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LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
ALARA	As Low As Reasonably Achievable
BMP	Best Management Practices
BSRA	Battelle Savannah River Alliance, LLC
CA	Composite Analysis
CAA	Clean Air Act
CEC	contaminants of emerging concern
CFR	Code of Federal Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act
D&D	Deactivation and Decommissioning
DOE	U.S. Department of Energy
DOE-SROO	U.S. Department of Energy-Savannah River Operations Office
DWPF	Defense Waste Processing Facility
EC&ACP	Environmental Compliance and Area Completion Projects
ECA	Environmental Compliance Authority
EM	Environmental Management
EEC	Environmental Evaluation Checklist
EMS	Environmental Management System
EPCRA	Emergency Planning and Community Right-to-Know Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FFA	Federal Facility Agreement
GPP	Groundwater Protection Program
HW	Hazardous Waste
HWMF	Hazardous Waste Management Facility
IC	Institutional Controls
IDW	Investigation Derived Waste
ISM	Integrated Safety Management
LUC	Land Use Controls
LLC	Limited Liability Corporation
LLW	Low-Level Waste
LLLW	Low-Level Liquid Waste
LLWF	Low-Level Waste Facility
LWO	Liquid Waste Operations
M&O	Management and Operations
MBA	Material Balance Area
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
mi	miles
mi ²	square miles
MNA	Monitored Natural Attenuation
mrem	millirem
MRWJ	Mueser, Rutledge, Wentworth, and Johnston Consulting Engineers

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
mSv	millisievert
MWMF	Mixed Waste Management Facility
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
NNSA-SRFO	National Nuclear Security Administration – Savannah River Field Office
NPDES	National Pollutant Discharge Elimination System
ORPS	Occurrence Reporting and Processing System
P2	Pollution Prevention
PA	Performance Assessment
PCB	polychlorinated biphenyl
PFAS	per- and polyfluoroalkyls substances
PPA	Pollution Prevention Act
RCRA	Resource Conservation and Recovery Act
SC	South Carolina
SCDES	South Carolina Department of Environmental Services
SCHWMR	South Carolina Hazardous Waste Management Regulations
SEPC	Site Environmental Protection Coordinator
SIRIM	Site Item Reportability and Issue Management
SPCC	Spill Prevention Control and Countermeasure
SDF	Saltstone Disposal Facility
S/RID	Standards/Requirement Identification Document
SRMC	Savannah River Mission Completion
SRNL	Savannah River National Laboratory
SRNS	Savannah River Nuclear Solutions, LLC
SRR	Savannah River Remediation LLC
SRS	Savannah River Site
SWM	Solid Waste Management
TSCA	Toxic Substances Control Act
TRI	Toxic Release Inventory
TRU	Transuranic
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VOC	volatile organic compound
Waste Min	Waste Minimization
WSRC	Westinghouse Savannah River Company
WSRC	Washington Savannah River Company LLC

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) Policy 450.4A, *Integrated Safety Management Policy* in conjunction with DOE Order 450.2, *Integrated Safety Management*, establish the expectation for safety, including integrated safety management that will enable DOE's mission goals to be accomplished efficiently while ensuring safe operations at all facilities and activities. In this policy, "safety" refers to environmental, safety, and health to encompass protection of the workers, the public, and the environment. DOE contractor requirements for integrated safety management (ISM) are implemented via the Department of Energy Acquisition Regulations clause at 48 CFR 970.5223-1, *Integration of Environment, Safety, and Health into Work Planning and Execution*. This Groundwater Protection Program (GPP) plan supports the Savannah River Site (SRS) Environmental Management System (EMS) program by providing a document that describes the integrated program for groundwater protection, management, monitoring, and restoration at the SRS. This plan also addresses specific requirements provided in DOE Order 458.1, *Radiation Protection of the Public and the Environment*, which establishes requirements to protect the public and the environment against undue risk from radiation associated with DOE radiological activities (DOE 2025). Specific DOE requirements addressed in this GPP document include:

- Demonstrating Compliance with the Public Dose Limit (DOE O 458.1, 4e)
 - (5) *Direct measurements must be made, to the extent practicable, to obtain information characterizing source terms, exposures, exposure modes, and other information needed in evaluating dose.*
 - (9) *Environmental monitoring must be conducted to characterize routine and non-routine releases of radioactive material from radiological activities, estimate the dispersal pattern in the environs, characterize the pathway(s) of exposure to members of the public and estimate the doses to individuals and populations in the vicinity of the site or operation commensurate with the nature of the DOE radiological activities and the risk to the public and the environment. Radiological monitoring must be integrated with general environmental and effluent monitoring. Environmental monitoring must include, but is not limited to:*
-

(a) *Effluent Monitoring*

(b) *Environmental Surveillance*

- Control and Management of Radionuclides from DOE Activities in Liquid Discharges (DOE O 458.1, 4g). Operators of DOE facilities discharging or releasing liquids containing radionuclides from DOE activities must:

(3) *Conduct activities to ensure that liquid releases containing radionuclides from DOE activities are managed in a manner that protects groundwater resources now and, in the future, based on use and value considerations.*

(10) *Manage the disposition of non-process water potentially containing radionuclides from DOE activities to protect soil and groundwater and prevent the creation of future cleanup sites.*

- Protection of Drinking Water and Groundwater (DOE O 458.1, 4i).

(1) *DOE sites must provide a level of radiation protection for persons consuming water from a drinking water system operated by DOE, directly or through a DOE contractor, which is equivalent to that provided to members of the public by the community drinking water standards of 40 CFR Part 141, National Primary Drinking Water Regulations (that is, not exceed the radionuclide maximum contaminant levels [MCLs]).*

(2) *Groundwater must be protected from radiological contamination to ensure compliance with dose limits in the Order and consistent with As Low As Reasonably Achievable (ALARA) process requirements. To this end, DOE must ensure that:*

(a) *Baseline conditions of the groundwater quantity and quality are documented*

(b) *Possible sources of, and potential for, radiological contamination are identified and assessed*

(c) *Strategies to control radiological contamination are documented and implemented*

(d) *Monitoring methodologies are documented and implemented*

(e) Groundwater monitoring activities are integrated with other environmental monitoring activities

2.0 SRS OVERVIEW

2.1 Site Location

SRS is a DOE complex constructed during the early 1950s to produce plutonium and tritium for nuclear weapons. The site borders the Savannah River and encompasses approximately 310 mi² in South Carolina (Figure 1). Savannah River Nuclear Solutions, LLC (SRNS) is responsible for the SRS Management and Operations (M&O) activities. Savannah River Mission Completion (SRMC) is responsible for the Liquid Waste Operations (LWO). Battelle Savannah River Alliance, LLC (BSRA) is responsible for management and operation of the Savannah River National Laboratory (SRNL).

2.2 Facilities/Mission

During the time when SRS produced materials for nuclear weapons, the Site encompassed five reactors, a heavy water reprocessing facility, separations areas, waste management facilities, a reactor material area, and administration and research facilities. In recent years, many of these facilities have been shut down. One of the current SRS missions is environmental stewardship focusing on groundwater restoration, deactivation and decommissioning (D&D) of excess contaminated facilities, and radioactive waste disposition. The National Nuclear Security Administration's (NNSA's) primary mission for SRS is to manage and process the nation's tritium for the nuclear stockpile and support nonproliferation goals, including producing plutonium pits and disposing of excess plutonium. Key activities involve the extraction, purification, recycling, and loading of tritium, as well as the development of capabilities for plutonium pit production and the permanent disposal of surplus plutonium.

2.3 Geology and Hydrogeology

The Atlantic Coastal Plain sequence beneath the SRS consists mostly of semi-consolidated clastic sediments - layers and various mixtures of sand, silt, clay, and gravel deposited by water in shallow marine, marginal marine, and nearshore fluvial environments. The groundwater system at SRS

consists of four major aquifers, which include from deepest to shallowest, the McQueen Branch, the Crouch Branch, the Gordon, and the Upper Three Runs Aquifers (Figure 2). Groundwater normally migrates downward and laterally either discharging into the Savannah River and its tributaries or migrating into the deeper regional aquifer system. The Site uses groundwater for process water in facilities and for drinking water. Based upon past operations, there are contaminated groundwater plumes that predominately occur within the shallow aquifers (Upper Three Runs and Gordon Aquifers). Drinking water wells extract groundwater from the deeper aquifers (Crouch Branch and McQueen Branch Aquifers) (SRNS 2011a).

2.4 Baseline Conditions

SRS has considerable knowledge of the Site's subsurface environment. This information includes core field descriptions, cone penetrometer electric logs, borehole geophysical logs, geotechnical data, cross-hole tomography/resistivity, ground penetrating radar, seismic data, borehole flow test data, aquifer pumping test data, slug test data, x-ray fluorescence, geochemical data, and groundwater level data.

Baseline characterization started in the early 1950s prior to construction of the SRS when the U.S. Army Corps of Engineers (USACE) performed an extensive evaluation of the subsurface. Their work included aerial photography, geologic mapping, and geotechnical drilling (USACE 1951 and USACE 1952). Since that time, numerous studies have investigated SRS's groundwater regime and geochemistry. A few of these studies are highlighted below.

- During the 1980's, the SRNL, formerly known as the Savannah River Laboratory (1951-1992) and the Savannah River Technology Center (1992-2004), installed a series of observation well clusters in remote and background areas (upgradient of operating facilities) at SRS (Bledsoe 1984, Bledsoe 1987, and Bledsoe 1988). These well clusters are referred to as the P Wells and are part of SRNL's current regional water-level monitoring program. P Well data have been utilized in local and regional groundwater flow models performed at SRS in support of various PAs, CAs, remedial action evaluations, facility siting(s), and the Underflow Study conducted by the United States Geological Survey (USGS).
-

- Marine (1976) provides one of the earliest comprehensive geochemistry studies for SRS. As part of this study, Marine documented and interpreted water rock analyses from the Bedrock Waste Storage Exploration Program and from earlier studies of bedrock exploration. Data collection spanned from 1961 to 1973 and included samples from the bedrock, Coastal Plain aquifers, and surface waters.
- In the 1970's, Mueser, Rutledge, Wentworth and Johnston (MRWJ) Consulting Engineers conducted investigations at the F-Area and H-Area Tank Farms (MRWJ 1974; MRWJ 1975a, MRWJ 1975b, MRWJ 1975c, MRWJ 1975d, MRWJ 1977a, and MRWJ 1977b). Much of this work focused on geotechnical characterization for engineering purposes (e.g., slope stability, settlement issues) and involved exploratory drilling, soil descriptions and testing, identification of the water table, construction of geologic cross-sections, and mapping of calcareous zones.
- The mineralogy and chemistry of principal hydrogeologic units and the geochemistry of the water in principal aquifers at SRS was evaluated as part of the Baseline Hydrogeologic Investigation (WSRC 1992). Groundwater analyses included major cations, anions, minor and trace elements, gross alpha and nonvolatile bet, tritium, stable isotopes of hydrogen, oxygen and carbon, and carbon-14. Sediments were analyzed for mineralogy in addition to major and minor elements.
- As part of the Underflow Study, the USGS evaluated groundwater levels, predevelopment groundwater flow and stream-aquifer relations in a 5,147 mi² study area that included SRS and adjacent parts of Georgia and South Carolina (Clark and West 1997 and Clark and West 1998).

In addition to these specific studies, other documents are also available that provide comprehensive baseline information regarding geology and hydrogeology at SRS including Aadland et al. (1995) and Denham (1999). Because of the extensive environmental dataset available for SRS, little baseline subsurface characterization work is currently commissioned. However, in areas where new facilities are planned, and existing baseline data is insufficient, further characterization is performed.

2.5 Drinking Water and Groundwater Use

Groundwater is the source of all domestic water at SRS, and is subject to South Carolina regulations R. 61-58, *State Primary Drinking Water Regulations*, (SC, 2025a) Table 3. Requirements include periodic sample collection and analysis by SRS and South Carolina Department of Environmental Services (SCDES) to ensure groundwater and drinking water meet bacteriological and chemical drinking water quality standards. Domestic water at SRS is monitored at onsite locations. A summary of results is reported annually in the Annual SRS Environmental Report. In addition, South Carolina regulation R.61-113, *Groundwater Use and Reporting*, (SC, 2025c) Table 3, requires annual reporting of groundwater withdrawals. SRS maintains thirteen (13) groundwater withdrawal permits or registrations and one surface water withdrawal permit. Annual reporting of groundwater and surface water use is reported to SCDES in January of each year.

2.6 Legacy Facilities

Past operations at SRS have resulted in the release of hazardous and radioactive substances to soil and groundwater in some instances with contamination levels exceeding regulatory thresholds. SRS was issued a Resource Conservation and Recovery Act (RCRA) permit on September 30, 1987. This permit included provisions for addressing releases from solid waste management units. Subsequently, SRS was placed on the National Priorities List (NPL) on December 21, 1989. In accordance with the terms of Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, the DOE - Savannah River Operations Office (DOE-SROO), the U.S. Environmental Protection Agency (USEPA) - Region IV, and the SCDES (the Parties) entered into an interagency agreement, the Federal Facility Agreement for the Savannah River Site (FFA, 1993). The FFA became effective on August 16, 1993, and is designed to integrate the CERCLA response action process with the corrective measures provisions of Section 3004(u) of RCRA. The FFA also establishes requirements for the prevention and mitigation of releases or potential releases at or from the SRS high-level radioactive waste tank system(s). The general purposes of the FFA are:

- Ensure the environmental impacts associated with past and present activities at the Site are thoroughly investigated and appropriate corrective/remedial action is taken to protect the public health and welfare and the environment
- Ensure all releases of hazardous substances, pollutants or contaminants as defined by CERCLA and all releases of hazardous wastes or hazardous constituents as defined by RCRA are addressed to achieve a comprehensive remediation of the Site
- Establish a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at the Site in accordance with CERCLA, the NCP, RCRA, and in accordance with applicable South Carolina law

The Environmental Compliance and Area Completion Projects (EC&ACP) organization is responsible for the D&D of contaminated facilities and remediation of contaminated soils, groundwater, surface water, and sediments to levels that comply with established regulatory standards, that protect human health and the environment and meet the expectations of the FFA.

As documented in the FFA, EC&ACP investigates areas with potential or known release of hazardous substances that have not yet been identified in the FFA agreement. Upon discovery of such a site, DOE at SRS notifies the USEPA Region IV and SCDES. Once the site assessments are complete, DOE submits the Removal Site Evaluations Reports to the USEPA Region IV and SCDES and if necessary, appropriate actions are taken (e.g., removal actions are initiated, or the site is added to the SRS Site Evaluation List, Appendix G in the FFA). A summary of activities is reported annually in the Annual SRS Environmental Report.

2.7 Operating Facilities

In addition to legacy sites, releases of hazardous and radioactive substances to the environment can also occur through ongoing Site operations. During day-to-day operations, liquid discharges and air emissions have the potential to release contaminants to the environment. SRS uses ALARA to manage these releases.

Effluent/waste monitoring and environmental surveillance programs at SRS are used to identify, characterize, trend, and report the effects, if any, of SRS operations on the public and the environment. The monitoring programs also verify compliance with applicable environmental regulations, DOE orders, and commitments made in environmental documents. Examples of the types of monitoring conducted at SRS are listed in Section 4.0 Control and Management of Radionuclides. Applicable SRS procedures are listed in Table 2. Results from these monitoring programs are documented in annual facility monitoring reports as well as the Annual SRS Environmental Report.

2.8 New Facilities

The SRS EMS implements and integrates the environmental requirements mandated by statutes, regulations, and policies. The EMS is executed by multiple contractors using documents, programs, and strategies tailored to organization-specific resources. NNSA-Savannah River Field Office (SRFO) and DOE-SROO at SRS oversee the contractors to ensure a consistent and integrated site program. As new facilities and missions are brought to SRS, the EMS will incorporate new or updated environmental programs and strategies.

3.0 DEMONSTRATION OF COMPLIANCE WITH PUBLIC DOSE LIMIT (DOE O 458.1, 4E)

3.1 Evaluation of Dose

At SRS, direct measurements of radiological effluent are made to the extent practical, and the results are documented in the Site's annual environmental report. In addition, some environmental surveillance data (surface water data) are used to determine the overall radiological source terms for dose analyses. Surface water data are used to quantify the shallow groundwater migration into site streams from the Solid Waste Disposal Facility and from the various closed waste sites and operating facilities.

The annual compliance dose analysis only encompasses radiological releases to the atmosphere and surface water since these are the primary media that can carry radiological contaminants offsite (SRNL 2016). Groundwater is not considered a primary carrier of radiological contaminants offsite because groundwater monitoring data for SRS show that only an estimated 3% of the Site

has been contaminated by radionuclides and there is no evidence that groundwater contaminated with radionuclides has migrated offsite (SRNS 2025a). Apart from the radiological source terms originating from the shallow groundwater migrating into site streams, onsite groundwater is not considered as a potential exposure pathway to offsite people. A summary of results is reported annually in the Annual SRS Environmental Report.

3.2 SRS Procedures

Environmental policies and management at SRS are guided and implemented to comply with federal, state, and local environmental laws and regulations, and DOE orders, notices, and directives. These requirements, as well as site procedures and controls, ensure that work is performed in a manner that safely manages radionuclides and protects drinking water and groundwater. SRS has developed and maintains a compendium of policies and procedures to ensure compliance with the public dose limit as required by DOE Order 458.1 (4)(e). A full revision to the *Savannah River Site DOE 435.1 Composite Analysis Monitoring Plan*, (SRNL 2010) was completed by SRNL in 2011, *Savannah River Site USDOE 435.1 Composite Analysis Monitoring Plan* (SRNL 2011) to align with the SRS Composite Analysis (CA) Monitoring Program updates based upon revisions to DOE Order 435.1. SRMC issues annual CA summary reviews. A summary of the SRS procedures related to compliance with the public dose limit is provided in Table 2.

3.3 Reporting and Compliance

A summary of the SRS procedures related to reporting and compliance with the public dose limit is provided in Table 2. Results from the various programs are included in the Annual SRS Environmental Reports and annual CA summary reviews issued by SRMC.

4.0 CONTROL AND MANAGEMENT OF RADIONUCLIDES (DOE O 458.1, 4G)

4.1 Environmental Policies and Management

Environmental policies and management at SRS are guided and implemented to comply with federal, state, and local environmental laws and regulations, and DOE orders, notices, and directives. These regulations, as well as site procedures and controls, ensure that work is

performed in a manner that safely manages radionuclides and protects drinking water and groundwater. Training and communication at SRS and within the surrounding community support the environmental management program by disseminating information and providing opportunities for improvements to the Site's overall environmental performance.

SRNS is the prime contractor for the M&O activities at the SRS for NNSA-SRFO. As such, groundwater monitoring is the responsibility of SRNS. SRMC is the prime contractor for the liquid waste operations at the Site. BSRA is the M&O contractor for SRNL. In addition, several other major contractors to NNSA-SRFO or DOE-SROO provide various support services to the Site or are constructing new facilities. These contractors and tenants are required to implement environmental protection and compliance programs as provided in program specific contracts and agreements with NNSA-SRFO or DOE-SROO and to support compliance with environmental permits issued directly to their organization or company. Specific requirements to implement site programs described herein can be found in functional service agreements or program-specific compliance and contract requirements.

4.1.1 Federal and South Carolina Regulations

SRS is subject to a host of state and federal regulations that pertain to the protection of groundwater from contaminants. Below is a summary of federal and state regulation titles and Table 3 includes a brief description of these regulations:

- SC R.61-56, *Onsite Wastewater Systems*
 - SC R.61-58, *State Primary Drinking Water Regulations*
 - SC R.61-67, *Standards for Wastewater Facility Construction*
 - SC R.61-68, *Water Classifications and Standards*
 - SC R.61-71, *South Carolina Well Standards*
 - SC R.61-82, *Proper Closeout of Wastewater Treatment Facilities*
 - SC R.61-87, *South Carolina Underground Injection Control*
 - SC R.61-92, Part 280: *Underground Storage Tank Control Regulations*
-

- SC R.61-107.19, *SWM: Solid Waste Landfills and Structural Fill*
- SC R.61-113, *Groundwater Use and Reporting*
- SC R.61-79, *Hazardous Waste Management* regulations equivalent to 40 CFR 260-282.
- 40 CFR 300-374, Implementing regulations for CERCLA and the *National Oil and Hazardous Substance Pollution Contingency Plan* (NCP).
- DOE Order 435.1, *Radioactive Waste Management* (DOE 2021)
- DOE Order 458.1, *Radiation Protection of the Public and the Environment* (DOE 2025)
- 40 CFR 156, 157, 170, *Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)* regulations
- The 1969 *National Environmental Policy Act (NEPA)*
- The 1976 *Toxic Substances Control Act (TSCA)*
- The 1972 *Clean Water Act (CWA)*
- The 1986 *Emergency Planning and Community Right-to-Know Act (EPCRA)*
- The 1990 *Pollution Prevention Act (PPA)*
- The 1996 *Amendments to the Safe Drinking Water Act*

4.1.2 Site Procedures

SRS procedures provide direction concerning environmental work and radiological control to ensure compliance with federal, state, and local environmental laws and regulations, and DOE orders, notices, and directives. A list of SRS procedures is provided in Table 2 and the following procedures provide examples of site controls that protect the environment from the release of hazardous and radioactive materials:

- The 5Q Manual, *Radiological Control*
 - The 3Q1 Manual, Section 200, *SRS Environmental Permitting Requirements Documents*,
-

- The 3Q1 Manual, Section 9000, *Hydrogeologic Data Collection Procedures and Specifications*
- The 3Q Environmental Compliance Manual, Section 1.0, *Groundwater*
- The 3Q Environmental Compliance Manual, Section 2.0, *Spills and Discharges*
- The 3Q Environmental Compliance Manual, Section 3.0, *Wells and Drinking Water*
- The 3Q Environmental Compliance Manual, Section 5.0, *Environmental Evaluation*
- The 3Q Environmental Compliance Manual, Section 6.0, *Waste*
- The 3Q Environmental Compliance Manual, Section 8.0, *Insecticides, Fungicides and Rodenticides*
- The 3Q Environmental Compliance Manual, Procedure 13.0, *Appraisals*
- The 3Q Environmental Compliance Manual, Section 18.0, *Site Coordination*

4.1.3 Training

Environmental training at SRS is conducted to ensure that personnel whose actions could have environmental consequences are properly trained and made aware of their responsibilities to competently protect the environment, workers, and the public. General environmental awareness training is provided to all SRS employees as part of their initial General Employee Training and subsequent Consolidated Annual Training. Specialized training is developed and offered through a centralized training organization that uses subject matter experts within the environmental programs. The environmental training program covers topics such as Environmental Laws and Regulations, Hazardous Waste Worker Responsibilities, and Hazardous and Radiological Waste Characterization. Environmental resources assigned to each facility/project include Environmental Compliance Authorities (ECAs). More than 50 environmental program-related training courses are listed in the site-training database and individual organizations schedule and perform other facility-specific, environmental related training to ensure that personnel have the knowledge and skills to perform work safely and in a manner that protects the environment in and around SRS.

4.1.4 Communication

The goal of environmental communications at SRS is to improve stakeholder understanding, to advance the Site's overall environmental performance, and to protect human health and the environment in the surrounding communities. Environmental communications are guided by regulatory policies as well as site procedures and programs. At the core of the communication and community involvement programs are the SRS Environmental Policy and the *Savannah River Site Federal Facility Agreement Community Involvement Plan* (SRNS 2011b). This plan describes the goals and types of community involvement activities implemented by SRS. Community involvement activities include the SRS Citizens Advisory Board, public meetings and workshops, public tours of SRS, and outreach opportunities.

Additional SRS forums include, but are not limited to:

- Senior Environmental Managers Council - senior-level environmental managers from all SRS contractors/tenants
- NNSA-SRFO's Environmental Compliance and Protection Division - SRS contractors/tenants and NNSA-SRFO environmental oversight staff
- SRS Regulatory Integration Team - DOE-SROO, USEPA Region IV, and SCDES representatives

CERCLA requires SRS to notify the National Response Center if an unpermitted release to the environment of a reportable quantity of a hazardous substance (including radionuclides) occurs. Reportable quantities are quantities of a hazardous substance greater than or equal to values specified in 40 CFR 302 "Designation, Reportable Quantities and Notification". A summary of reportable releases is provided each year in the Annual SRS Environmental Reports.

4.1.5 Environmental Evaluation Checklist (EEC)

Determining elements of activities, products, processes, and services that could have significant impact on the environment is part of the SRS EEC. This checklist is used site-wide to include research and development, environmental cleanup, waste disposal, Site operations, and D&D

activities. With the checklist, principal investigators, supervisors, and subject matter experts identify and evaluate the significance of potential hazards to the environment, permitting and compliance requirements, and address the generation of radioactive emissions, radioactive discharges, and other types of radioactive waste in addition to their potential impacts to surface water and groundwater. The EEC is part of the EMA process and is also used to document NEPA compliance.

4.1.6 Land Use Control

Land use controls (LUCs), as defined in the USEPA Region IV Policy and concerning real property on federal facilities, means any restriction or control that limits the use of and/or exposure to any portion of that property, including water resources, arising from the need to protect human health and the environment. SRS developed the *Land Use Control Assurance Plan for the SRS* (WSRC 1999) for the purpose of cooperating with the USEPA memorandum and protecting human health and the environment.

SRS utilizes a comprehensive planning process. This process entails a systematic method for ensuring a site-wide approach to moving the Site from the present into the future based on SRS strategic planning. A comprehensive plan is developed that addresses such things as land use, facilities, infrastructure, cultural resources, and natural resources. A site procedure is in place to ensure that proposed land use and facility activities are considered for consistency with the comprehensive plan. This process, along with the Site Use/Site Clearance Permit system, ensures that sites selected for an activity are the most appropriate and that any potential conflicts or problems are identified and solved prior to approval.

As part of the FFA, SRS along with USEPA (Region IV) and SCDES ensure that environmental impacts associated with past and present activities at SRS are thoroughly investigated, and that appropriate corrective/remedial actions are taken to protect public health and welfare and the environment. The *Land Use Control Assurance Plan for the SRS* (WSRC, 1999) highlights waste units within each watershed that have LUC/ICs as part of the selected remedy. As the three Parties (DOE-SROO, USEPA (Region IV), and SCDES) agree upon remedial decisions, the document is

periodically updated to highlight those waste units that require land use controls as part of the remedial decision.

4.1.7 Spills and Releases Prevention and Response

The *Savannah River Site Best Management Practices Plan* (SRNS 2019) along with site procedures (e.g., Manual 3Q, *Environmental Compliance Manual*, Procedure 2.3, “Best Management Practices”) guide site operations in the prevention of spills and releases. Similarly, for oil, there is the *Savannah River Nuclear Solutions Spill Prevention Control and Countermeasure Plan* (SRNS 2021) along with site procedures (e.g., Manual 3Q, Procedure 2.4, “Spill Prevention Control and Countermeasure [SPCC]”). The *Savannah River Site Best Management Practices Plan* (SRNS 2019) outlines site organizations involved in the development, implementation, oversight, and evaluation of Best Management Practices (BMP), and who are collectively in charge of identifying and preventing the discharge of hazardous and toxic materials into the environment.

Multiple documents and procedures guide site operations in the response to spills and releases and Table 2 provides a list and summary of SRS procedures.

4.2 Waste Management

4.2.1 Radioactive Waste Facilities

Part of the SRS’s mission is to clean up Cold War legacy by safely storing, stabilizing, and disposing of radioactive wastes. Solid radioactive wastes (low-level waste, mixed low-level waste, and transuranic [TRU] waste) are managed and stored in E Area facilities for eventual disposal in E Area facilities or shipment to offsite commercial disposal facilities, *Performance Assessment Maintenance Plan for E-Area Low-Level Waste Facility* (SRNS, 2025a). Liquid radioactive wastes are held in large storage tanks until they are processed on-site through one of several treatment facilities into a safe form for long-term storage and disposal, *Savannah River Site Liquid Waste Facilities Performance Assessment Maintenance Program Implementation Plan* (SRMC 2025b), *2024 Annual Groundwater Monitoring Report for the F- and H-Area Radioactive Liquid Waste Tank Farms* (SRNS 2024b), and *Z-Area Saltstone Disposal Facility Annual Groundwater Monitoring Report for 2024* (SRNS 2024c). These treatment facilities include:

- Defense Waste Processing Facility (DWPF), which immobilizes high-level waste in glass and seals it into stainless steel canisters for long-term storage and disposal
- Salt Waste Processing Facility (SWPF), which decontaminates the salt waste (removing strontium and cesium that is sent to DWPF before sending it to the Saltstone Disposal Facility (SDF)
- SDF, which processes and disposes of low-activity salt waste in a grout form

The *Savannah River Site Radiation Protection Program (RPP)* (SRNS 2023b) describes the methods used to ensure SRS implements the appropriate actions to comply with the requirements of DOE Order 458.1 (SRNS 2024a) and 40 CFR 835. DOE Order 458.1 specifies radiation dose standards for individual members of the public. The dose standard to the public is 100 mrem (1 mSv) per year for a person from routine DOE operations.

4.2.1.1 Facility Monitoring and Environmental Surveillance

Facilities that currently store or manage radioactive components (e.g., E-Area LLWF, SDF, high-level radioactive waste tanks) implement monitoring and verification programs to evaluate facility performance and ensure compliance with state and federal regulations. Environmental surveillance at SRS is designed to survey and quantify potential effects that operations could have on the Site and surrounding areas. These programs involve monitoring used to ensure that facilities have adequate radiological control and to protect the groundwater at SRS from radiological contamination. Annual reports are issued for F- and H-Area Radioactive Liquid Waste Tank Farms and Z-Area SDF.

4.2.2 ***Investigation-Derived Waste (IDW) Program***

The IDW Program at SRS oversees the handling and disposition of environmental media and job-associated waste from site investigations and remedial activities to ensure that the practices are protective of human health and the environment and comply with regulatory requirements for handling hazardous wastes. The *SRS Investigation-Derived Waste Management Plan* (WSRC 2007) describes the methods for handling environmental media and job-associated waste.

The IDW program possesses a multi-disciplined infrastructure that integrates the functions of waste management and ECAs at SRS. For IDW issues not identified in the *Savannah River Site Investigation-Derived Management Plan*, (WSRC 2007) the SRS ECA provides interpretation and guidance.

4.2.3 Hazardous and Mixed Waste Management

RCRA establishes regulatory standards for generation, transportation, storage, treatment, and disposal of hazardous waste, such as a flammable or corrosive liquid. USEPA (Region IV) authorizes SCDES to regulate hazardous waste and the hazardous components of mixed waste at SRS. Mixed waste is a mixture of both radioactive and hazardous waste.

At SRS, hazardous waste must be managed (i.e., treated, stored, transported, or disposed of) as defined by South Carolina Hazardous Waste Management Regulations (SCHWMR) or RCRA. SCDES has issued an RCRA hazardous waste permit to SRS. SRS procedures for management of hazardous and mixed waste are found in SRS 3Q Manual, Section 6.0, *Wastes*.

4.2.4 Waste Minimization Program

The Pollution Prevention (P2)/Waste Minimization (Waste Min) Program at SRS was established in recognition of controls directed by federal, state, and local regulations including the PPA, the CWA, the CAA, RCRA and others. The P2/Waste Min Program is implemented through site procedures and is another strategy in protecting groundwater from radiological contamination. The program approaches pollution prevention and management through a variety of methods. These methods include:

- Contamination Area Reduction
 - Green is Clean Reduction
 - Recyclable Anti-Contamination Materials
 - Wastewater Recycling during Tank Closure
 - Chemical Management Center
 - Used Oil Management
-

4.3 Closure and Remediation

The EC&ACP is responsible for the remediation of waste units and the D&D of excess facilities at SRS. Groundwater remediation at SRS is guided by federal and South Carolina regulations, primarily the Safe Drinking Water Act (SDWA) and R 61-58: *State Primary Drinking Water Regulations* (SC 2025a). Soils, surface water, and groundwater have been contaminated by releases of hazardous substances from historical operations. These areas of contamination are identified as waste units warranting investigation and possibly remediation. Groundwater contamination areas may be addressed as separate units or as part of larger units.

EC&ACP's *Savannah River Site Groundwater Management Strategy and Implementation Plan* (SRNS 2023a) includes specific objectives that address the protection of groundwater from radiological contamination. The plan's objectives are to:

- Mitigate potential human and ecological exposure to contaminated groundwater and surface water
- Minimize contaminated groundwater from impacting surface water above regulatory standards
- Control contaminated groundwater growth and contaminant migration
- Take actions to return aquifers to their intended beneficial use
- Meet regulatory requirements
- Reduce long-term costs of groundwater remediation and land use controls (including monitoring)
- Minimize carbon emissions and waste generation

The strategies of SRS's groundwater program focus on protection, monitoring, and remediation.

4.3.1 Groundwater Protection

In addition to the SCDES and USEPA programs that are designed to protect groundwater (e.g., Underground Storage Tank [UST] program, Underground Injection Control [UIC] program, and waste disposal program), prevention of future groundwater contamination and the disposition

of contamination sources are the primary ways by which SRS groundwater is protected. Key activities include removing or immobilizing contaminant sources before contamination can reach groundwater, reducing natural and artificial recharge in contaminated areas, and eliminating the opportunity for contaminants to reach groundwater along unsealed well casings or through wells that are no longer needed

4.3.2 Groundwater Monitoring

Extensive groundwater monitoring is conducted at SRS waste units and operating facilities. Wells are monitored regularly to meet sampling requirements in FFA-related approved monitoring plans and RCRA permits. In areas with groundwater contamination, the major contaminants are volatile organic compounds (VOCs) and tritium. However, metals and other radionuclides are also sometimes present. Groundwater monitoring plans are developed to satisfy regulatory requirements or address technical data needs at a specific time in the regulatory process. The status of contaminant plumes is reported annually, semiannually, etc., based on schedules negotiated with the regulators. SRNS also provides support to DOE-SROO in updating SRS groundwater plumes as part of a groundwater database maintained by DOE - Headquarters. Further description of the groundwater monitoring program is provided in EC&ACP's *Savannah River Site Groundwater Management Strategy and Implementation Plan* (SRNS 2023a) and SRMC's annual groundwater monitoring reports for Z-Area, SDF, E-Area Low-Level Waste Facility, and the F- and H-Area Radioactive Liquid Tank Farms.

4.3.3 Groundwater Remediation

Groundwater remediation is underway at SRS on a variety of plumes and groundwater contamination areas. The status of these plumes are reported annually, semiannually, etc., based upon schedules negotiated with the regulators. SRNS also provides support to DOE-SROO in updating SRS groundwater plumes as part of a groundwater database maintained by DOE - Headquarters. The effectiveness of these actions is evaluated and reported as required by SCDES and USEPA (Region IV). Annual summaries of the groundwater remediation projects are also reported in the Annual SRS Environmental Reports.

4.3.3.1 Graded Approach in Groundwater Remediation

The selection of groundwater remediation technologies for a specific contamination area is based on the size, contaminant type, contaminant concentration, and configuration of the plume. These attributes are the result of the nature and mass of the source of contamination and the subsurface characteristics around the plume. Aggressive active groundwater remediation technologies remove or immobilize sources and lower contaminant concentrations in plumes. As remediation projects mature and the bulk of contaminants are removed, it is most efficient to transition from robust active systems to passive, low-energy-consumption, low-carbon-emission technologies. The active systems are terminated and replaced with passive and low energy technologies. Ultimately, when final remedial goals have been met, the groundwater remediation systems can be permanently terminated. SRS has groundwater remediation projects in all phases of remediation.

4.3.3.2 Modeling in Support of Groundwater Remediation

Groundwater modeling is used to support groundwater corrective action/remediation selection. Groundwater flow and transport modeling is used to predict how groundwater contamination will change with time. Future contaminant concentrations in groundwater and at stream discharge locations can be predicted. This is helpful in determining whether monitored natural attenuation (MNA) is an appropriate alternative for a plume, or whether technologies that are more active are needed. MNA is a passive, cost-effective approach to remediation which relies on biological, geochemical and physical processes that facilitate the reduction of mass, toxicity, mobility, or volume of contaminants.

SRS uses a suite of groundwater modeling codes that are peer reviewed, widely used in the environmental professional community, utilized by other DOE sites, and accepted by both USEPA and SCDES. SRS also uses modeling to predict how residual radionuclide contamination in the hardened facilities may impact groundwater in the future, to support potential in-situ decommissioning decisions.

4.3.3.3 Remediation Examples

A range of active and passive (or low energy) remedial technologies, listed below, have been used at SRS to address sources and contamination already present in groundwater.

- Thermal (steam stripping and electrical resistance heating)
- Groundwater capture and air stripping
- Soil Vapor Extraction
- Tritiated Debris Remediation Project
- Barrier Wall and Base Injection System
- Silver Chloride Injection
- Tritium Phytoremediation Project
- In Situ Decommissioning of P and R Reactors
- Edible Oil Treatment with Bioaugmentation
- Permeable Reactive Barriers
- In-situ Chemical Oxidation

5.0 PROTECTION OF DRINKING WATER AND GROUNDWATER (DOE O 458.1, 4I)

Monitoring practices at SRS are conducted to ensure that soil and groundwater are not adversely impacted by liquid releases containing radionuclides. Monitoring entails both effluent/waste monitoring and environmental surveillance. Effluent/waste monitoring at SRS is conducted to demonstrate compliance with applicable environmental standards and regulations and to determine if a facility is performing as expected. It includes the collection and analysis of liquid discharges at the point where materials are released from site facilities in addition to the monitoring of waste matrices, structures (e.g., vaults), covers, vadose zone, surface water, and groundwater. Environmental surveillance at SRS is designed to survey and quantify potential effects that operations could have on the Site and surrounding areas. This program covers more than 31,000 mi² and extends up to 100 mi from the Site (SRNL 2011). Environmental surveillance includes routine sampling and analysis of surface water (site streams and the Savannah River), drinking water, soil, sediment, and groundwater. With results of this surveillance, scientists collect data to assess baseline conditions and the extent of migration and impact of contaminants that have entered the environment.

Figure 3 shows the programmatic documents associated with monitoring requirements at the SRS. DOE Orders 458.1 and 435.1 provide the basis of the monitoring requirements. From these Orders, policies, and implementation documents (e.g., manuals, lower-tier procedures) are utilized to ensure monitoring requirements are met.

5.1 Emerging Contaminants

Increasing national attention to “emerging contaminants” or contaminants of emerging concern (CEC) can trigger a call for action from federal, state, and local government. Increased monitoring and detections of unregulated substances can lead the EPA to identify solutions to address these substances that may present a risk to human health or the environment. Review of federal publications, and after discussions with EPA and SCDES, SRS adds emerging contaminants to analyte lists when historical or process knowledge indicates that a contaminant could be of concern. For example, 1,4-dioxane is one of the emerging contaminants that SRS monitors regularly in conjunction with VOC plumes under both RCRA Permit and FFA Operable Unit agreements.

Other recent CECs include per- and polyfluoroalkyls substances (PFAS). PFAS are a family of man-made chemicals that have been manufactured and used worldwide since the 1940s. They are present in various items such as cookware, stain repellants, food packaging, and firefighting foam. In 2019, SRS began assessing the past and present use of PFAS at the Site using *DOE Guide for Investigating Historical and Current Uses of Per- and Polyfluoroalkyl Substances at Department of Energy Sites* (DOE 2023). Based on fire training activities in D Area using firefighting foams containing PFAS chemicals, groundwater sampling of PFAS in D Area was conducted. Results from groundwater sampling indicate the presence of multiple PFAS compounds above regulatory standards. Ongoing investigation is refining the full extent of contamination and whether residual soil contamination exists that could further impact groundwater. SRS is committed to understanding the full nature and extent of PFAS contamination at SRS in other areas where potential disposal of PFAS could have occurred. The SRS groundwater monitoring sampling protocols ensure there is no cross-contamination in samples due to the presence of PFAS in many consumer products.

6.0 INTEGRATION OF ENVIRONMENTAL MONITORING ACTIVITIES

The SRNS Environmental Compliance Department is responsible for coordinating and providing environmental support and compliance-based oversight of SRS operations to ensure that site activities are conducted in accordance with all applicable state and federal environmental regulations, DOE directives and Orders, and in a manner that will have minimal impact on workers, the public, and the environment.

The SRS EMS implements and integrates the environmental requirements mandated by statutes, regulations, and policies. The EMS is executed by multiple contractors using documents, programs, and strategies tailored to organization-specific resources. The implementation strategy for SRNS, as the M&O contractor, SRMC, as the LWO contractor, and BSRA, as the M&O for SRNL, is documented in the 3Q Environmental Compliance Manual, Section 13.5, *Environmental Management System Implementation*. Other SRS contractors, such as Centerra Group, LLC, have their own procedures or programs that address EMS.

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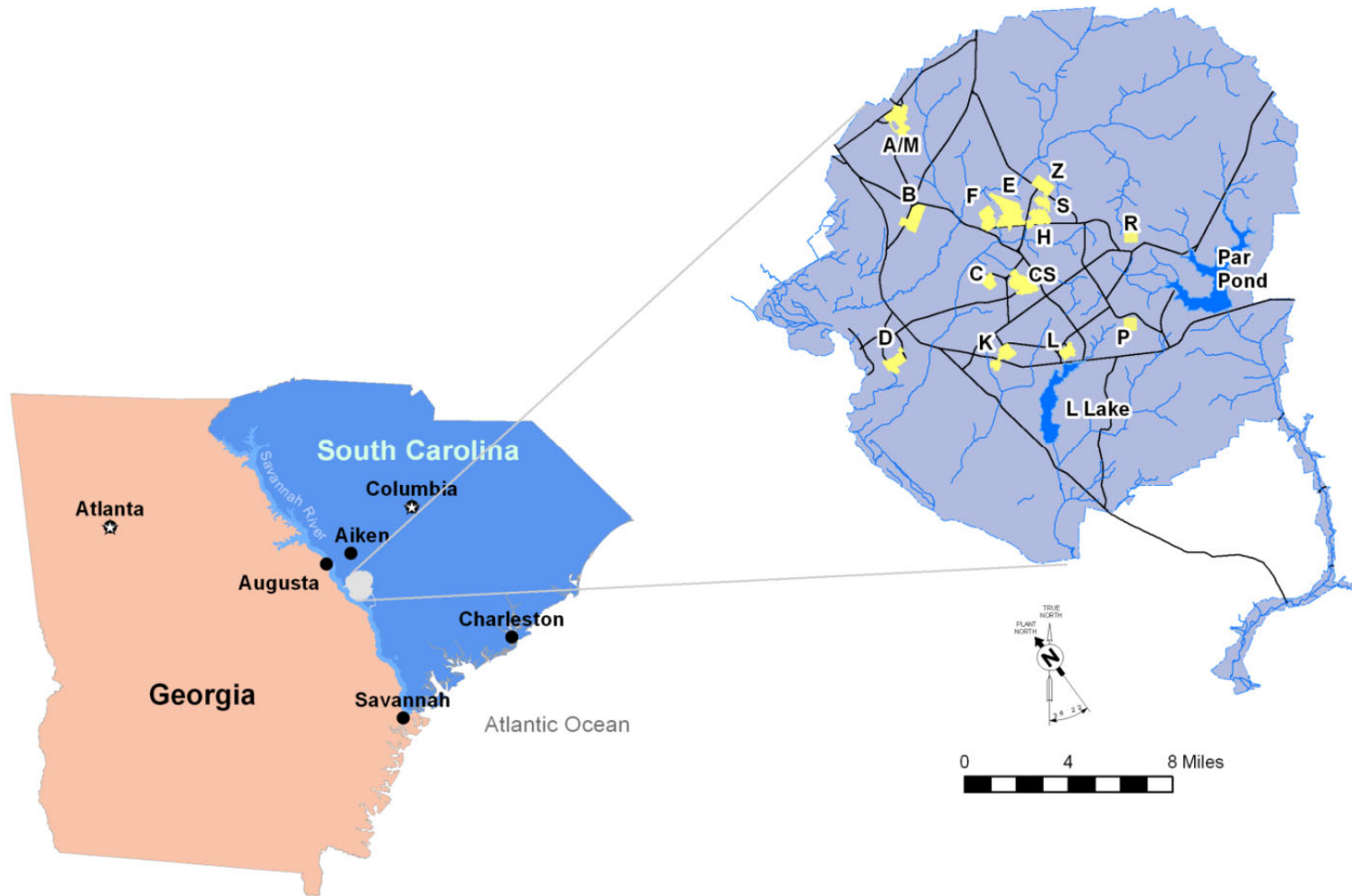


Figure 1. Map of SRS

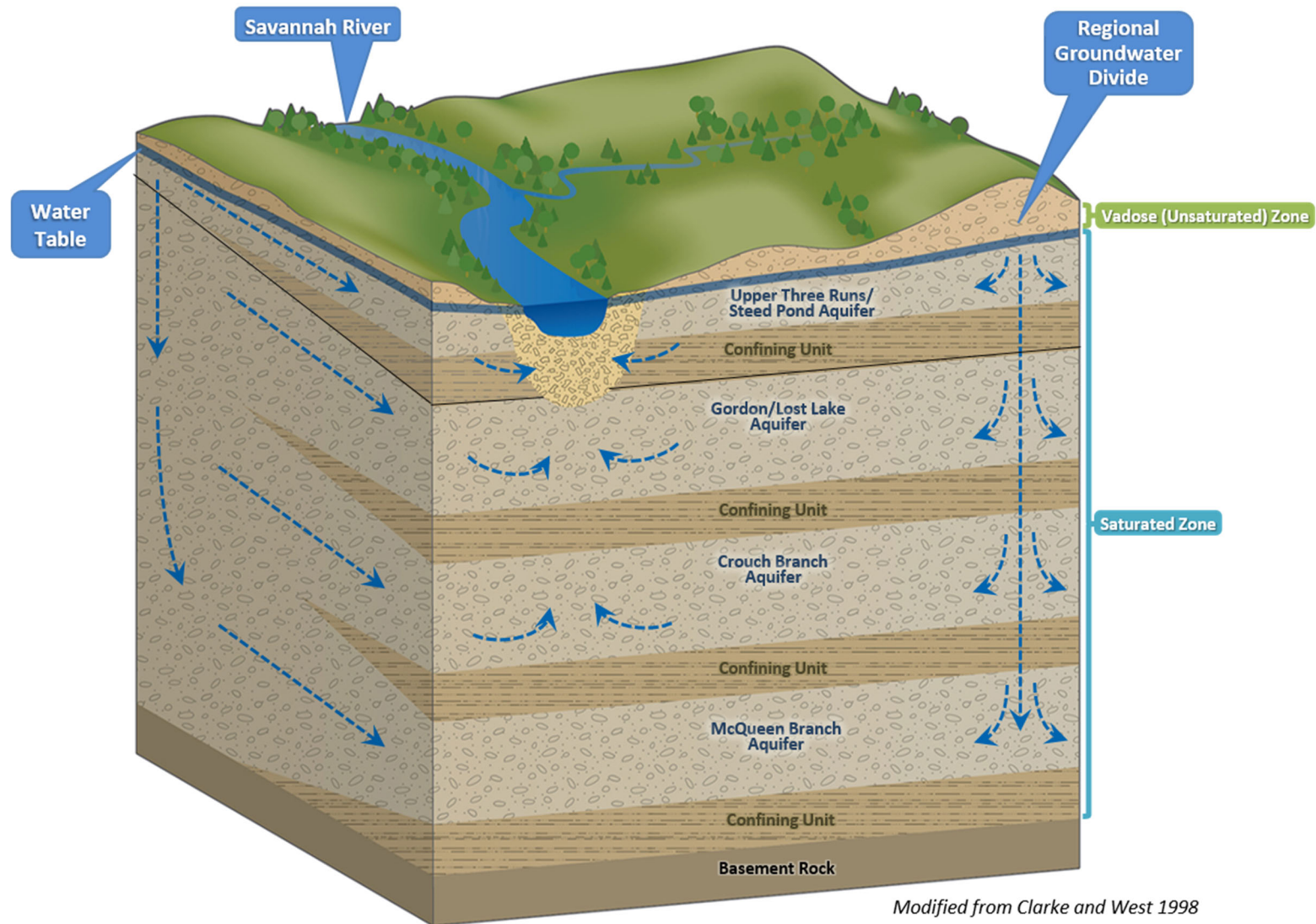


Figure 2. Groundwater at SRS

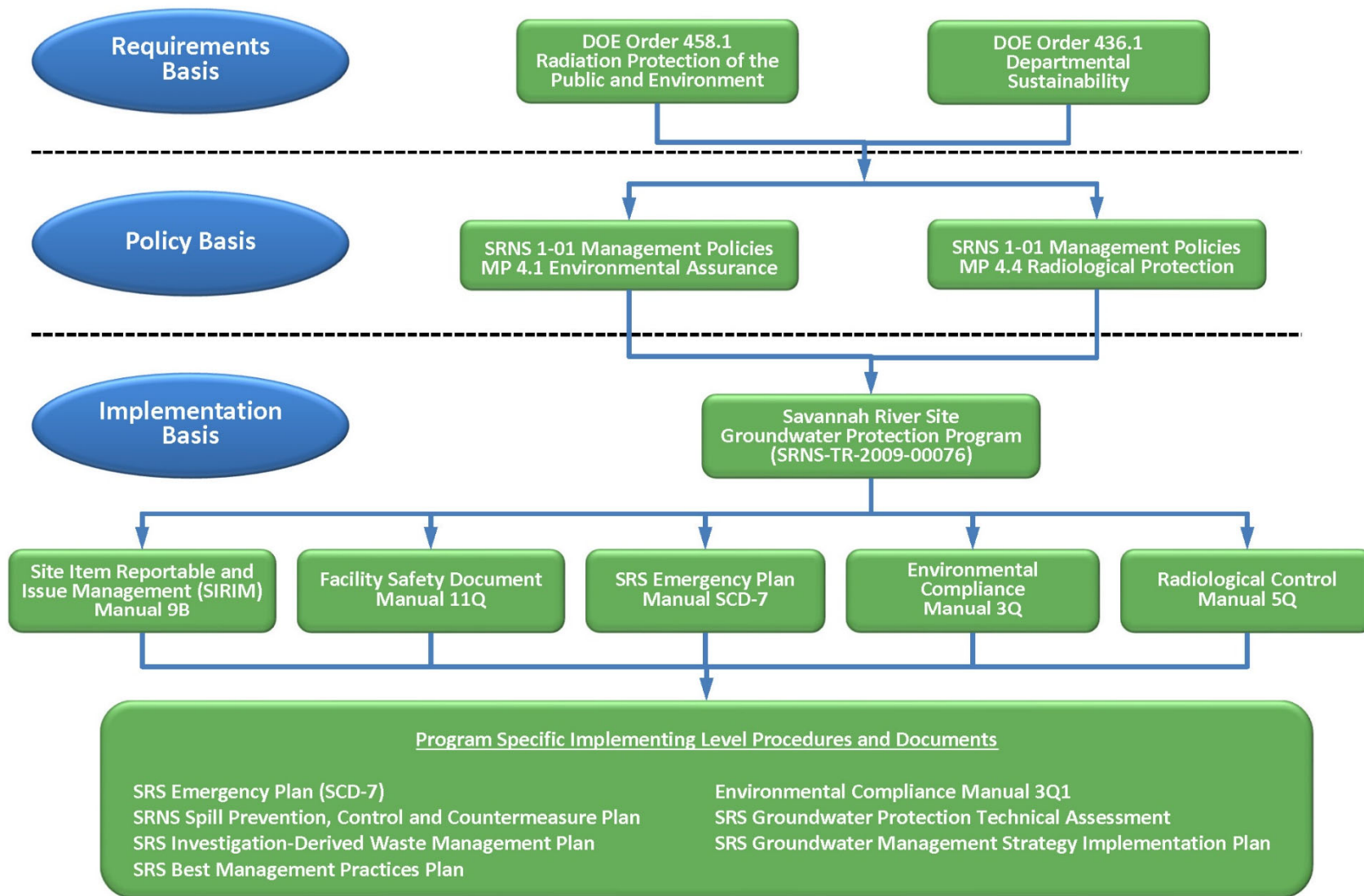


Figure 3. Programmatic Documents Associated with Monitoring Requirements

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Table 1. DOE Order 458.1 Requirements Table for Groundwater Protection

Summarized Requirement	DOE O 458.1 Source Citation	Section Discussed in this GPP Document	Other Sources
<p>Direct measurements must be made, to the extent practicable, to obtain information characterizing source terms, exposures, exposure modes, and other information needed in evaluating dose.</p>	<p>Demonstrating Compliance with the Public Dose Limit (4e) (5)</p>	<p>3.4 – Evaluation of Dose</p>	<p><i>Critical Radionuclide and Pathway Analysis for the Savannah River Site</i> (SRNL 2016)</p> <p><i>Radiological Impact of 2024 Operations at the Savannah River Site</i> (SRNL 2025)</p> <p><i>Savannah River Site Composite Analysis Total Facility Screening</i> (SRNL 2013)</p> <p><i>FY 2024 Savannah River Site Composite Analysis Annual Summary Review</i> (SRMC 2025a)</p> <p><i>Environmental Radiological Protection Program for DOE Order 458.1 Radiation Protection of the Public and the Environment</i> (SRNS 2024a)</p>

Table 1. DOE Order 458.1 Requirements Table for Groundwater Protection

Summarized Requirement	DOE O 458.1 Source Citation	Section Discussed in this GPP Document	Other Sources
<p>Environmental monitoring must be conducted to characterize routine and non-routine releases of radioactive material from radiological activities, estimate dispersal pattern in the environs, characterize pathway(s) of exposure to members of the public and estimate the doses to individuals and populations in the vicinity of the site or operation commensurate with the nature of the DOE radiological activities and the risk to the public and the environment. Radiological monitoring must be integrated with general environmental and effluent monitoring. include, but is not limited to: (a) Effluent Monitoring; (b) Environmental Surveillance</p>	<p>Demonstrating Compliance with the Public Dose Limit (4e) (9a and b)</p>	<p>3.4 – Evaluation of Dose</p>	<p>SRS 3Q, 4Q, and 5Q Manuals</p> <p><i>Critical Radionuclide and Pathway Analysis for the Savannah River Site (SRNL 2016)</i></p> <p><i>Environmental Radiological Protection Program for DOE Order 458.1 Radiation Protection of the Public and the Environment (SRNS 2024a)</i></p> <p><i>Radiological Impact of 2024 Operations at the Savannah River Site (SRNL 2025)</i></p> <p><i>Savannah River Site Environmental Report for 2024 (SRNS 2025b)</i></p> <p><i>Savannah River Site Pollution Prevention Plan for Savannah River Site Storm Water Outfalls Associated with Industrial Activity (SRNS 2025c)</i></p> <p><i>Performance Assessment Maintenance Plan for E-Area Low-Level Waste Facility (SRNS, 2025a)</i></p>

Table 1. DOE Order 458.1 Requirements Table for Groundwater Protection

Summarized Requirement	DOE O 458.1 Source Citation	Section Discussed in this GPP Document	Other Sources
Conduct activities to ensure that liquid releases containing radionuclides from DOE activities are managed in a manner that protects groundwater resources now and, in the future, based on use and value considerations	Control and Management of Radionuclides from DOE Activities in Liquid Discharges (4g) (3)	4.0 – Strategies to Control Hazardous Materials and Radiological Contamination 5.0 – Monitoring of Hazardous Materials and Radionuclides	SRS 3Q, 3Q Section 1.0, and 5Q Manuals <i>Savannah River Site Best Management Practice Plan</i> (SRNS 2019) <i>SRS Groundwater Management Strategy and Implementation Plan (U)</i> (SRNS 2023a) <i>Environmental Radiological Protection Program for DOE Order 458.1 Radiation Protection of the Public and the Environment</i> (SRNS 2024a) <i>Performance Assessment Maintenance Plan for E-Area Low-Level Waste Facility</i> (SRNS 2025b) <i>Savannah River Site Pollution Prevention Plan for Savannah River Site Storm Water Outfalls Associated with Industrial Activity</i> (SRNS 2025c) <i>Savannah River Site Liquid Waste Facilities Performance Assessment Maintenance Program Implementation Plan</i> (SRMC 2025b)
Manage the disposition of non-process water potentially containing radionuclides from DOE activities to protect soil and groundwater and prevent the creation of future cleanup sites	Control and Management of Radionuclides from DOE Activities in Liquid Discharges (4g) (10)	4.0 – Strategies to Control Hazardous Materials and Radiological Contamination 5.0 – Monitoring of Hazardous Materials and Radionuclides	SRS 3Q, 3Q Section 1.0, and 5Q Manuals <i>SRS Groundwater Management Strategy and Implementation Plan (U)</i> (SRNS 2023a) <i>Savannah River Site Liquid Waste Facilities Performance Assessment Maintenance Program Implementation Plan</i> (SRMC 2025b) <i>Environmental Radiological Protection Program for DOE Order 458.1 Radiation Protection of the Public and the Environment</i> (SRNS 2024a) <i>Savannah River Site Pollution Prevention Plan for Savannah River Site Storm Water Outfalls Associated with Industrial Activity</i> (SRNS 2025c)

Table 1. DOE Order 458.1 Requirements Table for Groundwater Protection

Summarized Requirement	DOE O 458.1 Source Citation	Section Discussed in this GPP Document	Other Sources
<p>DOE sites must provide a level of radiation protection for persons consuming water from a drinking water system operated by DOE, directly or through a DOE contractor, which is equivalent to that provided to members of the public by the community drinking water standards of 40 CFR Part 141, <i>National Primary Drinking Water Regulations</i> (that is, not exceed the radionuclide MCLs)</p>	<p>Protection of Drinking Water and Groundwater (4i) (1)</p>	<p>2.4 – Groundwater Use/ Conservation 4.0 – Strategies to Control Hazardous Materials and Radiological Contamination 5.0 – Monitoring of Hazardous Materials and Radionuclides</p>	<p>SRS 3Q, 3Q Section 3.0, and 5Q Manuals <i>Savannah River Site Groundwater Protection Technical Assessment</i> (SRNS 2011a) <i>SRS Groundwater Management Strategy and Implementation Plan (U)</i> (SRNS 2023a) <i>Environmental Radiological Protection Program for DOE Order 458.1 Radiation Protection of the Public and the Environment</i> (SRNS 2024a) <i>Savannah River Site Environmental Report for 2024</i> (SRNS 2025b)</p>
<p>DOE sites must provide a level of radiation protection for persons consuming water from a drinking water system operated by DOE, directly or through a DOE contractor, which is equivalent to that provided to members of the public by the community drinking water standards of 40 CFR Part 141, <i>National Primary Drinking Water Regulations</i> (that is, not exceed the radionuclide MCLs)</p>	<p>Protection of Drinking Water and Groundwater (4i) (1)</p>	<p>2.4 – Groundwater Use/ Conservation 4.0 – Strategies to Control Hazardous Materials and Radiological Contamination 5.0 – Monitoring of Hazardous Materials and Radionuclides</p>	<p>SRS 3Q, 3Q Section 3.0, and 5Q Manuals <i>Savannah River Site Groundwater Protection Technical Assessment</i> (SRNS 2011a) <i>SRS Groundwater Management Strategy and Implementation Plan (U)</i> (SRNS 2023a) <i>Environmental Radiological Protection Program for DOE Order 458.1 Radiation Protection of the Public and the Environment</i> (SRNS 2024a) <i>Savannah River Site Environmental Report for 2024</i> (SRNS 2025b)</p>

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Summarized Requirement	DOE O 458.1 Source Citation	Section Discussed in this GPP Document	Other Sources
DOE must ensure that: Baseline conditions of the groundwater quantity and quality are documented	Protection of Drinking Water and Groundwater (4i) (2a)	2.5 – Baseline Conditions 5.0 – Monitoring of Hazardous Materials and Radionuclides	SRS 3Q, 3Q Section 3.0, and 5Q Manuals <i>SRS Groundwater Management Strategy and Implementation Plan (U)</i> (SRNS 2023a) <i>Savannah River Site Environmental Report for 2024</i> (SRNS 2025b)
DOE must ensure that: Possible sources of, and potential for, radiological contamination are identified and assessed	Protection of Drinking Water and Groundwater (4i) (2b)	3.0 – Identification and Assessment of Contaminant Sources 5.0 – Monitoring of Hazardous Materials and Radionuclides	SRS 3Q, 3Q Section 3.0, and 5Q Manuals <i>Federal Facility Agreement for the Savannah River Site</i> (FFA 1993) <i>Savannah River Site Groundwater Protection Technical Assessment</i> (SRNS 2011a) <i>SRS Groundwater Management Strategy and Implementation Plan (U)</i> (SRNS 2023a) <i>Environmental Radiological Protection Program for DOE Order 458.1 Radiation Protection of the Public and the Environment</i> (SRNS 2024a)
DOE must ensure that: Strategies to control radiological contamination are documented and implemented	Protection of Drinking Water and Groundwater (4i) (2c)	4.0 – Strategies to Control Hazardous Materials and Radiological Contamination	SRS 3Q, 3Q1, and 5Q Manuals <i>SRS Groundwater Management Strategy and Implementation Plan (U)</i> (SRNS 2023a) <i>Savannah River Site Environmental Report for 2024</i> (SRNS 2025b) <i>Environmental Radiological Protection Program for DOE Order 458.1 Radiation Protection of the Public and the Environment</i> (SRNS 2024a)

Table 2. Summary of SRS Procedures Applicable to DOE Order 458.1 Requirements

Procedure No.	Title	Summary
1B Manual, Section 4.22	Control of Radiation Monitoring Equipment	Procedure establishes the requirements and responsibilities for the programmatic management of radiation monitoring equipment (RME) used at the SRS.
4B Manual	Training and Qualification Program	Procedures apply to the selection, training, qualification, and certification of personnel who, by action or inaction, can impact the safety basis through their involvement in the operation, maintenance, and technical support of SRS Hazard Category 2 and 3 Nuclear and Nonreactor Facilities as defined in DOE O 426.2A.
8B Manual	Compliance Assurance	Procedures define the general organizational structure, duties, responsibilities, and authorities for conducting the Performing Entity Compliance Assurance Program. The purpose of this procedure is to establish the necessary Performing Entity organizational infrastructure for effective program integration including effective communications and proper information flow. Further detailed organizational responsibilities are specified as part of other individual procedures in this manual.
9B Manual	Site Item Reportability and Issue Management (SIRIM)	Procedures are used to implement an Occurrence Reporting Program to ensure appropriate and timely identification, categorization, response, notification, investigation, reporting, and analysis of abnormal conditions and events in accordance with DOE O 232.2A, Occurrence Reporting and Processing of Operations Information, as committed in the Standards/Requirement Identification Document (S/RID). Portions of DOE O 232.2A committed through the S/RID that are appropriate and technically accurate for direct use are incorporated by direct reference into this procedure. For these instances, the user is sent to the applicable portions of DOE O 232.2A through the S/RID and/or Occurrence Reporting and Processing System (ORPS) webpage, accessible through the SRS Intranet.
13B Manual	Chemical Management	Procedures define the responsibilities and requirements for the receipt and storage of chemicals and the maintenance of the Site Chemical Inventory within the Chemical Safety Environmental Management Systems (CHMEMS) database, according to various regulatory criteria.

Table 2. Summary of SRS Procedures Applicable to DOE Order 458.1 Requirements

Procedure No.	Title	Summary
1C Manual	Facility Disposition Program	Procedure defines and outlines the SRS Facility Disposition Program mandated by DOE O 430.1C, Real Property Asset Management, and delineated in Management Policy 1-01, Procedure 5.24, Facility Disposition.
1Q Manual	Quality Assurance (QA)	Procedure provides requirements for the SRS-M&O, contractor QA Program. This documented Quality Assurance Program includes the policy, plans, manual(s), and implementing procedures or instructions required to define and control activities affecting quality.
3Q, Section 1.0	Groundwater Monitoring	Procedure outlines the permitting process and individual responsibilities involved in the installation or abandonment of groundwater monitoring wells at the SRS and establishes guidelines for the collection and analysis of groundwater or soil samples from monitoring wells or boreholes at the SRS. Includes descriptions of permitting processes and delineates responsibilities regarding domestic water wells and treatment systems, industrial wastewater systems, sanitary wastewater collection systems and treatments, septic tank and tile field systems, stormwater discharges, monitoring wells, and UIC systems.
3Q, Section 2.0	Spills and Discharges	Procedure includes NPDES Industrial Wastewater/Stormwater requirements, SPCC Plan, BMP Plan, wastewater collection/treatment, scavenger wastewater, radiological liquid effluent and releases to the environment.
3Q, Section 3.0	Wells and Drinking Water	Procedure includes permitting, drilling and abandonment of wells and UIC systems.
3Q, Section 4.0	Air Protection	Procedure includes air permitting, monitoring, inventory, and reporting for radiological, non-radiological, asbestos, refrigerants, halon, internal combustion engines.
3Q, Section 5.0	Environmental Evaluation	Procedure includes NEPA implementation and EECs.

Table 2. Summary of SRS Procedures Applicable to DOE Order 458.1 Requirements

Procedure No.	Title	Summary
3Q, Section 6.0	Waste	Procedure for identification, characterization, management, manifesting, transportation and disposal/treatment of solid wastes, special wastes, hazardous wastes, TSCA wastes, universal wastes and mixed wastes.
3Q, Section 8.0	Insecticides, Fungicides and Rodenticides	Procedure for compliance with Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).
3Q, Section 9.0	RCRA and CERCLA Documentation	Procedure for Administrative Record and Information Repository compliance.
3Q, Section 10.0	EPCRA Reporting	Procedure establishes requirements and responsibilities for preparing, managing, reporting, and submitting the Annual Tier II Chemical Inventory and the Toxic Release Inventory (TRI) Reports to the supporting environmental regulatory agencies for SRS.
3Q, Section 12.0	Relationships of Land, Water, Chemicals, and Health	Procedures establish requirements for wetlands permitting/protection and stormwater management.
3Q, Section 13.5	Environmental Management System Implementation	Procedure ensures the M&O, and the LWO and SRNL contractors and subcontractors organizations apply the principles and specific requirements of DOE Order 450.1A, Environmental Protection Program. This order mandates the integration of the IMS and the EMS which ensures sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources impacted by DOE operations.
3Q, Section 18.5	Site Coordination, Radiological Effluent Monitoring, Reporting, and Environmental ALARA Process	Procedure establishes requirements for monitoring and reporting radiological releases to the environment via process effluents (i.e., airborne or direct liquid discharges to the environment) and documents the process for establishing and trending data for the ALARA Program.

Table 2. Summary of SRS Procedures Applicable to DOE Order 458.1 Requirements

Procedure No.	Title	Summary
3Q, Section 21.0	Quality Control	Procedure establishes requirements for data quality objectives process, validation of environmental data, laboratory certifications, and chain of custody.
4Q Manual	Industrial Hygiene	Procedures establish requirements for industrial hygiene, special programs, chemical control programs, physical stress, laser safety, training/documentation, control of occupational exposure, respiratory protection, and hazardous waste operations.
5Q Manual	Radiological Control	Procedures establish requirements for excellence in radiological control, radiological standards, radiological work, radioactive materials, health support operations, training/qualifications, and radiological control records. The 5Q Manual focuses on minimizing the generation of radioactive waste and discharges to the environment and controlling contamination at its source.
6Q Manual	Emergency Management Program	Procedures establish requirements for development, maintenance, drills/exercises, and response organization for emergency response program.
7Q Manual	Site Security	Procedures establish requirements for safeguards/security, training, access, counterintelligence, vulnerability assessments for protection programs, information security and personnel security.
8Q Manual	Employee Safety	Procedures establish principles and program responsibilities for employee safety on site.
10Q Manual	Cyber Security	Procedures establish principles, roles, and responsibilities for compliance with DOE Orders and approved policies for EM and NNSA.
11Q Manuals	Facility Safety Document	Describes requirements and guidelines that apply to safety analysis and documentation activities implementing 10 CFR 830, Subpart B, Safety Basis Requirements, and associated standards and guides as discussed in Manual 11Q, Appendix A, Safety Analysis Criteria, and as noted in the Standards/Requirements identification Document (S/RID).

Table 2. Summary of SRS Procedures Applicable to DOE Order 458.1 Requirements

Procedure No.	Title	Summary
14Q Manuals	Material Control and Accountability	The procedures define the process of appointing a Material Balance Area (MBA) Custodian including qualifications, site approval, and removal. This procedure establishes the general responsibilities and defines the requirements applicable whenever a change in MBA Custodianship occurs.
SCD-7 Program Manual	SRS Emergency Plan	Plan outlines the internal emergency response organization, notification, protective actions, facilities, and equipment.
SCD-6 Program Manual	SRS ALARA Program	Program establishes the site-wide ALARA program for radiation exposure to onsite personnel and discharges to the environment and exposures to the public for compliance with DOE Orders, policies and Title 10 Code of Federal Regulations, Part 835 Occupational Radiation Protection (10 CFR 835).
1S Manual	Radioactive Waste Requirements	The procedure establishes waste acceptance requirements for characterization, packaging, and certification of solid Low-Level Radioactive Waste (LLW), Low-Level Liquid Waste (LLLW), Hazardous Waste (HW), Mixed (hazardous and radioactive) Waste (MW), Polychlorinated Biphenyl (PCB) Waste, and TRU Waste/Mixed Transuranic (MTRU) Waste as presented to SRS Solid Waste Management (SWM) for disposition.

Table 3. Summary of Federal and State Regulations and DOE Orders

SC Regulations	Description	Summary	Federal Regulations	DOE Orders
SC R.61-9	Criteria and Standards for the National Pollutant Discharge Elimination System	Regulations establish the NPDES permit program for which SC has primacy from USEPA. Also applies to owners or operators of any treatment works treating domestic sewage, whether or not the treatment works is otherwise required to obtain an NPDES permit, unless all requirements implementing section 405(d) of the CWA applicable to the treatment works treating domestic sewage are included in a permit issued under the appropriate provisions of subtitle C of the SWDA, Part C of the SDWA, the Marine Protection, Research, and Sanctuaries Act of 1972, or the Clean Air Act, or under a Land Application or State permit issued by the Department under R.61-9.505, as adequate to assure compliance with section 405 of the CWA.	40 CFR 125	
SC R.61-31	Radioactive Materials (Title A)	Regulations apply to all persons who receive, possess, use, transfer or acquire any radioactive material; provided, however, that nothing in these regulations shall apply to any person to the extent such person is subject to regulation by the U.S. Nuclear Regulatory Commission.	10 CFR 20, 37, 71, and 49 CFR 173	
SC R.61-58	Primary Drinking Water Regulations correspond to the Safe Drinking Water Act regulations	Requirements for water systems with groundwater sources. Requirements include periodic sample collection and analysis by SRS and SCDES to ensure groundwater and drinking water meet bacteriological and chemical drinking water quality standards consistent with the MCL and MCLGs	40 CFR 141-143	

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SC Regulations	Description	Summary	Federal Regulations	DOE Orders
SC R.61-67	Standards for Wastewater Facility Construction	Permitting requirements for construction of wastewater treatment systems, including groundwater treatment units such as the air stripper at M-Area, and (historically) the groundwater treatment systems at F-Area and H-Area Seepage Basins.		
SC R.61-68	Water Classifications and Standards	Classification for all South Carolina groundwater as Class GB effectively requiring groundwater to be below MCLs set forth in R.61-58	40 CFR 131	
SC R.61-71	South Carolina Well Standards	Requirements for monitoring wells (temporary and permanent/conventionally drilled and direct push) and environmental borings at SRS. Issues related to driller certification, well construction, identification and abandonment, data generated, and SCDES approval prior to installation and abandonment of monitoring wells	No Equivalent	
SC R.61-79	Hazardous Waste Management Regulations corresponding to Resource Conservation and Recovery Act (RCRA)	Regulations apply to all generators, transporters, or owners or operators of treatment, storage, or disposal facilities	40 CFR 260-282	
SC R.61-81	State Environmental Laboratory Certification Program	Regulation applies to any laboratory performing analyses to determine the quality of air, drinking water, hazardous waste, solid waste, or wastewater; performing bioassays or environmental quality evaluations required by SCDES or which will be officially submitted to SCDES	No Equivalent	

Table 3. Summary of Federal and State Regulations and DOE Orders

SC Regulations	Description	Summary	Federal Regulations	DOE Orders
SC R.61-82	Proper Closeout of Wastewater Treatment Facilities	Provides requirements for cessation of a wastewater treatment facility to mitigate current or prevent future impacts to the environment.	No Equivalent	
SC R.61-87	South Carolina Underground Injection Control	Regulates the injection of fluids into the subsurface by means of an injection well. This regulation impacts SRS groundwater corrective action projects, which have enabled the installation of Class V injection wells for the re-injection of treated water and nutrient addition. EC&ACP maintains a variety of applications for construction permits and permits to operate.	40 CFR 144-146	
SC R.61-92	Underground Storage Tank Control Regulations	Subparts E and F are concerned with releases from UST systems. Subpart E discusses the reporting of releases from a UST system. Groundwater related site characterization and corrective action because of UST system releases are discussed in Subpart F.	40 CFR 280	
SC R.61-107	SWM: Solid Waste Landfills and Structural Fill	Subpart E of Parts IV and V is concerned with groundwater monitoring and corrective action for landfills. SRS has four landfills on site that are subject to the requirements of this Subpart and include the Interim Sanitary Landfill, SDF, 632-G Class 2 Landfill, and the 288-F Ash Landfill.	40 CFR 258	
SC R.61-113	Groundwater Use and Reporting	Requires annual reporting of groundwater use for all wells withdrawing 3 million gallons or more.	No Equivalent	

Table 3. Summary of Federal and State Regulations and DOE Orders

SC Regulations	Description	Summary	Federal Regulations	DOE Orders
No Equivalent	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP)	Implementing regulations for CERCLA Subchapter J, Superfund, Emergency Planning and Community Right-to-Know Programs. Includes the NCP.	40 CFR 300-374	
	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	FIFRA implementing regulations of which the 1996 amendments EPA instructed federal agencies to use Integrated Pest Management techniques (40 CFR 171.9)	40 CFR 156, 157, 170, and 171	
	National Environmental Policy Act (NEPA)	Implementing regulations for NEPA promulgated through Department of the Interior. Mandates that federal agencies identify and consider the potential environmental consequences of their proposed actions early in the planning process, so they can make informed and environmentally sound decisions regarding project design and implementation.	43 CFR 46	
	Toxic Substances Control Act (TSCA)	Implementing regulations for TSCA under 40 CFR Subchapter R	40 CFR 700-799	

Table 3. Summary of Federal and State Regulations and DOE Orders

SC Regulations	Description	Summary	Federal Regulations	DOE Orders
	Clean Water Act	Establishes a program to regulate pollutant discharges into U.S. waters through the NPDES permits for point sources, sets water quality standards that states must implement, and requires permits for the discharge of dredged or fill materials into wetlands through the Section 404 program. The CWA also mandates technology-based standards for industrial facilities, such as effluent guidelines for industrial wastewater and secondary treatment standards for municipal treatment plants and requires SPCC plans for oil pollution.	40 CFR 308, 309, 401, 402, and 404	
	Radioactive Waste Management	This order requires that a PA be conducted to demonstrate facility operations and closure remain protective of the groundwater. The order also requires a site-wide analysis, the CA, to ensure that DOE low-level waste disposal, high-level waste tank closure, and transuranic waste disposal will provide radiological protection to the public. Facility and site-wide monitoring are performed as required by the Order to verify that facility releases remain within the protective bounds of the PA and CA. Applicable to the operation and closure of the E-Area LLWF, SDF, and closure of the F-Area and H-Area Tank Farms.		DOE Order 435.1

Table 3. Summary of Federal and State Regulations and DOE Orders

SC Regulations	Description	Summary	Federal Regulations	DOE Orders
	Radiation Protection of the Public and the Environment	Establishes requirements to protect the public and the environment against any undue risk from radiation associated with radiological activities at DOE sites. This order requires an Radiological Protection Program (RPP). The SRS RPP describes the methods used to ensure SRS implements the appropriate actions to comply with the requirements of DOE Order 458.1 (SRNS 2019). DOE Order 458.1 specifies radiation dose standards for individual members of the public. The dose standard to the public is 100 millirem (mrem) (1 milliSievert [mSv]) per year to a person from routine DOE operations.		DOE Order 458.1