
Applicable Guidelines, Standards, and Regulations



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The Savannah River Site (SRS) environmental monitoring program is designed to meet state and federal regulatory requirements for radiological and nonradiological programs. These requirements are stated in U.S. Department of Energy (DOE) Order 5400.5, *Radiation Protection of the Public and the Environment*; in the Clean Air Act (Standards of Performance for New Stationary Sources, also referred to as New Source Performance Standards, and the National Emission Standards for Hazardous Air Pollutants [NESHAP]); in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA—also known as Superfund); in the Resource Conservation and Recovery Act (RCRA); and in the Clean Water Act (i.e., National Pollutant Discharge Elimination System—NPDES).

SRS compliance with environmental requirements is assessed by the DOE-Savannah River Operations Office (DOE-SR), the South Carolina Department of Health and Environmental Control (SCDHEC), and the U.S. Environmental Protection Agency (USEPA).

The SRS environmental monitoring program's objectives incorporate recommendations of

- the International Commission on Radiological Protection (ICRP) in Principles of Monitoring for the Radiation Protection of the Public, ICRP Publication 43
- DOE Order 5400.5, "Radiation Protection of the Public and the Environment."
- DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance"

Detailed information about the site's environmental monitoring program is documented in Procedure 101 (SRS Environmental Monitoring Program Management Plan) of the SRS Environmental Requirements and Program Documents, Manual 3Q1. This document is reviewed annually and updated every 3 years.

SRS has implemented and adheres to the SRS Environmental Policy. Implementation of a formal Environmental Management System (EMS), such as that described in the International Organization for Standardization (ISO) 14001 Standard, is an Executive Order 13148 (*Greening the Government Through Leadership in Environmental Management*) and DOE

Order 450.1A (*Environmental Protection Program*) requirement. SRS maintains an EMS that fully meets the requirements of ISO 14001. The full text of the SRS Environmental Policy appears on the compact disk (CD) accompanying this report.

Air Effluent Discharges

DOE Order 5400.5 establishes derived concentration guides (DCGs) for radionuclides in air. DCGs, calculated by DOE using methodologies consistent with recommendations found in ICRP Publications 26 (Recommendations of the International Commission on Radiological Protection) and 30 (Limits for Intakes of Radionuclides by Workers), are used as reference concentrations for conducting environmental protection programs at DOE sites. DCGs are not considered release limits. DCGs for radionuclides in air are discussed in more detail on page A-6.

Radiological airborne releases are also subject to USEPA regulations cited in 40 CFR 61 (Code of Federal Regulations), *National Emission Standards for Hazardous Air Pollutants*, Subpart H (*National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities*).

Regulation of radioactive and nonradioactive air emissions (both criteria pollutants and toxic air pollutants) has been delegated to SCDHEC. Therefore, SCDHEC must ensure that its air pollution regulations are at least as stringent as federal regulations required by the Clean Air Act. This is accomplished by SCDHEC

Table A-1 National Ambient Air Quality Standards for Criteria Air Pollutants – 2011a

Pollutant	Measuring Interval	Micrograms Per Cubic Meter Unless Noted Otherwise ^{b c}
Carbon Monoxide	1 hour 8 hour	40 mg per cubic meter ^e 10 mg per cubic meter ^e
Gaseous Fluorides (as HF)	12 hr. avg. 24 hr. avg. 1 wk. avg. 1 mo. avg.	3.7 2.9 1.6 0.8
Lead	Rolling 3-month Average ^g	0.15
Nitrogen Dioxide	annual	100
Ozone	8 hours 8 hours	0.08 ppm ^{d f} 0.075 ppm ^d
PM10	24 hours annual	150 ^d 50 ^d
PM2.5 (Primary and Secondary Standards)	24 hours annual	35 ^d 15 ^d
Sulfur Dioxide	3 hours 24 hours annual	1300 ^e 365 ^e 80

^a Final rules signed May 27, 2011

^b Arithmetic Average except in case of total suspended particulate matter

^c At 250 degrees C and 760 mm Hg.

^d Attainment determinations will be made based on the criteria contained in 40 CFR 50 Appendices H, I, K and N.

^e Not to be exceeded more than once a year.

^f The 1997 standard – and the implementation rules for that standard – will remain in place for implementation purposes as USEPA undertakes rulemaking to address transition from the 1997 ozone standard to the 2008 ozone standard.

^g Detailed explanation of the rolling 3-month average calculation can be found in 40 CFR 50.16

Regulation 61-62, *Air Pollution Control Regulations and Standards*. As with many regulations found in the CFR, many of SCDHEC's regulations and standards are source specific. Each source of air pollution at SRS is permitted or exempted by SCDHEC, with specific emission rate limitations or special conditions identified. The bases for the limitations and conditions are the applicable South Carolina air pollution control regulations and standards. In some cases, specific applicable CFRs are also cited in the permits issued by SCDHEC. The applicable SCDHEC regulations are too numerous to discuss here, so only the most significant are listed.

Two SCDHEC standards, which govern criteria and toxic air pollutants and ambient air quality, are applicable to all SRS sources. Regulation 61-62.5, Standard No. 2, *Ambient Air Quality Standards*, identifies eight criteria air pollutants commonly used as indices of air quality (e.g., sulfur dioxide, nitrogen dioxide, and lead) and provides allowable site boundary concentrations for each

pollutant, as well as the measuring intervals. Compliance with the various pollutant standards is determined by conducting air dispersion modeling for all sources of each pollutant, using USEPA-approved dispersion models and then comparing the results to the standard. The pollutants, measuring intervals, and allowable concentrations are provided in table A-1.

Over 250 toxic air pollutants and their respective allowable site boundary concentrations are identified in Regulation 61-62.5, Standard No. 8, *Toxic Air Pollutants*. As with Standard No. 2, compliance is determined by air dispersion modeling.

SCDHEC airborne emission standards for each SRS permitted source may differ, based on size and type of facility, type and amount of expected emissions, and the year the facility was placed into operation. For example, SRS powerhouse coal-fired boilers are regulated by Regulation 61-62.5, Standard No. 1, *Emissions from*

Fuel Burning Operations. This standard specifies that for powerhouse stacks built before February 11, 1971, the opacity limit is 40 percent. For new sources constructed after this date, the opacity limit typically is 20 percent. The standards for particulate and sulfur dioxide emissions are shown in table A-2.

Regulation 61-62.5, Standard No. 4, *Emissions from Process Industries*, is applicable to all SRS sources except those regulated by a different source-specific standard. For some SRS sources, particulate matter emission limits depend on the weight of the material being processed and are determined from a table in the regulation. For process and diesel engine stacks in existence on or before December 31, 1985, emissions shall not exhibit an opacity greater than 40 percent. For new sources, where construction began after December 31, 1985, the opacity limit is 20 percent.

As previously noted, some SRS sources have both SCDHEC and CFRs applicable and identified in their permits. For the package steam generating boilers in K-Area and two portable package boilers, both SCDHEC and federal regulations apply. The standard for sulfur dioxide emissions is specified in 40 CFR 60, Subpart Dc, *Standards of Performance for Small Industrial Commercial-Institutional Steam Generating Units*, while the standard for particulate matter is found in Regulation 61-62.5, Standard No. 1.

Because these units were constructed after applicability dates found in both regulations, the opacity limit for the units is the same in both regulations. The emissions standards for these boilers are presented in table A-3.

The A-Area steam facility (Building 784-7A), which uses a smaller, less polluting, biomass boiler and a backup oil-fired boiler, replaced the old coal-fired boilers that had operated previously in that area of the site. This new facility complies with 40 CFR 63, Subpart DDDDD standards. Both particulate and sulfur dioxide emissions at the new facility are projected to be considerably lower than at the existing coal-fired facility. The emission standards for these two new boilers are presented in tables A-4 and A-5. A similar, but larger facility at SRS is expected to come online in 2012.

Liquid (Process) Effluent Discharges

DOE Order 5400.5 establishes DCGs for radionuclides in process effluents. (DCGs for radionuclides in liquid

Table A-2 Airborne Emission Limits for SRS Coal-Fired Boilers

Sulfur Dioxide	3.5 lb/10 ⁶ Btu ^{a,b}
Total Suspended Particulates	0.6 lb/10 ⁶ Btu ^{a,b}
Opacity	40%

^a British thermal unit

^b Heat input per hour

Table A-3 Airborne Emission Limits for SRS Fuel Oil-Fired Package Boilers

Sulfur Dioxide	0.5 lb/10 ⁶ Btu ^{a,b}
Total Suspended Particulates	0.6 lb/10 ⁶ Btu ^{a,b}
Opacity	20%

^a British thermal unit

^b Heat input per hour

are discussed in more detail on page A-7.) DCGs were calculated by DOE using methodologies consistent with recommendations found in ICRP, 1987, and ICRP, 1979, and are used as:

- reference concentrations for conducting environmental protection programs at DOE sites
- screening values for considering best available technology (BAT) for treatment of liquid effluents
- DOE Order 5400.5 exempts aqueous tritium releases from BAT requirements but not from as low as reasonably achievable (ALARA) considerations.

Four NPDES permits are in place that allow SRS to discharge water into site streams and the Savannah River: two industrial wastewater permits (SC0047431 and SC0000175) and two stormwater runoff permits (SCR000000 for industrial discharges and SCR100000 for construction discharges).

A fifth permit (ND0072125) is a no-discharge, water-pollution-control land application permit that regulates sludge generated at onsite sanitary waste treatment plants.

Detailed requirements for each permitted discharge point-including parameters sampled for, permit limits for each parameter, sampling frequency, and method

Table A-4 Airborne Emission Limits for SRS 784-7A Biomass Boiler

Sulfur Dioxide	0.50 lb/10 ⁶ Btu ^{a,b}
Total Suspended Particulates	0.60 lb/10 ⁶ Btu ^{a,b}
Nitrogen Oxides	0.33 lb/10 ⁶ Btu ^{a,b}
Opacity	20%

^a British thermal unit^b Heat input per hour**Table A-5 Airborne Emission Limits for SRS 784-7A Oil-Fired Package Boiler**

Sulfur Dioxide	3.5 lb/10 ⁶ Btu ^{a,b}
Sulfur Dioxide	0.5% Sulfur
Total Suspended Particulates	0.60 lb/10 ⁶ Btu ^{a,b}
Total Suspended Particulates	0.03 lb/10 ⁶ Btu ^{a,b}
Nitrogen Oxides	0.15 lb/10 ⁶ Btu ^{a,b}
Opacity	20%

^a British thermal unit^b Heat input per hour

for collecting each sample-can be found in the individual permits, which are available to the public through SCDHEC's Freedom of Information Office (phone contact 803-898-3882).

Site Streams

SRS streams are classified as *Freshwaters* by South Carolina Regulation 61-69, *Classified Waters*. Freshwaters are defined in Regulation 61-68, *Water Classifications and Standards*, as surface water suitable for

- primary- and secondary-contact recreation and as a drinking water source after conventional treatment in accordance with SCDHEC requirements
- fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora
- industrial and agricultural uses

Table A-6 provides some of the specific South Carolina freshwater standards used in water quality surveillance, but because some of these standards are not quantifiable,

they are not tracked in response form (i.e., amount of garbage found).

Savannah River

Because the Savannah River is defined under South Carolina Regulation 61-69 as a freshwater system, the river is regulated in the same manner as site streams (Table A-6).

Drinking Water

The federal Safe Drinking Water Act, enacted in 1974 to protect public drinking water supplies, was amended in 1977, 1979, 1980, 1986, and 1996.

SRS drinking water systems are tested routinely by SRS and SCDHEC to ensure compliance with SCDHEC State Primary Drinking Water Regulations (R61-58) and USEPA National Primary Drinking Water Regulations (40 CFR 141).

SRS drinking water is supplied to most site areas by the A-Area and D-Area systems, which are actively regulated by SCDHEC. Remote facilities such as field laboratories, barricades, and pumphouses utilize small drinking water systems, which receive a lesser degree of regulatory oversight, and/or bottled water which is purchased offsite.

Bacteriological samples are collected and analyzed monthly or quarterly at an onsite laboratory. SCDHEC personnel periodically collect samples and analyze chemical and organic constituents from the A-Area and D-Area systems. Lead and copper compliance samples are collected every three years from these systems. All sample results in 2011 met SCDHEC water quality standards.

Groundwater

Groundwater is a valuable resource and the subject of both protection and cleanup programs at SRS. More than 1,000 wells are monitored each year at the site for a wide range of constituents. Monitoring in the groundwater protection program is performed to detect new or unknown contamination across the site, and monitoring in the groundwater cleanup program is performed to meet the requirements of state and federal laws and regulations. Most of the monitoring in the cleanup program is governed by SCDHEC's administration of RCRA regulations.

The analytical results of samples taken from SRS monitoring wells are compared to various standards.

Table A-6 South Carolina Water Quality Standards for Freshwaters^a

Parameters	Standards
Fecal coliform	Not to exceed a geometric mean of 200/100 mL, based on five consecutive samples during any 30-day period; nor shall more than 10 percent of the total samples during any 30-day period exceed 400/100 mL
pH	Range between 6.0 and 8.5
Temperature	Generally, shall not be increased more than 5°F (2.8°C) above natural temperature conditions or be permitted to exceed a maximum of 90°F (32.2°C) as a result of the discharge of heated liquids; for more details, see E.12, Regulation 61–68, “Water Classifications and Standards” (April 25, 2008)
Dissolved oxygen	Daily average not less than 5.0 mg/L, with a low of 4.0 mg/L
Garbage, cinders, ashes, sludge, or other refuse	None allowed
Treated wastes, toxic wastes, deleterious substances, colored or other wastes, except in the parameter immediately above	None alone or in combination with other substances of wastes in sufficient amounts to make the waters unsafe or unsuitable for primary-contact recreation or to impair the waters for any other best usage as determined for the specific waters assigned to this class
Toxic pollutants listed in South Carolina Regulation 61–68, “Water Classifications and Standards”	See Appendix: Water Quality Numeric Criteria for the Protection of Aquatic Life and Human Health, Regulation 61–68, “Water Classifications and Standards” (April 25, 2008)

^a This is a partial list of water quality standards for freshwaters.

SOURCE: SCDHEC, 2008

The most common are final federal primary drinking water standards (DWS) or other standards if DWS do not exist. The DWS are considered first because groundwater aquifers are defined as potential drinking water sources by the South Carolina Pollution Control Act. DWS can be found at <http://www.epa.gov/drink/standardsriskmanagement.cfm> on the Internet. Other standards sometimes are applied by regulatory agencies to the SRS waste units under their jurisdiction. For example, standards under RCRA can include DWS, groundwater protection standards, background levels, or alternate concentration limits.

SRS responses to groundwater analytical results require careful evaluation of the data and relevant standards. Results from two constituents having DWS, (dichloromethane and bis(2-ethylhexyl) phthalate, are evaluated more closely than other constituents and are commonly dismissed. Both are common laboratory contaminants and are reported in groundwater samples with little or no reproducibility. Both are reported, with

appropriate flags and qualifiers, in detailed groundwater monitoring reports that can be obtained by contacting the groundwater manager of the Savannah River Nuclear Solutions (SRNS) Environmental Compliance and Area Completion Projects group at (803)-952-6523. The regulatory standards for radionuclide discharges from industrial and governmental facilities are set under the Clean Water Act and under Nuclear Regulatory Commission and DOE regulations. In addition, radionuclide cleanup levels, which fall under the authority of DOE, are included in the site RCRA permit. The proposed drinking water maximum contaminant levels (MCLs) discussed in this report are only an adjunct to these release restrictions and are not used to regulate SRS groundwater.

Many potential radionuclide contaminants are beta emitters. The standard used for gross beta is a screening standard; when public drinking water exceeds this standard, the supplier is expected to analyze for individual beta and gamma emitters. A gross beta result above the standard is an indication that one or

more radioisotopes are present in quantities that could exceed the USEPA annual dose equivalent for persons consuming two liters daily. Thus, for the individual beta and gamma radioisotopes (other than strontium-90 and tritium), the standard considered is the activity per liter that would, if only that isotope were present, exceed the dose equivalent. Similarly, the standards for alpha emitters are calculated to present the same risk at the same rate of ingestion.

The element radium has several isotopes of concern in groundwater monitoring. Although radium has a DWS of 5 pCi/L for the sum of radium-226 and radium-228, the isotopes have to be measured separately, and the combined numbers may not be representative of the total. Radium-226, an alpha emitter, and radium-228, a beta emitter, cannot be analyzed by a single method. Analyses for total alpha-emitting radium, which consists of radium-223, radium-224, and radium-226, are compared to the standard for radium-226.

Four other constituents without DWS are commonly used as indicators of potential contamination in wells.

These constituents and reference levels are

- specific conductance at values equal to or greater than 100 $\mu\text{S}/\text{cm}$
- alkalinity (as CaCO_3) at values equal to or greater than 120 mg/L
- total dissolved solids (TDS) at values equal to or greater than 500 mg/L
- pH at values equal to or less than 6.5 or equal to or greater than 8.5

The selection of these values as standards for comparison is somewhat arbitrary; however, the values exceed levels usually found in background wells at SRS. The occurrence of elevated alkalinity (as CaCO_3), specific conductance, pH, and TDS within a single well also may indicate leaching of the grouting material used in well construction, rather than degradation of the groundwater.

Potential Doses

The radiation protection standards followed by SRS are outlined in DOE Order 5400.5 and include USEPA regulations on the potential doses from airborne releases and treated drinking water. The following radiation dose standards for protection of the public in the SRS vicinity are specified in DOE Order 5400.5:

- Drinking Water Pathway 4 mrem per year

- Airborne Pathway 10 mrem per year
- All Pathway 100 mrem per year

The USEPA annual dose standard of 10 mrem (0.1 mSv) for the atmospheric pathway, which is contained in 40 CFR 61, Subpart H, is adopted in DOE Order 5400.5. These dose standards are based on recommendations of the ICRP and the National Council on Radiation Protection and Measurements.

The DOE dose standard enforced at SRS for drinking water is consistent with the criteria contained in *National Interim Primary Drinking Water Regulations, 40 CFR Part 141*. Under these regulations, persons consuming drinking water shall not receive an annual total body or organ dose (DOE Order 5400.5 interprets this dose as committed effective dose equivalent) of more than 4 mrem (0.04 mSv).

In 2000, USEPA promulgated 40 CFR, Parts 9, 141, and 142, *National Primary Drinking Water Regulations; Radionuclides; Final Rule*. This rule, which is applicable only to community drinking water systems, finalized MCLs for radionuclides, including uranium. In essence, it reestablishes the MCLs from USEPA's original 1976 rule. Most of these MCLs are derived from dose conversion factors that are based on early ICRP-2 methods.

However, when calculating dose, SRS must use the more current ICRP-30-based dose conversion factors provided by DOE. Because they are based on different methods, most USEPA and DOE radionuclide dose conversion factors differ. Therefore, a direct comparison of the drinking water doses calculated for showing compliance with DOE Order 5400.5 to the USEPA drinking water MCLs cannot be made.

Comparison of Average Concentrations in Airborne Emissions to DOE Derived Concentration Guides

Average concentrations of radionuclides in airborne emissions are calculated by dividing the yearly release total of each radionuclide from each stack by the yearly stack flow quantities. These average concentrations then can be compared to the DOE DCGs, which are found in DOE Order 5400.5 for each radionuclide.

DCGs are used as reference concentrations for conducting environmental protection programs at all DOE sites. DCGs, which are based on a 100-mrem exposure, are applicable at the point of discharge (prior to dilution or dispersion) under conditions of continuous

exposure (assumed to be an average inhalation rate of 8,400 cubic meters per year). This means that the DOE DCGs are based on the highly conservative assumption that a member of the public has direct access to, and continuously breathes (or is immersed in), the actual air effluent 24 hours a day, 365 days a year. However, because of the large distance between most SRS operating facilities and the site boundary, this scenario is improbable.

Average annual radionuclide concentrations in SRS air effluent can be referenced to DOE DCGs as a screening method to determine if existing effluent treatment systems are proper and effective.

Comparison of Average Concentrations in Liquid Releases to DOE Derived Concentration Guides

In addition to dose standards, DOE Order 5400.5 imposes other control considerations on liquid releases. These considerations are applicable to direct discharges but not to seepage basin and Solid Waste Disposal Facility migration discharges. The DOE order lists DCG values for most radionuclides. DCGs are used as reference concentrations for conducting environmental protection programs at all DOE sites. These DCG values are not release limits but screening values for BAT investigations and for determining whether existing effluent treatment systems are proper and effective.

Per DOE Order 5400.5, exceedance of the DCGs at any discharge point may require an investigation of BAT waste treatment for the liquid effluents. Tritium in liquid effluents is specifically excluded from BAT requirements; however, it is not excluded from other ALARA considerations. DOE DCG compliance is demonstrated when the sum of the fractional DCG values for all radionuclides detectable in the effluent is less than 1.00, based on consecutive 12-month average concentrations.

DCGs, based on a 100-mrem exposure, are applicable at the point of discharge from the effluent conduit to the environment (prior to dilution or dispersion). They are based on the highly conservative assumption that a member of the public has continuous direct access to the actual liquid effluents and consumes two liters of the effluents every day, 365 days a year. Because of security controls and the considerable distances between most SRS operating facilities and the site boundary, this scenario is highly improbable, if not impossible.

For each SRS facility that releases radioactivity, the site's Environmental Monitoring group compares the

monthly liquid effluent concentrations and 12-month average concentrations against the DOE DCGs.

Environmental Management

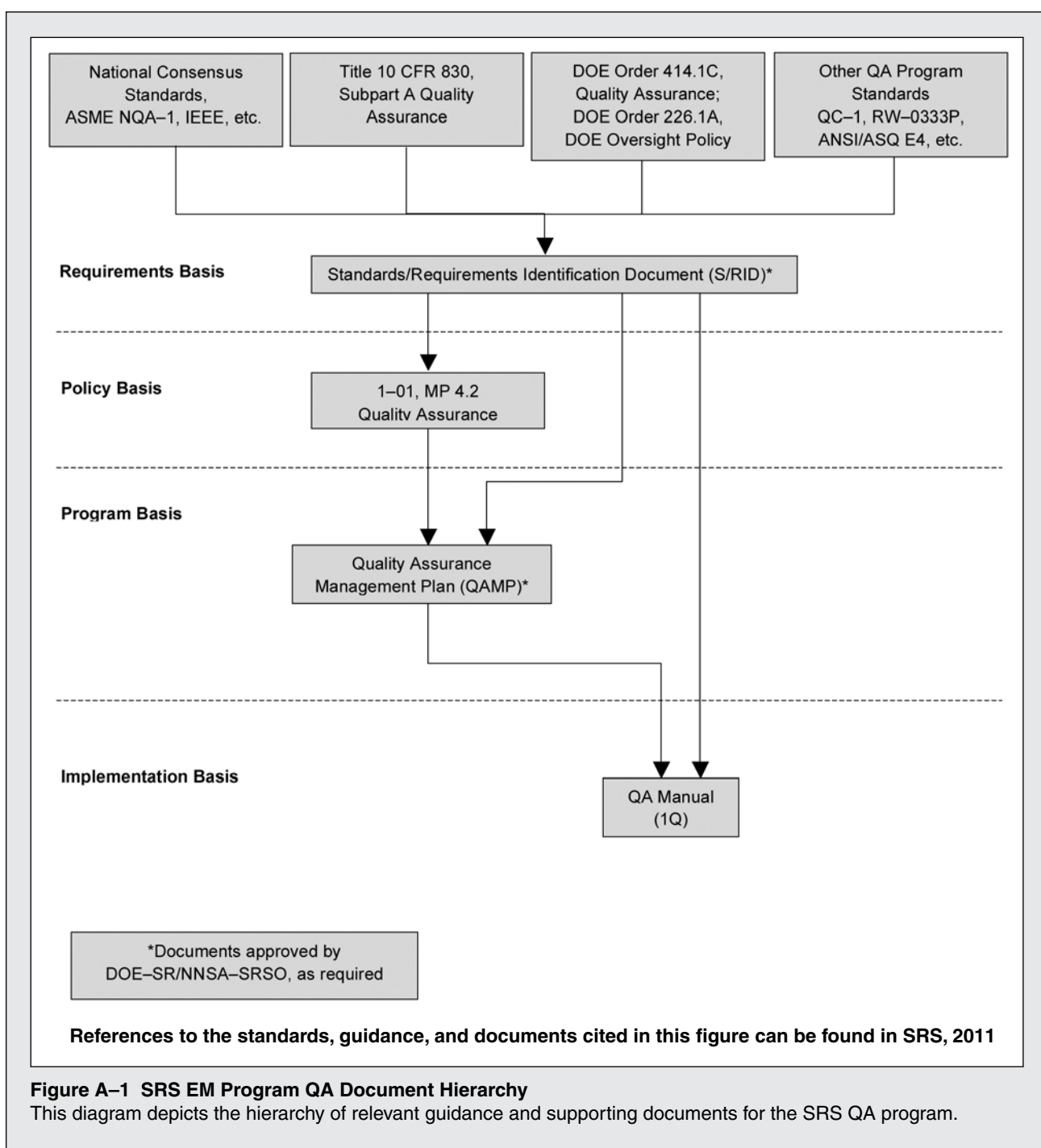
SRS began its cleanup program in 1981. Two major federal statutes provide guidance for the site's environmental restoration and waste management activities-RCRA and CERCLA. RCRA addresses the management of hazardous waste and requires that permits be obtained for facilities that treat, store, or dispose of hazardous or mixed waste. It also requires that DOE facilities perform appropriate corrective action to address contaminants in the environment. CERCLA (also known as Superfund) addresses the uncontrolled release of hazardous substances and the cleanup of inactive waste sites. This act established a National Priority List of sites targeted for assessment and, if necessary, corrective/remedial action. SRS was placed on this list December 21, 1989 (USEPA, 1989). In August 1993, SRS entered into the Federal Facility Agreement (FFA, 1993) with USEPA Region 4 and SCDHEC. This agreement governs the corrective/remedial action process from site investigation through site remediation. It also describes procedures for setting annual work priorities, including schedules and deadlines, for that process (FFA under section 120 of CERCLA and sections 3008[h] and 6001 of RCRA).

Additionally, DOE is complying with Federal Facility Compliance Act requirements for mixed waste management including high-level waste, most transuranic waste, and low-level waste with hazardous constituents. This act requires that DOE develop and submit site treatment plans to the USEPA or state regulators for approval.

The disposition of facilities after they are declared excess to the government's mission is managed by Site Area Completion Projects. The disposition process is conducted in accordance with DOE Order 430.1B, *Real Property Asset Management*, and its associated guidance documents. The major emphases are reducing risks to workers and the public and minimizing real property asset lifecycle costs.

Quality Assurance/Quality Control

DOE Order 414.1C, *Quality Assurance*, sets requirements and guidelines for departmental quality assurance (QA) practices. To ensure compliance with regulations and to provide overall quality requirements for site programs, the current site management and operations contractor (SRNS) developed its Quality Assurance Management Plan (SRNS-RP-2008-00020).



The plan's requirements are implemented by the SRNS Quality Assurance Manual (1Q).

The SRS Environmental Monitoring Quality Assurance Project Plan (3Q1, Procedure 102), was written to apply the QA requirements of Manual 1Q to the environmental monitoring and surveillance program. The 3Q1 manual includes procedures on sampling, analysis, and reporting

that emphasize the quality control requirements for the Environmental Monitoring group.

QA requirements for monitoring radiological air emissions are specified in 40 CFR 61, *National Emission Standards for Hazardous Air Pollutants*. For radiological air emissions at SRS, the responsibilities and lines of communication are detailed in *National*

Emission Standards for Hazardous Air Pollutants Quality Assurance Project Plan for Radionuclides (U) (WSRC-IM-91-60).

To ensure valid and defensible monitoring data, the records and data generated by the monitoring program are maintained according to the requirements of DOE Guide 1324.5B, *Implementation Guide for Use with 36 CFR Chapter XII - Subchapter B Records Management*, and of 1Q. QA records include sampling and analytical procedure manuals, logbooks, chain-of-custody forms, calibration and training records, analytical notebooks, control charts, validated laboratory data, and environmental reports. These records are maintained and stored per the requirements of the SRNS Retention Schedule Matrix (WSRC-EM-96-00023).

Environmental Monitoring group assessments are implemented according to the following documents:

- DOE Order 414.1C, “Quality Assurance”
- DOE/EH-0173T, “Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance.”

- DOE Environmental Management Consolidated Audit Program (EMCAP)
- SRNS 1Q, Quality Assurance Manual
- SRNS 12Q, Assessment Manual

Figure A-1 illustrates the hierarchy of relevant guidance documents that support the SRS QA program.

Reporting

DOE Orders 231.1B, *Environment, Safety and Health Reporting*, and 5400.5, *Radiation Protection of the Public and Environment*, require that SRS submit an annual environmental report.

This report, the *SRS Environmental Report for 2011*, is an overview of effluent monitoring and environmental surveillance activities conducted on and in the vicinity of SRS from January 1 through December 31, 2011.

