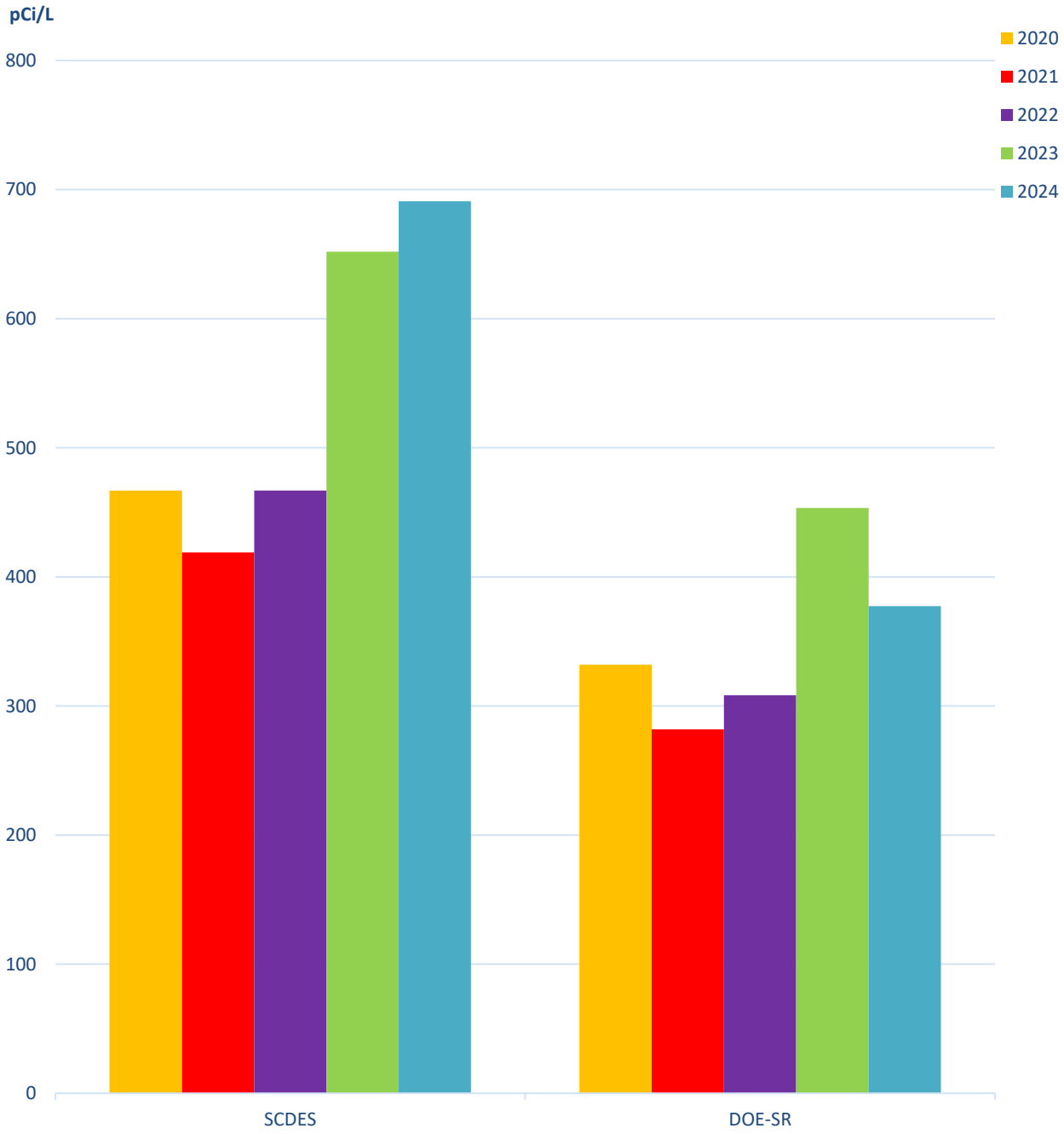


Note:
1) In 2020 & 2021, DOE-SR's data is not an average due to there only being one detection during the year with a reading of 335 & 411 pCi/L, respectively.
2) For 2022-2024, DOE-SR had no detections of tritium at Lower Three Runs Creek at SRS Road B (SV-2053).

Return to TOC

4.5.0 TABLES AND FIGURES

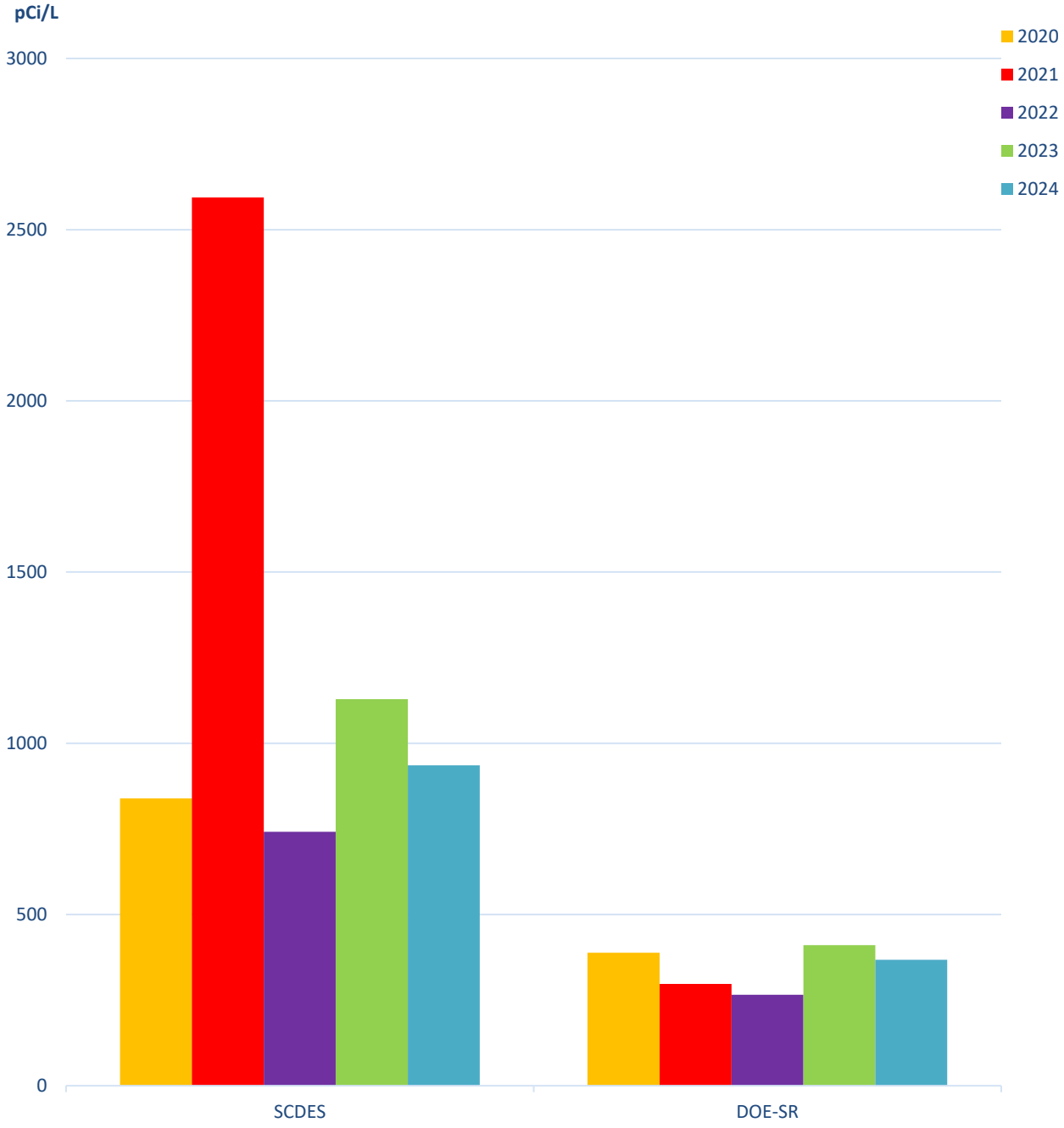
Figure 8. 2020-2024 Average Tritium Data Trends for SCDES and DOE-SR for the Savannah River at US Highway 301 Bridge (SV-118 – Ambient Location) (SRNS, 2021-2025; DHEC, 2021-2023; SCDES 2024b)



Return to TOC

4.5.0 TABLES AND FIGURES

Figure 9. 2020-2024 Average Tritium Data Trends for SCDES and DOE-SR for Steel Creek Mouth at RM 141.5 (SV-2017 – Creek Mouth Location) (SRNS, 2021-2025; DHEC, 2020-2023; SCDES, 2024b)



Return to TOC

4.6.0 SUMMARY STATISTICS

2024 Tritium Data Comparison for SCDES and DOE-SR Collocated Ambient & Creek Mouth Sampling Locations (SRNS, 2025)

Sample Location	Sample ID	Average Concentration (pCi/L)	Standard Deviation (pCi/L)	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detects	Number of Samples
Tims Branch at SRS Road C	SV-324	332	70	299	265	469	13	51
	TB-5	ND	ND	ND	ND	ND	0	12
Upper Three Runs Creek at S.C. 125/ SRS Road A	SV-325	429	158	407	263	1257	47	51
	U3R-4	594	112	602	461	711	4	12
Fourmile Branch at SRS Road A-12.2	SV-2039	14273	1929	14735	8071	17474	51	51
	FM-6	12642	1476	12650	10000	14700	12	12
Pen Branch at SRS Road A-13.2	SV-2047	6599	2138	6439	2150	10301	51	51
	PB-3	6046	1665	5385	3490	8560	12	12
Steel Creek at S.C. 125/SRS Road A	SV-327	1034	286	991	560	1819	51	51
	SC-4	1030	233	1050	635	1430	11	12
Highway 301 Bridge at RM 118.8	SV-118	691	401	550	286	1750	33	51
	RM-118	377	228	304	145	1380	40	52
Lower Three Runs Creek at SRS Road B	SV-2053	296	NA	296	296	296	1	46
	L3R-1A	ND	ND	ND	ND	ND	0	12
Steel Creek at RM 141.5	SV-2017	936	487	774	360	1984	11	11
	RM-141.5	368	434	248	9	2800	52	52

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) ND is Not Detected; NA is Not Applicable
3) SV-2053 only had 46 samples for SCDES in 2024 due to restricted access to this sampling location throughout November and December.
4) SV-2017 only had 11 samples for SCDES in 2024 due to a scheduling error in March.
5) SV-324, SV-325, SV-2039, SV-2047, SV-327, SV-118 only had 51 samples for SCDES due to sampling safety concerns in October 2024 after Hurricane Helene made landfall in South Carolina.
6) DOE-SR samples SV-118 (RM-118) and SV-2017 (RM-141.5) weekly for tritium. The remaining sample locations are sampled monthly by DOE-SR for tritium. SCDES samples SV-2017 monthly for tritium. The remaining sample locations are sampled weekly by SCDES for tritium.

4.6.0 SUMMARY STATISTICS

2024 Alpha Data Comparison for SCDES and DOE-SR Collocated Ambient Sampling Locations (SRNS, 2025)

Sample Location	Sample ID	Average Concentration (pCi/L)	Standard Deviation (pCi/L)	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detects	Number of Samples
Tims Branch at SRS Road C	SV-324	3.59	1.20	4.13	1.78	4.68	5	12
	TB-5	4.21	2.41	3.85	0.88	9.83	12	12
Upper Three Runs Creek at S.C. 125/SRS Road A	SV-325	3.16	0.93	2.98	2.02	5.32	10	12
	U3R-4	14.02	14.55	9.95	1.97	49.20	12	12
Fourmile Branch at SRS Road A-12.2	SV-2039	ND	ND	ND	ND	ND	0	12
	FM-6	0.61	0.30	0.48	0.33	1.18	9	12
Pen Branch at SRS Road A-13.2	SV-2047	ND	ND	ND	ND	ND	0	12
	PB-3	1.22	0.48	1.13	0.45	2.00	8	12
Steel Creek at S.C. 125/ SRS Road A	SV-327	1.79	NA	1.79	1.79	1.79	1	12
	SC-4	0.43	0.07	0.43	0.31	0.50	5	12
Highway 301 Bridge at RM 118.8	SV-118	ND	ND	ND	ND	ND	0	12
	RM-118	0.38	0.05	0.36	0.30	0.47	12	52
Lower Three Runs Creek at SRS Road B	SV-2053	ND	ND	ND	ND	ND	0	11
	L3R-1A	1.69	1.63	0.93	0.37	4.21	5	12

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) ND is Not Detected; NA is Not Applicable
3) SV-2053 only had 11 samples for SCDES in 2024 due to restricted access to this sampling location throughout November and December.
4) DOE-SR samples SV-118 (RM-118) weekly and the remaining locations monthly for alpha activity. SCDES samples all locations monthly for alpha activity.

4.6.0 SUMMARY STATISTICS

2024 Beta Data Comparison for SCDES and DOE-SR Collocated Ambient Sampling Locations (SRNS, 2025)

Sample Location	Sample ID	Average Concentration (pCi/L)	Standard Deviation (pCi/L)	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detects	Number of Samples
Tims Branch at SRS Road C	SV-324	ND	ND	ND	ND	ND	0	12
	TB-5	2.21	0.63	2.17	1.12	3.11	12	12
Upper Three Runs Creek at S.C. 125/SRS Road A	SV-325	ND	ND	ND	ND	ND	0	12
	U3R-4	8.25	8.09	5.84	1.36	27.00	12	12
Fourmile Branch at SRS Road A-12.2	SV-2039	5.01	1.26	4.58	4.02	6.42	3	12
	FM-6	3.72	0.46	3.73	2.84	4.40	12	12
Pen Branch at SRS Road A-13.2	SV-2047	ND	ND	ND	ND	ND	0	12
	PB-3	1.23	0.44	1.21	0.64	2.11	12	12
Steel Creek at S.C. 125/ SRS Road A	SV-327	ND	ND	ND	ND	ND	0	12
	SC-4	0.98	0.29	0.96	0.55	1.53	11	12
Highway 301 Bridge at RM 118.8	SV-118	ND	ND	ND	ND	ND	0	12
	RM-118	2.25	0.32	2.24	1.53	3.02	52	52
Lower Three Runs Creek at SRS Road B	SV-2053	ND	ND	ND	ND	ND	0	11
	L3R-1A	1.52	1.27	1.04	0.60	5.12	12	12

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) ND is Not Detected
3) SV-2053 only had 11 samples for SCDES in 2024 due to restricted access to this sampling location throughout November and December.
4) DOE-SR samples SV-118 (RM-118) weekly and the remaining locations monthly for beta activity. SCDES samples all locations monthly for beta activity.

4.6.0 SUMMARY STATISTICS

2024 Tritium Data Comparison for SCDES and DOE-SR Collocated Supplemental Sampling Locations (SRNS, 2025)

Sample Location	Sample ID	Average Concentration (pCi/L)	Standard Deviation (pCi/L)	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detects	Number of Samples
Beaver Dam Creek	SV-2040	463	-233	361	316	873	5	12
	BDC	547	NA	547	547	547	1	12
Steel Creek off SRS Road C	SV-2064	22147	5221	23229	9375	30329	12	12
	SC-2A	20792	3219	20600	15300	26000	12	12
Mary's Branch near Barnwell Barricade, SRS Road B	SV-2081	8186	553	8298	7128	9128	12	12
	Mary's Branch	6874	1240	7335	3120	7640	12	12

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) NA is Not Applicable
3) Collocated Supplemental Locations are sampled monthly by both SCDES and DOE-SR for tritium.

Return to TOC

4.6.0 SUMMARY STATISTICS

2024 Alpha Data Comparison for SCDES and DOE-SR Collocated Supplemental Sampling Locations (SRNS, 2025)

Sample Location	Sample ID	Average Concentration (pCi/L)	Standard Deviation (pCi/L)	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detects	Number of Samples
Steel Creek off SRS Road C	SV-2064	2.11	0.59	2.04	1.53	2.82	4	12
	SC-2A	2.13	1.67	1.49	0.39	6.04	12	12
Mary's Branch near Barnwell Barricade, SRS Road B	SV-2081	5.70	4.90	4.18	2.61	20.70	12	12
	Mary's Branch	34.33	41.63	15.80	3.03	148.00	12	12

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) Collocated Supplemental Locations are sampled monthly by both SCDES and DOE-SR for alpha activity.

2024 Beta Data Comparison for SCDES and DOE-SR Collocated Supplemental Sampling Locations (SRNS, 2025)

Sample Location	Sample ID	Average Concentration (pCi/L)	Standard Deviation (pCi/L)	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detects	Number of Samples
Steel Creek off SRS Road C	SV-2064	6.59	0.66	6.59	6.12	7.05	2	12
	SC-2A	3.04	1.57	2.51	1.31	7.19	12	12
Mary's Branch near Barnwell Barricade, SRS Road B	SV-2081	5.22	NA	5.22	5.22	5.22	1	12
	Mary's Branch	15.57	21.60	5.88	1.15	74.50	12	12

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) NA is Not Applicable
3) Collocated Supplemental Locations are sampled monthly by both SCDES and DOE-SR for beta activity.

4.6.0 SUMMARY STATISTICS

2024 SCDES Monitoring Data-Tritium in pCi/L

Ambient Sample Location	Average Concentration	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detections	Number of Samples
Jackson Boat Landing (SV-2010)	327	NA	327	327	327	1	51
Tims Branch at SRS Road C (SV-324)	332	70	299	265	469	13	51
Upper Three Runs Creek at S.C. 125/SRS Road A (SV-325)	429	158	407	263	1257	47	51
Fourmile Branch at SRS Road A-12.2 (SV-2039)	14273	1929	14735	8071	17474	51	51
Pen Branch at SRS Road A-13.2 (SV-2047)	6599	2138	6439	2150	10301	51	51
Steel Creek at S.C. 125/SRS Road A (SV-327)	1034	286	991	560	1819	51	51
Steel Creek Boat Landing at RM 141 (SV-2018)	985	1578	456	279	7242	34	51
Highway 301 Bridge at RM 118.8 (SV-118)	691	401	550	286	1750	33	51
L-Lake Spill Way (SV-2052)	319	52	301	274	491	20	50
Lower Three Runs Creek at SRS Road B (SV-2053)	296	NA	296	296	296	1	46
Creek Mouth Sample Location	**Average Concentration**	**Standard Deviation**	**Median**	**Minimum Detect**	**Maximum Detect**	**Number of Detects**	**Number of Samples**
Upper Three Runs Creek at RM 157.4 (SV-2011)	382	98	386	274	578	9	11
Fourmile Branch at RM 150.6 (SV-2015)	4477	4427	4516	330	10842	5	11
Steel Creek at RM 141.5 (SV-2017)	936	487	774	360	1984	11	11
Lower Three Runs Creek at RM 129.1 (SV-2020)	382	93	368	285	544	6	11

Note:
1) SV-2052 only had 50 samples for 2024 due to an analytical error.
2) SV-2053 only had 46 samples for 2024 due to restricted access to this sampling location throughout November and December.
3) SV-324, SV-325, SV-2039, SV-2047, SV-327, SV-118 only had 51 samples due to sampling safety concerns in October 2024 after Hurricane Helene made landfall in South Carolina.
4) No Creek Mouth samples were collected in March 2024 due to a scheduling error.
5) NA is Not Applicable

Return to TOC

4.6.0 SUMMARY STATISTICS

2024 SCDES Monitoring Data-Tritium in pCi/L continued

Supplemental Sample Location	Average Concentration	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects	Number of Samples
Mary's Branch near Barnwell Barricade, SRS Road B (SV-2081)	8186	553	8298	7128	9128	12	12
Steel Creek off SRS Road C (SV-2064)	22147	5221	23229	9375	30329	12	12
Mill Creek at Woodward Road, Road E – ATTA (SV-2032)	411	118	422	272	572	10	12
Beaver Dam Creek (SV-2040)	463	-233	361	316	873	5	12

4.6.0 SUMMARY STATISTICS

2024 SCDES Monitoring Data-Alpha

Ambient Sample Location	Average Concentration (pCi/L)	Standard Deviation	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detections	Number of Samples
Jackson Boat Landing (SV-2010)	ND	ND	ND	ND	ND	0	12
Tims Branch at SRS Road C (SV-324)	3.59	1.20	4.13	1.78	4.68	5	12
Upper Three Runs Creek at S.C. 125/SRS Road A (SV-325)	3.16	0.93	2.98	2.02	5.32	10	12
Fourmile Branch at SRS Road A-12.2 (SV-2039)	ND	ND	ND	ND	ND	0	12
Pen Branch at SRS Road A-13.2 (SV-2047)	ND	ND	ND	ND	ND	0	12
Steel Creek at S.C. 125/SRS Road A (SV-327)	1.79	NA	1.79	1.79	1.79	1	12
Steel Creek Boat Landing at RM 141 (SV-2018)	2.35	NA	2.35	2.35	2.35	1	12
Highway 301 Bridge at RM 118.8 (SV-118)	ND	ND	ND	ND	ND	0	12
Lower Three Runs Creek at SRS Road B (SV-2053)	ND	ND	ND	ND	ND	0	11
Supplemental Sample Location	**Average Concentration (pCi/L)**	**Standard Deviation**	**Median (pCi/L)**	**Minimum Detect (pCi/L)**	**Maximum Detect (pCi/L)**	**Number of Detections**	**Number of Samples**
Mary's Branch near Barnwell Barricade, SRS Road B (SV-2081)	5.70	4.90	4.18	2.61	20.70	12	12
Steel Creek off SRS Road C (SV-2064)	2.11	0.59	2.04	1.53	2.82	4	12
Mill Creek at Woodward Road, Road E – ATTA (SV-2032)	3.52	0.81	3.52	2.94	4.09	2	12
Beaver Dam Creek (SV-2040)	1.42	0.33	1.42	1.18	1.65	2	12

Note:
1) ND is Not Detected
2) NA is Not Applicable
3) SV-2053 only had 11 samples for 2024 due to restricted access to this sampling location throughout November and December.

Return to TOC

4.6.0 SUMMARY STATISTICS

2024 SCDES Monitoring Data-Beta

Ambient Sample Location	Average Concentration (pCi/L)	Standard Deviation	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detections	Number of Samples
Jackson Boat Landing (SV-2010)	ND	ND	ND	ND	ND	0	12
Tims Branch at SRS Road C (SV-324)	ND	ND	ND	ND	ND	0	12
Upper Three Runs Creek at S.C. 125/SRS Road A (SV-325)	ND	ND	ND	ND	ND	0	12
Fourmile Branch at SRS Road A-12.2 (SV-2039)	5.01	1.26	4.58	4.02	6.42	3	12
Pen Branch at SRS Road A-13.2 (SV-2047)	ND	ND	ND	ND	ND	0	12
Steel Creek at S.C. 125/SRS Road A (SV-327)	ND	ND	ND	ND	ND	0	12
Steel Creek Boat Landing at RM 141 (SV-2018)	5.32	NA	5.32	5.32	5.32	1	12
Highway 301 Bridge at RM 118.8 (SV-118)	ND	ND	ND	ND	ND	0	12
Lower Three Runs Creek at SRS Road B (SV-2053)	ND	ND	ND	ND	ND	0	11
Supplemental Sample Location	**Average Concentration (pCi/L)**	**Standard Deviation**	**Median (pCi/L)**	**Minimum Detect (pCi/L)**	**Maximum Detect (pCi/L)**	**Number of Detections**	**Number of Samples**
Mary's Branch near Barnwell Barricade, SRS Road B (SV-2081)	5.22	NA	5.22	5.22	5.22	1	12
Steel Creek off SRS Road C (SV-2064)	6.59	0.66	6.59	6.12	7.05	2	12
Mill Creek at Woodward Road, Road E – ATTA (SV-2032)	7.15	NA	7.15	7.15	7.15	1	12
Beaver Dam Creek (SV-2040)	ND	ND	ND	ND	ND	0	12

Note:
1) ND is Not Detected
2) NA is Not Applicable
3) SV-2053 only had 11 samples for 2024 due to restricted access to this sampling location throughout November and December.

Return to TOC

Chapter 5 Nonradiological Monitoring of Surface Water on SRS

Return to TOC

5.1.0 PROJECT SUMMARY

Using a Horiba Water Quality Meter to determine field parameters

SCDES assessed the surface water quality for nonradiological parameters in 2024 at SRS by sampling the on-site streams for inorganic and organic constituents. As an indication of possible water quality issues, SCDES data is compared to the freshwater standard guidelines in SCDES's Water Classifications and Standards, Regulation 61-68 (SCDES, 2024a). These guidelines give numeric criteria for specific parameters and narrative criteria that indicate conditions of biological integrity and water quality for aquatic life and human health. The fact that a stream does not meet the specified numeric standards for a particular parameter does not mean the stream is polluted or of poor quality. Natural conditions can cause streams to exceed the standards.

Seven SCDES sample locations were strategically chosen to monitor ambient surface water conditions and to determine the potential impacts from nonradiological constituents related to DOE-SR operations. A map of SCDES sample locations can be found in Section 5.4.0. Five of the SCDES sample locations are collocated with DOE-SR sample locations to provide data comparisons (Section 5.5.0, Table 1). SCDES also sampled 4 supplemental locations that are monitored separately to determine their potential to be added to the ambient sampling network based on SRS activities (Section 5.5.0, Table 2). Supplemental locations are only sampled for mercury, metals, and field parameters. SCDES supplemental locations are not collocated with DOE-SR. For all SCDES ambient and supplemental sample location ID, descriptions, and rationales, refer to Section 5.5.0, Tables 1 & 2. The stream sample locations were selected based on accessibility and their proximity upstream and downstream of DOE-SR operations before flowing into the publicly accessible Savannah River. A list of water quality parameter analyses and sample frequency can be found in Section 5.5.0, Table 3.

5.2.0 RESULTS AND DISCUSSION

Nonradiological Monitoring of Surface Water Summary Statistics can be found in Section 5.6.0 and all Nonradiological Monitoring of Surface Water Data can be found in the 2024 SCDES Data File.

Many chemical and biological processes in surface waters can be affected by pH, a measurement that indicates the alkalinity or acidity of a substance (EPA, 1997). The streams encountered at SRS are typical of southeastern streams characterized as blackwater. A blackwater stream is one that has a deep, slow-moving channel that flows through forested swamps and wetlands. Decaying vegetation in the water results in the leaching of tannins from the vegetation which

results in transparent, acidic water that is darkly stained, resembling tea or coffee. Low pH is typical for blackwater streams such as those sampled at SRS (Hughes et al., 2000).

Water sample to be analyzed by the lab in Columbia

The pH standard for all South Carolina freshwater streams is between 6.0 and 8.5 standard units (SU) (SCDES, 2024a). All ambient SCDES locations had yearly averages within the standard. NWSV-324 with a yearly pH average of 6.13, NWSV-325 with a yearly pH average of 6.55, NWSV-2039 with a yearly pH average of 6.27, and NWSV-2047 with a yearly pH average of 6.41 had individual pH detections under the standard. NWSV-2040 with a yearly pH average of 5.48 and NWSV-2032 with a yearly pH average of 5.33 were the only 2 supplemental locations that had yearly pH averages under the standard. All of the supplemental locations had some individual pH detections under the standard. These streams are blackwater streams, which may contribute to them having a pH lower than 6. All DOE-SR collocations had some individual pH detections under the standard, but all of the locations had yearly averages within the standard. See Section 5.5.0, Figure 1 for a comparison of SCDES and DOE-SR data for collocated samples (SRNS, 2025).

Oxygen is cycled through the environment and is both produced and consumed in streams. The amount of oxygen in its dissolved form in water is the Dissolved Oxygen (DO). The Biochemical Oxygen Demand (BOD) is the amount of oxygen consumed by microorganisms in stream water.

Recording field parameters: DO, pH, temperature, conductivity, and total dissolved solids

Water quality is diminished when the BOD is high, which depletes the oxygen in the water. Low DO means less oxygen to support higher forms of aquatic life (EPA, 1997). The South Carolina freshwater standard for DO is a daily average of no less than 5.0 mg/L with no individual sample to be below 4.0 mg/L (SCDES, 2024a). All SCDES individual samples and daily averages met the DO standard except for NWSV-2040 (Supplemental) with a yearly average DO of 8.01 mg/L and NWSV-2032 (Supplemental) with a yearly average DO of 7.28 mg/L in 2024. All DOE-SR collocations had individual samples and daily averages that met the DO standard. A DO comparison of SCDES and DOE-SR data for collocated samples can be found in Section 5.5.0, Figure 2 (SRNS, 2025). There are no numeric criteria in the South Carolina freshwater standards for a maximum BOD level; however, in 2024, SCDES samples had no detections above the LLD of 2.0 mg/L. SCDES Supplemental locations are not sampled for BOD. DOE-SR did not collect BOD samples in 2024, therefore, no comparison can be made for BOD.

Return to TOC

Water samples collected in a composite grab

Temperature can affect biological and chemical processes in a stream. All aquatic organisms can be negatively affected by temperatures that vary from the naturally occurring range (EPA, 1997). The South Carolina freshwater standards state that the temperature of free-flowing freshwater shall not exceed a maximum of 32.2°C (SCDES, 2024a). All SCDES and DOE-SR data showed that the stream temperatures during each sampling event were comparable to each other and did not exceed the maximum of 32.2°C.

The South Carolina freshwater *E. coli* standard is a daily maximum of 349 Most Probable Number per 100mL (MPN/100mL) (SCDES, 2024a). All streams sampled by SCDES had individual samples that exceeded 349 MPN/100mL except for NWSV-327, NWSV-2039, and NWSV-2053, but all locations had yearly averages below the standard. SCDES Supplemental locations are not sampled for *E. coli*. DOE-SR did not collect samples for *E. coli* in 2024, therefore, no comparison can be made.

Phosphorous and nitrogen are essential nutrients for the plants and animals that make up the aquatic food web. However, in excess they can cause significant water quality problems. Phosphorous and nitrogen cycle through the environment in a variety of forms and can indirectly impact DO and other water quality indicators (EPA, 1997). In 2024, SCDES sampled for total phosphorous and various forms of nitrogen, including nitrate/nitrite, total Kjeldahl nitrogen (TKN), and ammonia. There are no numeric criteria in the South Carolina freshwater standard for total phosphorus, TKN, or ammonia.

SCDES uses the most conservative of the federally established drinking water standards for nitrate/nitrite levels to indicate ambient water quality in freshwater streams for nutrients. The EPA drinking water standards for nitrate/nitrite levels are 10 mg/L and 1 mg/L, respectively, and are designed to protect the public from consumption of high levels of these nutrients (SCDES, 2024a). As a conservative measure, SCDES uses a maximum of 1 mg/L as an indication of possible water quality issues. NWSV-2039 with a yearly nitrate/nitrite average of 0.69 mg/L and NWSV-2047 with a yearly nitrate/nitrite average of 0.29 mg/L were the only locations with individual nitrate/nitrite detections above the standard for SCDES. SCDES Supplemental locations are not sampled for nitrate/nitrite. All DOE-SR collocated samples were below 1 mg/L except for a single detect at SV-324 (yearly average of 0.54 mg/L) and four detects at SV-2039 (yearly average of 0.70 mg/L). Overall, the nutrient levels on SRS are comparable to the levels found throughout the Savannah River Basin. DOE-SR did not sample for TKN or

Water sample to be analyzed

Return to TOC

ammonia in 2024; therefore, no comparison can be made. A comparison of SCDES and DOE-SR data from collocated samples for total phosphorous and nitrate/nitrite, respectively, can be found in Section 5.5.0, Figures 3 and 4.

Most metals are considered pollutants, including some that are toxic or known carcinogens. In 2024, SCDES personnel collected samples for the following metals: aluminum, beryllium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, thallium, and zinc. Due to the potential health effects of some metals, a yearly average, even if based on a single detection that exceeds the freshwater standards, may indicate a water quality issue. These metals, with the exceptions of aluminum, calcium, iron, magnesium, and manganese, have numeric criteria for the protection of human health and aquatic life in the South Carolina freshwater quality standards.

The freshwater quality standard for cadmium in South Carolina streams is not to exceed 0.00026 mg/L (SCDES, 2024a). The averages from all SCDES locations (ambient and supplemental) were below the standard for cadmium. DOE-SR collocations had no detections above the standard for cadmium (SRNS, 2025).

Samples are individually bottled and transported on ice

The freshwater quality standards for chromium, copper, and nickel in South Carolina streams are not to exceed 0.011 mg/L, 0.0029 mg/L and 0.016 mg/L, respectively (SCDES, 2024a). SCDES did not detect chromium, copper, or nickel above their respective standards in any samples in 2024. Due to copper's standard of 0.0029 mg/L being lower than the SCDES laboratory's limit of detection of <0.010 mg/L, samples that were found to be <0.010 mg/L were considered non-detects. DOE-SR detected chromium, copper, and nickel below the standard in their collocated sample locations with the exception of two detects of copper at NWSV-327 (yearly average of 0.0049 mg/L), a single detect of copper at NWSV-2039 (yearly average of 0.0018 mg/L) and a single detect of nickel at NWSV-324 (yearly average of 0.0068 mg/L). NWSV-324, NWSV-325, and NWSV-2047 did not have detects of chromium for DOE-SR (SRNS, 2025).

The freshwater quality standard for lead in South Carolina streams is not to exceed 0.00054 mg/L (SCDES, 2024a). Due to laboratory limitations, SCDES has a lower limit of detection (LLD) higher than the standard. Therefore, any detection of lead would be over the standard. SCDES did not detect lead in any samples above the standard except for a single detect in each Supplemental location aside from NWSV-2064 (NWSV-2032 – 0.0028 mg/L, NWSV-2040 – 0.0072 mg/L, NWSV-2081 – 0.0042 mg/L). NWSV-2064 (Supplemental) had two detections over the standard with an average of 0.0024 mg/L. Beginning in August 2018, DOE-SR changed their laboratory analysis for lead to achieve a lower detection limit. All DOE-SR collocations had yearly averages above the freshwater quality standard for lead in 2024 (SRNS, 2025).

Return to TOC

The freshwater quality standard for mercury in South Carolina streams is not to exceed 0.00091 mg/L (SCDES, 2024a). Mercury was not detected in any of the SCDES samples but was detected below the standard in DOE-SR individual collocation samples at NWSV-324, NSWV-327, and NWSV-2047 in 2024 (SRNS, 2025).

The freshwater quality standard for zinc in South Carolina streams is not to exceed 0.037 mg/L (SCDES, 2024a). SCDES had 1 individual sample at NWSV-2032 (Supplemental) (single detect of 0.046 mg/L) that exceeded the zinc standard while all other samples were below the standard. All DOE-SR collocations had yearly averages below the standard for zinc (SRNS, 2025). A zinc comparison of SCDES and DOE-SR yearly averages for collocated samples can be found in Section 5.5.0, Figure 5.

Samples were also analyzed for beryllium and thallium whose freshwater quality standards are <0.004 mg/L and <0.00024 mg/L, respectively. SCDES sample locations (Ambient and Supplemental) and DOE-SR collocations had no beryllium or thallium detects that exceeded their respective standards (SRNS, 2025).

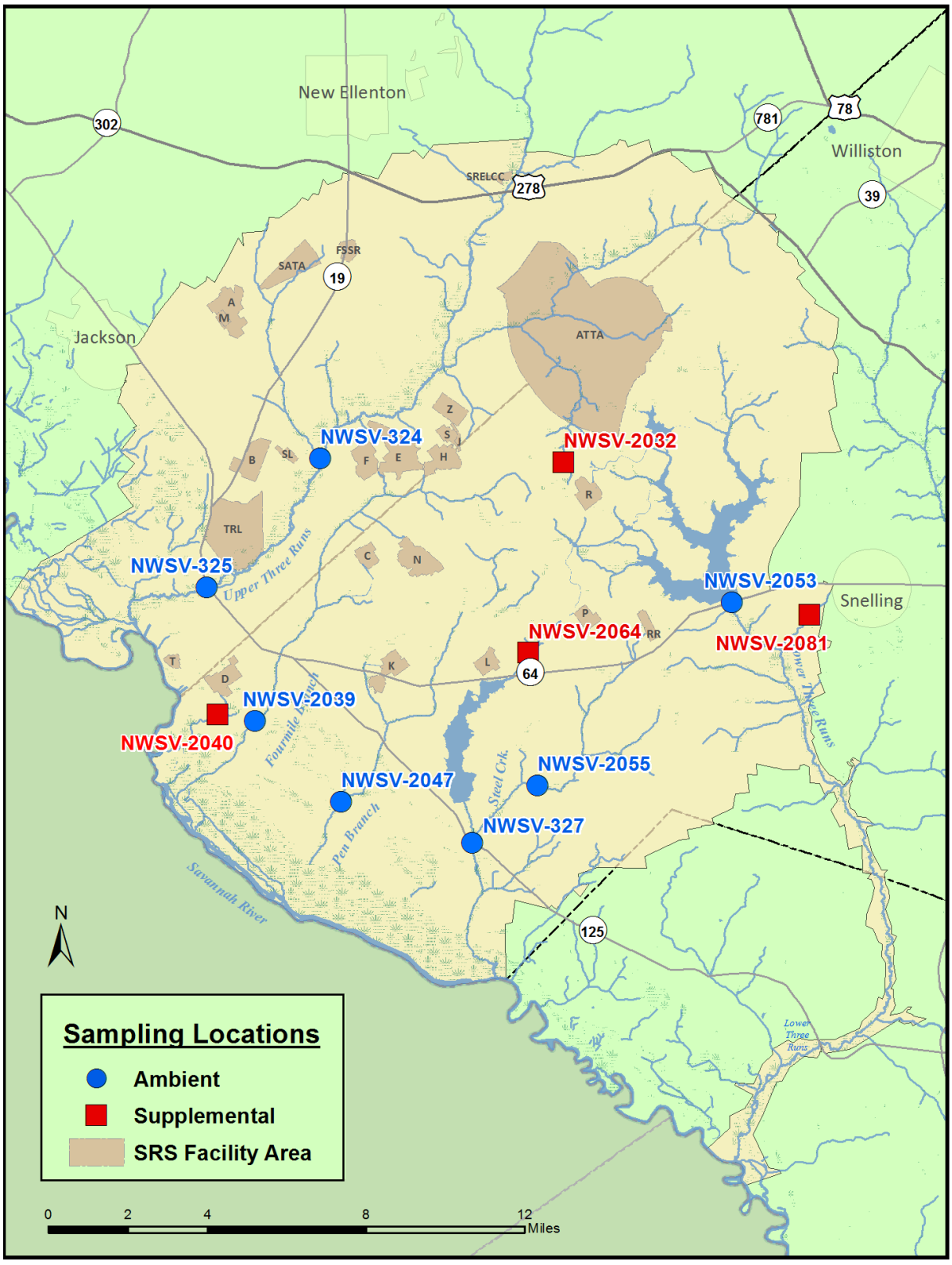
Small discrepancies in data between DOE-SR and SCDES may be attributed to differences in sample collection date and time, sample preservation, and lab analysis. Variances in statistical calculations, such as the yearly averages, may also attribute to dissimilarities. All data less than the LLD were left out of SCDES summary statistics due to lack of numeric information.

5.3.0 CONCLUSIONS AND RECOMMENDATIONS

The current parameters will continue to be monitored to establish trends that may warrant further investigation based on EPA or SCDES standards or recommended levels. Overall, the nonradiological water quality on SRS in 2024 compared favorably with the South Carolina Freshwaters Standard or other recommendations for the parameters and monitored locations. The 2024 SCDES results for most parameters were comparable to prior results reported by ESOP. SCDES will continue to evaluate water quality based on the independent, nonradiological testing and surveillance of SRS surface water. Monitoring is required due to continued land disturbance from clean-up activities, new facility construction, logging, and new missions. The locations, number and frequencies of samples, and monitoring parameters are reviewed annually and modified as needed to maximize available resources and address SRS mission changes.

5.4.0 MAP

Nonradiological Surface Water Monitoring Locations



2024 ESOP Nonradiological Surface Water Monitoring Map

www.des.sc.gov

Return to TOC

5.5.0 TABLES AND FIGURES

Table 1. 2024 SCDES Ambient Nonradiological Surface Water Monitoring Locations

Sample ID	Location Description	Location Rationale
NWSV-2027	Upper Three Runs Creek at SRS Road 2-1	Upstream of most SRS Operations
NWSV-2061	Tinker Creek at SRS Road 2-1	Downstream of ATTA
NWSV-324*	Tims Branch at SRS Road C	Downstream from M- & A-Areas
NWSV-325*	Upper Three Runs Creek at SC-125/SRS Road A	Downstream from F-Area
NWSV-2055	Meyers Branch at SRS Road 9	Downstream from P-Area
NWSV-2039*	Fourmile Branch at SRS Road A-12.2	Downstream from F- and H-Areas
NWSV-2047*	Pen Branch at SRS Road A-13.2	Downstream from K-Area
NWSV-327*	Steel Creek at SC-125/SRS Road A	Downstream from L-Lake
NWSV-328*	Lower Three Runs Creek at Patterson Mill Road	Downstream from Par Pond
NWSV-2053	Lower Three Runs Creek at SRS Road B	Downstream of SRS operations and Par Pond

Note:
1) * Indicates collocation with DOE-SR sample locations.
2) NWSV-2027, NWSV-2061, and NWSV-328 were not sampled by SCDES in 2024 due to safety concerns at the sampling location, but these locations will remain in network for future consideration.

5.5.0 TABLES AND FIGURES

Table 2. 2024 SCDES Supplemental Nonradiological Surface Water Monitoring Locations

Sample Location	Location Description	Location Rationale
NWSV-2032	Mill Creek at Woodward Road, SRS Road E - ATTA	Downstream of past operations R area
NWSV-2040	Beaver Dam Creek	Downstream of past operations in D Area
NWSV-2064	Steel Creek off SRS Road C	Downstream of past operations in P area
NWSV-2081	Mary's Branch near Barnwell Barricade, SRS Road B	Tributary monitoring related to potential impacts from adjacent off-site facility

Table 3. 2024 SCDES Water Quality Parameter Analyses

Laboratory	Frequency	Parameter
Field	Monthly	Temperature, pH, Specific Conductivity, Dissolved Oxygen, and Total Dissolved Solids (TDS)
SCDES Lab Aiken, S.C.	Monthly	Turbidity, BOD, E. Coli, and TSS
SCDES Lab Columbia, S.C.	Monthly	Alkalinity, Ammonia, Nutrients, Mercury, and Metals,

5.5.0 TABLES AND FIGURES

Figure 1. pH 2024 Yearly Average SCDES and DOE-SR Comparison (SRNS, 2025)

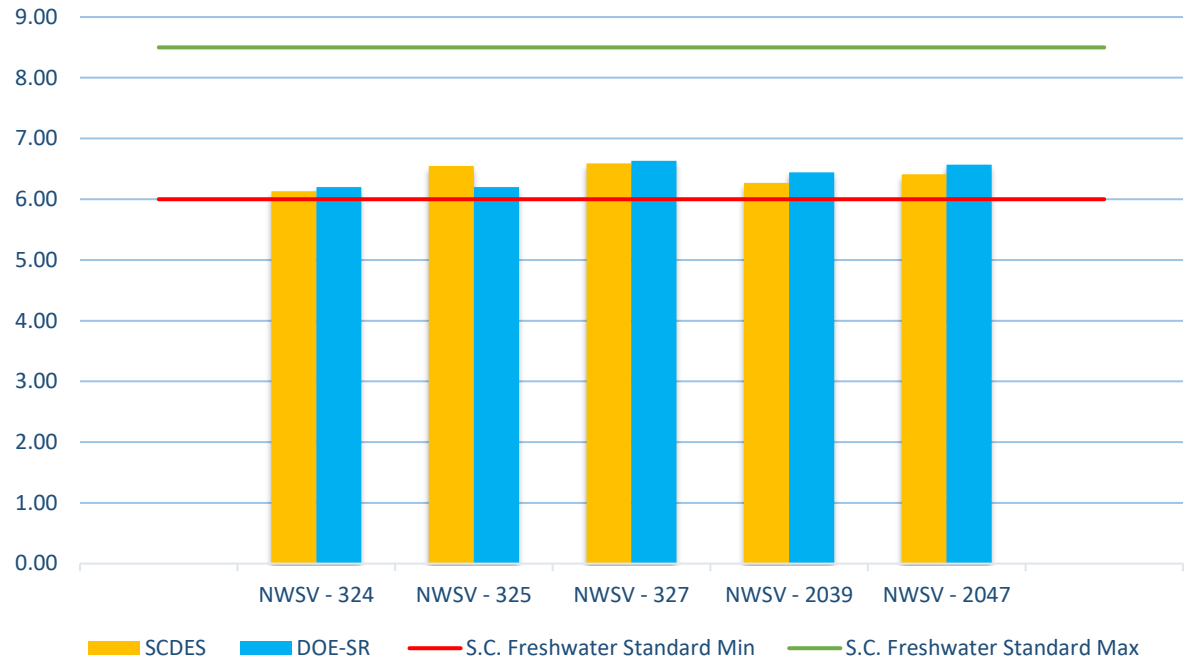
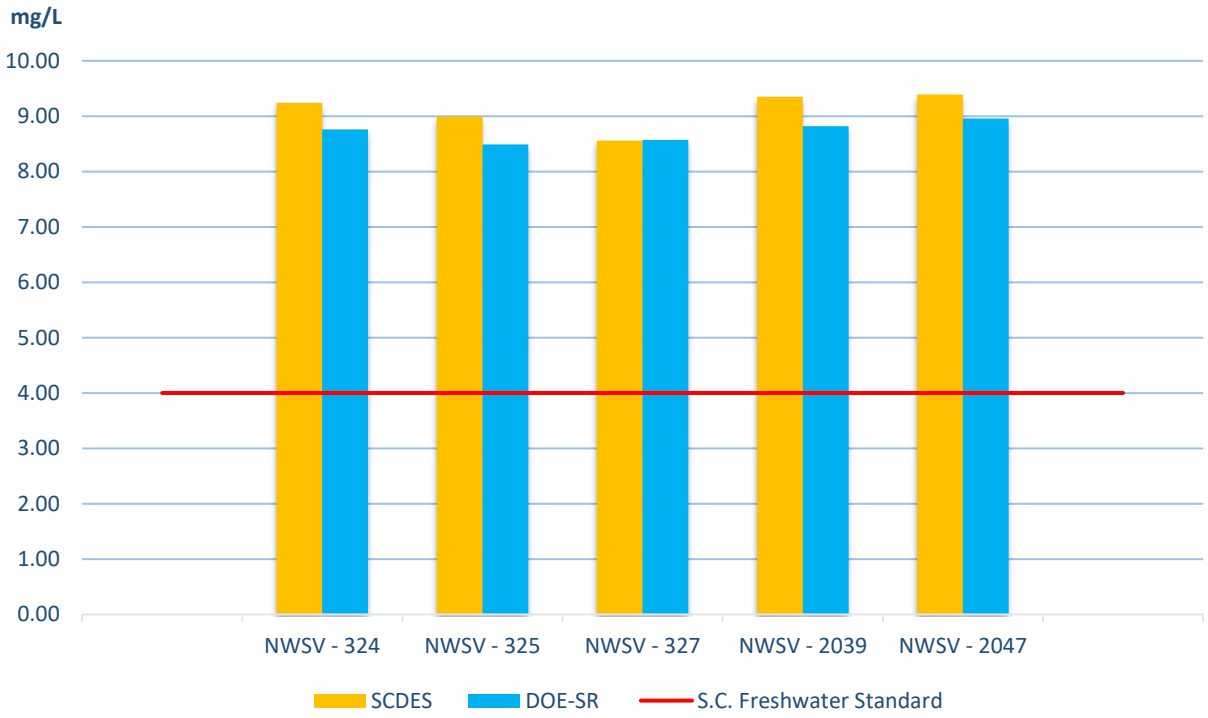


Figure 2. DO 2024 Yearly Average SCDES and DOE-SR Comparison (SRNS, 2025)



Return to TOC

5.5.0 TABLES AND FIGURES

Figure 3. Total Phosphorous 2024 Yearly Average SCDES and DOE-SR Comparison (SRNS, 2025)

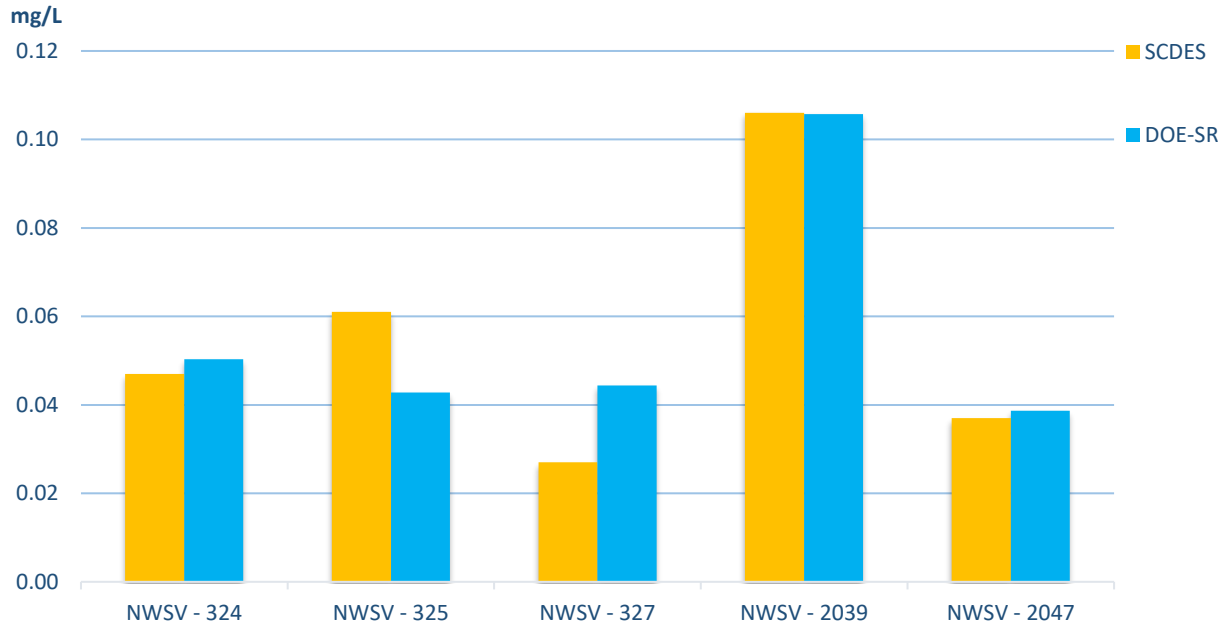
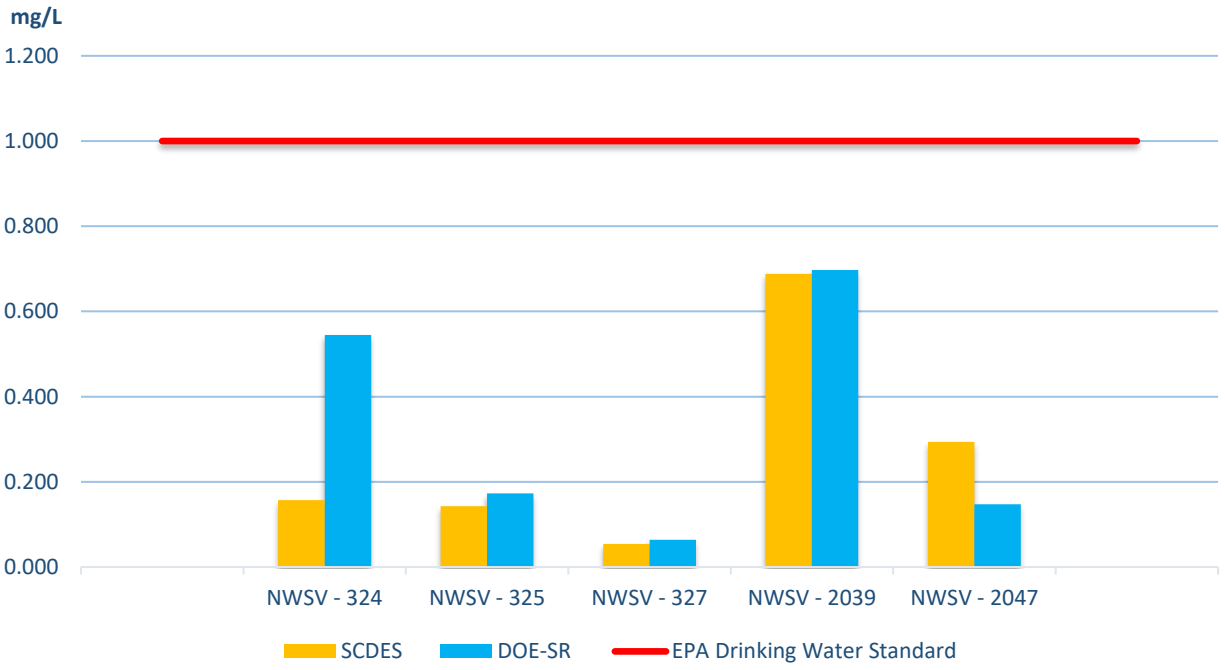


Figure 4. Nitrate/Nitrite 2024 Yearly Average SCDES and DOE-SR Comparison (SRNS, 2025)

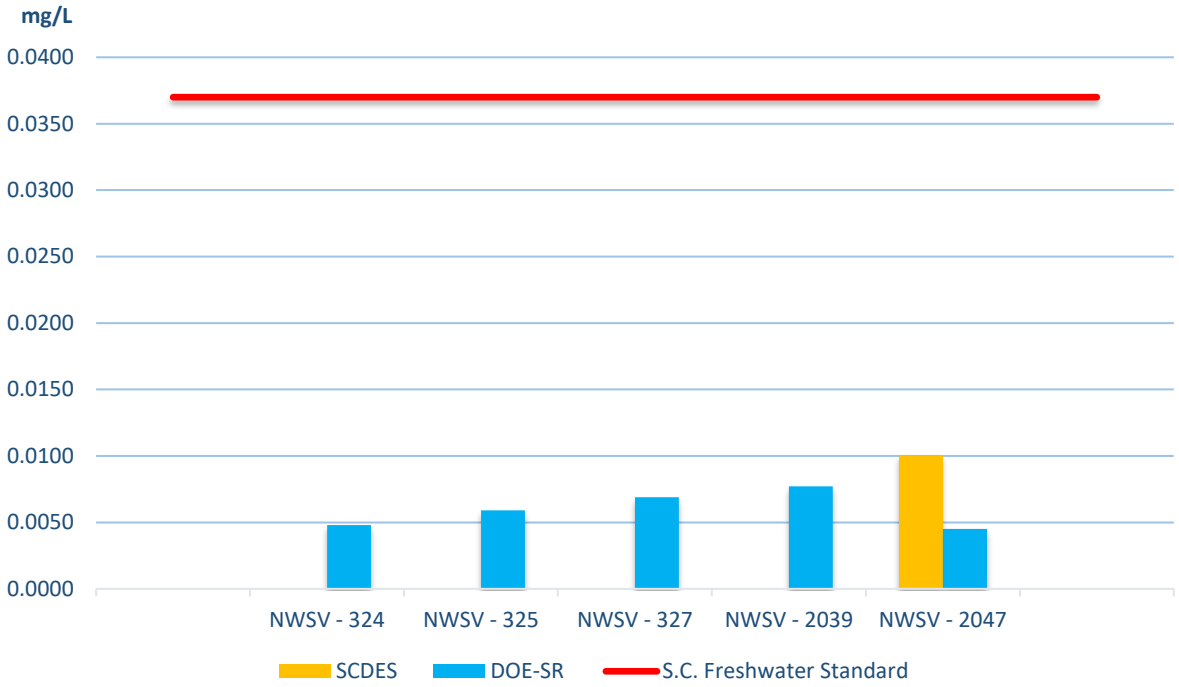


Note: DOE-SR collects nitrate and nitrite as separate parameters. In this graph, DOE-SR's nitrate and nitrite were added together and then an average of the sum was taken to produce one number representing both nitrate and nitrite at each location in order to have comparable data to SCDES.

Return to TOC

5.5.0 TABLES AND FIGURES

Figure 5. Zinc 2024 Yearly Average SCDES and DOE-SR Comparison (SRNS, 2025)



Note: SCDES had no detects of zinc in all locations except for NWSV-2047. DOE-SR has a lower detection limit than SCDES for zinc.

Return to TOC

5.6.0 SUMMARY STATISTICS

Notes for the 5.6.0 Summary Statistic Tables on pages 81-91:
1) All the Summary Statistics Tables report SCDES results only
2) NA is Not Applicable
3) ND is Not Detected
4) NS is Not Sampled
5) BOD, Chromium, Copper, Mercury, Nickel, and Thallium are not included in the table due to no detections in 2024 across all locations.
6) Total Alkalinity, Turbidity, BOD, TSS, E. Coli, TKN, Ammonia, Nitrate/Nitrite, Total Phosphorous, Hardness, and Total Organic Carbon samples are not collected at Supplemental locations.
7) The number of samples per parameter is 12 unless otherwise stated below each location table. Variations in the number of samples per parameter is due to analytical errors.

NWSV–324 Tims Branch at SRS Road C

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.13	0.22	6.22	5.67	6.36	12
	DO (mg/L)	9.24	1.84	8.67	6.54	12.43	12
	Water Temp (°C)	18.52	5.30	20.38	8.00	24.91	12
	Conductivity (mS/cm)	0.021	0.002	0.022	0.018	0.026	12
	TDS (mg/L)	0.014	0.001	0.014	0.012	0.017	12
Laboratory	Total Alkalinity (mg/L)	3.76	1.19	3.35	2.40	6.10	12
	Turbidity (NTU)	7.03	4.46	5.75	2.90	17.00	12
	TSS (mg/L)	9.22	9.09	7.10	2.40	31.00	9
	E. Coli (MPN/100mL)	201.94	154.31	131.40	20.30	547.50	11
	TKN (mg/L)	0.31	0.18	0.26	0.17	0.72	8
	Ammonia (mg/L)	ND	ND	ND	ND	ND	0
	Nitrate/Nitrite (mg/L)	0.157	0.102	0.130	0.021	0.310	12
	Total Phosphorus (mg/L)	0.047	0.017	0.049	0.020	0.077	12
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	0.92	0.25	0.87	0.68	1.60	12
	Iron (mg/L)	2.37	1.59	1.95	0.79	6.40	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.45	0.08	0.42	0.37	0.62	12
	Manganese (mg/L)	0.075	0.057	0.057	0.035	0.240	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	4.13	0.92	3.90	3.20	6.50	12
	Aluminum (mg/L)	0.22	0.14	0.17	0.08	0.53	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	3.83	2.88	2.95	1.80	12.00	12

Note: Only 9 samples were collected for TSS from NWSV-324 throughout 2024 due to analytical errors.

Return to TOC

5.6.0 SUMMARY STATISTICS

NWSV-325 Upper Three Runs Creek at S.C. 125/SRS Road A

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.55	0.50	6.43	5.88	7.41	12
	DO (mg/L)	8.99	2.24	8.37	6.21	13.23	12
	Water Temp (°C)	18.60	5.52	20.29	8.96	25.01	12
	Conductivity (mS/cm)	0.023	0.001	0.023	0.022	0.026	12
	TDS (mg/L)	0.015	0.001	0.015	0.014	0.017	12
Laboratory	Total Alkalinity (mg/L)	3.53	0.55	3.50	2.80	4.60	11
	Turbidity (NTU)	6.85	4.95	5.70	2.30	20.00	12
	TSS (mg/L)	9.28	8.71	5.40	1.70	30.00	9
	E. Coli (MPN/100mL)	278.66	285.64	194.55	70.30	1119.90	12
	TKN (mg/L)	0.29	0.15	0.28	0.11	0.69	12
	Ammonia (mg/L)	ND	ND	ND	ND	ND	0
	Nitrate/Nitrite (mg/L)	0.143	0.032	0.135	0.095	0.190	12
	Total Phosphorus (mg/L)	0.061	0.035	0.045	0.029	0.140	12
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	2.02	0.08	2.00	1.90	2.20	12
	Iron (mg/L)	0.80	0.41	0.63	0.48	1.90	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.45	0.03	0.45	0.41	0.50	12
	Manganese (mg/L)	0.035	0.031	0.026	0.014	0.130	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	6.89	0.26	6.80	6.60	7.50	12
	Aluminum (mg/L)	0.36	0.30	0.26	0.11	1.20	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	4.34	1.12	4.10	2.00	6.00	12

Note: Only 11 samples were collected for Total Alkalinity and 9 samples for TSS from NWSV-325 throughout 2024 due to analytical errors.

5.6.0 SUMMARY STATISTICS

NWSV-327 Steel Creek at S.C. 125/SRS Road A

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.59	0.30	6.52	6.32	7.38	12
	DO (mg/L)	8.56	1.43	8.20	6.55	10.78	12
	Water Temp (°C)	18.64	5.55	19.98	9.25	27.16	12
	Conductivity (mS/cm)	0.048	0.003	0.048	0.044	0.054	12
	TDS (mg/L)	0.031	0.002	0.031	0.028	0.035	12
Laboratory	Total Alkalinity (mg/L)	25.75	32.93	15.50	14.00	130.00	12
	Turbidity (NTU)	3.75	2.49	3.00	1.80	11.00	12
	TSS (mg/L)	5.11	5.74	3.00	1.70	20.00	9
	E. Coli (MPN/100mL)	140.41	93.25	120.60	25.30	307.60	12
	TKN (mg/L)	0.27	0.08	0.28	0.14	0.38	11
	Ammonia (mg/L)	0.063	0.005	0.062	0.057	0.070	4
	Nitrate/Nitrite (mg/L)	0.054	0.034	0.042	0.025	0.140	12
	Total Phosphorus (mg/L)	0.027	0.007	0.023	0.021	0.041	7
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	5.78	0.83	6.00	4.40	7.00	12
	Iron (mg/L)	0.57	0.20	0.58	0.24	1.00	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.71	0.09	0.69	0.58	0.83	12
	Manganese (mg/L)	0.051	0.019	0.051	0.019	0.080	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	17.25	1.76	17.50	14.00	20.00	12
	Aluminum (mg/L)	0.17	0.11	0.13	0.07	0.42	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	4.03	0.75	4.05	2.50	5.30	12

Note: Only 9 samples were collected for TSS from NWSV-327 throughout 2024 due to analytical errors.

5.6.0 SUMMARY STATISTICS

NWSV-2039 Fourmile Branch at SRS Road A-12.2

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.27	0.32	6.27	5.82	6.78	12
	DO (mg/L)	9.35	2.05	8.83	6.65	13.14	12
	Water Temp (°C)	17.96	6.04	20.04	6.85	24.96	12
	Conductivity (mS/cm)	0.046	0.005	0.046	0.041	0.053	12
	TDS (mg/L)	0.030	0.003	0.030	0.027	0.035	12
Laboratory	Total Alkalinity (mg/L)	11.67	2.03	11.50	8.40	15.00	12
	Turbidity (NTU)	5.36	2.41	4.65	2.90	10.00	12
	TSS (mg/L)	5.27	4.54	3.30	2.10	16.00	9
	E. Coli (MPN/100mL)	132.98	90.25	121.85	25.90	325.50	12
	TKN (mg/L)	0.41	0.39	0.27	0.13	1.40	12
	Ammonia (mg/L)	0.087	NA	0.087	0.087	0.087	1
	Nitrate/Nitrite (mg/L)	0.688	0.225	0.705	0.290	1.100	12
	Total Phosphorus (mg/L)	0.106	0.028	0.105	0.077	0.160	12
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	3.64	0.49	3.60	3.00	4.60	12
	Iron (mg/L)	1.19	0.46	0.95	0.76	2.10	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.57	0.05	0.56	0.50	0.64	12
	Manganese (mg/L)	0.052	0.034	0.036	0.026	0.120	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	11.43	1.53	11.00	9.60	14.00	12
	Aluminum (mg/L)	0.20	0.13	0.14	0.08	0.52	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	4.69	1.40	4.25	3.10	8.40	12

Note: Only 9 samples were collected for TSS from NWSV-2039 throughout 2024 due to analytical errors.

5.6.0 SUMMARY STATISTICS

NWSV-2047 Pen Branch at SRS Road A-13.2

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.41	0.29	6.38	5.94	6.99	12
	DO (mg/L)	9.39	2.10	8.67	6.88	13.26	12
	Water Temp (°C)	17.85	5.96	19.88	6.74	24.69	12
	Conductivity (mS/cm)	0.050	0.006	0.050	0.043	0.062	12
	TDS (mg/L)	0.032	0.003	0.033	0.028	0.040	12
Laboratory	Total Alkalinity (mg/L)	17.08	3.90	16.00	12.00	25.00	12
	Turbidity (NTU)	5.28	1.58	5.00	3.10	8.00	12
	TSS (mg/L)	5.17	2.39	4.20	2.70	11.00	9
	E. Coli (MPN/100mL)	203.55	119.31	208.10	52.10	410.60	12
	TKN (mg/L)	0.26	0.14	0.19	0.12	0.62	11
	Ammonia (mg/L)	ND	ND	ND	ND	ND	0
	Nitrate/Nitrite (mg/L)	0.294	0.524	0.115	0.057	1.900	12
	Total Phosphorus (mg/L)	0.037	0.008	0.034	0.026	0.052	12
	Cadmium (mg/L)	0.00024	NA	0.00024	0.00024	0.00024	1
	Calcium (mg/L)	7.33	0.96	7.10	6.10	9.20	12
	Iron (mg/L)	0.94	0.33	0.85	0.56	1.60	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.58	0.06	0.57	0.48	0.66	12
	Manganese (mg/L)	0.046	0.015	0.041	0.025	0.074	12
	Zinc (mg/L)	0.010	NA	0.010	0.010	0.010	1
	Hardness (mg/L)	20.75	2.60	20.00	17.00	25.00	12
	Aluminum (mg/L)	0.24	0.10	0.21	0.11	0.42	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	5.83	2.16	5.35	2.30	11.00	12

Note: Only 9 samples were collected for TSS from NWSV-2047 throughout 2024 due to analytical errors.

Return to TOC

5.6.0 SUMMARY STATISTICS

NWSV-2053 Lower Three Runs Creek at SRS Road B

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.80	0.34	6.76	6.38	7.42	11
	DO (mg/L)	8.36	2.01	8.09	5.72	11.50	11
	Water Temp (°C)	22.15	6.99	24.35	11.10	30.42	11
	Conductivity (mS/cm)	0.032	0.004	0.032	0.026	0.039	11
	TDS (mg/L)	0.021	0.002	0.021	0.018	0.025	11
Laboratory	Total Alkalinity (mg/L)	11.20	1.23	11.00	10.00	13.00	10
	Turbidity (NTU)	1.97	0.81	1.70	0.95	3.60	11
	TSS (mg/L)	2.25	0.59	2.15	1.60	3.00	6
	E. Coli (MPN/100mL)	5.22	5.87	3.05	2.00	17.10	6
	TKN (mg/L)	0.27	0.09	0.28	0.12	0.40	10
	Ammonia (mg/L)	0.064	0.024	0.050	0.050	0.092	3
	Nitrate/Nitrite (mg/L)	ND	ND	ND	ND	ND	0
	Total Phosphorus (mg/L)	0.033	0.017	0.024	0.021	0.062	5
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	4.37	0.39	4.30	3.90	5.10	11
	Iron (mg/L)	0.71	0.71	0.49	0.24	2.70	11
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.44	0.03	0.44	0.38	0.48	11
	Manganese (mg/L)	0.073	0.056	0.056	0.022	0.210	11
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	12.64	1.12	12.00	11.00	15.00	11
	Aluminum (mg/L)	ND	ND	ND	ND	ND	0
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	3.05	0.28	3.00	2.60	3.40	11

Note: For all parameters except for TSS, only 11 samples were collected throughout 2024 due to access restrictions during the month of December. Only 8 samples were collected for TSS throughout 2024 due to analytical errors and access restrictions.

Return to TOC

5.6.0 SUMMARY STATISTICS

NWSV-2055 Meyers Branch at SRS Road 9

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.64	0.21	6.61	6.27	7.07	12
	DO (mg/L)	9.35	1.97	8.97	6.47	12.69	12
	Water Temp (°C)	18.21	5.37	20.07	7.64	24.40	12
	Conductivity (mS/cm)	0.036	0.004	0.036	0.031	0.045	12
	TDS (mg/L)	0.024	0.002	0.024	0.021	0.029	12
Laboratory	Total Alkalinity (mg/L)	11.84	2.50	12.00	8.00	17.00	12
	Turbidity (NTU)	3.70	1.73	2.95	2.00	7.60	12
	TSS (mg/L)	4.57	2.28	4.10	2.20	9.90	9
	E. Coli (MPN/100mL)	300.90	140.15	273.40	123.60	579.40	12
	TKN (mg/L)	0.22	0.12	0.21	0.12	0.58	12
	Ammonia (mg/L)	ND	ND	ND	ND	ND	0
	Nitrate/Nitrite (mg/L)	0.087	0.026	0.090	0.043	0.130	12
	Total Phosphorus (mg/L)	0.026	0.005	0.025	0.020	0.032	5
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	5.43	0.84	5.40	4.40	7.10	12
	Iron (mg/L)	0.61	0.21	0.60	0.31	1.10	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.42	0.03	0.41	0.37	0.47	12
	Manganese (mg/L)	0.036	0.010	0.034	0.022	0.058	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	15.33	2.02	15.50	13.00	19.00	12
	Aluminum (mg/L)	0.21	0.09	0.21	0.10	0.36	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	4.91	1.82	4.75	2.00	9.80	12

Note: Only 9 samples were collected for TSS from NWSV-2055 throughout 2024 due to analytical errors.

5.6.0 SUMMARY STATISTICS

NWSV-2032 Mill Creek at Woodward Road, SRS Road E – ATTA (Supplemental)

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	5.33	0.60	5.16	4.88	6.99	12
	DO (mg/L)	7.28	2.96	7.12	2.70	11.67	12
	Water Temp (°C)	18.20	6.28	18.52	6.48	27.07	12
	Conductivity (mS/cm)	0.033	0.044	0.020	0.017	0.173	12
	TDS (mg/L)	0.021	0.028	0.013	0.011	0.110	12
Laboratory	Total Alkalinity (mg/L)	NS	NS	NS	NS	NS	NS
	Turbidity (NTU)	NS	NS	NS	NS	NS	NS
	TSS (mg/L)	NS	NS	NS	NS	NS	NS
	E. Coli (MPN/100mL)	NS	NS	NS	NS	NS	NS
	TKN (mg/L)	NS	NS	NS	NS	NS	NS
	Ammonia (mg/L)	NS	NS	NS	NS	NS	NS
	Nitrate/Nitrite (mg/L)	NS	NS	NS	NS	NS	NS
	Total Phosphorus (mg/L)	NS	NS	NS	NS	NS	NS
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	0.77	0.38	0.65	0.49	1.90	12
	Iron (mg/L)	9.06	7.06	7.60	1.00	25.00	12
	Lead (mg/L)	0.0028	NA	0.0028	0.0028	0.0028	1
	Magnesium (mg/L)	0.74	0.81	0.49	0.43	3.30	12
	Manganese (mg/L)	0.101	0.079	0.080	0.045	0.340	12
	Zinc (mg/L)	0.028	0.026	0.028	0.010	0.046	2
	Hardness (mg/L)	NS	NS	NS	NS	NS	NS
	Aluminum (mg/L)	1.08	1.79	0.57	0.26	6.70	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	NS	NS	NS	NS	NS	NS

.

5.6.0 SUMMARY STATISTICS

NWSV-2040 Beaver Dam Creek (Supplemental)

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	5.48	0.60	5.41	4.36	6.55	12
	DO (mg/L)	8.01	3.71	7.20	3.18	17.79	12
	Water Temp (°C)	17.32	6.48	17.35	6.59	26.66	12
	Conductivity (mS/cm)	0.122	0.026	0.122	0.085	0.158	12
	TDS (mg/L)	0.079	0.017	0.080	0.055	0.103	12
Laboratory	Total Alkalinity (mg/L)	NS	NS	NS	NS	NS	NS
	Turbidity (NTU)	NS	NS	NS	NS	NS	NS
	TSS (mg/L)	NS	NS	NS	NS	NS	NS
	E. Coli (MPN/100mL)	NS	NS	NS	NS	NS	NS
	TKN (mg/L)	NS	NS	NS	NS	NS	NS
	Ammonia (mg/L)	NS	NS	NS	NS	NS	NS
	Nitrate/Nitrite (mg/L)	NS	NS	NS	NS	NS	NS
	Total Phosphorus (mg/L)	NS	NS	NS	NS	NS	NS
	Cadmium	0.00015	0.00004	0.00013	0.00011	0.00020	6
	Calcium (mg/L)	14.20	4.49	13.00	9.00	25.00	12
	Iron (mg/L)	1.62	1.47	1.02	0.51	5.70	12
	Lead (mg/L)	0.0072	NA	0.0072	0.0072	0.0072	1
	Magnesium (mg/L)	2.60	0.38	2.70	2.00	3.10	12
	Manganese (mg/L)	0.362	0.080	0.375	0.210	0.500	12
	Zinc (mg/L)	0.025	0.005	0.024	0.019	0.036	11
	Hardness (mg/L)	NS	NS	NS	NS	NS	NS
	Aluminum (mg/L)	1.19	0.88	0.87	0.20	3.40	12
	Beryllium (mg/L)	0.0025	0.0008	0.0026	0.0013	0.0036	10
	Total Organic Carbon (mg/L)	NS	NS	NS	NS	NS	NS

5.6.0 SUMMARY STATISTICS

NWSV-2064 Steel Creek off SRS Road C (Supplemental)

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.19	0.43	6.08	5.44	6.85	12
	DO (mg/L)	9.33	1.60	9.27	7.55	12.26	12
	Water Temp (°C)	17.12	4.00	17.32	9.78	22.88	12
	Conductivity (mS/cm)	0.033	0.003	0.033	0.027	0.038	12
	TDS (mg/L)	0.021	0.002	0.022	0.017	0.025	12
Laboratory	Total Alkalinity (mg/L)	NS	NS	NS	NS	NS	NS
	Turbidity (NTU)	NS	NS	NS	NS	NS	NS
	TSS (mg/L)	NS	NS	NS	NS	NS	NS
	E. Coli (MPN/100mL)	NS	NS	NS	NS	NS	NS
	TKN (mg/L)	NS	NS	NS	NS	NS	NS
	Ammonia (mg/L)	NS	NS	NS	NS	NS	NS
	Nitrate/Nitrite (mg/L)	NS	NS	NS	NS	NS	NS
	Total Phosphorus (mg/L)	NS	NS	NS	NS	NS	NS
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	4.08	0.48	4.15	2.90	4.80	12
	Iron (mg/L)	1.07	0.91	0.67	0.39	3.40	12
	Lead (mg/L)	0.0024	0.0003	0.0024	0.0022	0.0026	2
	Magnesium (mg/L)	0.51	0.02	0.51	0.49	0.55	12
	Manganese (mg/L)	0.065	0.036	0.047	0.037	0.140	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	NS	NS	NS	NS	NS	NS
	Aluminum (mg/L)	0.45	0.42	0.29	0.10	1.50	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	NS	NS	NS	NS	NS	NS

.

Return to TOC

5.6.0 SUMMARY STATISTICS

NWSV-2081 Mary's Branch near Barnwell Barricade, SRS Road B (Supplemental)

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.07	0.35	5.94	5.56	6.68	12
	DO (mg/L)	9.60	1.38	8.90	8.17	12.22	12
	Water Temp (°C)	17.53	4.62	17.65	8.37	23.32	12
	Conductivity (mS/cm)	0.021	0.001	0.021	0.020	0.023	12
	TDS (mg/L)	0.014	0.001	0.014	0.013	0.015	12
Laboratory	Total Alkalinity (mg/L)	NS	NS	NS	NS	NS	NS
	Turbidity (NTU)	NS	NS	NS	NS	NS	NS
	TSS (mg/L)	NS	NS	NS	NS	NS	NS
	E. Coli (MPN/100mL)	NS	NS	NS	NS	NS	NS
	TKN (mg/L)	NS	NS	NS	NS	NS	NS
	Ammonia (mg/L)	NS	NS	NS	NS	NS	NS
	Nitrate/Nitrite (mg/L)	NS	NS	NS	NS	NS	NS
	Total Phosphorus (mg/L)	NS	NS	NS	NS	NS	NS
	Cadmium (mg/L)	0.00016	NA	0.00016	0.00016	0.00016	1
	Calcium (mg/L)	1.93	0.20	1.90	1.80	2.50	12
	Iron (mg/L)	0.58	0.66	0.32	0.18	2.60	12
	Lead (mg/L)	0.0042	NA	0.0042	0.0042	0.0042	1
	Magnesium (mg/L)	0.52	0.02	0.52	0.49	0.58	12
	Manganese (mg/L)	0.019	0.015	0.012	0.011	0.056	9
	Zinc (mg/L)	0.015	NA	0.015	0.015	0.015	1
	Hardness (mg/L)	NS	NS	NS	NS	NS	NS
	Aluminum (mg/L)	0.41	0.57	0.17	0.10	2.10	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	NS	NS	NS	NS	NS	NS

Chapter 6 Monitoring of Sediments on and Adjacent to SRS

6.1.0 PROJECT SUMMARY

The accumulation of radiological and nonradiological contaminants in sediment can directly affect aquatic organisms which can lead to human exposure. Impacts to water bodies come through direct discharge, atmospheric fallout, and runoff. These accumulated contaminants may re-suspend in streams and rivers or disperse downstream, potentially affecting drinking water supplies and fish consumed by the public. The transportation of sediments is a dynamic process. Stream flow changes can redistribute contaminants or bury them as part of the natural sedimentation process. Patterns of sediment contamination are strongly affected by hydrologic factors and the physical and chemical characterization of the sediment (EPA, 1987).

Collecting sediment sample from the Savannah River

SRS streams receive surface water runoff and water from permitted discharges (DOE, 1995). SRS is within the Savannah River watershed with five major streams feeding into the Savannah River. Dispersal of any contaminants from these streams has the potential to impact the Savannah River.

SCDES personnel evaluate sediment samples for radionuclide and non-radionuclide contaminant concentrations in SRS streams, SRS stormwater basins, creek mouths along the boundary of SRS, the Savannah River, and publicly accessible boat landings in the SRS vicinity. Radionuclide detections in sediment are typically the result of accumulation over many years and do not represent yearly depositions. Sediment samples on SRS are routinely split with DOE-SR to compare results.

A complete list of all radiological and nonradiological analytes can be found in List of Analytes, Table 1 and Table 2 on page ix. SCDES sediment sampling locations are illustrated in Section 6.4.0, Map. SCDES and DOE-SR split samples were collected from six stream locations on SRS, three SRS stormwater basins, and five creek mouths along SRS. All locations are sampled once. SCDES and DOE-SR also sample other locations independently, thus any comparisons between SCDES and DOE-SR are based only on collocated samples. Though SCDES and DOE-SR did not collect split samples at 2 public boat landings (SMBFL24 and SMLHL24), independent samples were collected and compared due to the collocation of these monitoring locations. Comparisons made from SMLHL24 are only for radiological parameters. SCDES also independently collects a background sample from Pinckney Island National Wildlife Refuge. DOE-SR does not collect background sediment samples from Pinckney Island National Wildlife Refuge. A complete list of sample locations is listed in Section 6.5.0, Table 1.

6.2.0 RESULTS AND DISCUSSION

SCDES Sediment Monitoring Summary Statistics can be found in Section 6.6.0 and Sediment Monitoring Data can be found in the 2024 SCDES Data File.

6.2.1 Radiological Results

Cesium-137 (Cs-137) releases from Z-Area have the potential to contaminate tributaries of McQueen Branch, which flows into Upper Three Runs. The impact from possible contamination warrants long-term monitoring by SCDES along SRS streams and the publicly accessible Savannah River.

The creek mouths of SRS are a potential conduit for the dispersal of radionuclides into publicly accessible water. Cs-137 activity was found by SCDES in the sediment within several creek mouths along the Savannah River. Actinium-228, beryllium-7, potassium-40, lead-212, lead-214, radium-226, and thorium-234 are NORM decay products that account for the remaining gamma detections found by SCDES. All other gamma-emitting radionuclides in SCDES samples had no detections above their respective MDA in 2024.

Sediment is collected and then dried before radiological analysis

SCDES had gross alpha and gross beta activity detections in 2024. The summary statistics can be found in Section 6.6.0.

Cs-137 is the most abundant anthropogenic radionuclide found in the sediment samples. Cs-137 levels in 2024 data from samples collected outside SRS boundaries are all within the expected range and consistent with previous SCDES background data. Cs-137 in sediment may be attributed, in part, to fallout from past nuclear events in the 1950s and 1960s. The highest level of Cs-137 from the 2024 SCDES and DOE-SR collocated on-site stream sediment samples occurred at SMSV-2049 (2.20 pCi/g for SCDES and 1.42 pCi/g for DOE-SR). The highest level of Cs-137 from the 2024 SCDES and DOE-SR collocated creek mouth sediment samples occurred at SMSV-2017 (5.04 pCi/g for SCDES and 4.02 pCi/g for DOE-SR). SCDES and DOE-SR only had detections of Cs-137 at stormwater basin SME-001 (0.025 pCi/g for SCDES and 0.037 for DOE-SR). The highest level of Cs-137 from the 2024 SCDES and DOE-SR collocated boat landing sediment samples occurred at SMBFL24 (0.067 pCi/g) for SCDES and SMLHL24 (0.093 pCi/g) for DOE-SR. The highest level of Cs-137 from all SCDES boat landing sediment samples occurred at SMSC24 (0.200 pCi/g). Cs-137 contamination in Steel Creek Mouth is well documented and not unexpected. All sample results were well below the Preliminary Remediation Goal (PRG) of 27.9 pCi/g for Cs-137 (Section 6.5.0, Table 2) (EPA, 2022).

All creek mouth locations are sampled annually, whereas other locations (on-site streams, stormwater basins, and boat landings) are sampled on varying schedules. Therefore, creek mouth locations are the only location type suitable for comparison of annual trends. Figure 1 in Section 6.5.0 illustrates the average Cs-137 activity in sediment samples from all SCDES sample

locations. SCDES's Cs-137 data from the SRS creek mouths were trended for 2020-2024 (Section 6.5.0, Figure 2) and compared to DOE-SR data (Section 6.5.0, Figure 3).

Preparing sample for non-radionuclide lab analysis

6.2.2 Nonradiological Results

Metals in sediment can be naturally occurring or a result of man-made processes such as those used in SRS operations. Re-distribution of sediment from flooding can carry contaminants to downstream locations. Geological factors in the Savannah River basin contribute to the levels of metals through erosion and sedimentation. All 2024 SCDES and DOE-SR samples had averages below the Ecological Screening Values (ESVs) for chromium and nickel (EPA, 2018). SCDES had no chemicals with detection concentrations above the ESV for the background location in 2024.

Comparisons were made to the ESVs for sediment, which do not represent remediation goals or cleanup levels but are used to identify constituents of potential concern (EPA, 2018).

Barium was detected above the ESV of 20 mg/kg by SCDES in all collocated creek mouths, all collocated on-site streams and 1 collocated boat landing (SMBFL24). SCDES also detected Barium above the ESV in 5 other boat landings (SMSC24, SMJL24, SMRVP24, SMSVC24, and SMJBL24). DOE-SR detected barium above the ESV in all collocated creek mouths, all collocated on-site streams except for SMSV-2049, 1 collocated stormwater basin (SME-001), and 1 collocated boat landing (SMBFL24).

Beryllium does not have an established ESV for sediment, so in lieu of a sediment value, the ESV for soil was used. SCDES detected beryllium above the ESV of 2.5 mg/kg in 1 collocated on-site stream (SMSV-2069). DOE-SR did not analyze for beryllium at any collocations in 2024.

Prepped samples being sent to the lab for radionuclide analysis

Cadmium was detected above the ESV of 1 mg/kg by SCDES in 1 collocated creek mouth (SMSV-2020), 2 collocated stormwater basins (SME-002 & SME-003), and 1 collocated on-site stream (SMSV-2049). SCDES also detected cadmium above the EVS of 1mg/kg in 1 public boat landing (SMSC24). DOE-SR did not detect cadmium above the ESV in any collocation in 2024.

SCDES did not detect chromium above the ESV of 43.4 mg/kg at any locations. DOE-SR did not detect chromium above the ESV at any collocation in 2024.

Copper was detected above the ESV of 31.6 mg/kg by SCDES and DOE-SR in 1 collocated on-site stream (SMSV-2069). SCDES also did not detect copper above the ESV at any other locations.

Pieces of rockier sediment are sieved before samples are sent to the Columbia lab for radionuclide analysis

Lead was not detected above the ESV of 35.8 mg/kg at any SCDES sample location. DOE-SR detected lead above the ESV at 1 collocated creek mouth (SMSV-2011).

SCDES detected manganese above the ESV of 460 mg/kg in 4 collocated creek mouths (SMSV-2011, SMSV-2015, SMSV-2017, SMSV-2020), and 1 collocated boat landing (SMBFL24). 4 other SCDES boat landings also had manganese detections above the ESV of 460 mg/kg (SMSC24, SMSVC24, SMRVP24, SMJBL24). DOE-SR had detections of manganese in 1 collocated boat landing (SMBFL24) and all collocated creek mouths except for SMSV-2013 with results above the ESV.

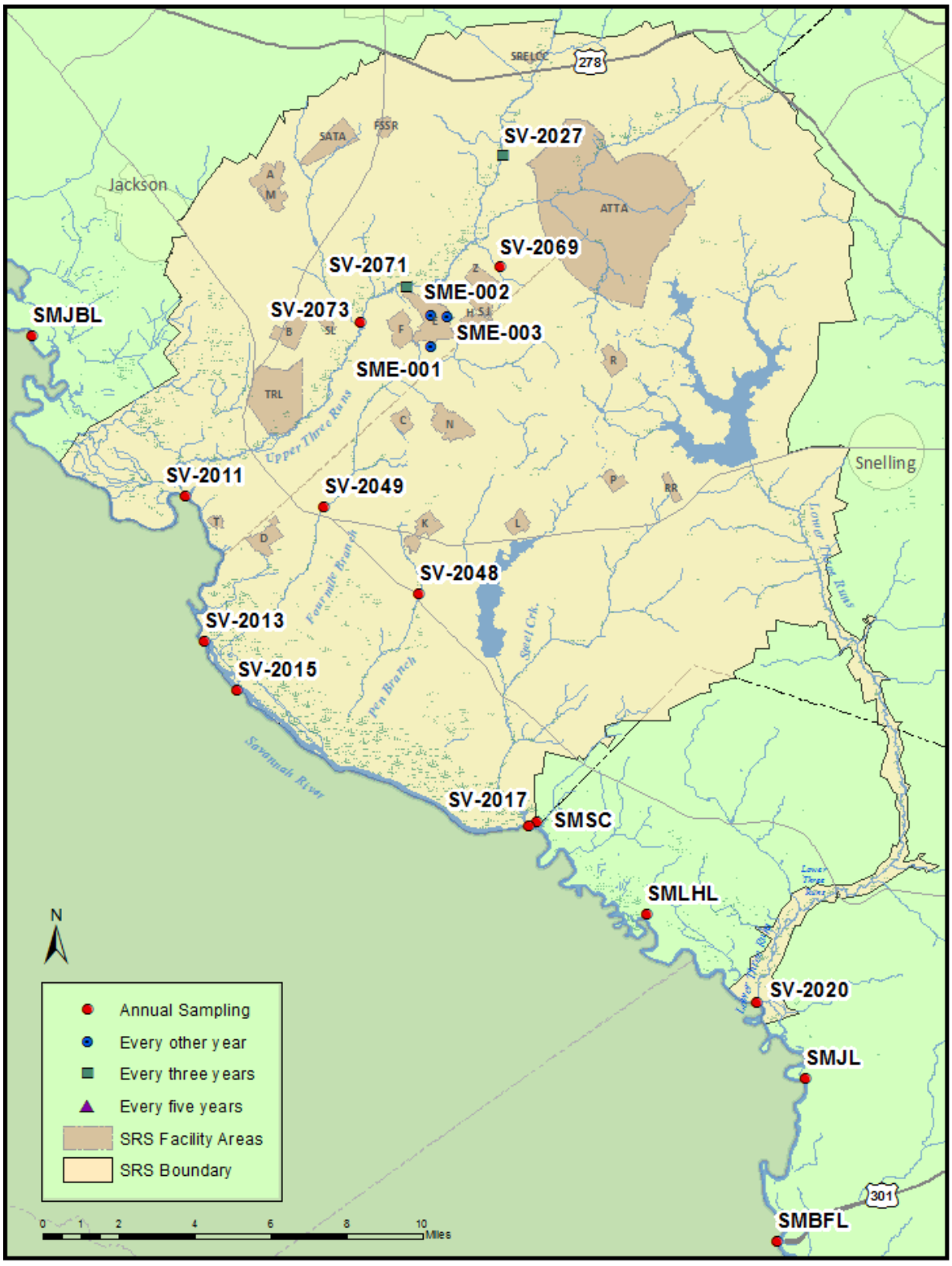
Mercury was detected above the ESV of 0.18 mg/kg by SCDES and DOE-SR in 1 collocated on-site stream (SMSV-2069). SCDES also detected zinc above the ESV of 121 mg/kg in 1 collocated creek mouth (SMSV-2017). DOE-SR did not have any detects above the ESV for zinc at any collocation in 2024.

6.3.0 CONCLUSIONS AND RECOMMENDATIONS

SRS sediments will continue to be monitored due to current releases of contaminants and the potential for future discharges from SRS operations, legacy wastes, and clean-up activities. Year-to-year data comparisons are difficult to interpret due to the nature of sediment accumulation. Differences among samples may be due to the fraction of clays that most effectively retain radionuclides. Monitoring of on-site sediments is of great importance since over-land precipitation and streams transport contaminated sediment with radionuclides outside the SRS boundary. SCDES will continue independent monitoring of sediment around SRS and split sampling with DOE-SR on-site and in the Savannah River to catalogue the presence of radionuclide and non-radionuclide analytes. SCDES will also periodically evaluate and modify the sampling methodology to better accomplish project objectives. Trending of data over multiple years demonstrates whether radionuclide concentrations in the SRS area are declining through radioactive decay or possibly increasing due to disturbances on SRS. Cooperation between DOE-SR and SCDES provides credibility and confidence in the information being provided to the public.

6.4.0 MAP

Sediment Monitoring Locations



2024 ESOP Sediment Monitoring Map www.des.sc.gov

Return to TOC

6.5.0 TABLES AND FIGURES

Table 1. 2024 SCDES Sediment Monitoring Locations

SCDES Sample Location ID	DOE Sample Location ID	Location Description
Stormwater Basins		
SME-001	E-001	E-001 E Area Stormwater Basin
SME-002	E-002	E-002 E Area Stormwater Basin
SME-003	E-003	E-003 E Area Stormwater Basin
Creek Mouths		
SMSV-2011	RM 157.2 U3R	Upper Three Runs Mouth at RM 157.4
SMSV-2013	BDC at RM 152.3	Beaver Dam Creek Mouth at RM 152.3
SMSV-2015	RM 150.2	Fourmile Branch Creek Mouth at RM 150.6
SMSV-2017	SC at RM 141.5	Steel Creek Mouth at RM 141.5
SMSV-2020	RM-129 L3R	Lower Three Runs Mouth at RM 129.1
On-site Streams		
SMSV-2073	U3R-3	Upper Three Runs off SRS Road C
SMSV-2069	McQB at MO Rd.	McQueen Branch at Monroe Owens Road
SMSV- 2071	U3R off Rd. 4	Upper Three Runs @ Rd 4
SMSV-2027	U3R @ USFS Rd. 2-1	Upper Three Runs @ USFS Rd 2-1
SMSV-2048	PB @ Rd. A	Pen Branch @ SC-125
SMSV-2049	FMC @ Rd. A	Four Mile Creek @ SC-125
Upstream of SRS		
SMRVP24	NA	North Augusta Riverview Park Boat Landing
SMSVC24	NA	Steven’s Creek Boat Landing
SMJBL24	RM 170.5	Jackson Boat Landing
Downstream of SRS		
SMLHL24	RM 134	Little Hell Boat Landing
SMJL24	NA	Johnson’s Boat Landing
SMBFL24	RM 118.7	Burton's Ferry Boat Landing
SMSC24	NA	Steel Creek Boat Landing
Background		
SMPKY24	NA	Pinckney Island National Wildlife Refuge

Note:
1) RM is River Mile
2) DOE-SR did not sample SMJBL24 (RM 170.5) in 2024.

Return to TOC

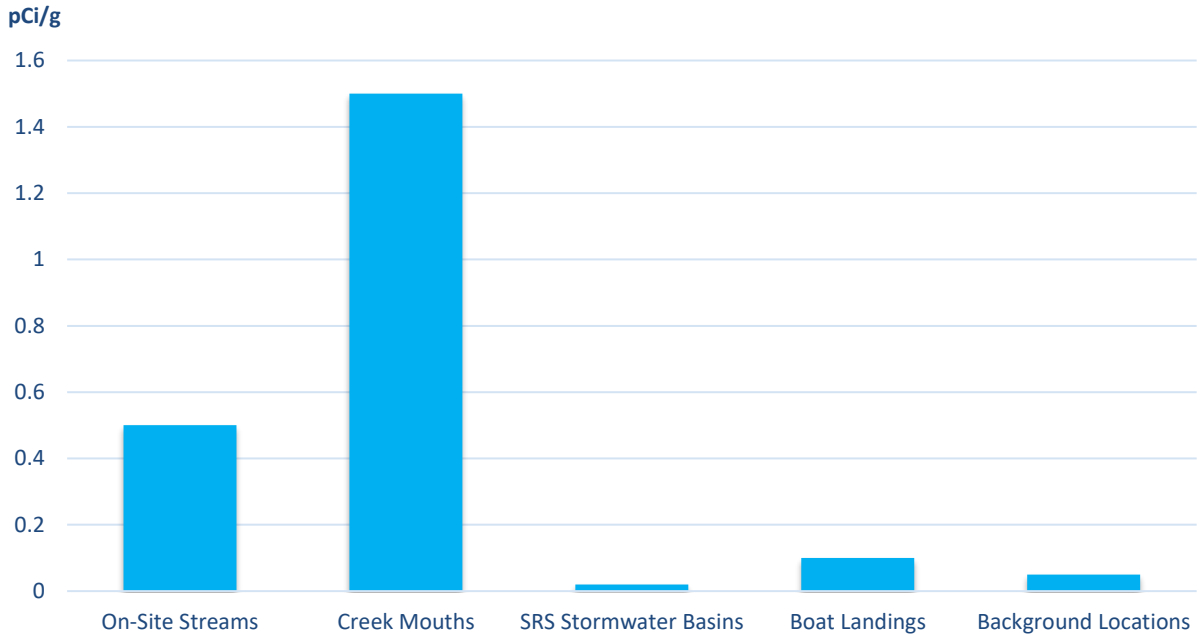
6.5.0 TABLES AND FIGURES

Table 2. Soil Ingestion Preliminary Remediation Goals (PRGs) of Select Anthropogenic Radionuclides (EPA, 2022)

Radionuclide	Peak PRG for Exposure through Ingestion (pCi/g)
Americium-241	4.95
Cesium-137	27.9
Cobalt – 60	82.8
Iodine-131	5980
Plutonium-238	4.40
Plutonium-239/240	3.92

Note: The PRG standards are produced through the EPA's "PRGs for Radionuclides Calculator" which are based on scenarios, select target risk, and media type and are calculated in real time and are not from an established table.

Figure 1. 2024 Comparisons of Cs-137 Average Activity Among SCDES Sample Location Types

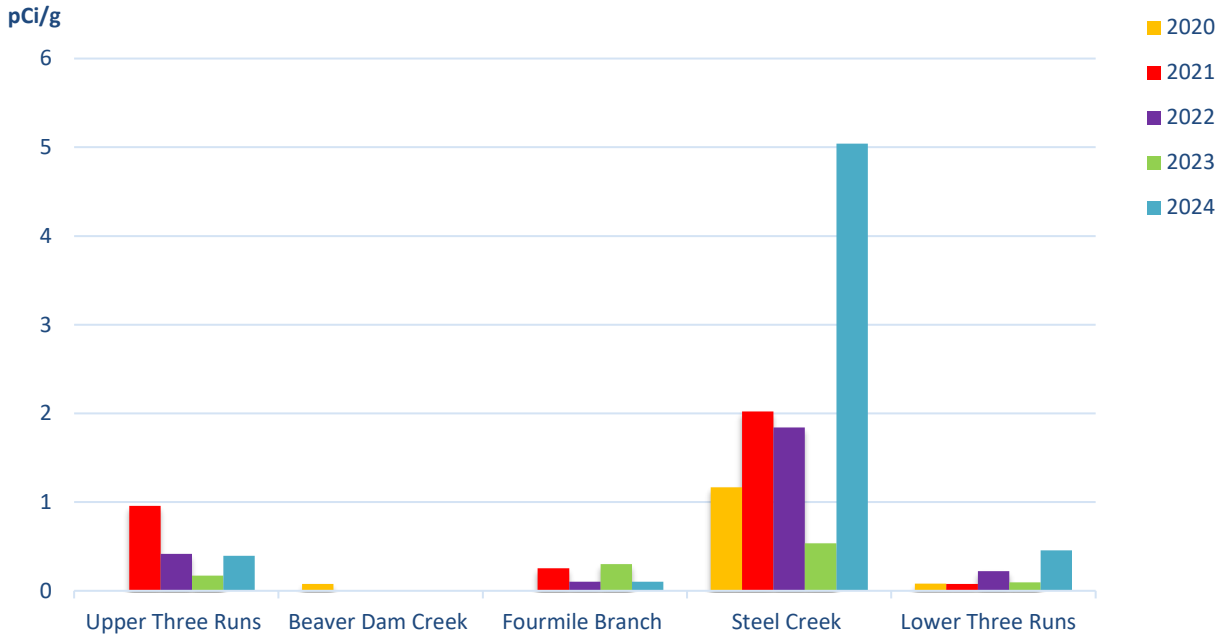


Note: No bar denotes no detection.

Return to TOC

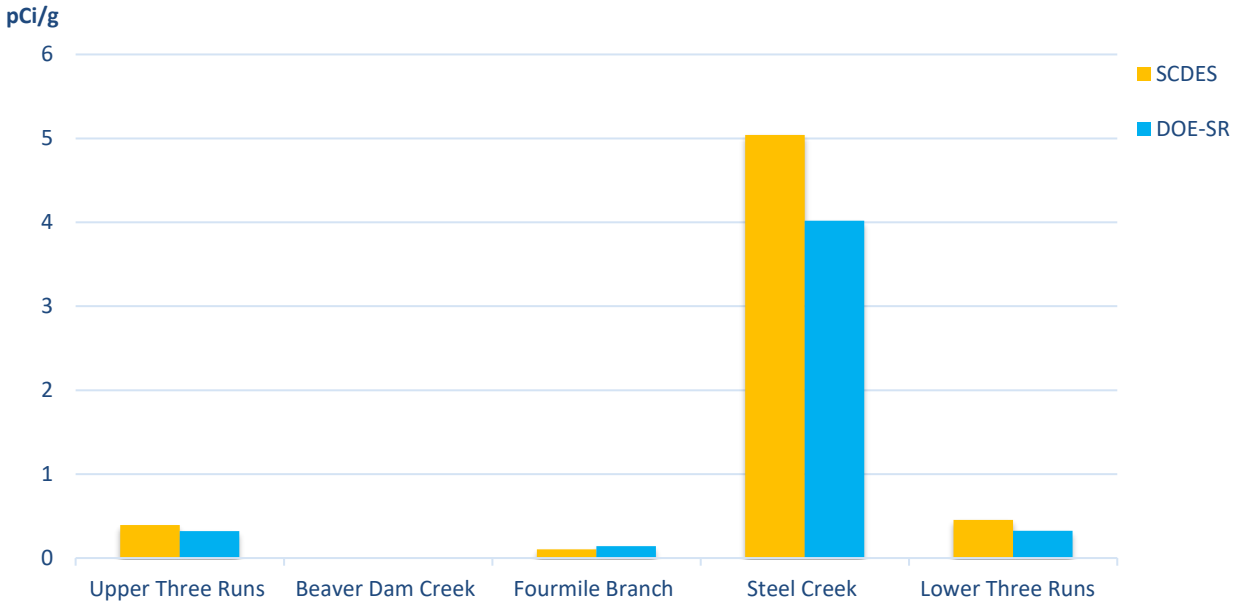
6.5.0 TABLES AND FIGURES

Figure 2. 2020-2024 Trending Data for Cs-137 in SRS Creek Mouth Samples (DHEC, 2021-2023; SCDES, 2024b)



Note: No bar denotes no detection for that year.

Figure 3. 2024 SCDES and DOE-SR Data Comparison of Cesium-137 in Collocated Savannah River Creek Mouths (SRNS, 2025)



Note: Beaver Dam Creek is a man-made stream that was used for past operations at D-Area.

Return to TOC

6.6.0 SUMMARY STATISTICS

2024 Alpha, Beta, & Cesium-137 Data Comparison for SCDES and DOE-SR Collocated On-Site Streams Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	43.87	26.43	44.00	10.90	82.00	6	6
	23.87	11.91	21.40	10.10	40.00	6	6
Gross Beta	20.08	9.18	20.80	11.90	34.40	5	6
	19.18	12.21	18.30	6.80	36.60	6	6
Cs-137	0.50	0.85	0.13	0.04	2.20	6	6
	0.47	0.64	0.19	0.08	1.42	4	6

Note: Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.

2024 Alpha, Beta, & Cesium-137 Data Comparison for SCDES and DOE-SR Collocated Creek Mouth Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	27.62	21.43	21.30	11.90	65.30	5	5
	18.46	10.18	14.60	10.90	35.40	5	5
Gross Beta	25.32	6.41	23.50	18.50	35.00	5	5
	22.20	6.66	21.90	15.20	32.90	5	5
Cs-137	1.50	2.37	0.42	0.10	5.04	4	5
	1.20	1.88	0.32	0.14	4.02	4	5

Note: Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.

2024 Alpha, Beta, & Cesium-137 Data Comparison for SCDES and DOE-SR Collocated Stormwater Basin Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	13.14	5.12	11.80	8.83	18.80	3	3
	10.25	3.59	8.18	8.17	14.40	3	3
Gross Beta	7.35	1.04	7.35	6.61	8.08	2	3
	6.72	1.81	6.72	5.44	8.00	2	3
Cs-137	0.02	NA	0.02	0.02	0.02	1	3
	0.04	NA	0.04	0.04	0.04	1	3

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) NA is Not Applicable

6.6.0 SUMMARY STATISTICS

2024 Alpha, Beta, & Cesium-137 Data Comparison for SCDES and DOE-SR Collocated Boat Landing Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	11.10	NA	11.10	11.10	11.10	1	2
	11.15	3.46	11.15	8.70	13.60	2	2
Gross Beta	17.20	NA	17.20	17.20	17.20	1	2
	19.60	0.28	19.60	19.40	19.80	2	2
Cs-137	0.07	NA	0.07	0.07	0.07	1	2
	0.07	0.03	0.07	0.05	0.09	2	2

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) NA is Not Applicable

Return to TOC

6.6.0 SUMMARY STATISTICS

2024 Nonradiological (Metals) Data Comparison for SCDES and DOE-SR Collocated On-Site Streams Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	84.67	63.82	56.00	29.00	170.00	6	6	20
	78.38	63.96	60.00	18.70	180.00	6	6	
Cadmium	1.30	NA	1.30	1.30	1.30	1	6	1
	0.31	0.25	0.20	0.15	0.67	4	6	
Chromium	16.22	13.89	12.00	5.80	40.00	5	6	43.4
	17.21	13.94	12.15	5.37	43.00	6	6	
Copper	11.40	15.86	4.35	1.90	35.00	4	6	31.6
	9.85	11.65	5.04	1.40	32.00	6	6	
Lead	ND	ND	ND	ND	ND	0	6	35.8
	10.18	8.04	7.10	2.77	23.00	6	6	
Manganese	154.00	123.53	108.00	43.00	350.00	6	6	460
	140.77	107.40	98.80	35.00	310.00	6	6	
Mercury	0.18	NA	0.18	0.18	0.18	1	6	0.18
	0.09	0.09	0.05	0.04	0.23	4	6	
Nickel	3.13	0.81	3.50	2.20	3.70	3	6	22.7
	6.62	5.26	5.35	1.88	16.00	6	6	
Zinc	32.67	29.88	25.50	12.00	92.00	6	6	121
	29.42	28.25	21.50	9.73	85.00	6	6	

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) DOE-SR did not sample for Beryllium in 2024.
3) ND is Not Detected
4) NA is Not Applicable

Return to TOC

6.6.0 SUMMARY STATISTICS

2024 Nonradiological (Metals) Data Comparison for SCDES and DOE-SR Collocated Creek Mouth Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	105.80	60.94	76.00	51.00	190.00	5	5	20
	111.60	60.77	91.00	48.00	190.00	5	5	
Cadmium	1.30	NA	1.30	1.30	1.30	1	5	1
	0.26	0.13	0.32	0.12	0.35	3	5	
Chromium	19.30	12.76	14.00	7.00	33.00	5	5	43.4
	22.06	15.24	17.00	7.30	42.00	5	5	
Copper	12.14	10.22	6.80	3.30	26.00	5	5	31.6
	12.62	11.12	7.30	2.50	27.00	5	5	
Lead	6.20	NA	6.20	6.20	6.20	1	5	35.8
	15.80	17.66	7.10	4.10	46.00	5	5	
Manganese	662.00	171.52	660.00	400.00	830.00	5	5	460
	728.00	233.39	790.00	360.00	1000.00	5	5	
Mercury	0.11	NA	0.11	0.11	0.11	1	5	0.18
	0.11	0.02	0.11	0.09	0.12	2	5	
Nickel	3.97	1.16	3.80	2.90	5.20	3	5	22.7
	10.30	5.77	9.95	4.30	17.00	4	5	
Zinc	57.20	56.18	31.00	15.00	150.00	5	5	121
	41.00	27.27	33.00	13.00	75.00	5	5	

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) DOE-SR did not sample for Beryllium in 2024.
3) NA is Not Applicable

Return to TOC

6.6.0 SUMMARY STATISTICS

2024 Nonradiological (Metals) Data Comparison for SCDES and DOE-SR Collocated Stormwater Basin Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	17.00	1.00	17.00	16.00	18.00	3	3	20
	17.67	2.89	16.00	16.00	21.00	3	3	
Cadmium	1.25	0.07	1.25	1.20	1.30	2	3	1
	0.08	0.01	0.08	0.07	0.09	2	3	
Chromium	13.17	6.29	14.00	6.50	19.00	3	3	43.4
	16.57	10.39	14.00	7.70	28.00	3	3	
Copper	4.93	1.78	5.70	2.90	6.20	3	3	31.6
	4.87	1.47	5.40	3.20	6.00	3	3	
Lead	7.30	0.57	7.30	6.90	7.70	2	3	35.8
	5.63	1.59	6.40	3.80	6.70	3	3	
Manganese	34.00	12.49	30.00	24.00	48.00	3	3	460
	37.00	8.89	34.00	30.00	47.00	3	3	
Mercury	ND	ND	ND	ND	ND	0	3	0.18
	0.03	0.01	0.03	0.02	0.04	2	3	
Nickel	3.15	0.07	3.15	3.10	3.20	2	3	22.7
	3.33	1.08	3.80	2.10	4.10	3	3	
Zinc	16.63	5.92	19.00	9.90	21.00	3	3	121
	16.97	7.06	20.00	8.90	22.00	3	3	

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) DOE-SR did not sample for Beryllium in 2024.
3) ND is Not Detected

6.6.0 SUMMARY STATISTICS

2024 Nonradiological (Metals) Data Comparison for SCDES and DOE-SR Collocated Boat Landing Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	58.00	NA	58.00	58.00	58.00	1	1	20
	95.00	NA	95.00	95.00	95.00	1	1	
Cadmium	ND	ND	ND	ND	ND	0	1	1
	ND	ND	ND	ND	ND	0	1	
Chromium	10.00	NA	10.00	10.00	10.00	1	1	43.4
	18.00	NA	18.00	18.00	18.00	1	1	
Copper	5.80	NA	5.80	5.80	5.80	1	1	31.6
	8.10	NA	8.10	8.10	8.10	1	1	
Lead	5.10	NA	5.10	5.10	5.10	1	1	35.8
	7.20	NA	7.20	7.20	7.20	1	1	
Manganese	580.00	NA	580.00	580.00	580.00	1	1	460
	940.00	NA	940.00	940.00	940.00	1	1	
Mercury	ND	ND	ND	ND	ND	0	1	0.18
	ND	ND	ND	ND	ND	0	1	
Nickel	3.80	NA	3.80	3.80	3.80	1	1	22.7
	8.30	NA	8.30	8.30	8.30	1	1	
Zinc	37.00	NA	37.00	37.00	37.00	1	1	121
	38.00	NA	38.00	38.00	38.00	1	1	

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) DOE-SR did not sample for Beryllium in 2024.
3) ND is Not Detected
4) NA is Not Applicable

Return to TOC

6.6.0 SUMMARY STATISTICS

2024 SCDES Radiological Data

On-Site Streams

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	43.87	26.43	44.00	10.90	82.00	6	6
Gross Beta	20.08	9.18	20.80	11.90	34.40	5	6
Cs-137	0.50	0.85	0.13	0.04	2.20	6	6

Creek Mouths

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	27.62	21.43	21.30	11.90	65.30	5	5
Gross Beta	25.32	6.41	23.50	18.50	35.00	5	5
Cs-137	1.50	2.37	0.42	0.10	5.04	4	5

Stormwater Basins

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	13.14	5.12	11.80	8.83	18.80	3	3
Gross Beta	7.35	1.04	7.35	6.61	8.08	2	3
Cs-137	0.02	NA	0.02	0.02	0.02	1	3

Note: NA is Not Applicable

Boat Landings

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	12.96	3.40	12.25	8.97	17.70	6	7
Gross Beta	18.58	3.44	17.75	14.60	24.50	6	7
Cs-137	0.10	0.07	0.07	0.06	0.20	4	7

6.6.0 SUMMARY STATISTICS

2024 SCDES Radiological Data

Background Samples

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	ND	ND	ND	ND	ND	0	1
Gross Beta	5.76	NA	5.76	5.76	5.76	1	1
Cs-137	0.05	NA	0.05	0.05	0.05	1	1

Note:
1) ND is Not Detected
2) NA is Not Applicable

2024 SCDES Nonradiological (Metals) Data

On-Site Streams

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	84.67	63.82	56.00	29.00	170.00	6	6	20
Beryllium	1.16	1.43	0.53	0.30	3.30	4	6	2.5*
Cadmium	1.30	NA	1.30	1.30	1.30	1	6	1
Chromium	16.22	13.89	12.00	5.80	40.00	5	6	43.4
Copper	11.40	15.86	4.35	1.90	35.00	4	6	31.6
Lead	ND	ND	ND	ND	ND	0	6	35.8
Manganese	154.00	123.53	108.00	43.00	350.00	6	6	460
Mercury	0.18	NA	0.18	0.18	0.18	1	6	0.18
Nickel	3.13	0.81	3.50	2.20	3.70	3	6	22.7
Zinc	32.67	29.88	25.50	12.00	92.00	6	6	121

Note:
1) Beryllium does not have an established ESV for sediment, so in lieu of a sediment value, the ESV for soil was used.
2) ND is Not Detected
3) NA is Not Applicable

6.6.0 SUMMARY STATISTICS

2024 SCDES Nonradiological (Metals) Data

Creek Mouth Locations

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	105.80	60.94	76.00	51.00	190.00	5	5	20
Beryllium	0.45	0.15	0.40	0.33	0.61	3	5	2.5*
Cadmium	1.30	NA	1.30	1.30	1.30	1	5	1
Chromium	19.30	12.76	14.00	7.00	33.00	5	5	43.4
Copper	12.14	10.22	6.80	3.30	26.00	5	5	31.6
Lead	6.20	NA	6.20	6.20	6.20	1	5	35.8
Manganese	662.00	171.52	660.00	400.00	830.00	5	5	460
Mercury	0.11	NA	0.11	0.11	0.11	1	5	0.18
Nickel	3.97	1.16	3.80	2.90	5.20	3	5	22.7
Zinc	57.20	56.18	31.00	15.00	150.00	5	5	121

Note:
1) Beryllium does not have an established ESV for sediment, so in lieu of a sediment value, the ESV for soil was used.
2) NA is Not Applicable

6.6.0 SUMMARY STATISTICS

2024 SCDES Nonradiological (Metals) Data

Stormwater Basins

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	17.00	1.00	17.00	16.00	18.00	3	3	20
Beryllium	ND	ND	ND	ND	ND	0	3	2.5*
Cadmium	1.25	0.07	1.25	1.20	1.30	2	3	1
Chromium	13.17	6.29	14.00	6.50	19.00	3	3	43.4
Copper	4.93	1.78	5.70	2.90	6.20	3	3	31.6
Lead	7.30	0.57	7.30	6.90	7.70	2	3	35.8
Manganese	34.00	12.49	30.00	24.00	48.00	3	3	460
Mercury	ND	ND	ND	ND	ND	0	3	0.18
Nickel	3.15	0.07	3.15	3.10	3.20	2	3	22.7
Zinc	16.63	5.92	19.00	9.90	21.00	3	3	121

Note:
1) Beryllium does not have an established ESV for sediment, so in lieu of a sediment value, the ESV for soil was used.
2) ND is Not Detected

Return to TOC

6.6.0 SUMMARY STATISTICS

2024 SCDES Nonradiological (Metals) Data

Boat Landings

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	102.59	73.20	110.00	5.10	210.00	7	7	20
Beryllium	0.51	0.18	0.51	0.38	0.63	2	7	2.5*
Cadmium	1.20	NA	1.20	1.20	1.20	1	7	1
Chromium	13.47	7.60	15.00	1.80	24.00	7	7	43.4
Copper	13.93	8.53	16.00	2.80	22.00	6	7	31.6
Lead	6.85	2.47	6.85	5.10	8.60	2	7	35.8
Manganese	1324.43	1350.20	1300.00	31.00	4100.00	7	7	460
Mercury	ND	ND	ND	ND	ND	0	7	0.18
Nickel	4.20	2.03	3.80	2.40	6.40	3	7	22.7
Zinc	42.46	25.10	41.00	6.20	69.00	7	7	121

Note:
1) Beryllium does not have an established ESV for sediment, so in lieu of a sediment value, the ESV for soil was used.
2) ND is Not Detected
3) NA is Not Applicable

Chapter 7 Monitoring of Surface Soil on and Adjacent to SRS

7.1.0 PROJECT SUMMARY

SCDES independently evaluates surface soil on and adjacent to SRS from the ground surface to a 12-inch depth for gross alpha, gross non-volatile beta, and select gamma-emitting radionuclides, as well as specific metals of concern. Soil samples are collected to determine if SRS activities have had an impact on areas inside and outside the site boundary. Radionuclide detections in soil are the result of accumulation over many years.

A 50-mile area from the center of SRS was chosen for the comparison of SCDES and DOE-SR radiological data averages. DOE-SR does not collect metals for surface soil; therefore, no direct data comparisons can be made.

Collecting soil samples which will be analyzed for radiological material and metals

SCDES collected samples from 12 sample locations around SRS and along site barricades, 1 on-site location (Burial Ground North), and 1 background location in 2024 (Section 7.5.0, Table 1). Soil samples are collected as split samples, which are samples taken and split between SCDES and DOE-SR to allow for direct sample data comparisons. SCDES's background location is the only location not collocated with DOE-SR. In 2024, SCDES and DOE-SR added Old Williston Barricade as a perimeter location after Hwy 21/167 was discontinued as a sampling location. SCDES and DOE-SR collocated sample locations are depicted on the Map in Section 7.4.0. DOE-SR has additional sample locations, but comparisons made in this report are only for sample locations that are collocated between DOE-SR and SCDES. On-site and perimeter sampling location classifications are based on DOE-SR sample location classifications to maintain direct data comparisons.

7.2.0 RESULTS AND DISCUSSION

Surface Soil Monitoring Summary Statistics for radionuclides and metals can be found in Section 7.6.0, and all Surface Soil Monitoring Data can be found in the 2024 SCDES Data File.

7.2.1 Radiological Parameter Results

Most samples had detectable amounts of Cesium-137 (Cs-137), an anthropogenic radionuclide that may be present due to a legacy of releases by SRS and atmospheric fallout from past nuclear weapons testing (SRNS, 2025). Cs-137 activity in 2024 is comparable to levels detected by SCDES in the past. No surface soil samples collected in 2024 were above the EPA Preliminary Remediation Goals (PRGs), which can be found in Section 7.5.0, Table 2 (EPA, 2022).

SCDES and DOE-SR had gross alpha and gross non-volatile beta detections in 2024. The summary statistics can be found in Section 7.6.0.

Cs-137 and potassium-40 (K-40) were the only gamma-emitting radionuclides that SCDES and DOE-SR shared in analytical results. K-40 is a NORM decay product that will not be discussed further. Both SCDES and DOE-SR samples resulted in similar findings. SCDES had a perimeter sample location average of 0.11 pCi/g for Cs-137, which was slightly lower than DOE-SR's finding of 0.14 pCi/g. Both SCDES and DOE-SR did not detect Cs-137 at the on-site sample location. The PRG for Cs-137 is 27.9 pCi/g and all sample results were well below that level. Trending data for Cs-137 in sample locations is in Section 7.5.0, Figures 1 and 2.

The results found by both SCDES and DOE-SR are influenced by the number of samples used to determine the average and differences in lab analysis. The average level of Cs-137 in surface soil can vary due to the highly variable nature of soils. Radiocesium bioavailability in soil is influenced by soil properties such as clay content, pH, organic matter, and soil microflora (Absalom et al., 2001).

The only other gamma-emitting radionuclides detected in SCDES surface soil samples were lead-212, lead-214, radium-226, actinium-228, and thallium-234. These are NORM decay products.

7.2.2 Nonradiological Parameter Results

DOE-SR did not analyze for metals; therefore, no comparisons could be made. SCDES saw no exceedances of the EPA Regional Screening Levels (RSLs) in any of the surface soil samples in 2024 (EPA, 2024). A complete list of all SCDES nonradiological analytes and RSLs can be found in Section 7.5.0, Table 3.

Samples being prepared for the lab

Barium has been a constituent of the H-Area Hazardous Waste Management Facility (WSRC, 1993). Barium was detected in 13 sample locations and the background location.

Beryllium is a strong, lightweight metal used in nuclear weapons that works as a shield for radiation and as a neutron source (Till et al., 2001). Beryllium was detected in 1 sample location.

Cadmium enters the atmosphere through fuel and coal combustion (Till et al. 2001). Cadmium was detected in 1 sample location.

Chromium solutions were used at SRS as corrosive inhibitors. Chromium was a part of wastewater solutions resulting from dissolving stainless steel. It was also used in cleaning solutions in the separations areas (Till et al., 2001). The legal disposal of fly ash on land as a result of burning coal is a contributor of both chromium and nickel to soils. Chromium was detected in 13 sample locations and the background location.

D-Area and the other coal combustion powerhouses emitted copper and other heavy metals (Till et al., 2001). These mechanisms are possible sources of elevated copper levels in surface soils. Copper was detected in 11 sample locations and the background location.

Atmospheric emissions of lead from SRS occurred through coal and fuel combustion (Till et al., 2001). Lead can accumulate in soils where its bioavailability can persist long-term (Alloway, 2013b). Lead was detected in 4 sample locations and the background location.

Manganese has been released in the separations areas processes and discharged to liquid waste tanks (Till et al., 2001). It is also a byproduct of coal burning. Manganese was detected in 13 sample locations and the background location.

Samples being prepared for lab analysis

The largest anthropogenic source of nickel globally is the burning of fuels and coal combustion (Alloway, 2013a). At SRS, nickel was directly released through M-Area effluent from the plating rinse tanks and through site use of diesel generators (Till et al., 2001). Nickel was detected in 4 sample locations.

Zinc was released in relatively small amounts to the separations areas seepage basins as well as the M-Area seepage basin (Till et al., 2001). Zinc was detected in 13 sample locations and the background location.

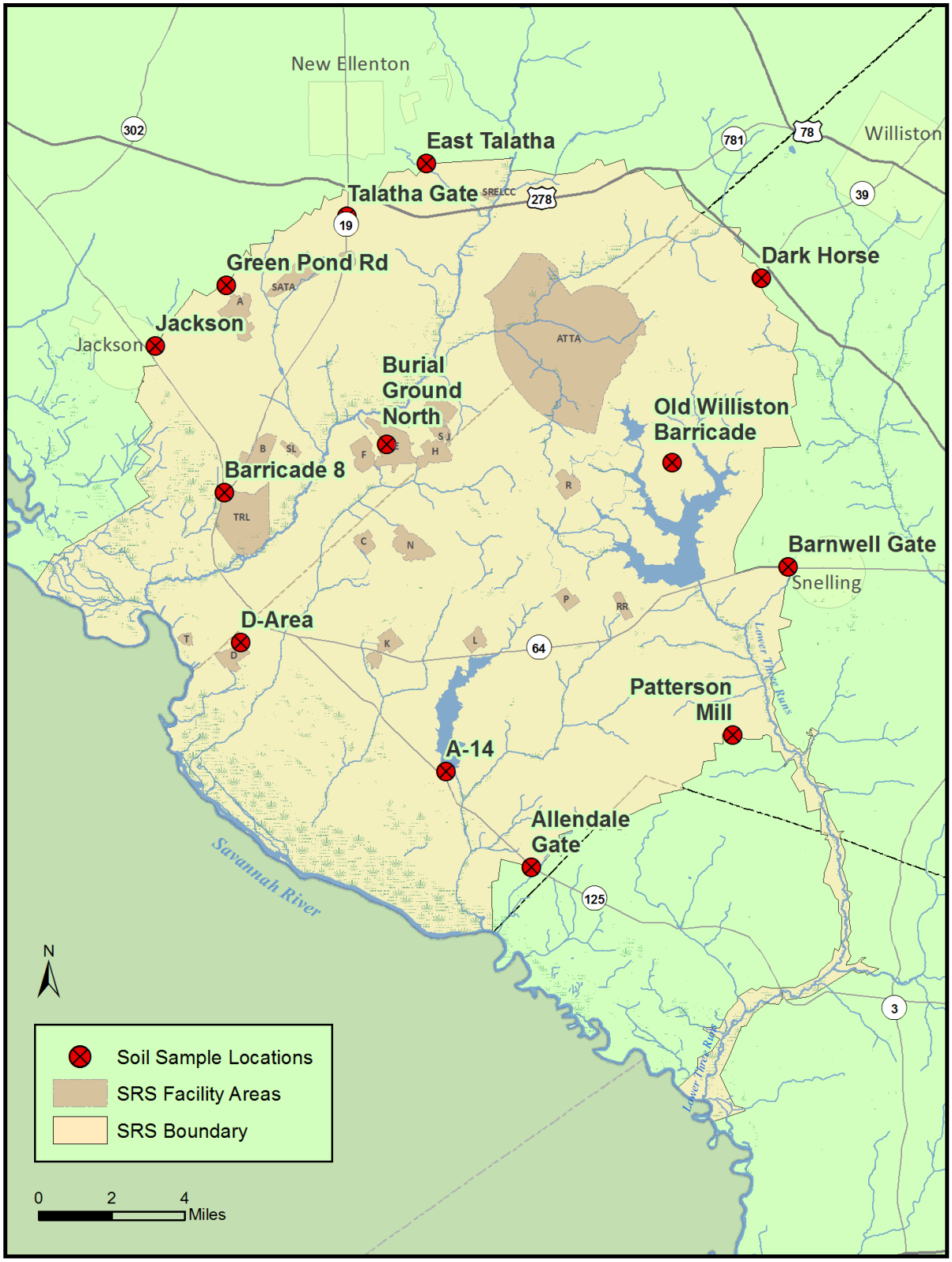
SRS facilities, such as F- and H-Area, tritium facilities, waste tanks, and the coal-fired power plants have emitted mercury to the atmosphere (Till et al., 2001). Atmospheric fallout contributes to mercury findings in surface soil. There were no mercury detections in surface soil samples collected in 2024.

7.3.0 CONCLUSIONS AND RECOMMENDATIONS

SCDES will continue to monitor the surface soil on and adjacent to SRS and will periodically evaluate modifications of the monitoring activities to better accomplish project goals and objectives. Monitoring will continue as long as there are activities at SRS that create the potential for contamination to enter the environment. Continued monitoring will provide an improved understanding of radionuclide and non-radionuclide activity in SRS perimeter surface soils and the surrounding areas. Additional monitoring will impart valuable information to human health exposure pathways. Trending of data over multiple years will give a more definitive answer as to whether radionuclide concentrations in the SRS area are declining due to radioactive decay or possibly increasing due to flooding, soil disturbances, and prescribed burns on SRS. The comparison of data allows for independent data verification of DOE-SR monitoring activities. Cooperation between DOE-SR and SCDES provides credibility and confidence in the information being provided to the public.

7.4.0 MAP

Surface Soil Monitoring Locations



2024 ESOP Soil Monitoring Map www.des.sc.gov

Return to TOC

7.5.0 TABLES AND FIGURES

Table 1. 2024 SCDES Surface Soil Monitoring Locations

On-Site and Perimeter Soil Samples		
Sample ID	**Location**	**County**
East Talatha	New Ellenton	Aiken
Talatha Gate	New Ellenton	Aiken
Burial Ground North	SRS	Aiken
Barricade 8	SC-125	Aiken
Jackson	Jackson	Aiken
Green Pond Rd	Near SRS Air Station at Green Pond	Aiken
A-14	SC-125	Aiken
D-Area	West of SC-125	Aiken
Allendale Gate	Air Station	Allendale
Old Williston Barricade	SRS Road 8, South of Barricade 3	Barnwell
Barnwell Gate	Snelling	Barnwell
Dark Horse	US-278	Barnwell
Patterson Mill	Patterson Mill Air Station	Barnwell
Background Soil Samples		
Sample ID	**Location**	**County**
Pinckney	Pinckney Island National Refuge	Beaufort

Table 2. Soil Ingestion Preliminary Remediation Goals of Select Anthropogenic Radionuclides (EPA, 2022)

Radionuclide	Peak PRG for Exposure through Ingestion (pCi/g)
Americium-241	4.95
Cesium-137	27.9
Cobalt – 60	82.8
Iodine-131	5,980
Plutonium-238	4.40
Plutonium-239/240	3.92

See note for Table 2 in Section 6.5.0

Table 3. Regional Screening Levels of Metals (EPA, 2024)

Analyte	RSL (mg/kg)
Barium	15,000
Beryllium	160
Cadmium	7.1
Total Chromium	23**
Copper	3,100
Lead	200
Manganese	1,800
Mercury	7.1
Nickel	1,400
Zinc	23,000

Note: The SCDES lab analyzes soil samples for total chromium; however, a RSL is not established for total chromium. The value provided in the table above is the ecological screening value for total chromium in soil.

7.5.0 TABLES AND FIGURES

Figure 1. 2020-2024 SCDES and DOE-SR Trending Averages for Cesium-137 (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)

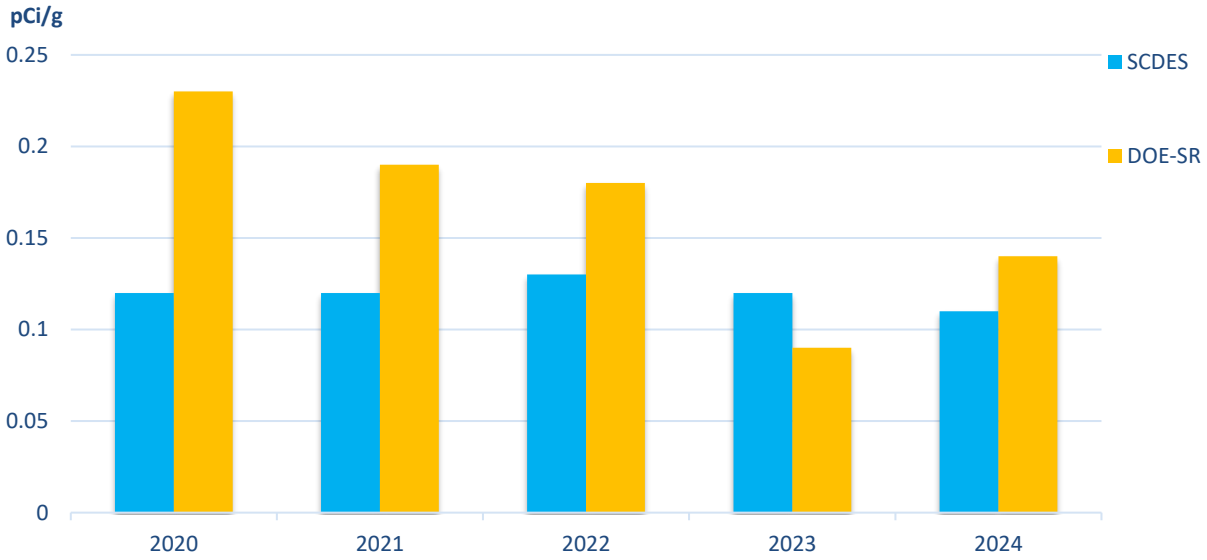
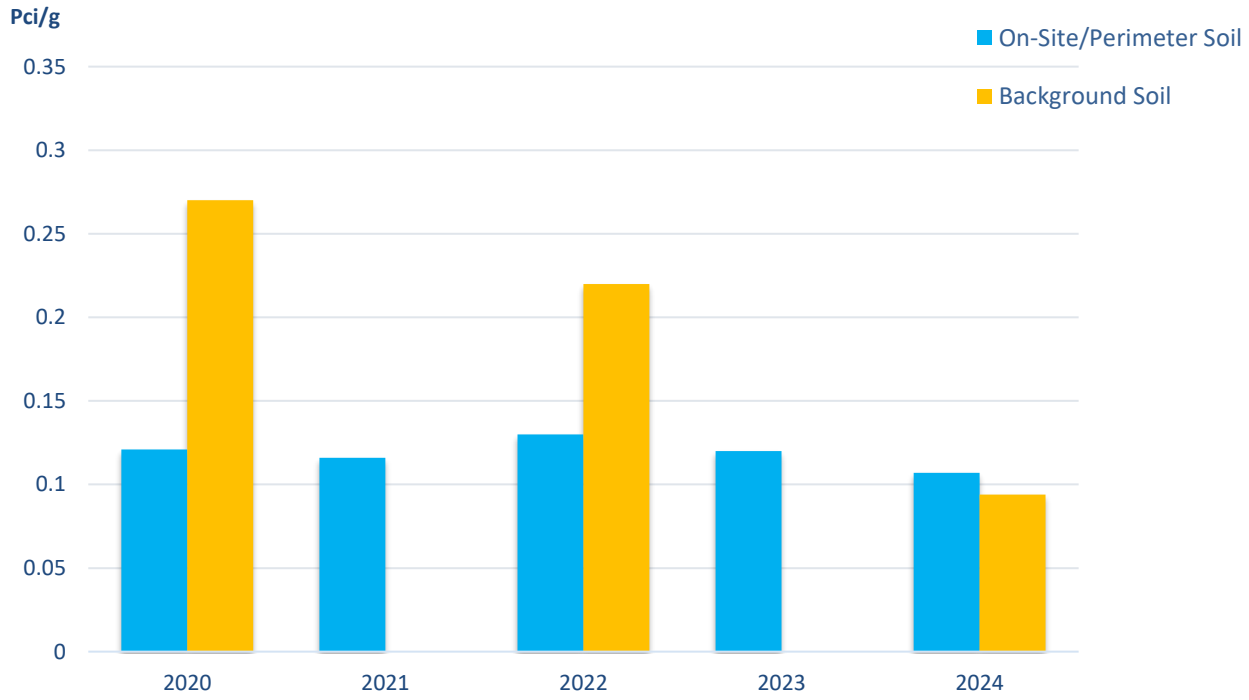


Figure 2. 2020-2024 SCDES On-Site/Perimeter and Background Trending Averages for Cesium-137 (DHEC 2021 – 2023; SCDES, 2024b)



Note: Background samples were not collected in 2021 and had no detects in 2023.

Return to TOC

7.6.0 SUMMARY STATISTICS

2024 Alpha, Beta, & Cesium-137 Data Comparison for SCDES and DOE-SR Collocated On-Site Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	12.00	NA	12.00	12.00	12.00	1	1
	9.49	NA	9.49	9.49	9.49	1	1
Gross Beta	9.98	NA	9.98	9.98	9.98	1	1
	13.40	NA	13.40	13.40	13.40	1	1
Cs-137	ND	ND	ND	ND	ND	0	1
	ND	ND	ND	ND	ND	0	1

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) NA is Not Applicable; ND is Not Detected

2024 Alpha, Beta, & Cesium-137 Data Comparison for SCDES and DOE-SR Collocated Perimeter Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	8.23	1.63	8.45	6.13	10.40	6	12
	7.05	2.78	6.07	3.18	11.20	12	12
Gross Beta	6.15	0.76	6.44	5.31	7.04	5	12
	5.88	1.66	6.40	3.79	8.27	9	12
Cs-137	0.11	0.07	0.09	0.03	0.27	12	12
	0.14	0.08	0.11	0.05	0.27	9	12

Note: Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.

2024 Alpha, Beta, & Cesium-137 Data Comparison for All SCDES and DOE-SR Collocated Sampling Locations (SRNS, 2025)

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	8.77	2.06	8.89	6.13	12.00	7	13
	7.24	2.74	6.34	3.18	11.20	13	13
Gross Beta	6.79	1.70	6.50	5.31	9.98	6	13
	6.63	2.84	6.72	3.79	13.40	10	13
Cs-137	0.11	0.07	0.09	0.03	0.27	12	13
	0.14	0.08	0.11	0.05	0.27	9	13

Note: Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.

7.6.0 SUMMARY STATISTICS

2024 SCDES Radiological Statistics – Background Sample

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	ND	ND	ND	ND	ND	0	1
Gross Beta	6.58	NA	6.58	6.58	6.58	1	1
Cs-137	0.09	NA	0.09	0.09	0.09	1	1

Note:
1) DOE-SR does not collect a background sample that is collocated with SCDES.
2) NA is Not Applicable; ND is Not Detected

2024 SCDES Nonradiological (Metals) Statistics -- On-Site and Perimeter Samples

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples
Barium	18.50	8.69	17.00	7.90	32.00	13	13
Beryllium	0.37	NA	0.37	0.37	0.37	1	13
Cadmium	2.00	NA	2.00	2.00	2.00	1	13
Chromium	4.85	2.35	4.60	2.20	10.00	13	13
Copper	4.50	3.73	2.70	1.10	12.00	11	13
Lead	11.75	5.98	10.35	6.30	20.00	4	13
Manganese	86.23	69.11	79.00	17.00	240.00	13	13
Mercury	ND	ND	ND	ND	ND	0	13
Nickel	2.50	0.45	2.40	2.10	3.10	4	13
Zinc	29.08	31.89	16.00	5.10	100.00	13	13

Note: NA is Not Applicable; ND is Not Detected

2024 SCDES Nonradiological (Metals) Statistics – Background Samples

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples
Barium	15.00	NA	15.00	15.00	15.00	1	1
Beryllium	ND	ND	ND	ND	ND	0	1
Cadmium	ND	ND	ND	ND	ND	0	1
Chromium	6.40	NA	6.40	6.40	6.40	1	1
Copper	2.10	NA	2.10	2.10	2.10	1	1
Lead	7.10	NA	7.10	7.10	7.10	1	1
Manganese	13.00	NA	13.00	13.00	13.00	1	1
Mercury	ND	ND	ND	ND	ND	0	1
Nickel	ND	ND	ND	ND	ND	0	1
Zinc	6.80	NA	6.80	6.80	6.80	1	1

Note: NA is Not Applicable; ND is Not Detected

Chapter 8 Radiological Monitoring of Terrestrial Vegetation on and Adjacent to SRS

8.1.0 PROJECT SUMMARY

DOE-SR collects and analyzes terrestrial vegetation, primarily Bermuda grass, to determine concentrations of radionuclides (SRNS, 2025). In 2019, SCDES began sampling Bermuda grass (*cynodon dactylon*) to align with DOE-SR's methodology. If grass is unavailable, SCDES and DOE-SR will revert to collecting leaves from broad-leafed evergreen trees and shrubs. SCDES and DOE-SR locations are collocated with samples being collected from 12 locations along the SRS perimeter and barricades along with 2 on-site locations at Burial Ground North and F-Area North. SCDES joins DOE-SR personnel in the field to collect and split grass samples. SCDES also has a background location at Pinckney Island National Wildlife Refuge that is not collocated with DOE-SR. SCDES and DOE-SR 2024 sample locations are shown in Section 8.4.0, Map. DOE-SR has additional sample locations, but comparisons made in this report are only for sample locations that are collocated between DOE-SR and SCDES. On-site and perimeter sampling location classifications are based on DOE-SR sample location classifications to maintain direct data comparisons.

Preparing vegetation samples for analysis

8.2.0 RESULTS AND DISCUSSION

Terrestrial Vegetation Data

Terrestrial Vegetation Monitoring Summary Statistics can be found in Section 8.6.0 and all Terrestrial Vegetation Monitoring Data can be found in the 2024 SCDES Data File.

In 2024, SCDES detected tritium at one on-site sample location (Burial Ground North – 10.000 pCi/g) and 3 perimeter sample locations (East Talatha – 0.240 pCi/g, D-Area – 0.264 pCi/g, and Allendale Gate – 0.189 pCi/g) (Section 8.6.0, Summary Statistics). DOE-SR had tritium detects at one on-site sample location (Burial Ground North – 0.280 pCi/g) and at 2 perimeter sample locations (D-Area – 0.095 pCi/g and Patterson Mill – 0.285 pCi/g) (SRNS, 2025).

Collecting Bermuda grass samples

Tritium analysis results from SCDES and DOE-SR sampling are presented in Section 8.6.0, Summary Statistics.

Gamma

Cesium-137 and potassium-40 were the only gamma-emitting radionuclides that SCDES and DOE-SR shared in analytical results. SCDES also detected beryllium-7

Return to TOC

and actinium-228. Potassium-40, beryllium-7, and actinium-228 are NORM; therefore, the results will not be discussed further but are presented in the 2024 SCDES Data File. A list of radionuclides in the gamma spectroscopy analysis are in the List of Analytes, Table 1, page ix.

Gamma analysis results for Cs-137 from SCDES and DOE-SR sampling in 2024 are presented in Section 8.6.0, Summary Statistics. The man-made isotopes Co-60 and Am-241 were not detected in the SCDES 2024 samples.

8.3.0 CONCLUSIONS AND RECOMMENDATIONS

In 2020, SCDES discontinued sampling at the three 25-mile radius locations (Hwy 301 Welcome Center, Augusta Loc and Dam, and the Aiken Airport). As a result, Pinckney Island National Wildlife Refuge in Beaufort County, SC was designated as the background sampling location to maintain exclusive sampling in South Carolina by SCDES. In 2024, SCDES and DOE-SR added Old Williston Barricade as a perimeter sample location after Hwy 21/167 was discontinued as a sampling location. SCDES also added F-Area North as an on-site sampling location to maintain direct data comparisons from collocations between SCDES and DOE-SR.

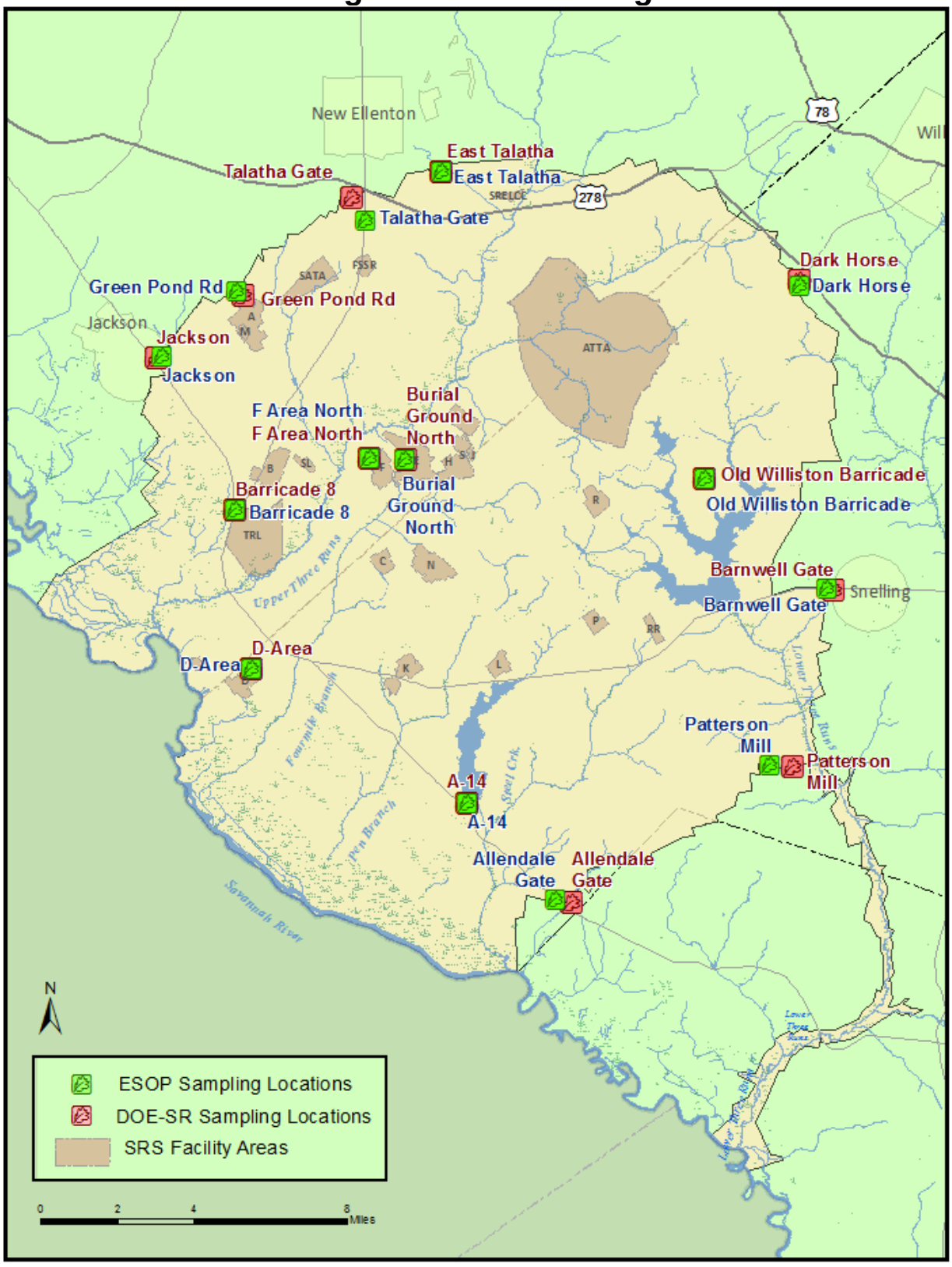
Prepared vegetation samples ready for analysis

SCDES's revision of beginning to sample Bermuda grass on an annual basis in 2019 allows for a more direct comparison with the data collected by DOE-SR. By having parallel sampling techniques with DOE-SR, SCDES will potentially observe less differences in the data.

Return to TOC

8.4.0 MAP

Terrestrial Vegetation Monitoring Locations



2024 ESOP Terrestrial Vegetation Monitoring Map www.des.sc.gov

Return to TOC

8.5.0 TABLES AND FIGURES

Table 1. 2024 SCDES Terrestrial Vegetation Monitoring Locations

On-Site and Perimeter Terrestrial Vegetation Samples		
Sample ID	**Location**	**County**
East Talatha	New Ellenton	Aiken
Talatha Gate	New Ellenton	Aiken
Burial Ground North	SRS	Aiken
F-Area North	SRS	Aiken
Barricade 8	SC-125	Aiken
Jackson	Jackson	Aiken
Green Pond Rd	Near SRS Air Station at Green Pond	Aiken
A-14	SC-125	Aiken
D-Area	West of SC-125	Aiken
Allendale Gate	Air Station	Allendale
Barnwell Gate	Snelling	Barnwell
Old Williston Barricade	SRS Road 8, South of Barricade 3	Barnwell
Dark Horse	US-278	Barnwell
Patterson Mill	Patterson Mill Air Station	Barnwell
Background Terrestrial Vegetation Samples		
Sample ID	**Location**	**County**
Pinckney	Pinckney Island National Refuge	Beaufort

8.6.0 SUMMARY STATISTICS

2024 Tritium Data Comparison for SCDES and DOE-SR Sampling Locations (SRNS, 2025)

Stations	SCDES Result (pCi/g)	DOE-SR Result (pCi/g)
On-Site Sample Locations		
Burial Ground North	10.000	0.280
F-Area North	ND	ND
Perimeter Sample Locations		
Talatha Gate	ND	ND
Green Pond Rd	ND	ND
Jackson	ND	ND
East Talatha	0.240	ND
Dark Horse	ND	ND
Patterson Mill	ND	0.285
D-Area	0.264	0.095
A-14	ND	ND
Barnwell Gate	ND	ND
Allendale Gate	0.189	ND
Barricade 8	ND	ND
Old Williston Barricade	ND	ND
Perimeter Locations' Summary Statistics – Tritium		
Average	0.231	0.190
Standard Deviation	0.038	0.135
Median	0.240	0.190

Note:
1) ND is Not Detected
2) SCDES's background location at Pinckney did not detect tritium in 2024. No background sample was collected at Pinckney for DOE-SR.
3) No summary statistics for each location were shown due to only one sample being taken per location.

8.6.0 SUMMARY STATISTICS

2024 Cesium-137 Data Comparison for SCDES and DOE-SR Sampling Locations (SRNS, 2025)

Stations	SCDES Result (pCi/g)	DOE-SR Result (pCi/g)
On-Site Sample Locations		
Burial Ground North	ND	ND
F-Area North	ND	ND
Perimeter Sample Locations		
Talatha Gate	ND	ND
Green Pond Rd	0.032	ND
Jackson	ND	ND
East Talatha	ND	ND
Dark Horse	ND	0.184
Patterson Mill	0.062	ND
D-Area	0.172	0.994
A-14	ND	0.488
Barnwell Gate	0.083	0.277
Allendale Gate	0.235	ND
Barricade 8	ND	ND
Old Williston Barricade	0.323	1.050
Perimeter Locations' Summary Statistics – Cs-137		
Average	0.151	0.599
Standard Deviation	0.113	0.402
Median	0.128	0.488

Note:
1) ND is Not Detected
2) SCDES's background location at Pinckney had no detection of Cs-137. No background sample was collected at Pinckney for DOE-SR.
3) No summary statistics for each location were shown due to only one sample being taken per location.

Chapter 9 Radiological Monitoring of Edible Vegetation Adjacent to SRS

Return to TOC

9.1.0 PROJECT SUMMARY

The Radiological Monitoring of Edible Vegetation Project is a component of the SCDES's ESOP that monitors edible vegetation from the SRS perimeter and background locations.

Foraging for wild plums

SCDES defined a study area comprised of grids radiating out to 25 miles from the SRS center point, 25 miles to 50 miles, and background locations greater than 50 miles from the SRS center point (Map in Section 9.4.0). DOE-SR, as compared to SCDES, has 5 defined quadrants where samples are collected annually: 4 quadrants are within 10 miles of SRS in each direction (NE, NW, SE, SW), along with 1 quadrant located within 25 miles SE. Direct comparisons between DOE-SR and SCDES could not be made due to variation in sampling and analysis methodologies.

Edible vegetation is collected based solely on availability and is directly dependent upon the growing season. Certain farmers, gardeners, and/or businesses surrounding the perimeter of SRS contribute domestically grown crops. Wild, edible vegetation, such as muscadines and plums, are also collected. References to vegetation in this section pertain to the edible parts of plants.

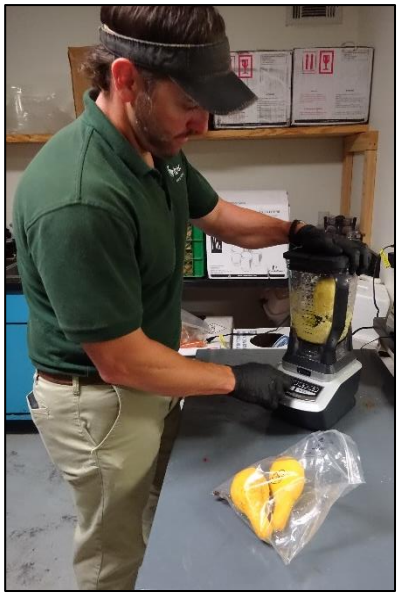
SCDES background sampling helps to separate atomic test fallout contamination levels and other sources (e.g., ongoing permitted releases at other nuclear facilities) from SRS source potential contamination. However, fallout dispersion patterns and concentrations are weather related and not uniform, and no assignment of a specific source can be made. SCDES collected one background sample at Pinckney Island National Wildlife Refuge.

9.2.0 RESULTS AND DISCUSSION

Edible Vegetation Monitoring Data can be found in the 2024 SCDES Data File.

Blended samples to be sent to the Columbia lab for analysis

The U.S. Food and Drug Administration (FDA) has guidance levels for specific radionuclides called Derived Intervention Levels (DILs). The FDA adopted DILs to help determine whether domestic food in interstate commerce or food offered for import into the United States presents a safety concern (FDA, 2020).



Blending squash for analysis

SCDES detected tritium in 2 samples of fruit from the NE-1 and E-1 quadrants with an average detection of 0.277 pCi/L in 2024. DOE-SR had no detections of tritium in any of their edible vegetation samples in 2024 (SRNS, 2025).

In 2024, DOE-SR edible vegetation exhibited radiological detections of gross alpha, nonvolatile beta, cesium-137, potassium-40, plutonium-238, strontium-90, americium-241, curium-243/244, technetium-99, uranium-233/234, uranium-235, and uranium-238 (SRNS, 2025). Potassium-40 was the only gamma analyte detected in 2024 in SCDES samples. Potassium-40 is NORM and is the source of most detections in edible vegetation; therefore, it will not be discussed further.

The FDA-derived Guidance Level for Cs-137 is 32.4 pCi/g (FDA, 2020). SCDES did not detect Cs-137 in any of the samples collected in 2024. DOE-SR detected Cs-137 in 4 of the 20 samples collected from the NE Quadrant 0-10 Miles, NW Quadrant 0-10 Miles, SE Quadrant 0-10 Miles, and SE Quadrant 25 Miles in 2024 with an average of 0.024 pCi/g (SRNS, 2025).

9.3.0 CONCLUSIONS AND RECOMMENDATIONS

SCDES and DOE-SR have different edible vegetation sampling schemes. DOE-SR samples primarily domestic plants collected from annual contributors in quadrants at zero to 10 miles from the perimeter of the SRS border and one quadrant at 25 miles. SCDES accepts domestic plants as donations from citizens and collects perennial, wild, edible vegetation and fungi found within 50 miles of the SRS center and background locations (Section 9.4.0).

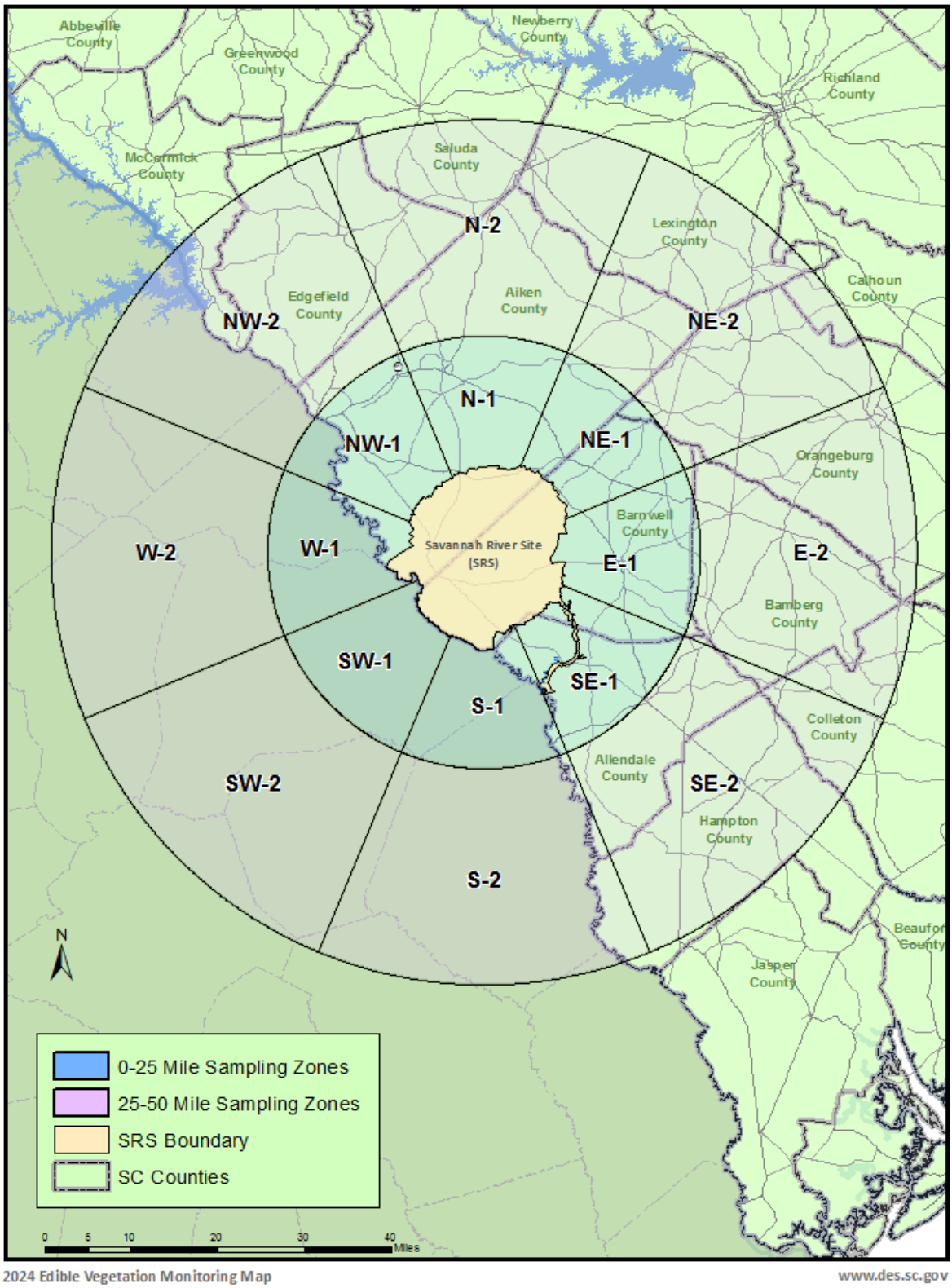
In the future, SCDES will explore opportunities to split samples with DOE-SR and attempt to establish collocated sampling locations for better comparisons between the two. In addition, SCDES will continue to attempt to collect wild fungi due to its inherent ability to bioconcentrate Cs-137.

Collecting kale in a garden

Return to TOC

9.4.0 MAP

Edible Vegetation Monitoring Locations



Note: Though zones are highlighted in Georgia, samples are only collected in South Carolina.

Return to TOC

Chapter 10 Radiological Monitoring of Dairy Milk Adjacent to SRS

10.1.0 PROJECT SUMMARY

Operations at SRS have resulted in the potential for radiological constituents to be released to the surrounding environment (Till et al., 2001). Consumption of milk products containing radioactive materials can be a human exposure pathway. When an atmospheric release occurs, radionuclides can be deposited on pastures and ingested by grazing dairy animals. The animals may release a portion of the radionuclides into their milk that could be consumed by humans (Till et al., 2001). Radionuclides could also enter milk through the irrigation of a pasture using groundwater containing radioactive materials and through uptake by plants from soil containing radioactive materials.

In 2024, SCDES collected milk from four dairies within South Carolina (Section 10.4.0, Map). All four of these locations are within a 50-mile radius to the center of SRS. This project provides analytical data for trending and comparison to published DOE-SR data. SCDES and DOE-SR have varying sampling locations. Comparisons are based on each program's respective results.

Milk samples collected for analysis

SCDES personnel collected unpasteurized milk samples on a quarterly basis in 2024. All milk samples from each quarter were analyzed for tritium, Sr-89/90, and gamma-emitting radionuclides. While a select group of gamma-emitting radionuclides (iodine-131 (I-131), cesium-137 (Cs-137), and cobalt-60 (Co-60)) are analytes of concern in dairy milk for this project, all other detections such as potassium-40 (K-40) are considered NORM and will not be discussed further. SCDES analyzes samples for total strontium (Sr-89/90) instead of only Sr-90. This is done to provide a more conservative result, and it is assumed the total strontium detected is in the form of Sr-90.

On September 26, 2024, Hurricane Helene made landfall in South Carolina. Due to statewide power outages and dangerous conditions, milk samples collected during the third quarter were unable to be tested for Sr-89/90. Additionally, fourth quarter samples were not collected from MK-25 due to a milk supply shortage. Dairy Milk Monitoring Summary Statistics can be found in Section 10.6.0 and all Dairy Milk Monitoring Data can be found in the 2024 SCDES Data File.

10.2.0 RESULTS AND DISCUSSION

None of the 15 SCDES milk samples collected in 2024 exhibited tritium activity above the LLD. DOE-SR detected tritium above the LLD in 1 of the 19 samples collected in 2024 from South Carolina dairies with a concentration of 247 pCi/L (SRNS, 2025).

SCDES analyzed for gamma-emitting radionuclides (K-40, I-131, Cs-137, and Co-60) in 15 milk samples collected in 2024. All analytical results for these radionuclides were below the sample MDA, except for naturally occurring K-40 at all locations and 2 detects of Cs-137 at MK-25 with an average concentration of 3.795 pCi/L. DOE-SR detected K-40 at all locations and had a

single detect of Cs-137 out of the 19 cow milk samples collected from South Carolina dairies with a concentration of 4.520 pCi/L (SRNS, 2025). Variations in data may be attributed to differences between sampling locations and frequency for SCDES and DOE-SR.

2 of the 11 SCDES milk samples collected in 2024 exhibited strontium activity above the MDA with an average of 0.347 pCi/L. Section 10.5.0, Figure 1 shows the trend for SCDES strontium detections for the last five years. All strontium averages have been below the EPA established MCL of 8 pCi/L for Sr-90 in drinking water (EPA, 2025b) since testing initiated in 1998. DOE-SR had 2 detections of Sr-89/90 above the MDA in their 19 cow milk samples collected in 2024 in South Carolina with an average of 1.875 pCi/L (SRNS, 2025).

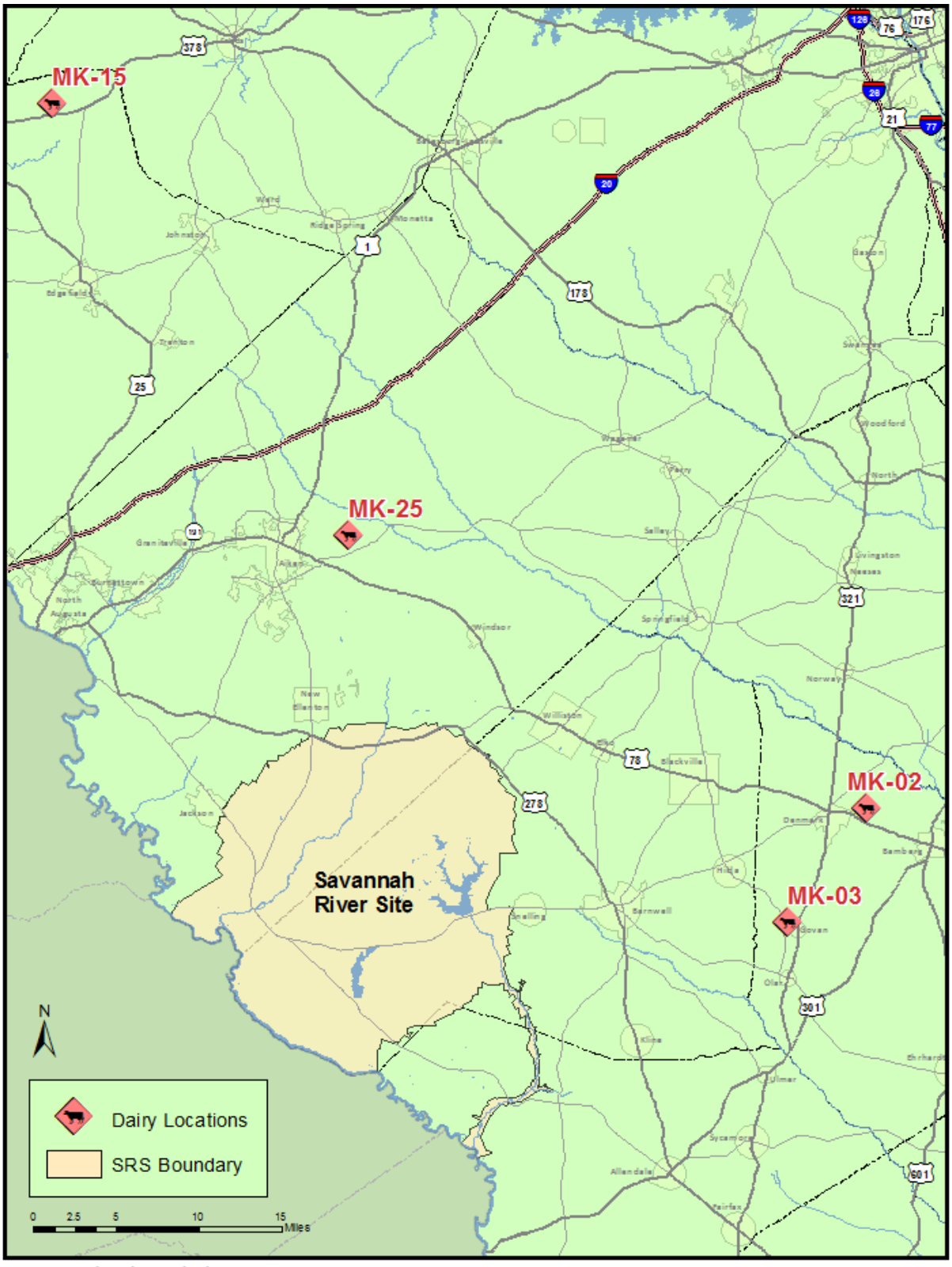
10.3.0 CONCLUSIONS AND RECOMMENDATIONS

A large portion of the radiological activity observed in milk samples can be attributed to fallout from past nuclear testing (Kathren, 1984). Also, radionuclides within soil and plants can potentially be redistributed because of farming practices and fires. Due to strontium's ability to be stored in bones and cesium building up in muscles, SCDES will continue to monitor tritium, gamma-emitting radionuclides, and strontium in milk to ensure the safety of milk consumption by the public.

The remaining dairies in SCDES's study area appear to be stable with no indication of closing in the foreseeable future. SCDES will continue to seek opportunities to add additional dairies to the sampling program for better coverage of the study area.

10.4.0 MAP

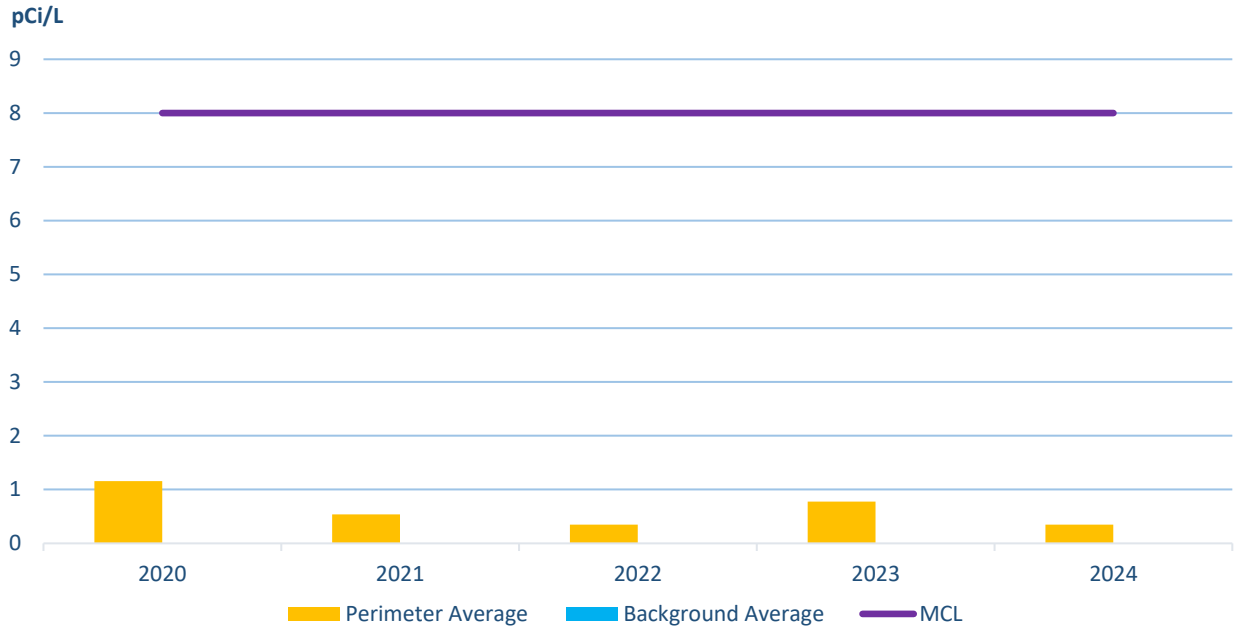
Radiological Dairy Milk Monitoring Locations



Return to TOC

10.5.0 TABLES AND FIGURES

Figure 1. SCDES Average Strontium-89/90 Data Trends for 2020-2024 (DHEC, 2021-2023; SCDES, 2024b)



Note:
1) No bar indicates <MDA
2) No background samples were collected between 2020 and 2024.

10.6.0 SUMMARY STATISTICS

2024 Strontium-89/90 All Sample Detections

Sample Location	Average (pCi/L)	Standard Deviation	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detections	Number of Samples
MK-02	ND	ND	ND	ND	ND	0	3
MK-03	0.330	NA	0.330	0.330	0.330	1	3
MK-15	0.363	NA	0.363	0.363	0.363	1	3
MK-25	ND	ND	ND	ND	ND	0	2

Note:
1) NA is Not Applicable
2) ND is Not Detected
3) All third quarter samples were lost for Sr-89/90 testing due to Hurricane Helene.
4) MK-25 was not sampled during the fourth quarter due to a milk supply shortage.

Chapter 11 Monitoring of Fish Adjacent to SRS

11.1.0 PROJECT SUMMARY

SCDES conducts non-regulatory, independent monitoring and surveillance of fish to determine the magnitude, extent, and trend levels for radionuclides and select metals.

Electroshocking boat on the Savannah River

In 2024, SCDES collected largemouth bass (*Micropterus salmoides)*, channel catfish (*Ictalurus punctatus*), and flathead catfish (*Pylodictis olivaris*) from four stations where creeks from SRS meet the Savannah River: Upper Three Runs Creek (SV-2011), Fourmile Branch (SV-2015), Steel Creek (SV-2017), and Lower Three Runs Creek (SV-2020). Samples of largemouth bass and channel catfish were also collected from the background station on the Combahee River between Beaufort and Colleton counties (MD-119), one Savannah River station upstream of SRS (New Savannah Bluff Lock and Dam, NSBLD SV-2028), and one station downstream of SRS (Highway 301, SV-118). Flathead catfish were also collected at SV-118 and SV-2028. SV-2091 is the only area where striped mullet (*Mugil cephalus*) and red drum (*Sciaenopsocellatus*) are caught. Stations sampled in 2024 are shown in Section 11.4.0, Map. These stations are accessible to the public.

A total of 5 largemouth bass, 5 channel catfish, and 5 flathead catfish were collected and composited from all Savannah River stations. 5 red drum and 5 striped mullet were collected and composited from the saltwater station (SV-2091) along with 5 largemouth bass and 5 channel catfish collected and composited from the Combahee River background sampling location (MD-119). Non-edible portions (bone) were tested for Sr-89/90. DOE-SR only analyzes Sr-90 while SCDES analyzes Sr-89/90. Edible portions (muscle tissue) were analyzed for mercury and other select metals and gamma-emitting isotopes. In 2023, DOE-SR discontinued sampling for individual, large flathead catfish. Due to this, SCDES did not collect individual, large flathead catfish in 2024 and will continue to do so for the future as there will be no direct comparison with DOE-SR data. Tritium has been found to contribute to “less than 1% of the estimated total fisherman dose” (SRNS, 2016). This is due to tritium’s ability to reach concentration equilibrium (the ability of a chemical to balance out) in both water and fish flesh resulting in no bioaccumulation (build up) in fish muscle (SRNS, 2016). With this discovery, DOE-SR and SCDES have at this time discontinued their testing of tritium in fish flesh.

Catching a largemouth bass

11.2.0 RESULTS AND DISCUSSION

Fish Monitoring Summary Statistics can be found in Section 11.6.0 and all Fish Monitoring Data can be found in the 2024 SCDES Data File.

Prepared fish samples ready for laboratory analysis

11.2.1 Radiological Data Comparison

SCDES bass and catfish data collected in 2024 were compared to DOE-SR data (Section 11.5.0) (SRNS, 2025). One difference between the two programs is that SCDES analyzes one composite from each species for each station, whereas the DOE-SR program analyzes three composites per station for Cs-137. Therefore, a single composite for a SCDES station was compared to the average of the three DOE-SR composites reported. For Sr-90, DOE-SR reports composite sample results. To compare Sr-89/90 data, the average of three composite Sr-90 DOE-SR samples for each location are compared to the one SCDES Sr-89/90 composite sample.

Blending fish samples for sample preparation

Trending graphs for 2024 activity levels of Cs-137 and Sr-89/90 are reported in Section 11.5.0, Figures 1 and 2.

11.2.2 Nonradiological Data Comparison

SCDES and DOE-SR analyzed fish for antimony, arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc. SCDES did have detections of chromium, copper, manganese, mercury, nickel, and zinc in some of its edible fish samples. Due to differences in sampling methodology, direct comparisons were not made between SCDES and DOE-SR for these nonradiological constituents with the exception of mercury. Since mercury tends to be a public health focus with fish consumption, a comparison was made for bass and both catfish species (Section 11.5.0, Table 9, 10, 11, and 12). In 2024, SCDES had 1 composite sample per species tested for mercury while DOE-SR had 7 individual samples per species tested for mercury per location. Therefore, the 1 composite of SCDES species were compared to the average of 7 samples of DOE-SR species for mercury. Mercury trends for 2024 are reported in Section 11.5.0, Figure 3.

11.3.0 CONCLUSIONS AND RECOMMENDATIONS

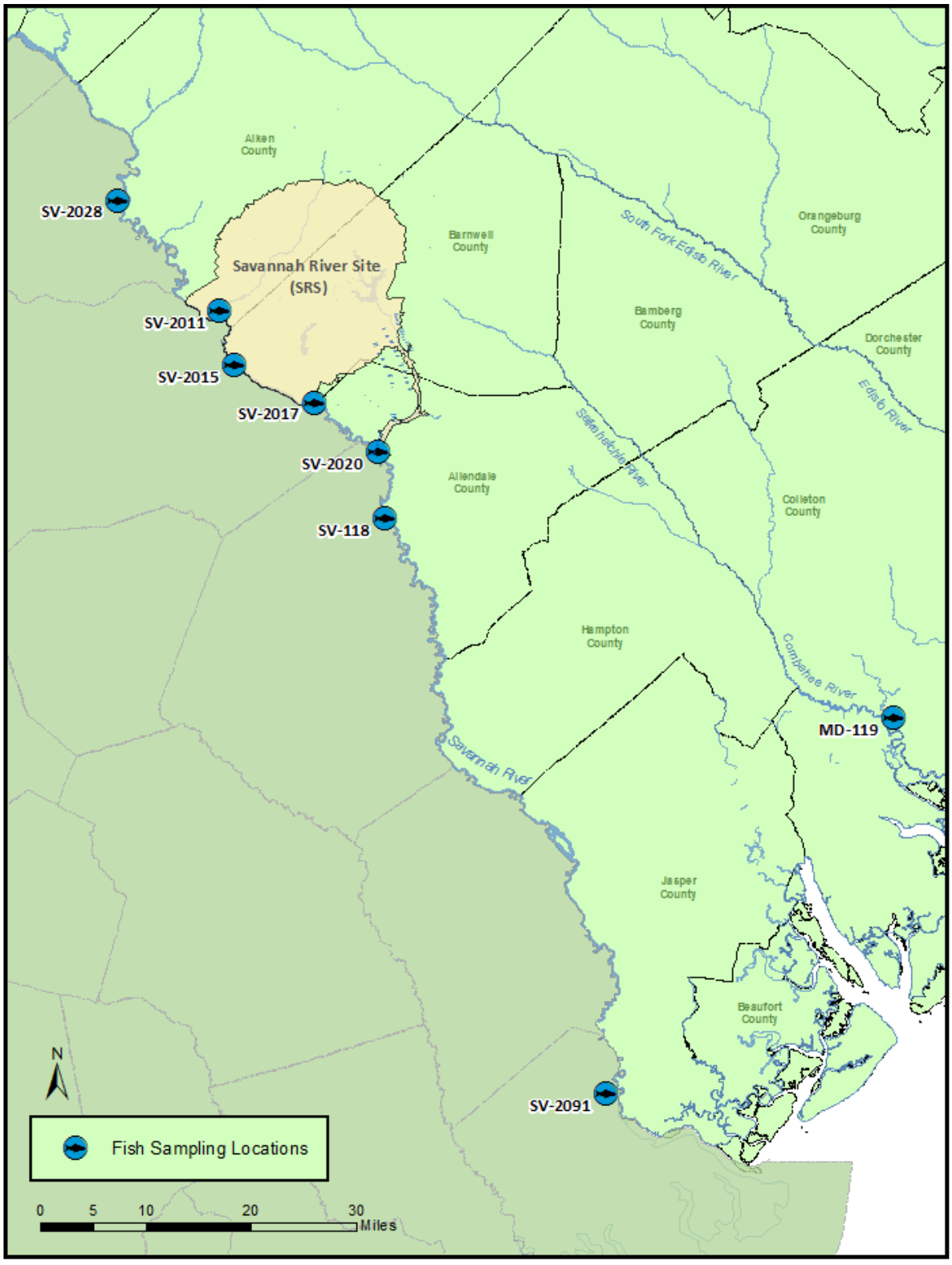
Higher levels of radionuclides are found in Savannah River fish collected adjacent to and downstream of SRS compared to upstream. Therefore, independent monitoring of radionuclide levels in Savannah River fish will continue along with evaluating the DOE-SR Radiological Fish Monitoring Program. Continued monitoring will provide a better understanding of radionuclides, their extent, and trends. Data comparisons will support DOE-SR program evaluations by SCDES which provide credibility and confidence in DOE-SR's data and reports. Future analyses of the target species will continue to include mercury and select metals. This will augment the existing data on Savannah River fish, provide information for human health assessment, and provide another basis for comparison of results with DOE-SR data.

Flathead Catfish

Return to TOC

11.4.0 MAP

Fish Monitoring Locations



2024 ESOP Fish Monitoring Map www.des.sc.gov

Return to TOC

11.5.0 TABLES AND FIGURES

2024 SCDES and DOE-SR Data Comparison (SRNS, 2025)

Notes for Table 1-9:
1) ND is Not Detected
2) NS is Not Sampled
3) SCDES collects one composite sample per species for each location, whereas DOE-SR collects three composite samples per species for Cs-137, three composite samples per species for Sr-90, and seven individual samples per species for Mercury at each location (however, there may be variation with each year). Due to this, DOE-SR data results are averages.

Table 1. Cesium-137 in Edible Bass

Location	Agency	Number of Detects	Result (pCi/g)
NSBLD	SCDES	0	ND
	DOE-SR	0	ND
Upper Three Runs	SCDES	0	ND
	DOE-SR	3	0.070
Fourmile Branch	SCDES	1	0.626
	DOE-SR	3	0.032
Steel Creek	SCDES	1	0.159
	DOE-SR	3	0.200
Lower Three Runs	SCDES	0	ND
	DOE-SR	3	0.173
Hwy. 301	SCDES	0	ND
	DOE-SR	3	0.017

Table 2. Cesium-137 in Edible Channel Catfish

Location	Agency	Number of Detects	Result (pCi/g)
NSBLD	SCDES	0	ND
	DOE-SR	0	ND
Upper Three Runs	SCDES	0	ND
	DOE-SR	0	ND
Fourmile Branch	SCDES	1	0.063
	DOE-SR	3	0.038
Steel Creek	SCDES	1	0.052
	DOE-SR	3	0.134
Lower Three Runs	SCDES	1	0.523
	DOE-SR	3	0.124
Hwy. 301	SCDES	0	ND
	DOE-SR	3	0.018

11.5.0 TABLES AND FIGURES

2024 SCDES and DOE-SR Data Comparison (SRNS, 2025)

Table 3. Cs-137 in Edible Flathead Catfish

Location	Agency	Number of Detects	Result
NSBLD	SCDES	0	ND
	DOE-SR	0	ND
Upper Three Runs	SCDES	0	ND
	DOE-SR	2	0.040
Fourmile Branch	SCDES	1	0.130
	DOE-SR	3	0.046
Steel Creek	SCDES	1	0.039
	DOE-SR	3	0.042
Lower Three Runs	SCDES	1	0.043
	DOE-SR	3	0.182
Hwy. 301	SCDES	0	ND
	DOE-SR	3	0.024

Table 4. Sr-89/90 in Non-Edible Bass

Location	Agency	Number of Detects	Result
NSBLD	SCDES	0	ND
	DOE-SR	3	0.390
Upper Three Runs	SCDES	1	0.031
	DOE-SR	3	0.514
Fourmile Branch	SCDES	1	0.067
	DOE-SR	3	0.634
Steel Creek	SCDES	0	ND
	DOE-SR	2	0.458
Lower Three Runs	SCDES	1	0.008
	DOE-SR	2	0.457
Hwy. 301	SCDES	0	ND
	DOE-SR	3	0.412

Table 5. Sr-89/90 in Non-Edible Channel Catfish

Location	Agency	Number of Detects	Result
NSBLD	SCDES	1	0.013
	DOE-SR	2	0.536
Upper Three Runs	SCDES	1	0.014
	DOE-SR	3	0.414
Fourmile Branch	SCDES	1	0.008
	DOE-SR	3	0.785
Steel Creek	SCDES	1	0.013
	DOE-SR	3	0.600
Lower Three Runs	SCDES	1	0.011
	DOE-SR	1	0.616
Hwy. 301	SCDES	0	ND
	DOE-SR	2	0.373

Table 6. Sr-89/90 in Non-Edible Flathead Catfish

Location	Agency	Number of Detects	Result
NSBLD	SCDES	0	ND
	DOE-SR	3	0.547
Upper Three Runs	SCDES	1	0.008
	DOE-SR	3	0.421
Fourmile Branch	SCDES	0	ND
	DOE-SR	2	0.519
Steel Creek	SCDES	1	0.010
	DOE-SR	1	0.341
Lower Three Runs	SCDES	1	0.015
	DOE-SR	1	0.582
Hwy. 301	SCDES	0	ND
	DOE-SR	1	0.385

11.5.0 TABLES AND FIGURES

2024 SCDES and DOE-SR Data Comparison (SRNS, 2025)

Table 7. Mercury in Edible Bass

Location	Agency	Number of Detects	Result
NSBLD	SCDES	1	0.410
	DOE-SR	7	0.410
Upper Three Runs	SCDES	1	0.470
	DOE-SR	6	0.778
Fourmile Branch	SCDES	1	0.640
	DOE-SR	7	0.373
Steel Creek	SCDES	1	1.400
	DOE-SR	7	0.564
Lower Three Runs	SCDES	1	0.520
	DOE-SR	7	0.342
Hwy. 301	SCDES	1	0.480
	DOE-SR	7	0.551

Table 8. Mercury in Edible Channel Catfish

Location	Agency	Number of Detects	Result
NSBLD	SCDES	1	0.140
	DOE-SR	7	0.151
Upper Three Runs	SCDES	1	0.170
	DOE-SR	7	0.126
Fourmile Branch	SCDES	1	0.140
	DOE-SR	7	0.262
Steel Creek	SCDES	1	0.140
	DOE-SR	7	0.343
Lower Three Runs	SCDES	1	0.190
	DOE-SR	7	0.258
Hwy. 301	SCDES	1	0.120
	DOE-SR	7	0.154

Table 9. Mercury in Edible Flathead Catfish

Location	Agency	Number of Detects	Result
NSBLD	SCDES	1	0.200
	DOE-SR	7	0.235
Upper Three Runs	SCDES	1	0.340
	DOE-SR	7	0.349
Fourmile Branch	SCDES	1	0.410
	DOE-SR	7	0.212
Steel Creek	SCDES	1	0.440
	DOE-SR	7	0.237
Lower Three Runs	SCDES	1	0.190
	DOE-SR	7	0.206
Hwy. 301	SCDES	1	0.160
	DOE-SR	7	0.244

11.5.0 TABLES AND FIGURES

Notes for Figures 1-3:
Missing bars indicate <MDA

Figure 1. 2024 SCDES Cesium-137 in Fish Composites

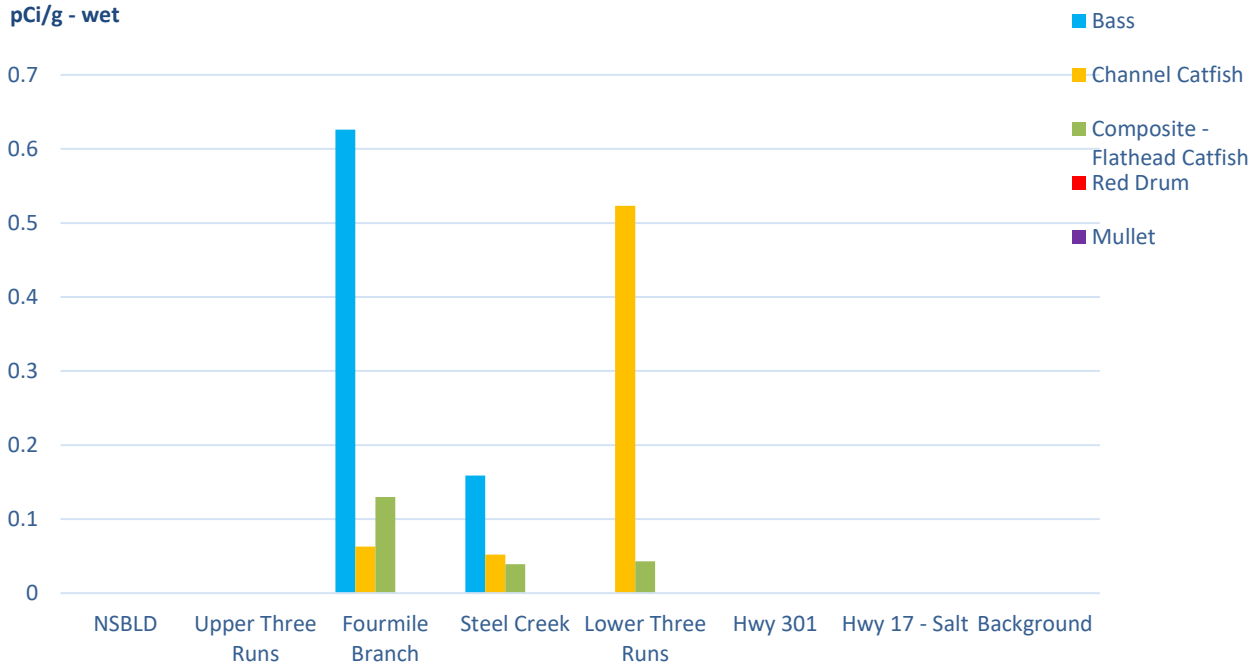
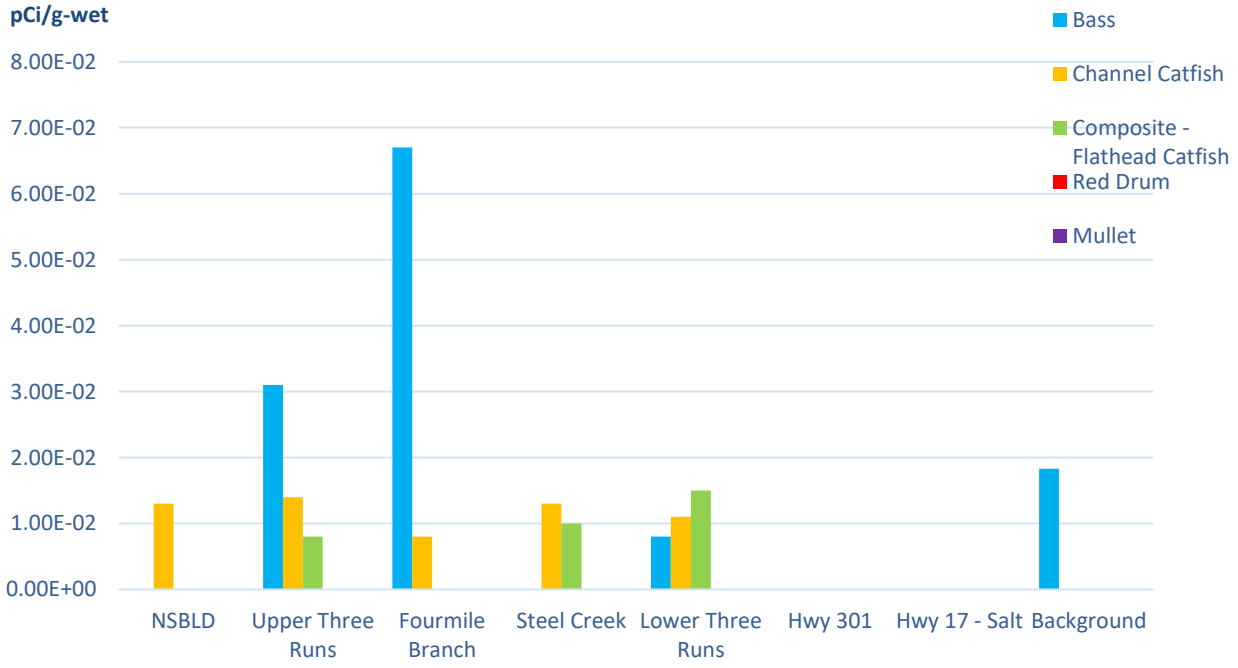


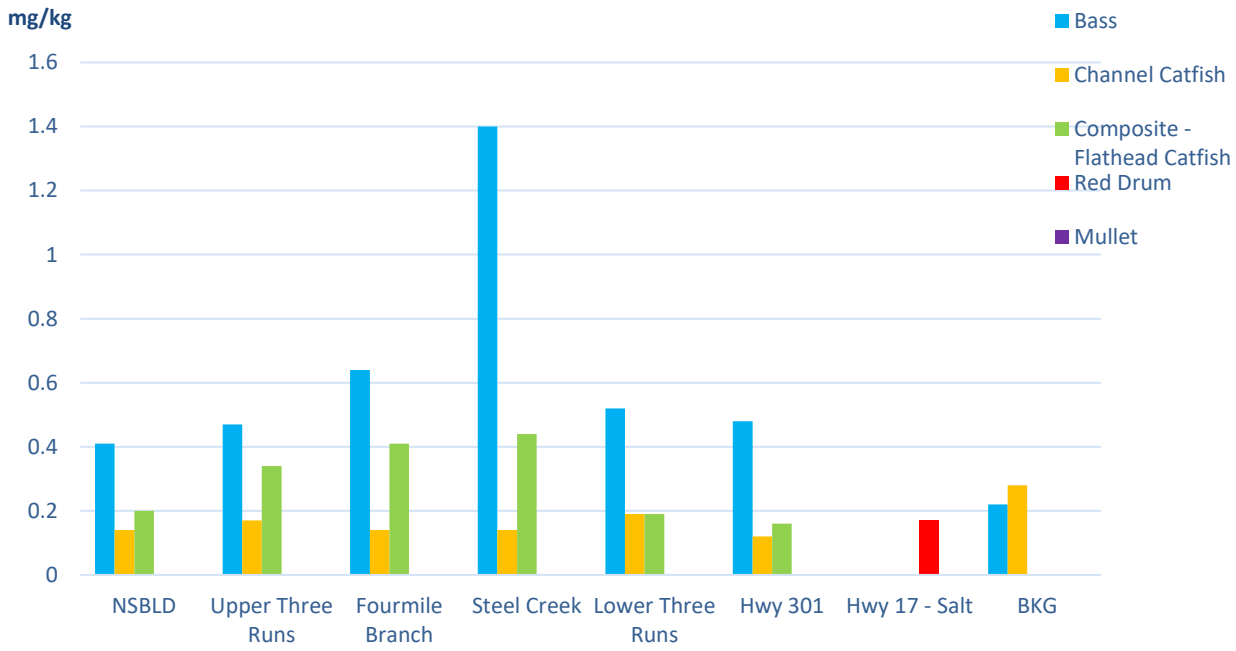
Figure 2. 2024 SCDES Strontium-89/90 in Fish Bone Composites



Return to TOC

11.5.0 TABLES AND FIGURES

Figure 3. 2024 SCDES Mercury in Fish



Return to TOC

11.6.0 SUMMARY STATISTICS

2024 SCDES Cesium-137 Levels in Savannah River Fish (pCi/g–wet)

Edible	Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects	Number of Samples
Bass	0.393	0.330	0.393	0.160	0.626	2	6
Channel Catfish	0.213	0.269	0.063	0.052	0.523	3	6
Composite - Flathead Catfish	0.071	0.052	0.043	0.039	0.130	3	6

Note: Cs-137 results represent the activity level in fish tissue.

2024 SCDES Strontium-89/90 Levels in Savannah River Fish (pCi/g–wet)

Edible	Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects	Number of Samples
Bass	0.035	0.030	0.031	0.008	0.067	3	6
Channel Catfish	0.012	0.002	0.013	0.008	0.014	5	6
Composite - Flathead Catfish	0.011	0.004	0.010	0.008	0.015	3	6

Note: Sr-89/90 results represent the activity level in an aliquot of fish bone.

2024 SCDES Mercury Levels in Savannah River Fish (mg/kg)

Edible	Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects	Number of Samples
Bass	0.653	0.374	0.500	0.410	1.400	6	6
Channel Catfish	0.150	0.025	0.140	0.120	0.190	6	6
Composite - Flathead Catfish	0.290	0.122	0.270	0.160	0.440	6	6

Note: Mercury results represent the activity level in fish tissue.

Chapter 12 Radiological Monitoring of Game Animals on and Adjacent to SRS

12.1.0 PROJECT SUMMARY

SCDES conducts game animal monitoring activities on and around SRS due to white-tailed deer and feral hogs having the highest potential of mammalian species for human exposure pathway from cesium-137 (Cs-137) (Haselow, 1991). The game animal project addresses concerns of potentially contaminated white-tailed deer and feral hogs migrating off SRS. It also provides valuable information concerning potential exposure to Cs-137 from consuming game animals harvested around SRS.

Deer sample being prepared in the field for analysis

White-tailed deer and feral hogs have access to several contaminated areas on and off SRS which allows them to be a vector for the redistribution of contaminants (primarily Cs-137). A five-mile study area was established based on a typical white-tailed deer upper limit home range to ensure that potentially contaminated deer residing at or near the SRS boundary would be included in the sample set. DOE-SR data is from on-site game samples only. In 2024, SCDES was able to collect samples on-site in addition to samples collected within the study area shown in Section 12.4.0, Map, which provides a better comparison of data with DOE-SR.

Cesium-137 is the isotope of focus for game due to its ability to accumulate in an animal's skeletal muscles (Brisbin & Smith, 1975). When contaminated game is eaten by hunters, Cs-137 is readily incorporated into the human body because of its similarity to potassium-40 (K-40) in physiological processes (Davis, 1963).

12.2.0 RESULTS AND DISCUSSION

Game Monitoring Summary Statistics can be found in Section 12.6.0 and all Game Monitoring Data can be found in the 2024 SCDES Data File.

SCDES analyzed muscle tissue collected in 2024 for Cs-137 from 16 deer and 14 hogs collected from area hunters via hunting clubs, plantations, and Crackerneck Wildlife Management Area within a five-mile study area adjacent to SRS (Section 12.4.0, Map). 5 deer samples were collected from Hunt Zone 9 which is within the SRS borders. Additionally, 5 deer tissue samples were collected and analyzed from a background location at Pinckney Island National Refuge (Hunt Zone 8). Sample size, location, and collection dates were dependent on the participating hunters.

Cesium-137 and naturally occurring K-40 were the only isotopes detected in SCDES game samples collected in 2024**.** Naturally occurring isotopes will not be discussed in this report. Cesium-137 concentrations from deer and hogs collected along the SRS perimeter and on-site study area are shown in Section 12.5.0, Figure 1.

DOE-SR does not collect game animal samples within the off-site SCDES study area and off-site hunter doses are based on DOE-SR models.

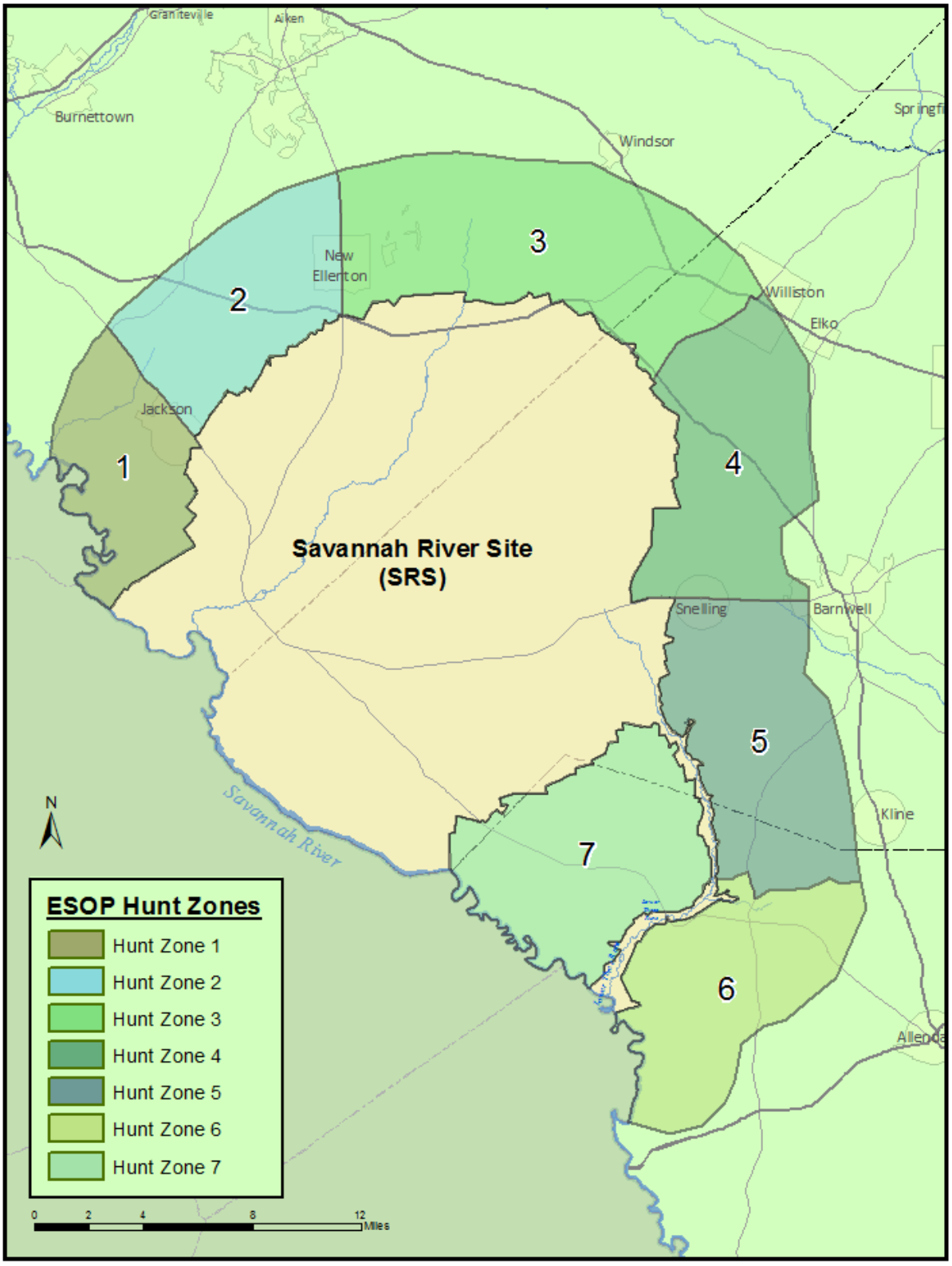
12.3.0 CONCLUSIONS AND RECOMMENDATIONS

Historic SRS operations released known Cs-137 contamination to Steel Creek, Par Pond, Lower Three Runs, their floodplains, and the Savannah River swamp (Till et al., 2001). All of which impact hunt zones 4, 5, 6, and 7 (Section 12.4.0, Map). Although a portion of Cs-137 was deposited on SRS from site operations, levels found in the study area and background location are likely results of above ground nuclear weapons testing (Haselow, 1991). Age, sex, body weight, soil type, diet, and collection location may affect the Cs-137 activities found in white-tailed deer and hogs (Haselow, 1991). A hunter consuming deer from SRS, the study area, or background locations would most likely ingest a portion of the activity associated with these animals. Refer to the 2024 SCDES Critical Pathway Dose section of this report for a better understanding of the contamination found in game versus other food sources.

SCDES will continue to monitor Cs-137 levels in deer and hogs within the established study area and background locations to assess trends. SCDES will continue to pursue new hunters within the five-mile study area to ensure adequate sample numbers can be achieved each year. SCDES will also put additional efforts into trapping wild hogs within the study area.

12.4.0 MAP

Game Monitoring Locations

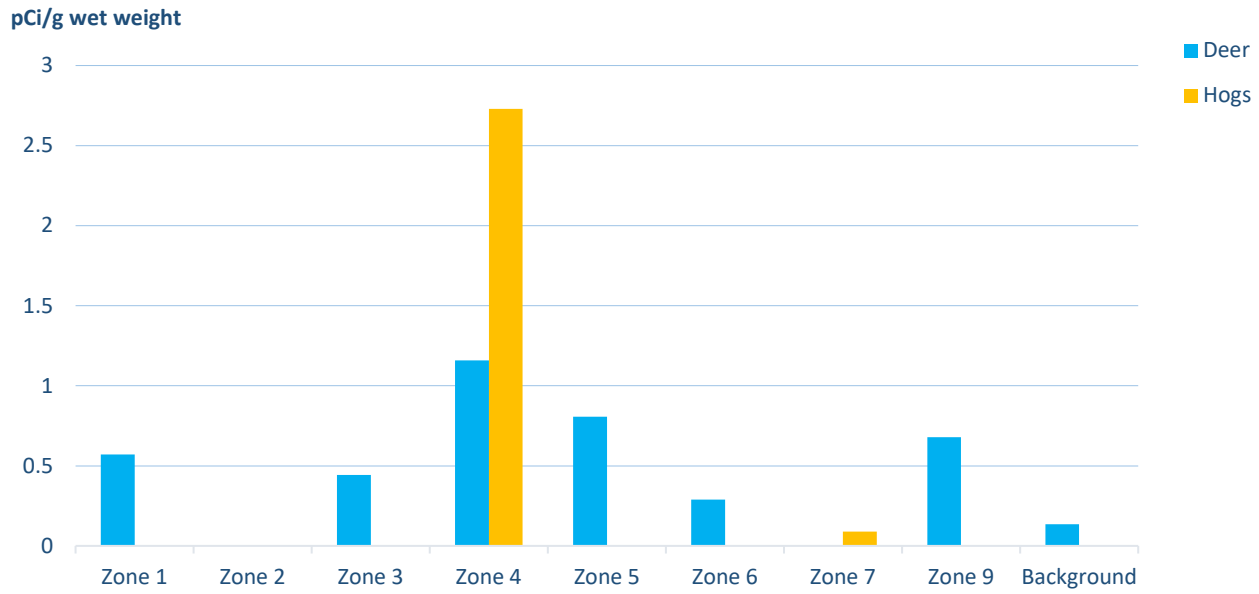


2024 ESOP Game Animal Monitoring Map www.des.sc.gov

Return to TOC

12.5.0 TABLES AND FIGURES

Figure 1. 2024 SCDES Hunt Zone Average Cs-137 Concentration in Game

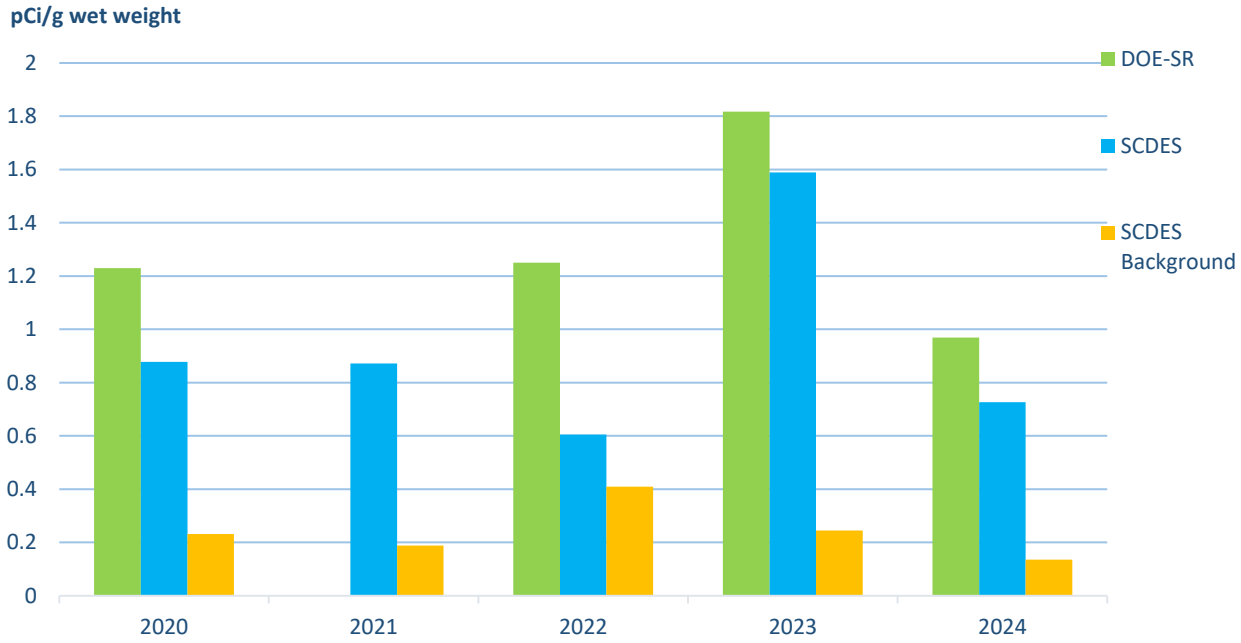


Note: Hunt Zones 2 and 7 did not have deer samples in 2024. Hunt Zones 1, 2, 3, 5, 6, 9, and the background did not have hog samples in 2024.

Return to TOC

12.5.0 TABLES AND FIGURES

Figure 2. 2020-2024 Average Cs-137 Concentration in Deer (SRNS, 2021-2025; DHEC, 2021-2023; SCDES, 2024b)



Note:
1) For 2020-2024, the background location was Pinckney Island National Wildlife Refuge.
2) For 2020 & 2022, DOE-SR concentrations are based on Field Gross Average Cs-137 Concentrations. DOE-SR did not collect deer samples in 2021. For 2023-2024, DOE-SR concentrations are based on SCDES calculations of DOE-SR game data.

Return to TOC

12.6.0 SUMMARY STATISTICS

2024 Cs-137 Concentration (pCi/g wet weight) in Deer

	Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detections	Number of Samples
Study Area Deer	0.727	0.571	0.581	0.079	2.030	21	21
Background Deer	0.136	0.053	0.106	0.085	0.208	5	5

2024 Cs-137 Concentration (pCi/g wet weight) in Deer SCDES Hunt Zones

Hunt Zone	Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detections	Number of Samples
Zone 1 Deer	0.570	0.622	0.410	0.079	1.654	5	5
Zone 3 Deer	0.443	0.078	0.465	0.357	0.509	3	3
Zone 4 Deer	1.158	0.542	1.005	0.617	2.030	5	5
Zone 5 Deer	0.807	0.076	0.807	0.753	0.861	2	2
Zone 6 Deer	0.289	NA	0.289	0.289	0.289	1	1
Zone 9 Deer	0.679	0.753	0.581	0.111	1.958	5	5

Note: Zones 2 and 7 did not have deer samples in 2024.

2024 Cs-137 Concentration (pCi/g wet weight) in Hogs SCDES Hunt Zones

Hunt Zone	Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detections	Number of Samples
Zone 4 Hogs	2.73	1.77	2.81	0.38	5.53	11	11
Zone 7 Hogs	0.09	0.03	0.10	0.05	0.11	3	3

Note: Zones 1, 2, 3, 5, 6, 9, and the background did not have hog samples in 2024.

12.6.0 SUMMARY STATISTICS

2024 Cesium-137 Data Comparison for SCDES and DOE-SR Deer (Hunt Zone 9) (SRNS, 2025)

Game Species	Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detections	Number of Samples
Deer	0.679	0.753	0.581	0.111	1.958	5	5
	0.969	0.829	0.528	0.090	1.970	7	7

Note:
1) Shaded areas represent SCDES data and unshaded areas represent DOE-SR data.
2) SCDES did not collect any hog samples in Hunt Zone 9, therefore no comparison can be made with DOE-SR.

Return to TOC

Chapter 13 Critical Pathway and Dose Assessment

13.1.0 PROJECT SUMMARY

SCDES implemented a Radionuclide Dose Calculation Project/Critical Pathway Project to calculate the potential exposure or dose to the public within 50-miles of an SRS center point. This study area was chosen for comparison to the DOE-SR 80-km (50-mile) radius dose results. Individual project managers chose sample locations/schemes within this study area to establish trends in media radionuclide concentrations.

SCDES and DOE-SR programs were evaluated based on media potential exposure in mrem (Section 13.2.4). The figures in Section 13.4.0 illustrate the trends for the average exposed individual (AEI) in the critical pathway potential dose exposures. The annual dose is calculated on AEI and maximum exposed individual (MEI) bases which are summarized in Section 13.4.0, Table 1.

13.2.0 RESULTS AND DISCUSSION

All 2024 Dose Data can be found in Section 13.5.0.

The SCDES MEI is a hypothetical subsistence and survivalist type of individual who resides downriver in the area below all SRS contributions to the Savannah River, visits the entire 50-mile perimeter study area, and receives the MEI dose based on the single highest detection per radionuclide per media detected in the environment. The 2024 data and dose results are discussed under the following headings in this section: 2024 AEI and MEI Dose, Critical Pathways 2024 Summary, 2015-2024 Total AEI Dose, and DOE-SR/SCDES 2024 Comparisons. Total AEI Dose covers the 2015-2024 period, whereas other headings discuss only 2024 data. Not all media were collected for all years during this summary period.

The critical pathways were analyzed both on a millirem (mrem) basis and percentage of dose basis (Section 13.4.0, Table 4). Percentages denote relative contributions, whereas mrem denotes potential exposure levels. The dose critique attempts to point out the limits of this dose estimate and why any DOE-SR and SCDES estimates may or may not be similar.

13.2.1 2024 AEI and MEI Dose

The basis for dose calculations is not limited to any pathway of dose exposure based on lifestyle or media encountered but is a tabulation of detected dose found in media sampled regardless of applicability to an individual. Only the highest contributor for the AEI and the MEI is used for groundwater derived drinking water and Savannah River derived drinking water, the various types of fish that are sampled, sediment at creek mouths and boat landings, and swimming at creek mouths and boat landings. Table 1 in Section 13.4.0 summarizes all SCDES detections by media on an AEI and MEI detection basis. For calendar year 2024 SCDES began subtracting backgrounds from all media for which backgrounds were available.

The AEI dose is a conservative estimate based on consumption rates, shown in the consumption rate column in the data tables, average dose per media (Section 13.5.0), and is based on sample results only with no modeling. In 2024, the calculated AEI dose was 3.139 mrem (Section 13.4.0, Table 1), with 3.130 mrem from food dose. If wild game is not consumed the AEI dose

falls to 0.107 mrem. The AEI dose skews high, as only detections are used in the dose calculations. For a typical person in the study area, the dose they receive should be lower than the AEI dose.

In 2024, the total calculated MEI dose was 38.404 mrem, of which 38.362 mrem was attributable to food consumption. If wild game is not consumed, the MEI dose falls to 1.015 mrem. The MEI basis column uses the single highest detection for a media radionuclide and calculates dose as if the high dose occurrence was somehow stored and the exposure continued throughout the year. If the individual did not store the media at the location, date, and time of SCDES sample collection and achieve a full year's exposure to that media, then the MEI estimate represents a sizable overestimate.

Only speciated doses for specific radionuclides were included in the estimated doses for 2024. The use of detections only in determining AEI dose, the calculation of dose based on the MEI detection for each radionuclide/media, and conservative consumption rates provided a protective dose estimate. Each media radionuclide dose, excluding Naturally Occurring Radioactive Material (NORM), was considered as part of a critical pathway with potential contributions through the inhalation, ingestion, and direct exposure routes.

The MEI dose can be received by only one individual since that individual had to consume the specific dose basis animals. Two elevated dose bases (AEI and MEI) were used because they were measured and protective without the inclusion of screening value assumptions for alpha and beta. The assumption of all alpha as plutonium-239 (Pu-239) and all beta as strontium-90 (Sr-90) may double the calculated dose without evidence for that assumption in speciated data. Unspeciated dose assignments were discontinued in 2011 and replaced by calculating a MEI dose potential from the single highest detection per radionuclide per media.

13.2.2 Critical Pathways 2024 Summary

Atmospheric Pathway 2024 Summary

The SCDES 2024 atmospheric pathway used dose estimates from the inhalation of resuspended soil as well as the inhalation of tritium (H-3) in air, the consumption of food, predominantly from wild game but also including milk, edible vegetation, and fungi (not sampled in 2024), as well as direct exposure from soil and the incidental consumption of soil with edible vegetation. Section 13.4.0, Table 2 illustrates the dominance of the atmospheric pathway, which accounted for 3.055 mrem, at 97.32 percent, of dose to the AEI and 37.481 mrem, at 97.60 percent, of dose to the MEI. The primary contributor to the atmospheric pathway was Cs-137 in wild game.

Liquid Pathway 2024 Summary

The SCDES 2024 liquid pathway used dose estimates from the consumption of fish, drinking water from the Savannah River, ingestion from swimming, and exposure from wading at Savannah River boat landings and SRS creek mouths. The liquid pathway contributions to dose exposure were secondary to those contributed by the atmospheric pathway. In 2024, the liquid pathway contribution to the AEI was 0.084 mrem, accounting for 2.68 percent of dose. The contribution to the MEI dose was 0.923 mrem, at 2.40 percent. The primary contributors to the

liquid pathway were Cs-137 and Sr-89/90 in fish.

Food Sub-pathway 2024 Summary

The food sub-pathway was covered under the atmospheric and liquid pathways except for these additional observations. The annual 2024 SCDES AEI food sub-pathway dose order, highest to lowest, was wild game-hog (2.170 mrem, 69.33 percent of the AEI food dose), wild game-deer (0.862 mrem, 27.54 percent), fish (0.080 mrem, 2.56 percent), cow milk (0.016 mrem, 0.51 percent), and vegetation (0.002 mrem, 0.06 percent). Incidental soil ingestion did not contribute any quantifiable dose.

The 2024 MEI food sub-pathway order was wild game-hog (30.383 mrem, 79.20 percent of the MEI food dose), wild game-deer (7.006 mrem, 18.26 percent), fish (0.896 mrem, 2.34 percent), cow milk (0.071 mrem, 0.18 percent), and vegetation (0.006 mrem, 0.02 percent). Incidental soil ingestion did not contribute any quantifiable dose.

Cs-137 was the predominant dose contributor to food through the consumption of hog for the AEI and the MEI. It should be noted that deer and hog consumption rates are based on the edible portions of the relevant harvested animals and they vary from year to year. In 2024 the consumption rates were 62 pounds for the deer AEI and 333 pounds for the deer MEI. The hog dose AEI and MEI were based on 44 pounds and 511 pounds, respectively. Cs-137 and Sr-89/90 also contributed to dose from fish and milk. Tritium contributed a small amount of dose through fruits and vegetables (edible vegetation).

For the 2024 calendar year the calculation of a per pound dose was added for those who consume deer and wild hog meat. In 2024 the highest concentration of Cs-137 found in deer meat was from a deer with an edible portion of 36.0 pounds at a concentration of 2.03 pCi/g. A member of the public eating this animal would receive 0.043 mrem per pound consumed. In wild hog meat the highest concentration of Cs-137 was found in an animal with an edible portion of 58.5 pounds at a concentration of 5.526 pCi/g which equates to a dose of 0.123 mrem per pound consumed.

An interested member of the public may take the indicated dose per pound for the applicable animal type, i.e. deer or hog, and multiply the dose per pound with their own estimated consumption during a given year to get an individualized dose estimate for wild game. For example, someone who eats ten pounds of deer meat per year would receive 0.430 mrem from deer for that year (e.g. 10 pounds per year X 0.043 mrem per pound = 0.430 mrem per year) while someone eating 10 pounds of wild hog meat per year would receive 1.230 mrem from their consumption (e.g. 10 pounds per year X 0.123 mrem per pound = 1.230 mrem per year). It should be noted that this will likely be an overestimation of dose because the highest sample concentrations found in deer and wild hogs were used for the calculations.

Isotopic Contribution Summary

Most of the AEI dose exposure in 2024 was due to Cs-137: 3.117 mrem (99.30 percent) of the 3.139 mrem total. The primary contributor to the Cs-137 AEI dose was wild game (hog, 2.170 mrem, 69.13 percent). Sr-89/90 and tritium accounted for 0.011 mrem (0.35 percent) each.

Cesium-137, Sr-89/90, and tritium were all detected in the atmospheric and the liquid pathways.

Cs-137 was also the primary contributor to the MEI, at 38.190 mrem (99.44 percent) of the 38.404 mrem total, with Sr-89/90 second, at 0.170 mrem (0.44 percent), and H-3 third at 0.044 mrem (0.11 percent). Cs-137 in wild game (hog, 30.383 mrem) at 79.11 percent was the single largest dose contributor to the MEI.

13.2.3 2015-2024 Total AEI Dose

Section 13.4.0, Table 4 summarizes dose associated with all media on an AEI basis from 2015-2024. The critical pathway basis of comparison for SCDES detected dose comes from releases of radionuclides that were deposited outside of SRS during 2015-2024 and within 50 miles of the SRS center point although animals that are harvested off-site may have migrated from on-site. Additionally, the Chelsea and Purrysburg drinking water locations are located outside of the 50-mile zone, but they draw water directly from the Savannah River.

Table 4 illustrates the dominance of the atmospheric pathway accumulated dose which accounted for 26.888 mrem at 97.97 percent, over the liquid pathway's 0.515 mrem, at 2.03 percent. The food sub-pathway was the dominant route, accounting for 27.283 mrem at 99.56 percent of accumulated exposure. The AEI received a 27.403 mrem total during the 2015-2024 period, an average of 2.74 mrem per year.

Section 13.4.0, Figures 1-3 and Table 4 illustrate the various pathways of dose exposure. The AEI basis critical pathway dose for 2024, 3.139 mrem, is less than the 7.00 mrem dose an individual typically receives from living in a brick house for one year (Wahl, 2011). Section 13.4.0, Figures 1-3 illustrate the media exposure trends via line graphs.

The predominant source of AEI exposure from 2015-2024 was wild game (deer and hog). In total it accounted for 22.505 mrem, which amounts to 82.13 percent of the total accumulated AEI exposure (27.403 mrem) during that time period. Following wild game were fungi (3.800 mrem; 13.87 percent), edible vegetation (0.490 mrem; 1.79 percent), and fish (0.438 mrem; 1.60 percent). Fish was also the primary contributor to the liquid pathway accumulated dose. Furthermore, wild game accounted for 83.70 percent of the accumulated dose from the atmospheric pathway's 26.888 mrem and 82.49 percent of the food sub-pathway's 27.283 mrem.

The predominant route of accumulated exposure from 2015-2024 for water sources was public system water from the Savannah River (0.077 mrem, 0.28 percent). Groundwater derived drinking water accounted for 0.005 mrem although this was not added into the total as only the highest source of drinking water is used. The primary routes for minor sources of accumulated dose were from the inhalation of tritium in air (0.028 mrem), surface soil resuspension inhalation (0.009 mrem), and direct exposure to soil (0.006 mrem).

13.2.4 DOE-SR and SCDES 2024 Comparisons

DOE-SR calculates potential doses to members of the public from atmospheric and liquid releases, as well as from special-case exposure scenarios, on an annual basis (SRNS, 2025). These include liquid pathway and air pathway doses, an all-pathway dose, a sportsman dose, on-

site and off-site hunter doses, and an off-site fisherman dose. The DOE-SR dose estimates are analogous to SCDES dose estimates as follows, although it should be taken into account that there are differences between DOE-SR and SCDES sampling and dose estimation protocols:

1. The DOE-SR all-pathway dose and the sum of the SCDES fish, wading, swimming, public system drinking water from the Savannah River, vegetation, milk, and inhalation doses, serve as a means of comparison of the dose a member of the public in the study area (an individual who doesn't consume wild game or gather edible mushrooms) could receive from SRS activities during a given year (The SCDES All-Pathway Approximation).

2. The DOE-SR off-site hog and deer consumption doses and the SCDES hog and deer consumption doses serve as a means of comparison of the dose a hunter or survivalist type of individual who consumes wild game could receive.

3. The DOE-SR creek mouth fisherman dose being derived from fish caught at the mouths of creeks that empty into the Savannah River: SCDES uses the highest creek mouth location to calculate a creek mouth fisherman dose. In 2024 the highest DOE-SR fish dose applicable to the creek mouth fisherman was from bass from the mouth of Steel Creek. SCDES's creek mouth fisherman dose as presented in Table 3 was from bass at the mouth of Four Mile Creek.

The DOE-SR all-pathways representative person dose and the SCDES all-pathway approximation were the most relevant dose estimates that represent the potential dose exposure for the general public in 2024. The DOE-SR all-pathways representative person dose for 2024 was 0.33 mrem (Section 13.4.0, Table 3). The SCDES All-Pathway Approximation was 0.30 mrem in 2024 which is 0.30 percent of the DOE all-pathway dose standard of 100 mrem/yr (SRNS, 2025).

In 2024, the DOE-SR creek mouth fisherman dose (0.24 mrem), which used bass caught from the mouth of Steel Creek, was lower than SCDES's estimate (0.90 mrem from Cs-137 and Sr-89/90 at Fourmile Creek; SCDES's creek mouth bass dose at Steel Creek was 0.19 mrem). The DOE-SR off-site deer hunter dose estimate of 2.97 mrem was lower than SCDES's 7.01 mrem estimate while the off-site hog hunter estimate of 5.50 mrem was lower than SCDES's estimate of 30.38 mrem (Section 13.4.0, Table 3; SRNS, 2025).

13.2.5 Dose Critique

In 2024, most sampling resulted in less than minimum detectable activity (MDA) determinations and was not included in the SCDES summary statistics, which used detections only. The use of detections only in calculations was protective and biases the measures of central tendency higher (Gilbert, 1987).

The NORM averages and maximums were not included in the dose estimates as this dose was considered to be part of the background dose for the study area. The yearly dose averages were based on SCDES detections only and are inflated since most sample results were less than MDA. The justification for using detections only was to allow for undetected radionuclides and media.

The justification for selecting higher source consumption levels was due to the conceptualization of the SCDES MEI as a survivalist type who consumed natural media at a greater than typical use rate. The basis for both considerations was to be protective of the public and environment.

The inclusion of alpha and beta assumed dose in the past provided an excessively high dose estimate and was not supported by media radionuclide species detections. The inclusion of calculations based on a single highest maximum detection for each radionuclide/media was a more definable basis for establishing an upper bound rather than the dose assumption of unknown alpha as Pu-239 and unknown beta as Sr-90. This upper bound is not practically achievable by the MEI due to the unlikely probability of exposure to all maximums at a constant rate throughout the year.

However, since most of the dose was due to wild-type food consumption containing Cs-137, a single individual who ate all of the worst-case deer, hog, and fish could approach the MEI dose if these media were stored and consumed over the entire year. It should be noted that in 2024 there was a larger than usual number of hogs taken by an individual hunter that resulted in a higher consumption rate (232 Kg or 511 lbs), and, therefore, a higher MEI than is typically seen. While it is possible to eat that much meat in a year it's also likely that a harvest of that size would be shared with others which would drop that individual's MEI dose accordingly.

The SCDES 2007 Critical Pathway Dose Report noted that 38.50 percent of the dose was assigned and represented a potential dose overestimate that may in fact be NORM detections (alpha and beta). The SCDES dose calculations since then were still protective due to the use of detections only in determining dose, the calculation of a maximum dose for the MEI based on a single maximum detection for each radionuclide/media, and the use of conservative consumption rates.

The AEI was given prominence as protective for general dose considerations, and the reader should be aware that the AEI dose estimate was biased high due to the use of detections only for dose calculation. For example, the omission of less than MDA assignments from calculations would raise any calculated number to a higher value. Alternatively, less than MDA actually represents an undetermined low number that may be zero or any number up to the given MDA value for that analysis.

This project used dose instead of risk so that direct comparisons of dose could be made with similar media data published in the SRS Environmental Reports. It should also be recognized that SCDES uses sampling methods for various media that are similar to, but not necessarily the same, as DOE-SR's. Additionally, DOE-SR uses modeled radionuclide releases for some dose estimates while SCDES uses only sample results.

13.3.0 CONCLUSIONS AND RECOMMENDATIONS

The 2024 results indicated that monitoring of the primary inhalation, ingestion, and direct exposure routes from the atmospheric and liquid pathways should continue. Groundwater, surface water, sediments, plants, and animals should be monitored for contaminants that are associated with past and present SRS operations. Early detection is paramount to protecting the public and the environment if a release to off-site streams or groundwater occurs. SCDES will

continue to monitor SRS and adjacent areas for the primary radionuclide contributors to dose potentially associated with DOE-SR operations.

13.4.0 TABLES AND FIGURES

Table 1. SCDES Dose Estimates (mrem) for all Media: AEI and MEI

Pathway	Route	Source of Exposure	AEI	MEI
Atmospheric	Inhalation	Surface Soil Resuspension	0.000	0.000
Atmospheric	Inhalation	Inhalation of H-3 in Air	0.005	0.011
Air Inhalation Total			**0.005**	**0.011**
Liquid	Ingestion	Fish	0.080	0.896
Atmospheric	Ingestion	Cow Milk	0.016	0.071
Atmospheric	Ingestion	Wild Game (Deer)	0.862	7.006
Atmospheric	Ingestion	Wild Game (Hog)	2.170	30.383
Atmospheric	Ingestion	Vegetation (Fruit and Vegetables)	0.002	0.006
Atmospheric	Ingestion	Fungi	NS	NS
Atmospheric	Ingestion	Soil Ingestion with Food	0.000	0.000
Food Ingestion Total			**3.130**	**38.362**
Liquid	Ingestion	Public System Drinking Water - Savannah River	0.004	0.025
Liquid	Ingestion	Drinking Water - Groundwater	ND	ND
Liquid	Ingestion	Ingestion from Swimming	0.000	0.002
Drinking Water Total			**0.004**	**0.027**
Liquid	Direct	Exposure from Wading at Boat Landings	0.000	0.000
Liquid	Direct	Exposure from Wading at SRS Creek Mouths	0.000	0.000
Atmospheric	Direct	Exposure from Soil	0.000	0.004
Direct Exposure Total			**0.000**	**0.004**
Overall Total Dose			**3.139**	**38.404**

Note:
1) ND is Not Detected; NS is Not Sampled
2) Drinking Water - Groundwater includes aquifers that supply both public and private wells.
3) Drinking Water Total is the sum of the Savannah River/Groundwater dose, whichever is higher, and the Ingestion from Swimming dose.
4) Fungi was not sampled in 2024.
5) The MEI for Wild Game (Hog) was high in 2024 due to a specific hunter who harvested a large number of animals. Because of this, the consumption rate used to calculate the dose was higher than typically seen at 232 Kg (511 lbs).
6) If wild game is not eaten the AEI falls to 0.107 mrem while the MEI falls to 1.015 mrem.

Table 2. SCDES Dose Estimates (mrem) for the Atmospheric and Liquid Pathways: AEI and MEI

Critical Pathway Summary	AEI	MEI
The Atmospheric Pathway Totals	3.055	37.481
The Liquid Pathway Totals	0.084	0.923
Combined Dose	**3.139**	**38.404**

13.4.0 TABLES AND FIGURES

Table 3. DOE-SR/SCDES Dose Comparisons

Pathway	Comparison Basis	DOE-SR[1]	SCDES[2]
All-Pathway	SCDES All-Pathway Approximation[3]	0.33	0.30
Sportsman	Onsite Hunter[4]	8.29	NA
	Onsite Turkey[5]	ND	NS
	Creek Mouth Fisherman[6]	0.24	0.90
	Off-site Hunter Deer	2.97	7.01
	Off-site Hunter Hog[7]	5.50	30.38
	Edible Fungi[8]	NS	NS

Note:
1) DOE-SR data from Table 6-5 and Table 6-7 (SRNS, 2025).
2) Based on SCDES maximums or single highest detection basis for all media per route of exposure unless otherwise specified (Table 1).
3) Sum of SCDES highest fish at Steel Creek, swimming ingestion, Savannah River derived drinking water, vegetation, milk, and atmospheric inhalation.
4) SCDES does not assign onsite dose.
5) SRS did sample turkeys in 2024, but none were greater than background.
6) Compares DOE-SR and SCDES fish results from the mouths of creeks that flow into the Savannah River. In 2024 DOE-SR's dose came from bass at the mouth of Steel Creek while SCDES's was from bass at Four Mile Creek.
7) The SCDES MEI for Wild Game (Hog) was higher than usual in 2024 due to a specific hunter who harvested a large number of animals. Because of this, the consumption rate used to calculate the dose was higher than typically seen at 232 Kg (511 lbs).
8) Edible fungi was not sampled in 2024.
9) ND is Not Detected; NA is Not Applicable; NS is Not Sampled

13.4.0 TABLES AND FIGURES

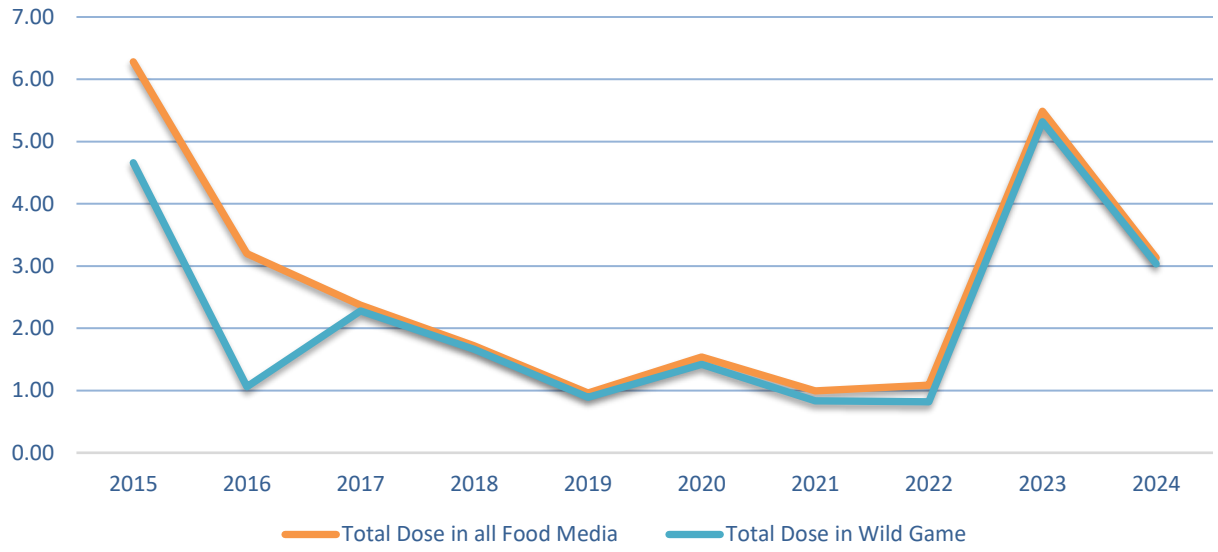
Table 4. 2015-2024 AEI Exposure: Total AEI Dose (mrem) and Percentage

Pathway	AEI Media Categories	2024[1]	2015-2024[2]	2015-2024 % AEI[3]
Atmospheric	Surface Soil Resuspension Inhalation	0.000	0.009	0.03
Atmospheric	H-3 Inhalation	0.005	0.028	0.10
Liquid	Fish	0.080	0.438	1.60
Atmospheric	Cow Milk	0.016	0.050	0.18
Atmospheric	Wild Game (Deer and Hog)	3.032	22.505	82.13
Atmospheric	Vegetation (Fruit and Vegetables)	0.002	0.490	1.79
Atmospheric	Fungi	NS	3.800	13.87
Atmospheric	Soil Ingestion with Food	0.000	0.000	0.000
Liquid	Drinking Water from the Savannah River	0.004	0.077	0.28
Liquid	Drinking Water from Groundwater[4]	ND	0.005	NA
Liquid	Ingestion from Swimming	0.000	0.000	0.000
Liquid	Exposure from Wading at Boat Landings	0.000	0.000	0.000
Liquid	Exposure from Wading at Creek Mouths[5]	0.000	0.000	0.000
Atmospheric	Exposure from Soil	0.000	0.006	0.02
Totals[6,7]		**3.139**	**27.403**	**100%**

Note:
1) The 2024 column is average dose in mrem during 2024.
2) The 2015-2024 column is total dose in mrem over the 2015-2024 ten-year period.
3) The AEI % basis column is the percentage of the 2015-2024 total dose from a given media.
4) Only the highest drinking water source is used for the ten-year total and percentages.
5) Only the highest wading dose is used for wading.
6) Percentages may not equal 100 percent due to rounding.
7) The average dose received per year is 2.740 mrem.
8) ND is Not Detected; NA is Not Applicable; NS is Not Sampled

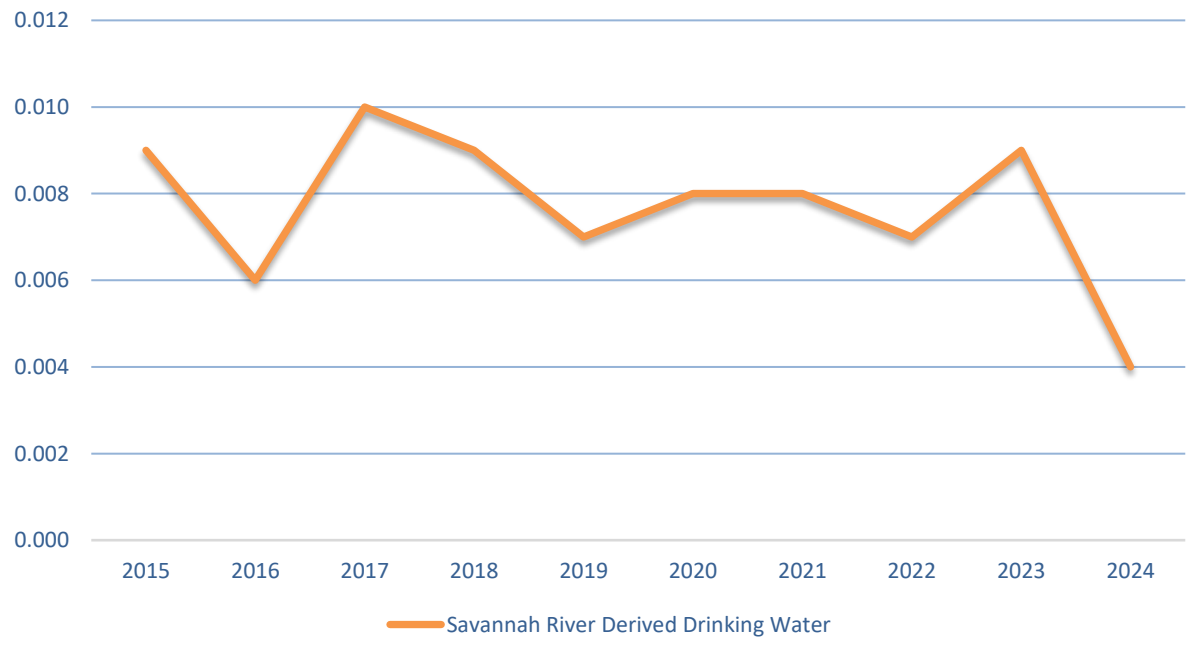
13.4.0 TABLES AND FIGURES

Figure 1. 2015-2024 SCDES AEI Food Dose



Note: This graph shows the total food AEI dose trend and the trend for the primary contributor to that dose for 2024 in mrem.

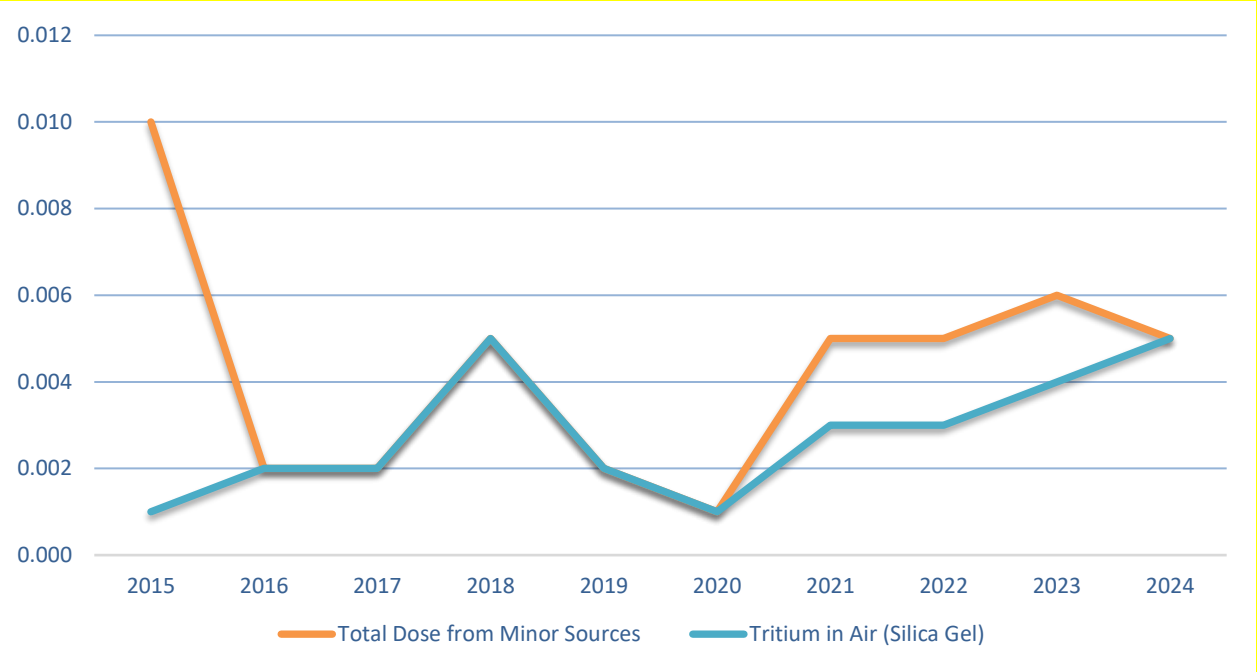
Figure 2. 2015-2024 SCDES AEI Water Dose



Note: This graph shows the water AEI dose trend for drinking water obtained from the Savannah River in mrem. Only groundwater derived or Savannah River derived drinking water is used, whichever is higher.

13.4.0 TABLES AND FIGURES

Figure 3. 2015-2024 SCDES AEI Dose from Minor Sources



Note: This graph shows the total minor sources AEI dose trend and the trend for the primary contributor to that dose from 2024 in mrem.

Return to TOC

13.5.0 2024 DOSE DATA

Notes for 13.5.0 Dose Data:
1. ND is Not Detected
2. NA is Not Applicable
3. NS is Not Sampled
4. All consumption rates are from Aranceta et al., 2006; Botsch et al., 2000; EPA, 2011; EPA, 2022; and SRNS, 2025.
5. Dose coefficients are from EPA, 2019; DOE, 2021; and DOE, 2022.
6. EPA, 2025c was use for PM10 (soil) resuspended in air for Cs-137 inhalation dose.
7. Dose in the following tables may be presented differently from the text or in the above tables and graphs due to rounding error.

AEI Fish Dose

Dose from Fish Ingestion (AEI)					
Media	**Radionuclide**	**Activity (pCi/g)**	**BKG (pCi/g)**	**Consumption Rate (kg/yr)**	**Dose (mrem)**
Bass	Cs-137	0.393	ND	3.7	0.072
Bass	Sr-89/90	0.035	0.018	3.7	0.008
Channel Catfish	Cs-137	0.213	ND	3.7	0.039
Channel Catfish	Sr-89/90	0.012	ND	3.7	0.006
Flathead Catfish	Cs-137	0.071	NS	3.7	0.013
Flathead Catfish	Sr-89/90	0.011	NS	3.7	0.005
Drum	Cs-137	ND	NS	3.7	ND
Drum	Sr-89/90	ND	NS	3.7	ND
Mullet	Cs-137	ND	NS	3.7	ND
Mullet	Sr-89/90	ND	NS	3.7	ND
Fish Total					**0.080**

Note: Large flathead catfish are no longer processed as a separate category.

13.5.0 2024 DOSE DATA

MEI Fish Dose

Dose from Fish Ingestion (MEI)					
Media	**Radionuclide**	**Activity (pCi/g)**	**BKG (pCi/g)**	**Consumption Rate (kg/yr)**	**Dose (mrem)**
Bass	Cs-137	0.626	ND	24.0	0.739
Bass	Sr-89/90	0.067	0.018	24.0	0.157
Channel Catfish	Cs-137	0.523	ND	24.0	0.618
Channel Catfish	Sr-89/90	0.014	ND	24.0	0.045
Flathead Catfish	Cs-137	0.130	NS	24.0	0.154
Flathead Catfish	Sr-89/90	0.015	NS	24.0	0.048
Drum	Cs-137	ND	NS	24.0	ND
Drum	Sr-89/90	ND	NS	24.0	ND
Mullet	Cs-137	ND	NS	24.0	ND
Mullet	Sr-89/90	ND	NS	24.0	ND
Fish Total					**0.896**

Note: Large flathead catfish are no longer processed as a separate category.

AEI Milk Dose

Dose from Milk (AEI)				
Media	**Radionuclide**	**Activity (pCi/L)**	**Consumption Rate (kg/yr)**	**Dose (mrem)**
Milk	H-3	ND	69.0	ND
	Cs-137	3.795	69.0	0.013
	Sr-89/90	0.347	69.0	0.003
	I-131	ND	69.0	ND
Milk Total				**0.016**

Note: Background samples are not collected for milk.

13.5.0 2024 DOSE DATA

MEI Milk Dose

Dose from Milk (MEI)				
Media	Radionuclide	**Activity (pCi/L)**	**Consumption Rate (kg/yr)**	**Dose (mrem)**
Milk	H-3	ND	260.0	ND
	Cs-137	4.518	260.0	0.058
	Sr-89/90	0.363	260.0	0.013
	I-131	ND	260.0	ND
Milk Total				**0.071**

Note: Background samples are not collected for milk.

AEI Wild Game Dose

Dose from Wild Game (AEI)		
Media	**Radionuclide**	**Dose (mrem)**
Deer	Cs-137	0.862
Hog	Cs-137	2.170
Game Total		**3.032**

Note: Deer AEI consumption rate is based on an edible portion of 28 Kg (62 lbs); Hog is based on 20 Kg (44 lbs).

MEI Wild Game Dose

Dose from Wild Game (MEI)		
Media	**Radionuclide**	**Dose (mrem)**
Deer	Cs-137	7.006
Hog	Cs-137	30.383
Game Total		**37.389**

Note: Deer MEI consumption rate is based on an edible portion of 151 Kg (333 lbs); Hog is based on 232 Kg (511 lbs). It should also be noted that the consumption rates can be traced to individual hunters who harvested multiple animals and were assumed to have consumed the entire edible portion themselves.

13.5.0 2024 DOSE DATA

AEI Edible Vegetation Dose

Dose in Edible Vegetation (AEI)					
Media	**Radionuclide**	**Activity (pCi/g)**	**BKG (pCi/g)**	**Consumption Rate (kg/yr)**	**Dose (mrem)**
Fruit and Vegetables	H-3	0.277	ND	92	0.002
	Cs-137	ND	ND	92	ND
Fruit and Vegetable Total					**0.002**
Nuts	H-3	NS	NS	NA	NA
	Cs-137	NS	NS	NA	NA
Nuts Total					**NA**
Fungi	H-3	NS	NS	NA	NA
	Cs-137	NS	NS	NA	NA
Fungi Total					**NA**
Combined Vegetation Total					**0.002**

Note: Nuts and fungi were not sampled in 2024.

MEI Edible Vegetation Dose

Dose in Edible Vegetation (MEI)					
Media	**Radionuclide**	**Activity (pCi/g)**	**BKG (pCi/g)**	**Consumption Rate (kg/yr)**	**Dose (mrem)**
Fruit and Vegetables	H-3	0.330	ND	248	0.006
	Cs-137	ND	ND	248	ND
Fruit and Vegetable Total					**0.006**
Nuts	H-3	NS	NS	NA	NA
	Cs-137	NS	NS	NA	NA
Nuts Total					**NA**
Fungi	H-3	NS	NS	NA	NA
	Cs-137	NS	NS	NA	NA
Fungi Total					**NA**
Combined Vegetation Total					**0.006**

Note: Nuts and fungi were not sampled in 2024.

13.5.0 2024 DOSE DATA

AEI Ingestion from Surface Water and Wells Dose

Drinking Water from Surface Water and Wells (AEI)					
Source	**Radionuclide**	**Activity (pCi/L)**	**BKG (pCi/L)**	**Consumption Rate (L/yr)**	**Dose (mrem)**
Savannah River	H-3	490	327	300	0.004
Surface Water Total					**0.004**
Drinking Water from Wells					
Groundwater	H-3	ND	ND	NA	ND
Water Ingestion from Wells Total					**ND**
Total Drinking Water					**0.004**

Note:
1) Groundwater aquifers that are known to be used for drinking water were used and samples were collected as part of the groundwater project. Individual groundwater sourced drinking water taps were not sampled.
2) Only the highest dose is used for the total.

MEI Ingestion from Surface Water and Wells Dose

Drinking Water from Surface Water and Wells (MEI)					
Source	**Radionuclide**	**Activity (pCi/L)**	**BKG (pCi/L)**	**Consumption Rate (L/yr)**	**Dose (mrem)**
Savannah River	H-3	732	327	300	0.025
Surface Water Total					**0.025**
Drinking Water from Wells					
Groundwater	H-3	ND	ND	NA	ND
Water Ingestion from Wells Total					**ND**
Total Drinking Water					**0.025**

Note:
1) Groundwater aquifers that are known to be used for drinking water were used and samples were collected as part of the groundwater project. Individual groundwater sourced drinking water taps were not sampled.
2) Only the highest dose is used for the total.

13.5.0 2024 DOSE DATA

AEI Incidental Water Ingestion and Direct Exposure from Water Dose

Incidental Water Ingestion and Direct Exposure from Water-Creek Mouths (AEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Swimming at Savannah River Creek Mouths					
Surface Water Swimming	H-3	pCi/L	pCi/L	L/yr	mrem
Ingestion		**1194**	**327**	**0.189**	**0.000**
Surface Water Swimming	H-3	pCi/L		hrs/yr	mrem
Surface Water Immersion		**1194**	**327**	**9**	**0.000**
Savannah River Creek Mouth Total					**0.000**

Incidental Water Ingestion and Direct Exposure from Water-Boat Landings (AEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Swimming at Savannah River Boat Landings					
Surface Water Swimming	H-3	pCi/L	pCi/L	L/yr	mrem
Ingestion		**847**	**327**	**0.189**	**0.000**
Surface Water Swimming	H-3	pCi/L		hrs/yr	mrem
Surface Water Immersion		**847**	**327**	**9**	**0.000**
Savannah River Boat Landings Total					**0.000**

MEI Incidental Water Ingestion and Direct Exposure from Water Dose

Incidental Water Ingestion and Direct Exposure from Water-Creek Mouths (MEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Swimming at Savannah River Creek Mouths					
Surface Water Swimming	H-3	pCi/L	pCi/L	L/yr	mrem
Ingestion		**10842**	**327**	**2.57**	**0.002**
Surface Water Swimming	H-3	pCi/L	pCi/L	hrs/yr	mrem
Surface Water Immersion		**10842**	**327**	**36**	**0.000**
Savannah River Creek Mouth Total					**0.002**

Incidental Water Ingestion and Direct Exposure from Water-Boat Landings (MEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Swimming at Savannah River Boat Landings					
Surface Water Swimming	H-3	pCi/L	pCi/L	L/yr	mrem
Ingestion		**7242**	**327**	**2.57**	**0.001**
Surface Water Swimming	H-3	pCi/L	pCi/L	hrs/yr	mrem
Surface Water Immersion		**7242**	**327**	**36**	**0.000**
Savannah River Boat Landings Total					**0.001**

13.5.0 2024 DOSE DATA

AEI Sediment at Creek Mouths and Boat Landings Dose

Sediment at Creek Mouths and Boat Landings (AEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Sediment Dose		pCi/g	pCi/g	hrs/yr	mrem
Creek Mouths	Cs-137	1.499	0.051	9	**0.000**
Boat Landings	Cs-137	0.134	0.051	9	**0.000**
Sediment Total					**0.000**

MEI Sediment at Creek Mouths and Boat Landings Dose

Sediment at Creek Mouths and Boat Landings (MEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Sediment Dose		pCi/g	pCi/g	hrs/yr	mrem
Creek Mouths	Cs-137	5.043	0.051	36	**0.000**
Boat Landings	Cs-137	0.200	0.051	36	**0.000**
Sediment Total					**0.000**

AEI Surface Soil Ingestion Dose

Surface Soil Ingestion (AEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Surface Soil		pCi/g	pCi/g	Mg/day	mrem
Ingestion	Cs-137	0.110	0.094	20	0.000
Soil Ingestion Total					**0.000**

Note: This represents soil inadvertently consumed with plants.

MEI Surface Soil Ingestion Dose

Surface Soil Ingestion (MEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Surface Soil		pCi/g	pCi/g	Mg/day	mrem
Ingestion	Cs-137	0.265	0.094	20	0.000
Soil Ingestion Total					**0.000**

Note: This represents soil inadvertently consumed with plants.

13.5.0 2024 DOSE DATA

AEI Soil Direct Dose

Soil Direct (AEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Surface Soil		pCi/g	pCi/g	hrs/yr	mrem
External Direct	Cs-137	0.110	0.094	4380	0.000
Direct Soil Total					**0.000**

MEI Soil Direct Dose

Soil Direct (MEI)					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Surface Soil		pCi/g	pCi/g	hrs/yr	mrem
External Direct	Cs-137	0.265	0.094	4380	0.004
Direct Soil Total					**0.004**

13.5.0 2024 DOSE DATA

AEI Atmospheric Inhalation Dose

Atmospheric Inhalation (AEI)					
Surface Soil Resuspension and Air Inhalation					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Surface Soil Resuspension		**pCi/g**	**pCi/g**	**m3/yr**	**mrem**
Inhalation	Cs-137	0.110	0.094	5000	0.000
Surface Soil Resuspension Total					**0.000**
Air Inhalation (Silica Gel)		**pCi/m^3**	**pCi/m^3**	**m3/yr**	**mrem**
Inhalation	H-3	4.903	NS	5000	0.005
Atmospheric Inhalation Total					**0.005**

MEI Atmospheric Inhalation Dose

Atmospheric Inhalation (MEI)					
Surface Soil Resuspension and Air Inhalation					
Source	**Radionuclide**	**Activity**	**BKG**	**Consumption Rate**	**Dose**
Surface Soil Resuspension		**pCi/g**	**pCi/g**	**m3/yr**	**mrem**
Inhalation	Cs-137	0.265	0.094	6400	0.000
Surface Soil Resuspension Total					**0.000**
Air Inhalation (Silica Gel)		**pCi/m^3**	**pCi/m^3**	**m3/yr**	**mrem**
Inhalation	H-3	8.759	NS	6400	0.011
Atmospheric Inhalation Total					**0.011**

Chapter 14 2023 ESOP Errata

14.1.0 PROJECT SUMMARY

SCDES implemented an errata chapter within the ESOP Report to address minor corrections to the previous annual report. The corrections for the 2023 ESOP Report are marked in blue and orange. Corrections to values or interpretations of a value are marked in blue. Corrections to analytical/grammatical discrepancies and additional notes to explain material presented within the report are marked in orange. These corrections do not influence the final dose values for 2023.

14.2.0 CHAPTER 1: RADIOLOGICAL ATMOSPHERIC MONITORING ON AND ADJACENT TO SRS CORRECTIONS

1.5.0 TABLES AND FIGURES

Table 1. 2023 DHEC Radiological Atmospheric Monitoring Locations

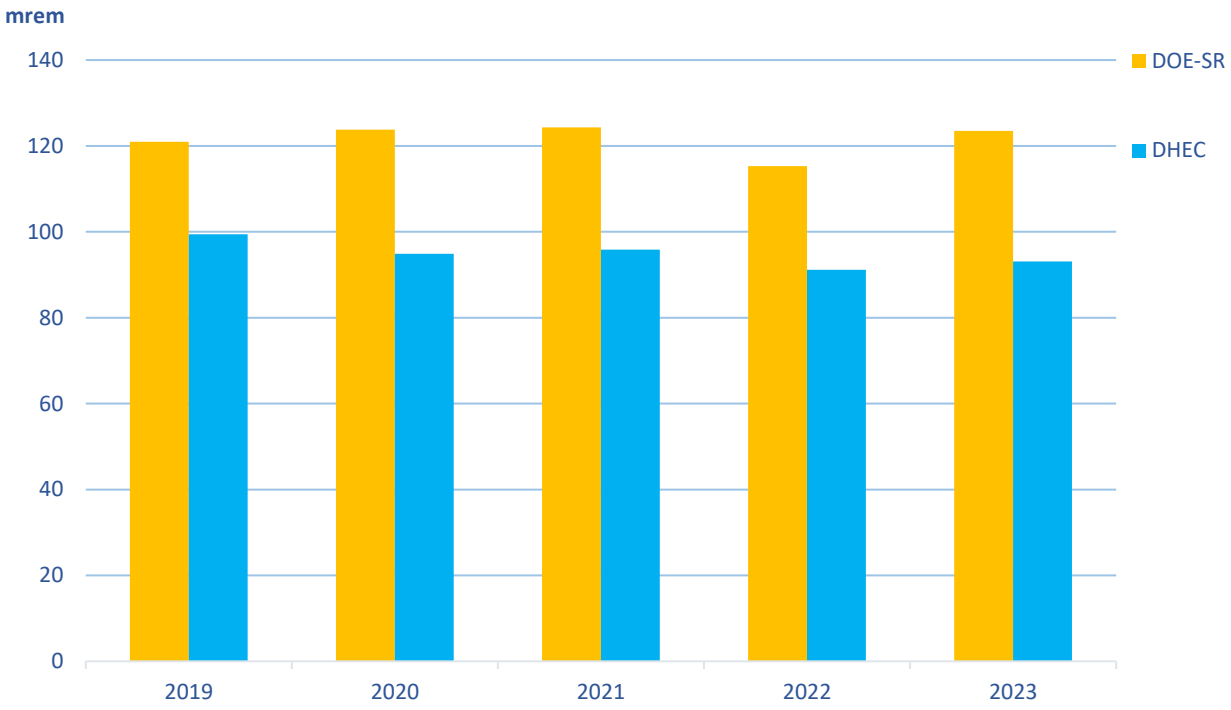
Dosimeter Monitoring Locations

Sample ID	Location	Proximity to SRS
TLD-01	Collocated with AIK Air Station	Within 25 miles of SRS
TLD-02	Collocated with BGN Air Station	Center of SRS
TLD-03*	Savannah River Research Park	SRS Perimeter
TLD-04*	Collocated with JAK Air Station	SRS Perimeter
TLD-05*	Crackerneck Gate	SRS Perimeter
TLD-06*	Ellenton Memorial on Hwy 125	SRS Perimeter
TLD-07*	Collocated with ABR Air Station	SRS Perimeter
TLD-08*	Junction of Millet Road and Round Tree Road	SRS Perimeter
TLD-09*	Patterson Mill Road at Lower Three Runs Creek	SRS Perimeter
TLD-10	Collocated with ALN Air Station	Within 25 miles of SRS
TLD-11	Barnwell Health Department	Within 25 miles of SRS
TLD-12*	Collocated with BWL Air Station	SRS Perimeter
TLD-13*	Collocated with DKH Air Station	SRS Perimeter
TLD-14*	Seven Pines Road Collocated with SRS Air Station	SRS Perimeter
TLD-15	Williston Police Department	Within 25 miles of SRS
TLD-16*	Junction of US-278 and SC-781	SRS Perimeter
TLD-17*	SREL Conference Center on US-278	SRS Perimeter
TLD-18*	Collocated with NEL Air Station	SRS Perimeter
TLD-19	Windsor Post Office	Within 25 miles of SRS

Note: * Denotes a perimeter location

1.5.0 TABLES AND FIGURES

Figure 3. 2019-2023 DOE-SR and DHEC Comparison of Yearly Average Ambient Beta/Gamma Dose for Dosimeters at the SRS Perimeter (SRNS, 2020-2024; DHEC, 2020-2023)



Note:
1) The yearly average results for DOE-SR are based on population centers within proximity to SRS, site perimeter stations, and perimeter air surveillance stations within South Carolina. The yearly average results for DHEC are based on all SRS Perimeter locations (not limited to collocations).
2) Averages for DOE-SR were updated to calculate all population centers within proximity to SRS, site perimeter stations, and perimeter air surveillance stations within South Carolina.

14.3.0 CHAPTER 2: MONITORING OF AMBIENT GROUNDWATER ADJACENT TO SRS CORRECTIONS

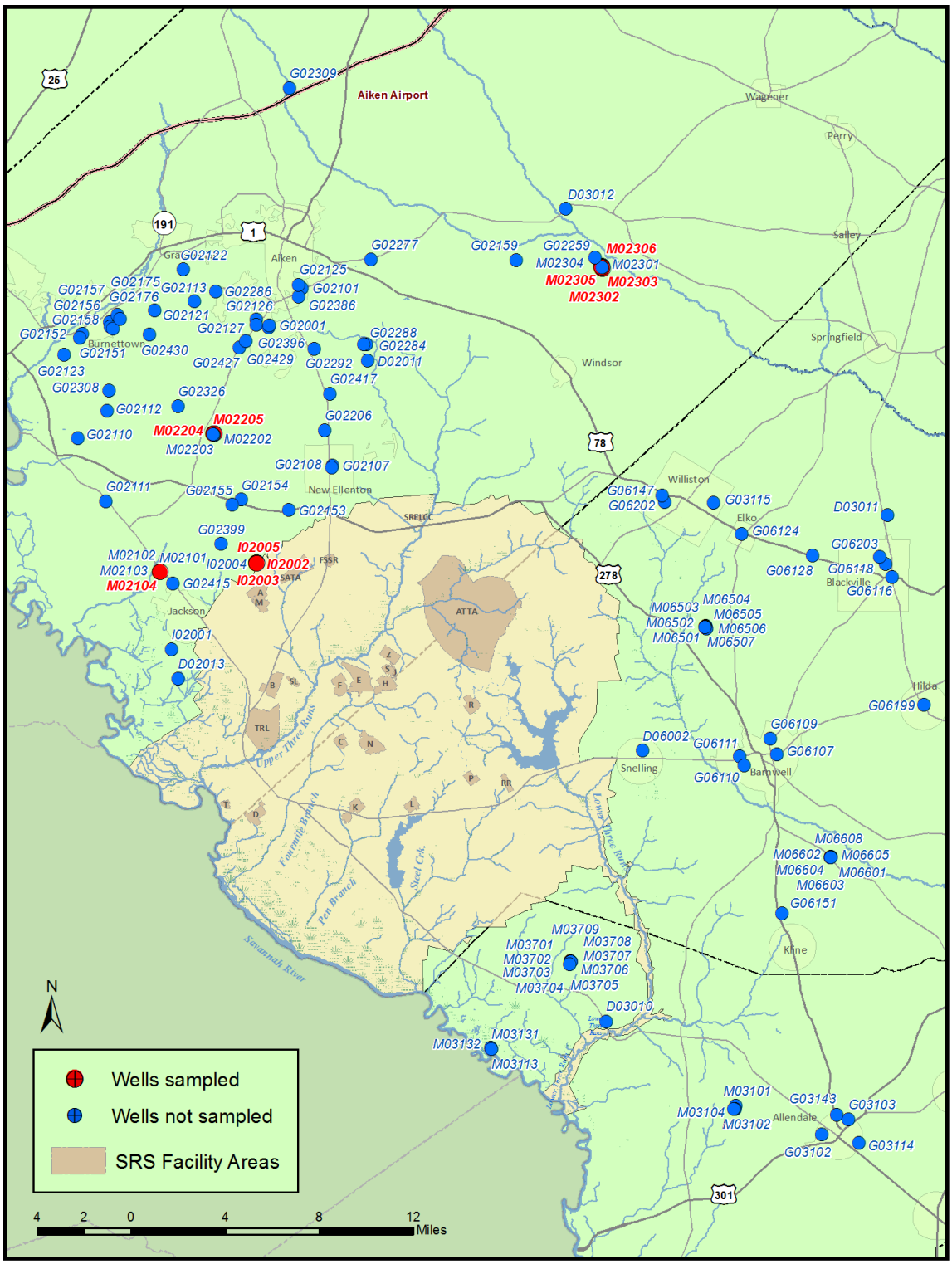
2.1.0 PROJECT SUMMARY

DHEC currently utilizes a regional groundwater monitoring well network consisting of cluster wells (C-wells) and network wells (private wells and public water systems). This groundwater well network consists of approximately 115 wells that are cyclically sampled every five years by DHEC. The C-wells are owned and maintained by the South Carolina Department of Natural Resources (DNR). These cluster wells are screened from shallow surficial aquifers to deeper aquifers up to depths exceeding 1,400 feet below ground surface. The C-wells are situated around the perimeter of SRS.

Return to TOC

2.4.0 MAP

Groundwater Monitoring Locations



2023 ESOP Groundwater Monitoring Map www.scdhec.gov

Note: G02259 and G06147 were added the 2023 ESOP Groundwater Monitoring Map.

Return to TOC

2.5.0 TABLES AND FIGURES

Table 1. DHEC Ambient Groundwater Monitoring Locations

Well No.	Well Name	Sample Year	Top of Casing Elevation (ft amsl)	Total Depth (ft bgs)	Aquifer
I02002	Greene Irrigation 1	**2023**	381	278	SP
I02003	Greene Irrigation 2	**2023**	381	280	SP
I02004**	Greene Irrigation 3	**2023**	373	276	SP
I02005	Greene Irrigation 4	**2023**	373	236	SP
M02101**	SCDNR Cluster C-01, AIK-2378	**2023**	220.3	185	CB
M02102**	SCDNR Cluster C-01, AIK-2379	**2023**	224.2	266	CB
M02103**	SCDNR Cluster C-01, AIK-2380	**2023**	228.9	385	MB
M02104	SCDNR Cluster C-01, AIK-902	**2023**	231.9	511	MB
M02202**	SCDNR Cluster C-02, AIK-825	**2023**	418.8	231	CB
M02203**	SCDNR Cluster C-02, AIK-824	**2023**	418.6	365	CB
M02204	SCDNR Cluster C-02, AIK-818	**2023**	418.3	425	MB
M02205	SCDNR Cluster C-02, AIK-817	**2023**	418.9	535	MB
M02301**	SCDNR Cluster C-03, AIK-849	**2023**	301.6	97	SP
M02302	SCDNR Cluster C-03, AIK-848	**2023**	299.7	131	CB
M02303	SCDNR Cluster C-03, AIK-847	**2023**	299	193	CB
M02304**	SCDNR Cluster C-03, AIK-846	**2023**	297.8	255	CB
M02305	SCDNR Cluster C-03, AIK-845	**2023**	296.9	356	MB
M02306	SCDNR Cluster C-03, AIK-826	**2023**	294.9	500	MB
M06501**	SCDNR Cluster C-05, BRN-360	**2023**	264.3	140	UTR
M06502**	SCDNR Cluster C-05, BRN-359	**2023**	265.5	214	GOR
M06503**	SCDNR Cluster C-05, BRN-367	**2023**	263.8	285	GOR
M06504	SCDNR Cluster C-05, BRN-368	2024	265.1	443	CB
M06505	SCDNR Cluster C-05, BRN-365	2024	263.5	539	CB
M06506	SCDNR Cluster C-05, BRN-366	2024	266.7	715	MB
M06507	SCDNR Cluster C-05, BRN-358	2024	265.6	847	MB
M03706	SCDNR Cluster C-07, ALL-368	2024	246.6	691	CB
M03707	SCDNR Cluster C-07, ALL-369	2024	242.1	800	CB
M03708	SCDNR Cluster C-07, ALL-370	2024	245.1	975	MB
M03709	SCDNR Cluster C-07, ALL-358	2024	243.1	1123	MB
M03701	SCDNR Cluster C-07, ALL-363	2024	246.1	105	UTR
M03702	SCDNR Cluster C-07, ALL-364	2024	245.2	225	UTR
M03703	SCDNR Cluster C-07, ALL-365	2024	244.3	333	GOR
M03704	SCDNR Cluster C-07, ALL-366	2024	243.5	400	GOR
M03705	SCDNR Cluster C-07, ALL-367	2024	245.7	566	CB
M06601	SCDNR Cluster C-06, BRN-351	2024	207.3	95	UTR
M06602	SCDNR Cluster C-06, BRN-350	2024	207.4	170	UTR
M06603	SCDNR Cluster C-06, BRN-352	2024	207.1	293	GOR
M06604	SCDNR Cluster C-06, BRN-354	2024	207.6	411	GOR
M06605	SCDNR Cluster C-06, BRN-353	2024	207.7	588	CB
M06608	SCDNR Cluster C-06, BRN-349	2024	208.6	1045	MB
M03101	SCDNR Cluster C-10, ALL-347	2024	281.6	1423	MB
M03102	SCDNR Cluster C-10 ALL-372	2024	282	155	UTR
M03103	SCDNR Cluster C-10 ALL-371	2024	282.2	217	UTR
M03113	SCDNR Cluster C-13 Artesian	2024	73	*	GOR
M03132	SCDNR Cluster C-13 ALL-378	2024	90	1060	MB
M03131	SCDNR Cluster C-13, Artesian	2024	80	*	GOR
M03104	SCDNR Cluster C-10, ALL-374	2024	280.9	580	GOR

G02206	Oak Hill Subdivision	2025	445	240	SP
G06124	Elko	2025	351	353	UTR
G06116	Blackville Lartique St.	2025	295	380	UTR
G06118	Blackville Greene Well	2025	292	620	GOR
G06203	Blackville Industrial Park	2025	273	425	UTR
G06199	Hilda	2025	271	345	UTR
G02309	Aiken Shiloh Springs	2025	362	50	SP
G02101	Aiken Pine Log Road	2025	483	407	MB
G02126	Aiken Town Creek	2025	508	400	MB
G02427	Aiken Silver Bluff	2025	467	*	MB
G02121	Vally PSA Gloverville	2025	413	242	CB
G02286	Vally PSA Walker	2025	471	400	MB
G02122	Vally PSA Howlandville	2025	483	323	CB
G02123	Valley PSA Johnstown	2025	259	150	CB
G02259	Aiken State Park	2025	262	*	SP
G02153	Talatha well #1	2025	420	280	SP
G02154	Talatha Well #2	2025	250	185	CB
G02155	Talatha Well #3	2025	343	240	SP
G02399	Jackson Well #3`	2025	405	450	CB
G02415	Jackson Well #4	2025	339	400	CB
G02110	Beech Island Well #2	2025	417	468	CB
G02111	Beech Island Well #3	2025	369	460	MB
G02112	Beech Island Well #4	2025	380	600	MB
G02113	Beech Island Well #5	2025	508	438	CB
G02308	Beech Island Well #6	2025	448	400	CB
G02430	Beech Island Well Piney Heights	2025	453	490	CB
G02326	Boyd Pond (Former ORA)	2025	300	397	MB
D02013	Cowden Plantation, Well 2	2025	124	*	SP
I02001	Cowden Plantation, Well 1	2025	132	*	CB
D02011	Mettlen Well	2025	400	180	SP
G02108	New Elenton Well #1	2025	422	427	CB
G02107	New Elenton Well #2	2025	422	425	CB
G02417	New Ellenton Well #4	2025	488	565	MB
G02277	Montmorenci WD Office Well	2025	504	363	CB
G02159	Montmorenci Well 1	2025	504	330	CB
G06110	Barnwell #10 Shuron	2025	190	276	UTR
G02292	Hunter's Glen	2025	487	210	SP
G06109	Barnwell, Hwy. 3	2026	230	146	UTR
G06111	Barnwell, Rose St.	2026	220	166	UTR
G06107	Barnwell Shop Well	2026	224	314	GOR
D03011	Healing Springs	2026	240	*	CB
D03012	Cedar Creek Spring	2026	271	*	CB
G06128	Edisto Station	2026	322	360	GOR
G06202	Williston, Schuler St.	2026	352	220	GOR
G06147	Williston, Halford St.	2026	352	530	CB
D06002	Moore Well	2026	240	*	UTR
G02001	Hidden Haven 2	2027	471	484	MB
G02125	Aiken Douglas Dr	2027	483	480	MB
G02127	Aiken Woodside	2027	491	407	MB
G02429	Aiken Silver Bluff 2	2027	451	*	MB
G02386	Aiken Robin Rd	2027	492	430	MB
G02396	Aiken Hidden Haven 1	2027	494	504	MB
G02284	Aiken Vale 2	2027	435	300	CB

G02288	Aiken Vale/Tank	2027	439	363	CB
D03010	Martin Post Office	2027	108	105	UTR
G03102	Allendale, Water St.	2027	201	343	UTR
G03103	Allendale, Googe St.	2027	180	347	UTR
G03114	Allendale Patterson Street	2027	172	308	UTR
G03143	Allendale Spruce Street	2027	185	335	UTR
G06151	Chappels Labor Camp	2027	250	260	UTR
G02151	Bath Well One - Tank Well	2027	194	150	SP
G02152	Bath Well Two -Hill Well	2027	217	100	SP
G02157	Burnettown Well Two	2027	272	173	SP
G02156	Burnettown Well One	2027	306	245	SP
G02158	Burnettown Well Three	2027	312	180	SP
G02175	Langley Well One	2027	206	100	SP
G02176	Langley Well Two	2027	249	105	SP
G03115	Martin District Fire Department	2027	95	*	*

Note:
1) ft amsl is feet above mean sea level
2) ft bgs is feet below ground surface
3) CB is Crouch Branch
4) MB is McQueen Branch
5) SP is Steeds Pond
6) UTR is Upper Three Runs
7) GOR is Gordon
8) * is total depth/top of casing information unknown.
9) ** Well was unable to be sampled during the sampling cycle; however, it will remain in the network

14.4.0 CHAPTER 3: RADIOLOGICAL MONITORING OF DRINKING WATER ADJACENT TO SRS CORRECTIONS

3.5.0 TABLES AND FIGURES

Table 1. 2023 DHEC Drinking Water System Monitoring Locations

System Number	System Name	Number of Taps	Population
0210001	Aiken	20,292	45,090
0220006	Breezy Hill Water District	8,378	20,526
0210003F	North Augusta	13,659	33,185
0720003F	Chelsea B/J	61,769	196,061
0720004F	Purrysburg B/J	96	280
	Total		
	Savannah River-fed systems downstream from SRS	61,865	196,341
	Systems not fed from the Savannah River downstream of SRS	42,329	98,801

Note: Data was obtained from DHEC's Environmental Facility Information System database.

Return to TOC

3.5.0 TABLES AND FIGURES

Note for Tables 5-6: Summary Statistics are not shown for locations whose analytes had either no detections or only one detection. If a location did have multiple detections for a specific analyte, the summary statistics are written as a note below its table. AE is Analytical Error and ND is Not Detected.

Table 5: 2023 DHEC Drinking Water Data for Aiken Public Shaw Creek Water Works Treatment Plant (DW0210001) in pCi/L

Month	Total Alpha	Nonvolatile Beta	Tritium
JAN	2.17	ND	ND
FEB	ND	ND	ND
MAR	ND	ND	ND
APR	3.09	ND	ND
MAY	ND	ND	ND
JUN	ND	ND	ND
JUL	3.74	ND	ND
AUG	AE	AE	ND
SEP	ND	ND	ND
OCT	2.04	ND	ND
NOV	4.75	ND	ND
DEC	3.87	ND	ND

Note: 1). In pCi/L, DHEC Total Alpha summary statistics: Average = 3.28, Standard Deviation = 1.05, Median = 3.42, Minimum = 2.04, Maximum = 4.75, Number of Detections = 6, Number of Samples = 12.

Table 6: 2023 DHEC Drinking Water Data for Breezy Hill Water Treatment Plant (DW0220006) in pCi/L

Month	Total Alpha	Nonvolatile Beta	Tritium
JAN	ND	ND	ND
FEB	ND	ND	ND
MAR	ND	ND	ND
APR	ND	ND	ND
MAY	ND	ND	ND
JUN	ND	ND	ND
JUL	ND	ND	ND
AUG	AE	AE	270
SEP	ND	ND	ND
OCT	1.31	ND	ND
NOV	ND	ND	ND
DEC	ND	ND	ND

14.5.0 CHAPTER 4: RADIOLOGICAL MONITORING OF SURFACE WATER ON AND ADJACENT TO SRS CORRECTIONS

4.2.0 RESULTS AND DISCUSSION

Beta

The location exhibiting the highest average gross beta activity for ambient sampling locations for DHEC was SV-2039 with an average of 6.33 pCi/L while the highest average gross beta activity for DOE-SR ambient locations was from SV-325 with an average of 8.76 pCi/L (SRNS, 2024). SV-2064 had the highest gross beta activity for collocated supplemental sampling locations for DHEC with an average of 5.53 pCi/L while the highest average gross beta activity for DOE-SR was from SV-2081 with an average of 7.58 pCi/L. The location with the highest gross beta activity for all DHEC supplemental locations was SV- 2032 with an average of 6.52 pCi/L. EPA has established a Maximum Contaminant Level (MCL) of 4 millirem per year for beta particle and photon radioactivity from man-made radionuclides in drinking water (EPA, 2020). The EPA screening MCL for gross beta-emitting particles for drinking water systems is 50 pCi/L minus natural potassium-40 (K-40). All averages were below this limit.

4.5.0 TABLES AND FIGURES

Table 1. 2023 DHEC Surface Water Monitoring Locations and Frequency

Supplemental Monitoring Locations

ID	Location	Rationale	Frequency
SV-2032	Mill Creek at Woodward Road, SRS Road E - ATTA	Downstream of past operations R area	Monthly Tritium, Alpha, Beta, and Gamma grab
SV-2040*	Beaver Dam Creek	Downstream of past operations in D Area	Monthly Tritium, Alpha, Beta, and Gamma grab
SV-2064*	Steel Creek off SRS Road C	Downstream of past operations in P area	Monthly Tritium, Alpha, Beta, and Gamma grab
SV-2081*	Mary's Branch near Barnwell Barricade, SRS Road B	Tributary monitoring related to potential impacts from adjacent off-site facility	Monthly Tritium, Alpha, Beta, and Gamma grab

4.6.0 SUMMARY STATISTICS

2023 Tritium Data Comparison for DHEC and DOE-SR Collocated Supplemental Sampling Locations (SRNS, 2024)

Sample Location	Sample ID	Average Concentration (pCi/L)	Standard Deviation (pCi/L)	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detects	Number of Samples
Beaver Dam Creek	SV-2040	334	38	339	271	383	6	12
	BDC	ND	ND	ND	ND	ND	0	12
Steel Creek off SRS Road C	SV-2064	25658	3786	25510	15909	30097	12	12
	SC-2A	22275	2218	21950	18200	26700	12	12
Mary's Branch near Barnwell Barricade, SRS Road B	SV-2081	8355	670	8712	6961	8955	12	12
	Mary's Branch	7065	1251	7350	3910	8480	12	12

Note:
1) Shaded areas represent DHEC data and unshaded areas represent DOE-SR data.
2) ND is Not Detected

4.6.0 SUMMARY STATISTICS

2023 Alpha Data Comparison for DHEC and DOE-SR Collocated Supplemental Sampling Locations (SRNS, 2024)

Sample Location	Sample ID	Average Concentration (pCi/L)	Standard Deviation (pCi/L)	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detects	Number of Samples
Steel Creek off SRS Road C	SV-2064	6.19	NA	6.19	6.19	6.19	1	12
	SC-2A	1.29	0.54	1.16	0.56	2.45	11	12
Mary's Branch near Barnwell Barricade, SRS Road B	SV-2081	5.09	3.09	3.76	2.88	13.20	10	12
	Mary's Branch	19.06	10.72	17.55	5.31	43.40	12	12

Note:
1) Shaded areas represent DHEC data and unshaded areas represent DOE-SR data.
2) NA is Not Applicable

4.6.0 SUMMARY STATISTICS

2023 DHEC Monitoring Data-Alpha

Ambient Sample Location	Average Concentration (pCi/L)	Standard Deviation	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detections	Number of Samples
Jackson Boat Landing (SV-2010)	ND	ND	ND	ND	ND	0	12
Tims Branch at SRS Road C (SV-324)	2.57	0.65	2.64	1.64	3.34	6	12
Upper Three Runs Creek at S.C. 125/SRS Road A (SV-325)	4.66	2.42	4.34	1.67	8.58	11	12
Fourmile Branch at SRS Road A-12.2 (SV-2039)	ND	ND	ND	ND	ND	0	12
Pen Branch at SRS Road A-13.2 (SV-2047)	ND	ND	ND	ND	ND	0	11
Steel Creek at S.C. 125/SRS Road A (SV-327)	ND	ND	ND	ND	ND	0	12
Steel Creek Boat Landing at RM 141 (SV-2018)	1.75	NA	1.75	1.75	1.75	1	12
Highway 301 Bridge at RM 118.8 (SV-118)	ND	ND	ND	ND	ND	0	11
Lower Three Runs Creek at SRS Road B (SV-2053)	ND	ND	ND	ND	ND	0	12
Supplemental Sample Location	**Average Concentration (pCi/L)**	**Standard Deviation**	**Median (pCi/L)**	**Minimum Detect (pCi/L)**	**Maximum Detect (pCi/L)**	**Number of Detections**	**Number of Samples**
Mary's Branch near Barnwell Barricade, SRS Road B (SV-2081)	5.09	3.09	3.76	2.88	13.20	10	12
Steel Creek off SRS Road C (SV-2064)	6.19	NA	6.19	6.19	6.19	1	12
Mill Creek at Woodward Road, Road E – ATTA (SV-2032)	2.44	NA	2.44	2.44	2.44	1	12
Beaver Dam Creek (SV-2040)	0.76	NA	0.76	0.76	0.76	1	12

Note:
1) Only 11 samples were collected for SV-118 and SV-2047 in 2023 due to a sampling error.
2) ND is Not Detected
3) NA is Not Applicable

Return to TOC

4.6.0 SUMMARY STATISTICS

2023 DHEC Monitoring Data-Beta

Ambient Sample Location	Average Concentration (pCi/L)	Standard Deviation	Median (pCi/L)	Minimum Detect (pCi/L)	Maximum Detect (pCi/L)	Number of Detections	Number of Samples
Jackson Boat Landing (SV-2010)	ND	ND	ND	ND	ND	0	12
Tims Branch at SRS Road C (SV-324)	4.42	NA	4.42	4.42	4.42	1	12
Upper Three Runs Creek at S.C. 125/SRS Road A (SV-325)	5.71	NA	5.71	5.71	5.71	1	12
Fourmile Branch at SRS Road A-12.2 (SV-2039)	6.33	NA	6.33	6.33	6.33	1	12
Pen Branch at SRS Road A-13.2 (SV-2047)	ND	ND	ND	ND	ND	0	11
Steel Creek at S.C. 125/SRS Road A (SV-327)	ND	ND	ND	ND	ND	0	12
Steel Creek Boat Landing at RM 141 (SV-2018)	ND	ND	ND	ND	ND	0	12
Highway 301 Bridge at RM 118.8 (SV-118)	ND	ND	ND	ND	ND	0	11
Lower Three Runs Creek at SRS Road B (SV-2053)	ND	ND	ND	ND	ND	0	12
Supplemental Sample Location	**Average Concentration (pCi/L)**	**Standard Deviation**	**Median (pCi/L)**	**Minimum Detect (pCi/L)**	**Maximum Detect (pCi/L)**	**Number of Detections**	**Number of Samples**
Mary's Branch near Barnwell Barricade, SRS Road B (SV-2081)	5.36	NA	5.36	5.36	5.36	1	12
Steel Creek off SRS Road C (SV-2064)	5.53	1.52	5.10	4.27	7.21	3	12
Mill Creek at Woodward Road, Road E – ATTA (SV-2032)	6.52	3.17	6.52	4.28	8.76	2	12
Beaver Dam Creek (SV-2040)	3.73	NA	3.73	3.73	3.73	1	12

Note:
1) Only 11 samples were collected for SV-118 and SV-2047 in 2023 due to a sampling error.
2) ND is Not Detected
3) NA is Not Applicable

Return to TOC

14.6.0 CHAPTER 5: NON-RADIOLOGICAL MONITORING OF SURFACE WATER ON SRS CORRECTIONS

5.6.0 SUMMARY STATISTICS

Notes for the 5.6.0 Summary Statistic Tables on pages 193-203:
1) NA is Not Applicable
2) ND is Not Detected
3) NS is Not Sampled
4) Chromium, Mercury, Nickel, and Thallium are not included in the table due to no detections in 2023 across all locations.
5) Total Alkalinity, Turbidity, BOD, TSS, E. Coli, TKN, Ammonia, Nitrate/Nitrite, Total Phosphorous, and Total Organic Carbon samples are not collected at Supplemental locations.
6) The number of samples per parameter is 12 unless otherwise stated below each location table. Variations in the number of samples per parameter is due to analytical errors.
7) All of the values were correct in the 2023 ESOP Report. Values were edited to have consistent decimal places.

5.6.0 SUMMARY STATISTICS

NWSV–324 Tims Branch at SRS Road C

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.42	0.35	6.30	6.09	7.32	12
	DO (mg/L)	8.38	2.43	8.64	1.59	10.95	12
	Water Temp (°C)	17.62	4.60	17.87	10.22	24.01	12
	Conductivity (mS/cm)	0.020	0.001	0.020	0.019	0.022	12
	TDS (mg/L)	0.013	0.001	0.013	0.012	0.014	12
Laboratory	Total Alkalinity (mg/L)	5.86	7.95	3.75	2.40	31.00	12
	Turbidity (NTU)	5.62	3.51	4.70	2.60	15.00	12
	BOD (mg/L)	ND	ND	ND	ND	ND	0
	TSS (mg/L)	10.84	16.35	6.00	4.00	60.00	11
	E. Coli (MPN/100mL)	207.76	126.50	175.60	30.90	488.40	12
	TKN (mg/L)	0.24	0.10	0.25	0.12	0.39	9
	Ammonia (mg/L)	ND	ND	ND	ND	ND	0
	Nitrate/Nitrite (mg/L)	0.087	0.034	0.093	0.029	0.140	12
	Total Phosphorus (mg/L)	0.036	0.009	0.037	0.024	0.051	12
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	0.85	0.15	0.83	0.66	1.20	12
	Copper (mg/L	0.081	NA	0.081	0.081	0.081	1
	Iron (mg/L)	1.79	0.73	1.55	1.10	3.20	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.41	0.04	0.40	0.35	0.52	12
	Manganese (mg/L)	0.058	0.019	0.054	0.034	0.096	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	3.78	0.53	3.65	3.10	5.10	12
	Aluminum (mg/L)	0.20	0.22	0.14	0.07	0.90	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	3.23	1.20	3.15	1.60	4.90	12

Note: Only 11 samples were collected for TSS from NWSV-324 throughout 2023.

5.6.0 SUMMARY STATISTICS

NWSV-325 Upper Three Runs Creek at S.C. 125/SRS Road A

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.83	0.44	6.72	6.10	7.56	12
	DO (mg/L)	8.82	1.33	9.32	6.96	10.97	12
	Water Temp (°C)	17.81	4.74	17.59	10.89	24.68	12
	Conductivity (mS/cm)	0.025	0.004	0.023	0.019	0.034	12
	TDS (mg/L)	0.016	0.003	0.015	0.012	0.022	12
Laboratory	Total Alkalinity (mg/L)	3.48	0.41	3.55	2.70	4.00	12
	Turbidity (NTU)	3.34	1.13	3.30	1.40	5.70	12
	BOD (mg/L)	2.00	NA	2.00	2.00	2.00	1
	TSS (mg/L)	5.81	6.22	4.70	1.20	24.00	11
	E. Coli (MPN/100mL)	209.86	195.10	156.10	108.10	816.40	12
	TKN (mg/L)	0.32	0.27	0.18	0.11	0.92	10
	Ammonia (mg/L)	0.059	NA	0.059	0.059	0.059	1
	Nitrate/Nitrite (mg/L)	0.153	0.048	0.150	0.084	0.270	12
	Total Phosphorus (mg/L)	0.039	0.017	0.037	0.020	0.086	12
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	2.04	0.12	2.00	1.80	2.20	12
	Copper (mg/L)	ND	ND	ND	ND	ND	0
	Iron (mg/L)	0.55	0.18	0.52	0.31	0.91	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.44	0.02	0.44	0.41	0.49	12
	Manganese (mg/L)	0.019	0.005	0.018	0.010	0.031	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	6.93	0.38	6.85	6.20	7.50	12
	Aluminum (mg/L)	0.22	0.15	0.17	0.09	0.64	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	4.15	2.09	3.50	2.30	10.00	12

Note: Only 11 samples were collected for TSS from NWSV-325 throughout 2023.

5.6.0 SUMMARY STATISTICS

NWSV-327 Steel Creek at S.C. 125/SRS Road A

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	7.09	0.42	7.13	6.40	7.78	12
	DO (mg/L)	8.18	1.26	8.22	6.14	10.33	12
	Water Temp (°C)	18.39	5.85	17.99	10.51	26.01	12
	Conductivity (mS/cm)	0.055	0.017	0.049	0.046	0.109	12
	TDS (mg/L)	0.036	0.011	0.032	0.030	0.071	12
Laboratory	Total Alkalinity (mg/L)	17.58	1.93	17.50	15.00	21.00	12
	Turbidity (NTU)	4.38	2.84	3.50	1.60	11.00	12
	BOD (mg/L)	ND	ND	ND	ND	ND	0
	TSS (mg/L)	7.83	8.96	4.00	1.30	30.00	11
	E. Coli (MPN/100mL)	98.39	30.58	110.90	44.10	145.00	12
	TKN (mg/L)	0.27	0.09	0.26	0.16	0.43	10
	Ammonia (mg/L)	0.065	NA	0.065	0.065	0.065	1
	Nitrate/Nitrite (mg/L)	0.047	0.015	0.051	0.020	0.063	12
	Total Phosphorus (mg/L)	0.031	0.010	0.027	0.025	0.050	6
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	6.28	0.70	6.30	4.50	7.30	12
	Copper (mg/L)	ND	ND	ND	ND	ND	0
	Iron (mg/L)	0.63	0.45	0.46	0.27	1.70	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.70	0.11	0.73	0.48	0.86	12
	Manganese (mg/L)	0.052	0.035	0.041	0.021	0.140	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	18.58	1.31	19.00	15.00	20.00	12
	Aluminum (mg/L)	0.25	0.25	0.13	0.06	0.76	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	4.31	1.01	4.35	3.00	6.10	12

Note: Only 11 samples were collected for TSS from NWSV-327 throughout 2023.

5.6.0 SUMMARY STATISTICS

NWSV-2039 Fourmile Branch at SRS Road A-12.2

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.46	0.49	6.35	5.82	7.52	12
	DO (mg/L)	9.27	1.22	9.33	7.52	10.94	12
	Water Temp (°C)	17.21	4.86	17.27	9.38	24.29	12
	Conductivity (mS/cm)	0.046	0.012	0.044	0.036	0.084	12
	TDS (mg/L)	0.028	0.002	0.029	0.024	0.031	12
Laboratory	Total Alkalinity (mg/L)	11.46	1.72	11.50	9.30	15.00	12
	Turbidity (NTU)	3.25	0.71	3.35	1.90	4.80	12
	BOD (mg/L)	2.10	NA	2.10	2.10	2.10	1
	TSS (mg/L)	3.07	1.60	2.70	1.10	6.80	11
	E. Coli (MPN/100mL)	116.84	66.72	113.25	54.60	290.90	12
	TKN (mg/L)	0.34	0.15	0.36	0.10	0.51	11
	Ammonia (mg/L)	ND	ND	ND	ND	ND	0
	Nitrate/Nitrite (mg/L)	0.505	0.213	0.570	0.220	0.790	12
	Total Phosphorus (mg/L)	0.084	0.028	0.083	0.030	0.140	12
	Cadmium (mg/L)	0.00022	NA	0.00022	0.00022	0.00022	1
	Calcium (mg/L)	3.68	0.26	3.65	3.30	4.10	12
	Copper (mg/L)	ND	ND	ND	ND	ND	0
	Iron (mg/L)	0.88	0.24	0.80	0.55	1.40	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.57	0.04	0.56	0.51	0.63	12
	Manganese (mg/L)	0.039	0.011	0.038	0.020	0.060	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	11.58	0.79	12.00	10.00	13.00	12
	Aluminum (mg/L)	0.12	0.04	0.11	0.06	0.17	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	4.54	1.16	4.60	3.00	7.00	12

Note: Only 11 samples were collected for TSS from NWSV-2039 throughout 2023.

5.6.0 SUMMARY STATISTICS

NWSV-2047 Pen Branch at SRS Road A-13.2

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.44	0.40	6.45	5.83	7.34	12
	DO (mg/L)	9.37	1.45	9.28	7.35	11.83	12
	Water Temp (°C)	16.95	5.18	17.05	9.38	24.38	12
	Conductivity (mS/cm)	0.053	0.005	0.053	0.046	0.061	12
	TDS (mg/L)	0.035	0.003	0.034	0.030	0.040	12
Laboratory	Total Alkalinity (mg/L)	18.75	3.25	19.00	13.00	24.00	12
	Turbidity (NTU)	4.82	1.23	4.95	2.60	6.80	12
	BOD (mg/L)	ND	ND	ND	ND	ND	0
	TSS (mg/L)	4.98	2.53	4.10	2.00	11.00	11
	E. Coli (MPN/100mL)	193.12	135.93	134.40	86.50	579.40	12
	TKN (mg/L)	0.28	0.13	0.29	0.12	0.43	10
	Ammonia (mg/L)	ND	ND	ND	ND	ND	0
	Nitrate/Nitrite (mg/L)	0.135	0.038	0.120	0.089	0.200	12
	Total Phosphorus (mg/L)	0.035	0.006	0.037	0.025	0.044	12
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	7.53	0.89	7.60	6.10	9.20	12
	Copper (mg/L)	ND	ND	ND	ND	ND	0
	Iron (mg/L)	0.85	0.18	0.91	0.55	1.10	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.65	0.07	0.64	0.56	0.75	12
	Manganese (mg/L)	0.048	0.011	0.046	0.032	0.067	12
	Zinc (mg/L)	0.019	0.001	0.019	0.018	0.020	2
	Hardness (mg/L)	21.50	2.15	21.50	18.00	25.00	12
	Aluminum (mg/L)	0.23	0.10	0.27	0.09	0.41	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	5.97	1.85	6.10	3.20	8.40	12

Note: Only 11 samples were collected for TSS from NWSV-2047 throughout 2023.

5.6.0 SUMMARY STATISTICS

NWSV-2053 Lower Three Runs Creek at SRS Road B

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.86	0.25	6.83	6.49	7.33	12
	DO (mg/L)	7.97	1.48	8.08	5.73	10.22	12
	Water Temp (°C)	21.50	6.34	19.84	12.61	30.34	12
	Conductivity (mS/cm)	0.033	0.002	0.033	0.029	0.036	12
	TDS (mg/L)	0.022	0.001	0.021	0.019	0.024	12
Laboratory	Total Alkalinity (mg/L)	11.17	0.83	11.00	10.00	13.00	12
	Turbidity (NTU)	1.75	0.73	1.50	1.10	3.50	11
	BOD (mg/L)	ND	ND	ND	ND	ND	0
	TSS (mg/L)	1.89	0.89	1.45	1.00	3.20	8
	E. Coli (MPN/100mL)	19.50	34.89	3.10	1.00	81.60	5
	TKN (mg/L)	0.28	0.11	0.23	0.16	0.50	10
	Ammonia (mg/L)	ND	ND	ND	ND	ND	0
	Nitrate/Nitrite (mg/L)	ND	ND	ND	ND	ND	0
	Total Phosphorus (mg/L)	ND	ND	ND	ND	ND	0
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	4.41	0.18	4.35	4.20	4.80	12
	Copper (mg/L)	0.210	NA	0.210	0.210	0.210	1
	Iron (mg/L)	0.46	0.28	0.39	0.23	1.30	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.44	0.02	0.44	0.41	0.46	12
	Manganese (mg/L)	0.051	0.025	0.047	0.026	0.120	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	12.75	0.62	13.00	12.00	14.00	12
	Aluminum (mg/L)	0.05	0.005	0.05	0.05	0.06	2
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	3.08	0.43	3.05	2.50	4.20	12

Note: Only 10 samples were collected for TSS and 11 samples collected for Turbidity and BOD from NWSV-2053 throughout 2023.

5.6.0 SUMMARY STATISTICS

NWSV-2055 Meyers Branch at SRS Road 9

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.83	0.18	6.85	6.56	7.15	12
	DO (mg/L)	9.54	1.15	9.44	8.07	11.28	12
	Water Temp (°C)	17.19	4.63	17.78	10.09	23.70	12
	Conductivity (mS/cm)	0.038	0.004	0.038	0.032	0.044	12
	TDS (mg/L)	0.024	0.002	0.025	0.021	0.029	12
Laboratory	Total Alkalinity (mg/L)	15.28	9.58	13.50	9.00	45.00	12
	Turbidity (NTU)	3.24	1.18	3.30	1.30	5.30	12
	BOD (mg/L)	ND	ND	ND	ND	ND	0
	TSS (mg/L)	4.72	2.34	4.30	1.10	8.10	11
	E. Coli (MPN/100mL)	245.24	102.99	212.00	141.40	461.10	12
	TKN (mg/L)	0.25	0.11	0.26	0.12	0.42	9
	Ammonia (mg/L)	ND	ND	ND	ND	ND	0
	Nitrate/Nitrite (mg/L)	0.108	0.022	0.110	0.075	0.150	12
	Total Phosphorus (mg/L)	0.023	0.003	0.022	0.021	0.027	3
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	5.68	0.59	5.65	4.60	6.70	12
	Copper (mg/L)	ND	ND	ND	ND	ND	0
	Iron (mg/L)	0.50	0.13	0.49	0.31	0.70	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.44	0.04	0.44	0.38	0.54	12
	Manganese (mg/L)	0.031	0.009	0.030	0.017	0.044	12
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	15.92	1.56	15.50	13.00	19.00	12
	Aluminum (mg/L)	0.19	0.08	0.21	0.06	0.33	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	4.70	1.49	5.30	2.60	6.50	12

Note: Only 11 samples were collected for TSS from NWSV-2055 throughout 2023.

5.6.0 SUMMARY STATISTICS

NWSV-2032 Mill Creek at Woodward Road, SRS Road E – ATTA (Supplemental)

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	5.44	0.49	5.22	4.83	6.16	12
	DO (mg/L)	6.47	2.47	6.16	2.78	10.37	12
	Water Temp (°C)	18.80	6.48	19.36	9.11	27.35	12
	Conductivity (mS/cm)	0.020	0.003	0.019	0.016	0.028	12
	TDS (mg/L)	0.014	0.004	0.013	0.011	0.023	12
Laboratory	Total Alkalinity (mg/L)	NS	NS	NS	NS	NS	NS
	Turbidity (NTU)	NS	NS	NS	NS	NS	NS
	BOD (mg/L)	NS	NS	NS	NS	NS	NS
	TSS (mg/L)	NS	NS	NS	NS	NS	NS
	E. Coli (MPN/100mL)	NS	NS	NS	NS	NS	NS
	TKN (mg/L)	NS	NS	NS	NS	NS	NS
	Ammonia (mg/L)	NS	NS	NS	NS	NS	NS
	Nitrate/Nitrite (mg/L)	NS	NS	NS	NS	NS	NS
	Total Phosphorus (mg/L)	NS	NS	NS	NS	NS	NS
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	0.67	0.39	0.58	0.43	1.90	12
	Copper (mg/L)	ND	ND	ND	ND	ND	0
	Iron (mg/L)	3.06	2.79	2.35	0.50	9.90	12
	Lead (mg/L)	0.0027	NA	0.0027	0.0027	0.0027	1
	Magnesium (mg/L)	0.63	0.62	0.46	0.38	2.60	12
	Manganese (mg/L)	0.079	0.078	0.063	0.030	0.320	12
	Zinc (mg/L)	0.040	NA	0.040	0.040	0.040	1
	Hardness (mg/L)	7.23	6.73	3.40	3.30	15.00	3
	Aluminum (mg/L)	0.66	1.37	0.30	0.14	5.00	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	NS	NS	NS	NS	NS	NS

Note: Only 3 samples were collected for Hardness from NWSV-2032 throughout 2023.

5.6.0 SUMMARY STATISTICS

NWSV-2040 Beaver Dam Creek (Supplemental)

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	4.45	0.72	4.28	3.81	6.50	12
	DO (mg/L)	7.24	1.87	7.08	5.06	11.05	12
	Water Temp (°C)	18.18	5.55	18.70	10.30	26.05	12
	Conductivity (mS/cm)	0.136	0.027	0.135	0.096	0.177	12
	TDS (mg/L)	0.089	0.017	0.088	0.064	0.115	12
Laboratory	Total Alkalinity (mg/L)	NS	NS	NS	NS	NS	NS
	Turbidity (NTU)	NS	NS	NS	NS	NS	NS
	BOD (mg/L)	NS	NS	NS	NS	NS	NS
	TSS (mg/L)	NS	NS	NS	NS	NS	NS
	E. Coli (MPN/100mL)	NS	NS	NS	NS	NS	NS
	TKN (mg/L)	NS	NS	NS	NS	NS	NS
	Ammonia (mg/L)	NS	NS	NS	NS	NS	NS
	Nitrate/Nitrite (mg/L)	NS	NS	NS	NS	NS	NS
	Total Phosphorus (mg/L)	NS	NS	NS	NS	NS	NS
	Cadmium	0.00017	0.00009	0.00014	0.00011	0.00034	9
	Calcium (mg/L)	12.58	2.91	12.00	9.00	20.00	12
	Copper (mg/L)	ND	ND	ND	ND	ND	0
	Iron (mg/L)	2.58	2.44	1.70	0.45	8.50	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	2.58	0.40	2.65	1.90	3.10	12
	Manganese (mg/L)	0.367	0.072	0.385	0.230	0.440	12
	Zinc (mg/L)	0.031	0.008	0.029	0.020	0.049	12
	Hardness (mg/L)	39.33	8.62	41.00	30.00	47.00	3
	Aluminum (mg/L)	1.57	0.63	1.40	0.63	2.80	12
	Beryllium (mg/L)	0.0026	0.0008	0.0025	0.0014	0.0040	12
	Total Organic Carbon (mg/L)	NS	NS	NS	NS	NS	NS

Note: Only 3 samples were collected for Hardness from NWSV-2040 throughout 2023.

5.6.0 SUMMARY STATISTICS

NWSV-2064 Steel Creek off SRS Road C (Supplemental)

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.00	0.28	6.03	5.54	6.58	12
	DO (mg/L)	8.69	0.97	8.60	7.19	10.80	12
	Water Temp (°C)	17.77	3.73	18.65	12.21	22.68	12
	Conductivity (mS/cm)	0.034	0.002	0.035	0.029	0.036	12
	TDS (mg/L)	0.022	0.001	0.023	0.019	0.023	12
Laboratory	Total Alkalinity (mg/L)	NS	NS	NS	NS	NS	NS
	Turbidity (NTU)	NS	NS	NS	NS	NS	NS
	BOD (mg/L)	NS	NS	NS	NS	NS	NS
	TSS (mg/L)	NS	NS	NS	NS	NS	NS
	E. Coli (MPN/100mL)	NS	NS	NS	NS	NS	NS
	TKN (mg/L)	NS	NS	NS	NS	NS	NS
	Ammonia (mg/L)	NS	NS	NS	NS	NS	NS
	Nitrate/Nitrite (mg/L)	NS	NS	NS	NS	NS	NS
	Total Phosphorus (mg/L)	NS	NS	NS	NS	NS	NS
	Cadmium (mg/L)	0.00024	NA	0.00024	0.00024	0.00024	1
	Calcium (mg/L)	4.21	0.41	4.25	3.10	4.60	12
	Copper (mg/L)	ND	ND	ND	ND	ND	0
	Iron (mg/L)	1.21	2.09	0.53	0.30	7.80	12
	Lead (mg/L)	0.0043	NA	0.0043	0.0043	0.0043	1
	Magnesium (mg/L)	0.51	0.03	0.51	0.47	0.55	12
	Manganese (mg/L)	0.078	0.106	0.046	0.032	0.410	12
	Zinc (mg/L)	0.015	NA	0.015	0.015	0.015	1
	Hardness (mg/L)	11.57	1.69	12.00	9.70	13.00	3
	Aluminum (mg/L)	0.36	0.53	0.16	0.07	1.90	11
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	NS	NS	NS	NS	NS	NS

Note: Only 3 samples were collected for Hardness from NWSV-2064 throughout 2023.

Return to TOC

5.6.0 SUMMARY STATISTICS

NWSV-2081 Mary's Branch near Barnwell Barricade, SRS Road B (Supplemental)

Parameters		Average	Standard Deviation	Median	Minimum Detect	Maximum Detect	Number of Detects
Field	pH (SU)	6.03	0.42	5.95	5.55	7.18	12
	DO (mg/L)	9.18	1.49	8.67	7.52	12.16	12
	Water Temp (°C)	17.81	4.51	19.13	10.45	23.50	12
	Conductivity (mS/cm)	0.022	0.002	0.022	0.018	0.026	12
	TDS (mg/L)	0.014	0.001	0.014	0.012	0.017	12
Laboratory	Total Alkalinity (mg/L)	NS	NS	NS	NS	NS	NS
	Turbidity (NTU)	NS	NS	NS	NS	NS	NS
	BOD (mg/L)	NS	NS	NS	NS	NS	NS
	TSS (mg/L)	NS	NS	NS	NS	NS	NS
	E. Coli (MPN/100mL)	NS	NS	NS	NS	NS	NS
	TKN (mg/L)	NS	NS	NS	NS	NS	NS
	Ammonia (mg/L)	NS	NS	NS	NS	NS	NS
	Nitrate/Nitrite (mg/L)	NS	NS	NS	NS	NS	NS
	Total Phosphorus (mg/L)	NS	NS	NS	NS	NS	NS
	Cadmium (mg/L)	ND	ND	ND	ND	ND	0
	Calcium (mg/L)	1.98	0.17	1.90	1.80	2.40	12
	Copper (mg/L)	0.017	NA	0.017	0.017	0.017	1
	Iron (mg/L)	0.53	0.32	0.44	0.20	1.40	12
	Lead (mg/L)	ND	ND	ND	ND	ND	0
	Magnesium (mg/L)	0.52	0.02	0.52	0.48	0.56	12
	Manganese (mg/L)	0.017	0.009	0.013	0.011	0.040	9
	Zinc (mg/L)	ND	ND	ND	ND	ND	0
	Hardness (mg/L)	6.83	0.49	6.60	6.50	7.40	3
	Aluminum (mg/L)	0.32	0.25	0.26	0.10	1.00	12
	Beryllium (mg/L)	ND	ND	ND	ND	ND	0
	Total Organic Carbon (mg/L)	NS	NS	NS	NS	NS	NS

Note: Only 3 samples were collected for Hardness from NWSV-2081 throughout 2023.

14.7.0 CHAPTER 6: MONITORING OF SEDIMENTS ON AND ADJACENT TO SRS CORRECTIONS

6.6.0 SUMMARY STATISTICS

2023 Alpha, Beta, & Cesium-137 Data Comparison for DHEC and DOE-SR Collocated Boat Landing Sampling Locations (SRNS, 2024)

Analyte	Average Concentration (pCi/g)	Standard Deviation	Median (pCi/g)	Minimum Detect (pCi/g)	Maximum Detect (pCi/g)	Number of Detections	Number of Samples
Gross Alpha	13.69	5.91	11.40	9.27	20.40	3	3
	16.43	3.11	15.50	13.90	19.90	3	3
Gross Beta	22.73	11.31	25.50	10.30	32.40	3	3
	22.93	5.74	24.10	16.70	28.00	3	3
Cs-137	0.06	0.04	0.06	0.03	0.08	2	3
	0.12	0.06	0.12	0.08	0.17	2	3

Note:
1) Shaded areas represent DHEC data and unshaded areas represent DOE-SR data.
2) NA is Not Applicable

2023 DHEC Non-radiological (Metals) Data

On-Site Streams

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	77.38	52.16	59.50	17.00	170.00	8	8	20
Beryllium	1.17	0.63	1.10	0.54	2.20	6	8	2.5*
Cadmium	1.86	0.38	1.90	1.40	2.40	5	8	1
Chromium	15.04	6.96	15.00	3.40	24.00	8	8	43.4
Copper	4.88	2.03	4.30	3.40	8.80	6	8	31.6
Lead	11.07	3.45	10.50	6.50	16.00	6	8	35.8
Manganese	345.88	294.56	270.00	47.00	1000.00	8	8	460
Mercury	0.10	NA	0.10	0.10	0.10	1	8	0.18
Nickel	6.86	4.76	6.00	2.00	17.00	8	8	22.7
Zinc	34.50	14.73	39.50	6.00	48.00	8	8	121

Note:
1) Beryllium does not have an established ESV for sediment, so in lieu of a sediment value, the ESV for soil was used.
2) NA is Not Applicable

Return to TOC

6.6.0 SUMMARY STATISTICS

2023 DHEC Non-radiological (Metals) Data

Creek Mouth Locations

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	121.00	40.68	110.00	65.00	170.00	5	5	20
Beryllium	0.93	0.49	0.85	0.34	1.70	5	5	2.5*
Cadmium	2.95	0.81	2.75	2.20	4.10	4	5	1
Chromium	22.26	11.35	22.00	6.30	38.00	5	5	43.4
Copper	9.00	4.26	7.95	5.10	15.00	4	5	31.6
Lead	13.98	5.63	12.50	8.90	22.00	4	5	35.8
Manganese	1160.00	353.27	1200.00	740.00	1500.00	5	5	460
Mercury	AE	AE	AE	AE	AE	AE	AE	0.18
Nickel	8.68	4.24	8.40	3.10	15.00	5	5	22.7
Zinc	47.60	23.90	45.00	15.00	82.00	5	5	121

Note:
1) Beryllium does not have an established ESV for sediment, so in lieu of a sediment value, the ESV for soil was used.
2) No Mercury data is reported for Creek Mouths due to an Analytical Error (AE).

6.6.0 SUMMARY STATISTICS

2023 DHEC Non-radiological (Metals) Data

Stormwater Basins

Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	43.00	12.77	46.00	29.00	54.00	3	3	20
Beryllium	1.05	0.07	1.05	1.00	1.10	2	3	2.5*
Cadmium	2.77	0.84	3.20	1.80	3.30	3	3	1
Chromium	37.33	10.07	36.00	28.00	48.00	3	3	43.4
Copper	6.00	3.47	4.20	3.80	10.00	3	3	31.6
Lead	19.60	10.80	22.00	7.80	29.00	3	3	35.8
Manganese	86.67	48.68	96.00	34.00	130.00	3	3	460
Mercury	ND	ND	ND	ND	ND	0	3	0.18
Nickel	8.43	1.93	9.50	6.20	9.60	3	3	22.7
Zinc	37.33	36.25	20.00	13.00	79.00	3	3	121

Note:
1) Beryllium does not have an established ESV for sediment, so in lieu of a sediment value, the ESV for soil was used.
2) ND is Not Detected

Return to TOC

6.6.0 SUMMARY STATISTICS

2023 DHEC Non-radiological (Metals) Data

Boat Landings

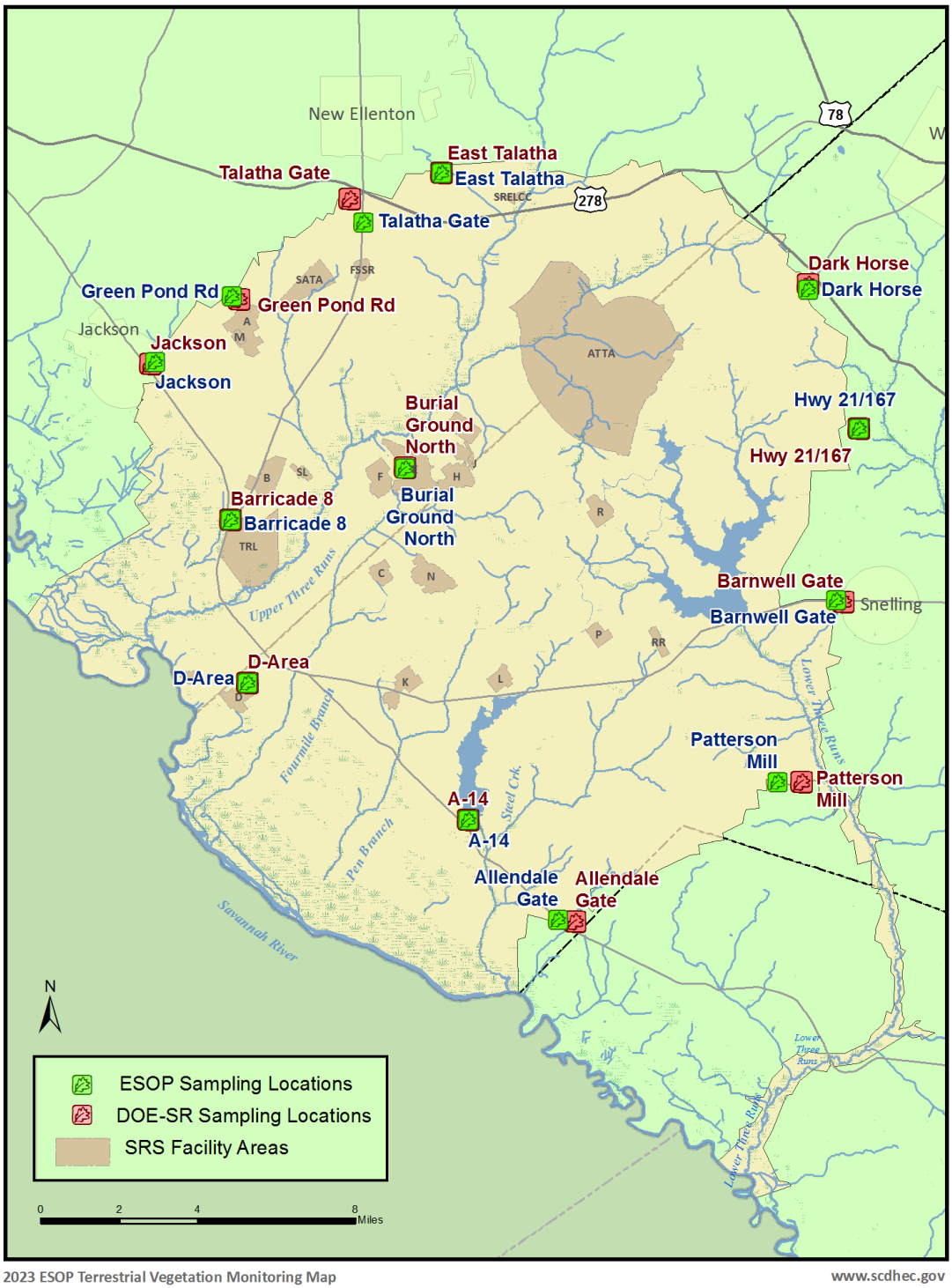
Analyte	Average Concentration (mg/kg)	Standard Deviation	Median (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Number of Detections	Number of Samples	ESV
Barium	59.69	46.06	54.00	7.20	150.00	9	9	20
Beryllium	0.71	0.47	0.52	0.34	1.60	6	9	2.5*
Cadmium	1.68	0.98	1.30	1.00	3.40	5	9	1
Chromium	12.26	8.39	11.00	4.90	32.00	9	9	43.4
Copper	7.43	6.18	5.40	1.40	18.00	9	9	31.6
Lead	12.56	10.34	7.60	5.40	30.00	5	9	35.8
Manganese	507.56	351.00	510.00	38.00	1100.00	9	9	460
Mercury	ND	ND	ND	ND	ND	0	7	0.18
Nickel	6.00	3.83	4.40	2.50	14.00	7	9	22.7
Zinc	33.44	22.77	24.00	10.00	76.00	9	9	121

Note:
1) Beryllium does not have an established ESV for sediment, so in lieu of a sediment value, the ESV for soil was used.
2) Boat Landing calculations include the split and independent samples from SMJBL23 and SMBFL23. Split samples from SMJBL23 and SMBFL23 were not sampled for mercury due to an Analytical Error.
3) ND is Not Detected

14.8.0 CHAPTER 8: RADIOLOGICAL MONITORING OF TERRESTRIAL VEGETATION ON AND ADJACENT TO SRS CORRECTIONS

8.4.0 MAP

Terrestrial Vegetation Monitoring Locations



2023 ESOP Terrestrial Vegetation Monitoring Map www.scdhec.gov

Note: “Terrestrial” was corrected for spelling.

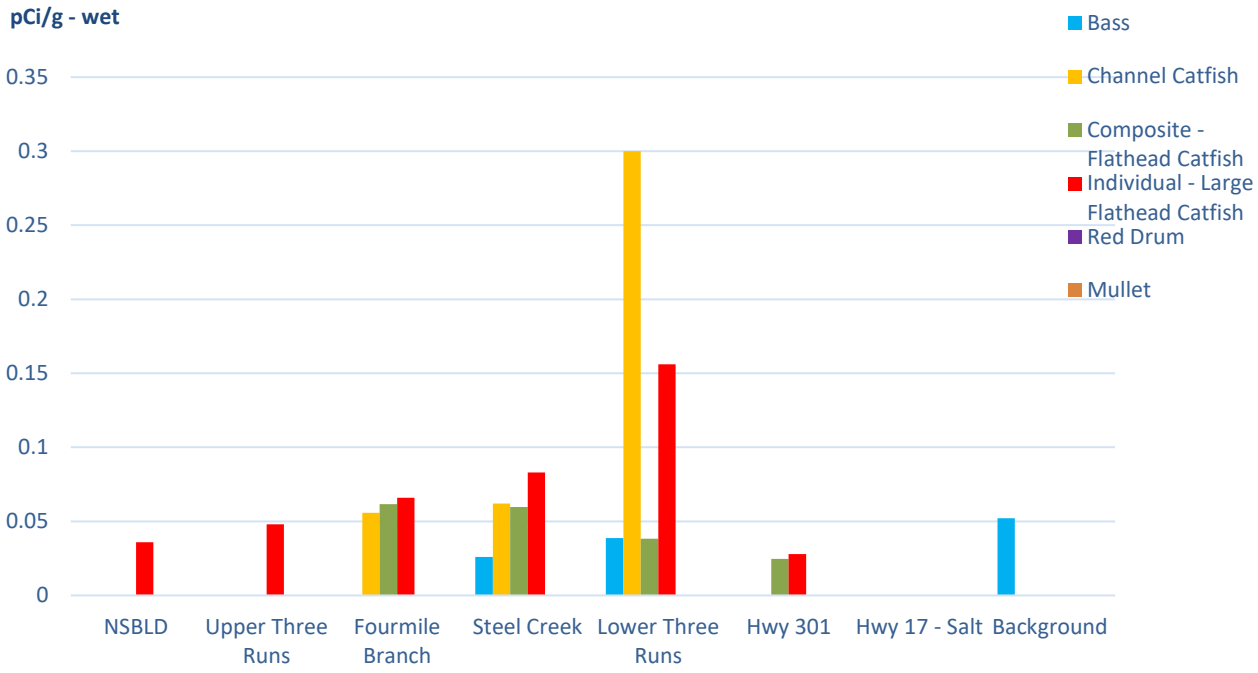
Return to TOC

14.9.0 CHAPTER 11: MONITORING OF FISH ADJACENT TO SRS CORRECTIONS

11.5.0 TABLES AND FIGURES

Notes for Figures 1-3:
1) Missing bars indicate <MDA
2) Red Drum and Mullet samples could not be analyzed for mercury due to a holding time error.
3) Mullet was added to the Legend in the tables.

Figure 1. 2023 DHEC Cesium-137 in Fish Composites



Return to TOC

11.5.0 TABLES AND FIGURES

Figure 2. 2023 DHEC Strontium-89/90 in Fish Bone Composites

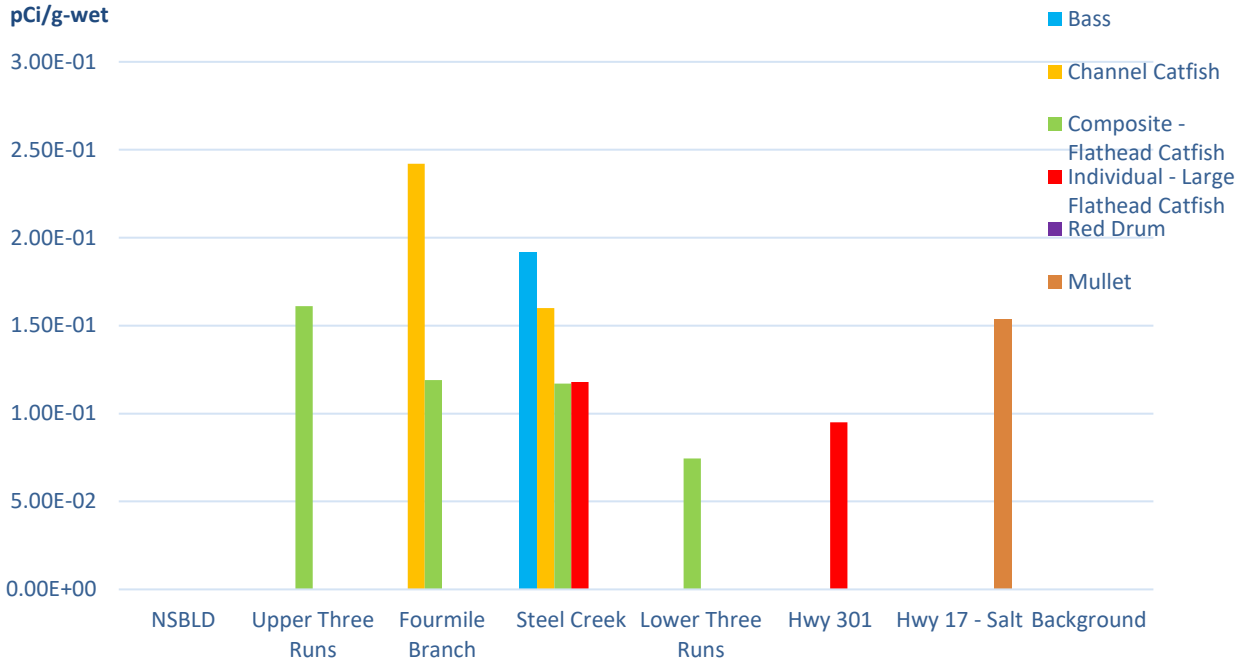
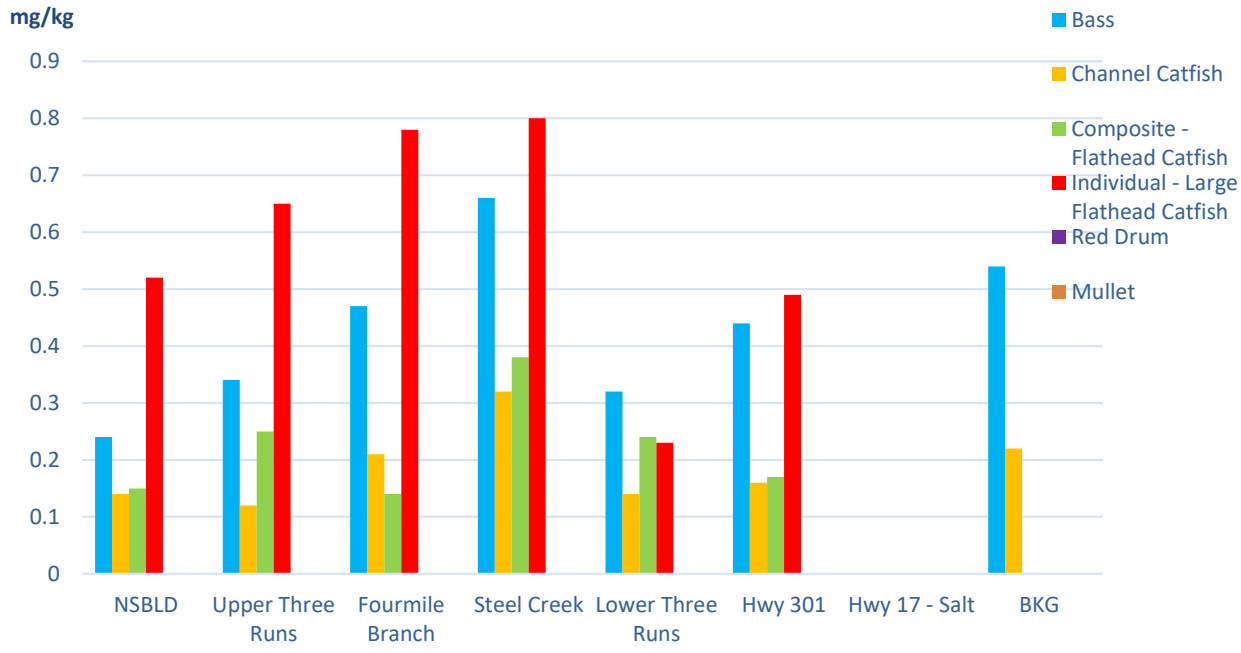


Figure 3. 2023 DHEC Mercury in Fish



Return to TOC

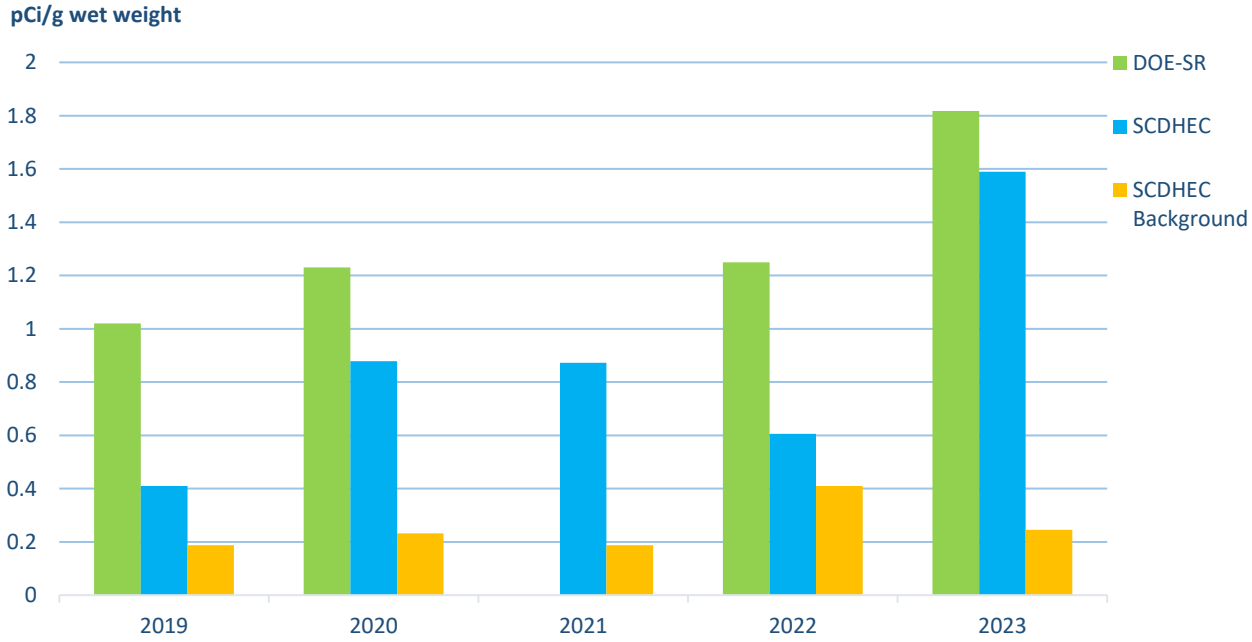
14.10.0 CHAPTER 12: RADIOLOGICAL MONITORING OF GAME ANIMALS ON AND ADJACENT TO SRS CORRECTIONS

12.1.0 PROJECT SUMMARY

White-tailed deer and feral hogs have access to several contaminated areas on and off SRS which allows them to be a vector for the redistribution of contaminants (primarily Cs-137). A five-mile study area was established based on a typical white-tailed deer upper limit home range to ensure that potentially contaminated deer residing at or near the SRS boundary would be included in the sample set. DOE-SR data is from on-site game samples only. In 2023, DHEC was able to collect samples on-site in addition to samples collected within the study area shown in Section 12.4.0, Map, which provides a better comparison of data with DOE-SR.

12.5.0 TABLES AND FIGURES

Figure 2. 2019-2023 Average Cs-137 Concentration in Deer (SRNS, 2020-2024; DHEC, 2020-2024)



Note:
1) 2019-2023 background location was Pinckney Island National Wildlife Refuge.
2) 2019, 2020, & 2022 DOE-SR concentrations are based on Field Gross Average Cs-137 Concentrations. DOE-SR did not collect deer samples in 2021. DHEC began calculating the DOE-SR concentration based on data provided by DOE-SR in 2024 for the 2023 Report Year. DHEC will continue to calculate DOE-SR average Cs-137 concentration in deer based on data provided by DOE-SR for the corresponding report year.

Return to TOC

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