4.5 SAVANNAH RIVER SITE

The following sections describe the affected environment at SRS for land use, visual resources, site infrastructure, air quality and noise, water resources, geology and soils, biological resources, cultural and paleontological resources, and socioeconomics. In addition, radiation and hazardous chemical environment, transportation, and waste management are described.

4.5.1 Land Use and Visual Resources

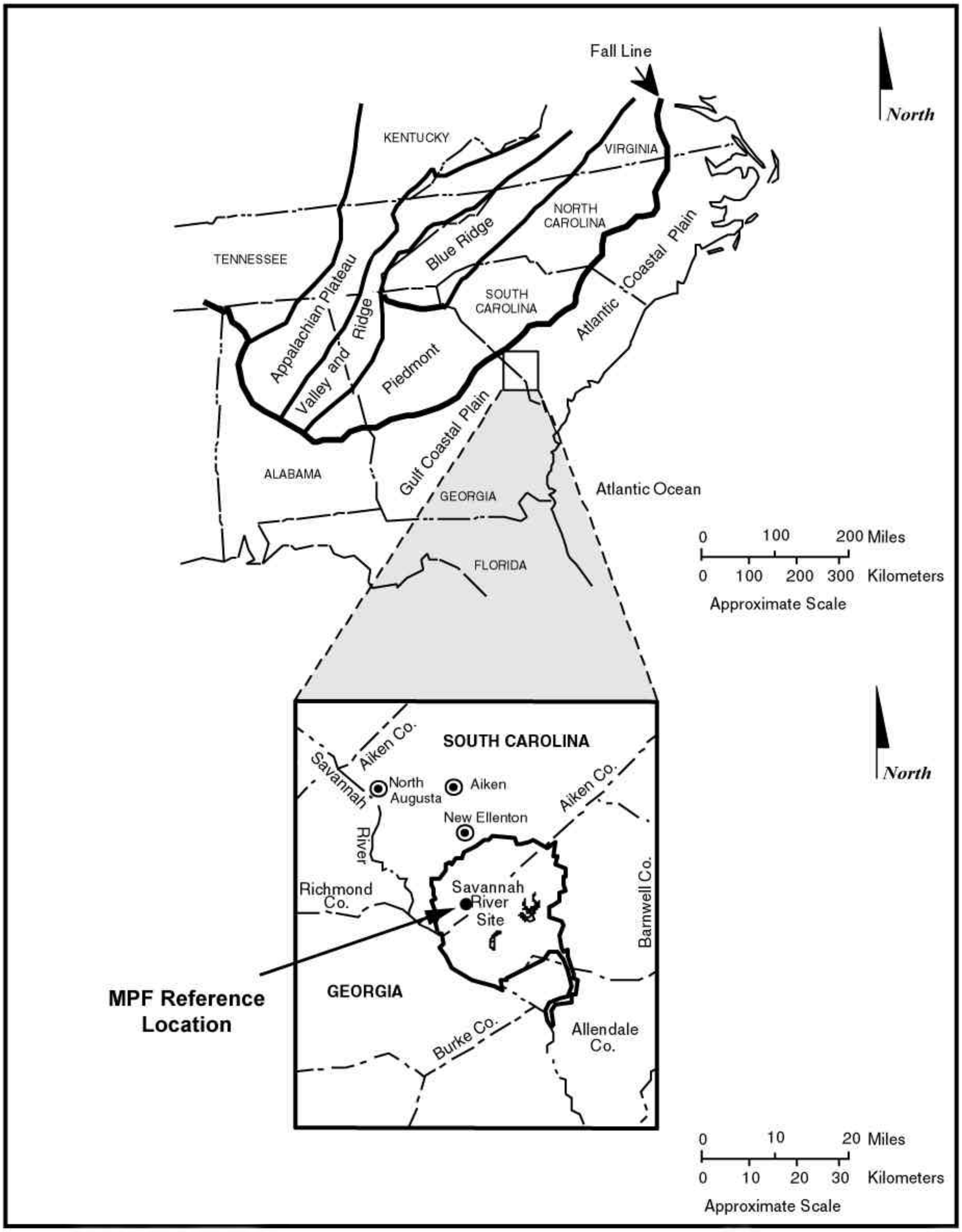
4.5.1.1 Land Use

SRS is located in south-central South Carolina and occupies an area of approximately 803 km^2 (310 mi^2) in Aiken, Barnwell, and Allendale Counties. The site's center is approximately 37 km (23 mi) southeast of Augusta, Georgia, and 32 km (20 mi) south of Aiken, South Carolina, the two closest major population centers. A marked property line establishes the site's boundary to the north, south, and east. The Savannah River forms the site's southwestern boundary for 32 km (20 mi) on the South Carolina/Georgia border. The southern tail of the site, commonly referred to as the Lower Three Runs Corridor, follows the path of Lower Three Runs Creek, and is bounded on both sides by marked property line to the river (see Figure 4.5.1.1–1).

SRS is situated on the Upper Atlantic Coastal Plain. Land use around SRS is varied and includes residential, industrial, commercial, transportation, recreation, and agricultural activities. Regional industrial land uses include a commercial nuclear power plant near Waynesboro, Georgia; a regional, low-level nuclear waste repository in Barnwell, South Carolina; a variety of conventional chemical industries near Augusta; and a variety of manufacturing industries in Aiken.

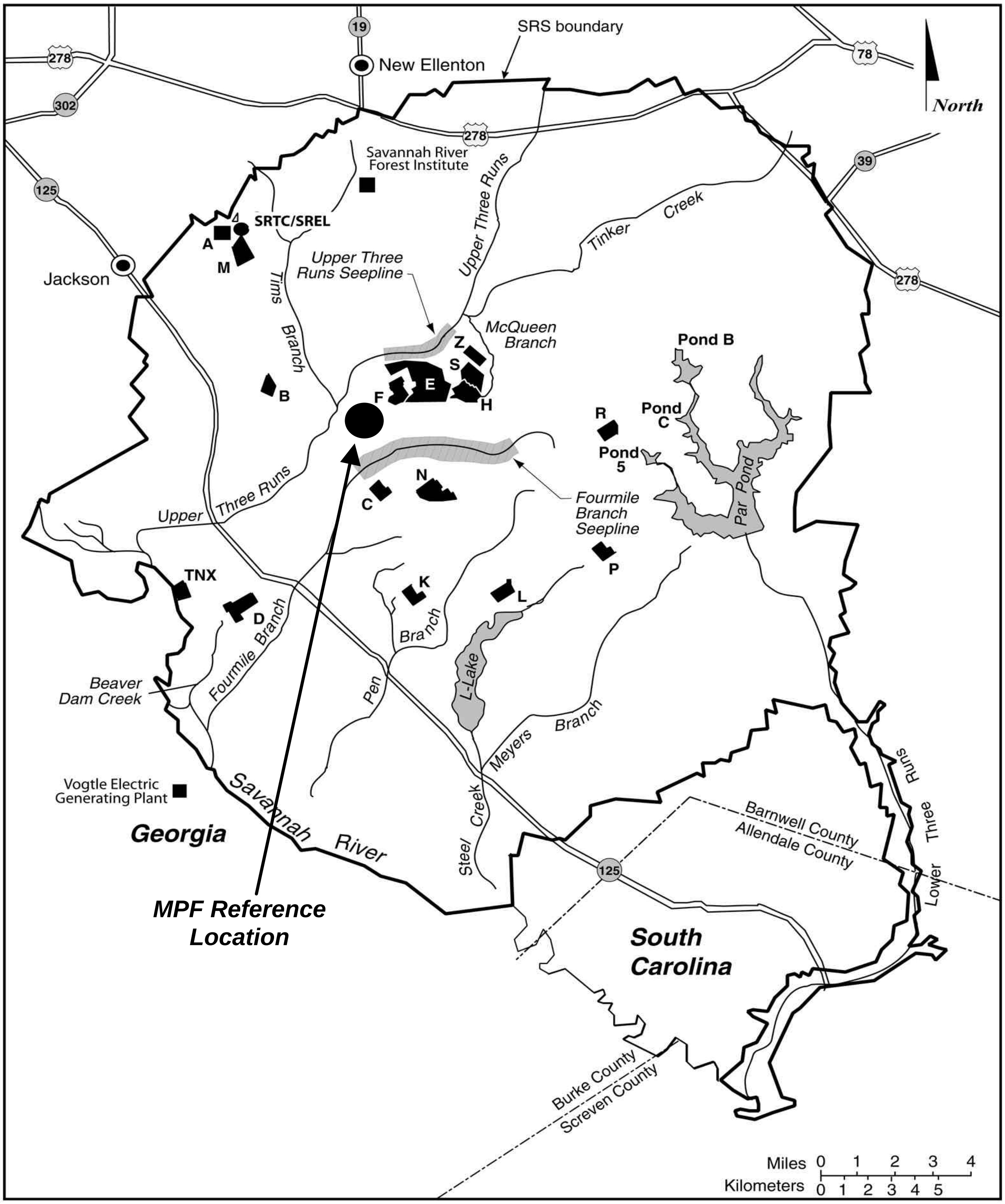
The site is drained by several streams: Upper Three Runs, Fourmile Branch, Pen Branch, Steel Creek, and Lower Three Runs Creek. The streams form the basis for subdividing the site into watershed units used in environmental restoration and long-term stewardship planning. Two large water impoundments, L-Lake and Par Pond, were developed to support past reactor activities and currently serve as important ecological research areas (see Figure 4.5.1.1–2).

SRS ecology has always been a concern, starting with a census of all wildlife before construction began. Beginning in the early 1950s, the U.S. Forest Service reforested prior crop and pasture lands to stabilize and rehabilitate the soil to support native plant and animal life, reduce erosion, and minimize dust generation that could impact nuclear facility operations. In addition, this reforestation also reduced the movement of surface contamination, protecting downstream aquatic resources and domestic water supplies. In 1972, DOE designated SRS as the Nation's first National Environmental Research Park, providing a large tract of land where the effects of anthropogenic-related activities upon the environment could be studied.



Source: DOE 2001d.

Figure 4.5.1.1–1. Generalized Location of SRS and its Relationship to Physiographic Provinces of the Southeastern United States



Source: Modified from DOE 2001d.

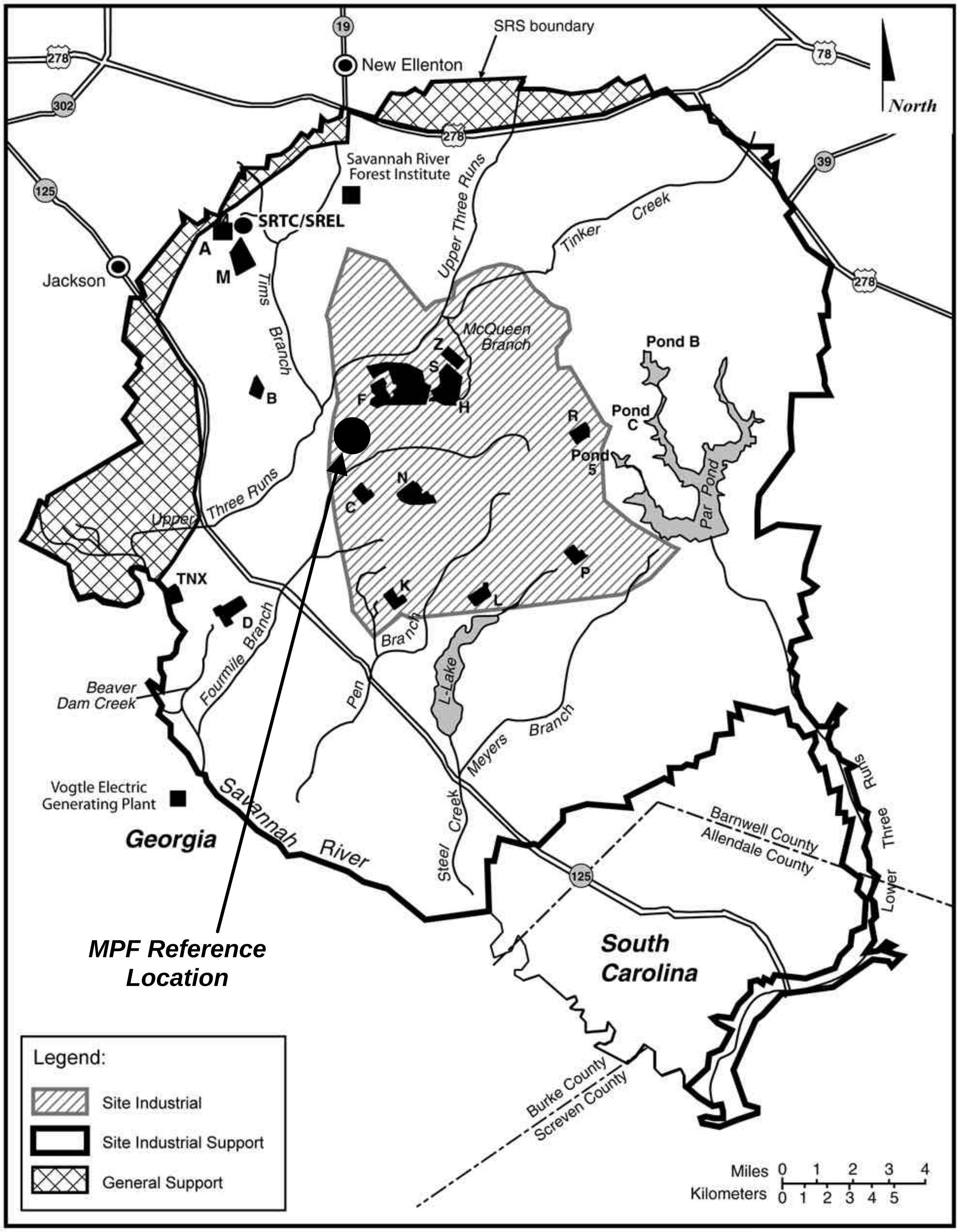
Figure 4.5.1.1–2. Savannah River Site

Currently, more than 90 percent of the site is covered in forest or other natural vegetation. Production and support facilities, infrastructure, R&D, and waste management areas account for the remaining 10 percent of the site property (DOE 2000g). The original facility layout of SRS was designed to isolate major radioactive operations away from the site boundaries, creating a buffer zone that provided both security and a reduced risk of accidental exposure to the general public. DOE has designated the entire site as a property protection area with limited public access (see Figure 4.5.1.1–2).

In December 2000, the Discussion Draft of the *Savannah River Site Long Range Comprehensive Plan* (DOE 2000g) was formally issued. It defines the future of the site and was developed in partnership with all major site contractors, support agencies, DOE Headquarters, and stakeholders. According to this document, the future configuration for SRS has been developed using the Integral Site Future Use Model.

The Integral Site Model most realistically accommodates the site's mission and vision over the next 50 years. As a remnant of the 1950s site configuration, functional areas (labeled by capital letters) are inefficiently distributed across the site. M-, C-, and P-areas are currently inactive, and primary site administrative activities are performed in A-, B-, H-, and G-areas. Nuclear research activities are performed in A-Area, which is near the site boundary. In this model, site boundaries would remain intact and land use would not change significantly. The industrial footprint, however, would shrink and be consolidated to the center of the site in a "reconfigured" land use. This scenario would allow for the accommodation of new missions, as well as the option of expanding the site core if a national need arises, terrorist activities increase, or other external causes of significant re-industrialization occur. The amount of environmental cleanup would be related to the intended future use, but potential new missions that complement existing site uses would be less likely to alter the existing land use. Land uses that require extensive unrestricted public access would not be compatible with this scenario. The key advantages of this model are that it allows flexibility for planned and future missions, provides a maximum safety buffer, and allows for research, natural resource management, biological diversity, and cultural resource management. An important prerequisite is DOE ownership of SRS land area into the foreseeable future. In selecting this model, SRS management has strengthened its commitment to the application of the future use policy guidelines and planning considerations. It should be noted that residential use would not be allowed, and site security and other institutional controls would be maintained in all zones (DOE 2000g).

SRS planners developed a zoned planning model specifically designed to address SRS's future land use circumstances, including concurrent, compatible land uses. Using this concept, SRS is divided into three principal planning zones: Site Industrial, Site Industrial Support, and General Support (see Figure 4.5.1.1–3). The most intensive uses occur in the Site Industrial Zone, located close to the site's center, to minimize the effect on surrounding communities, maintain controlled site access, and ensure the integrity of the established safety buffer. The Site Industrial Support and General Support Zones accommodate uses of decreasing intensity, particularly as they approach the site's boundaries. Each zone is restricted to the types of uses specified for that zone. Site reconfiguration would address consolidation and collocation of functions to improve efficiency and optimize security (DOE 2000g).



Source: Modified from DOE 2001d.

Figure 4.5.1.1–3. Savannah River Site Future Land Use Zoning Concentrates Industrial Activities to the Center of the Site

The reference location for MPF at SRS is located on a heavily wooded 32-ha (80-ac) tract immediately south of Road C near Burma Road. The site is flat and located on a topographic divide so surface drainage is both west toward Upper Three Runs and east toward Fourmile Branch streams. The reference location would be located on land categorized as Site Industrial (see Figure 4.5.1.1–3).

4.5.1.2 Visual Resources

The dominant aesthetic settings in the SRS vicinity are agricultural and forest, with limited industrial and residential areas. SRS is almost completely forested with 10 percent in use for nuclear processing purposes (i.e., industrial uses) (DOE 2000g). The industrial areas are primarily located in the interior of the site, away from public access. Because of the distance to the boundary from the industrialized areas, the gently rolling terrain, and heavy vegetation, SRS facilities are not generally visible from public access roads.

4.5.2 Site Infrastructure

An extensive network of existing infrastructure provides services to SRS activities and facilities as shown in Table 4.5.2–1. These services are discussed in detail in the following sections. Two categories of infrastructure—transportation access and utilities—are described below for SRS. Transportation access includes roads, railroads, and airports while utilities include electricity and fuel (e.g., natural gas, gasoline, and coal).

Table 4.5.2–1. Savannah River Site-Wide Infrastructure Characteristics

Resource	Current Usage	Site Capacity
Transportation		
Roads (km)	230	NA
Railroads (km)	103	NA
Electricity		
Energy consumption (MWh/yr)	370,000	4,400,000
Peak load (MWe)	70	330
Fuel		
Natural gas (m^3/yr)	0	NA
Oil (L/yr)	28,400,000	Not limited[a]
Coal (t/yr)	210,000	Not limited[a]

NA = Not applicable.
[a] Low supplies can be replenished by truck or rail.
Source: DOE 1999h, DOE 2000e.

4.5.2.1 Transportation

SRS has 230 km (140 mi) of roads to meet its intrasite transportation requirements. SRS also contains 103 km (64 mi) of railroad tracks that support large volume deliveries of coal and oversized structural components (DOE 2000g).

Aiken is part of the Augusta-Aiken, Georgia-South Carolina metropolitan area. Aiken Municipal Airport serves Aiken and Aiken County and is owned by the city of Aiken. Aiken Municipal Airport is about 8 km (5 mi) from Aiken and provides general aviation services. The nearest commercial airport is Augusta Regional Airport in Augusta, Georgia, approximately 56 km (35 mi) from Aiken. Augusta Regional Airport and Columbia Metropolitan Airport in Columbia, South Carolina, approximately 95 km (59 mi) from Aiken, receive jet air passenger and cargo service from both national and local carriers. There also are numerous smaller private airports located in Aiken and surrounding areas.

4.5.2.2 Electrical Power

SRS receives electrical power from South Carolina Electric and Gas Company via one 160-MVA and two 115-MVA capacity transmission lines. SRS is located in and draws its power from the Virginia-Carolina Subregion, an electric power pool area that is part of the Southeastern Electrical Reliability Council. The majority of the power from the Virginia-Carolina Subregion is generated from coal-fired and nuclear-powered generating plants (DOE 2000g).

Current site electricity consumption and site capacity are approximately 370,000 MWh/yr and 4.4 million MWh/yr, respectively. The peak load capacity for the entire site is 330 MWe with peak load usage at approximately 70 MWe (DOE 2000g).

4.5.2.3 Fuel

Coal and oil are used at SRS primarily to power steam plants. Coal is delivered by rail and is stored in piles in A-, D-, and H-areas. Oil is delivered by truck to the K-Area. Natural gas is not used at SRS (DOE 2000g).

4.5.3 Air Quality and Noise

4.5.3.1 Climate and Meteorology

The SRS region has a temperate climate with short, mild winters and long, humid summers. Throughout the year, the climate is frequently affected by warm, moist maritime air masses. The average annual temperature at SRS is 18.2°C (64.7°F). July is the warmest month of the year, with an average daily maximum of 33.3°C (92°F) and an average daily minimum near 22.2°C (72°F). January is the coldest month, with an average daily high around 13.3°C (56°F) and an average daily low of 2.2°C (36°F). Temperature extremes recorded at SRS since 1961 range from a minimum of -19.4°C (-3°F) in January 1985 to a maximum of 41.7°C (107°F) in July 1986.

Annual precipitation at SRS averages 125.7 cm (49.5 in) and is distributed fairly evenly throughout the year. Summer is the wettest season of the year with an average monthly rainfall of 13.2 cm (5.2 in). Autumn is the driest season with a monthly average rainfall of 8.4 cm (3.3 in). Relative humidity averages 70 percent annually, with an average daily maximum of 91 percent and an average daily minimum of 45 percent. An average of 54 thunderstorm days per year were recorded by the National Weather Service in Augusta, Georgia, between 1950 and 1996. About half of the annual thunderstorms occurred during the summer.

The observed wind at SRS indicates no prevailing wind direction, which is typical for the lower Midlands of South Carolina. According to wind data collected from 1992-1996, winds are most frequently from the northeast sector (9.7 percent) followed by winds from the north-northeast sector (9.4 percent). The average annual wind speed at the Augusta National Weather Service Station is 2.9 m/s (6.5 mph). Measurements of air turbulence are used to determine whether the atmosphere has relatively high, moderate, or low potential to disperse airborne pollutants (commonly identified as unstable, neutral, or stable atmospheric conditions, respectively). Generally, SRS atmospheric conditions were categorized as unstable 56 percent of the time (DOE 2001d).

Since operations began at SRS, 10 confirmed tornadoes have occurred on or in close proximity to the site. Several of these tornadoes, one of which was estimated to have winds up to 241 km/hr (150 mph) did considerable damage to forested areas of SRS. None caused damage to structures. Tornado statistics indicate that the average frequency of a low intensity tornado striking SRS is 2×10^{-4} times per year or about once every 5,000 years (WSRC 1998). A tornado of this frequency would have a maximum wind speed (3-second gust) of 72 km/hr (soft return) (45 mph). Similarly, a tornado with a maximum wind speed of 193 km/hr (120 mph) would occur approximately once every 25,000 years. The highest sustained wind recorded by the Augusta National Weather Service Station is 132 km/hr (82 mph). Hurricanes struck South Carolina 36 times from 1700-1992, which equates to an average recurrence frequency of once every 8 years. A hurricane-force wind of 119 km/hr (74 mph) or greater has been observed at SRS only once, during Hurricane Gracie in 1959 (DOE 2001d).

4.5.3.2 Nonradiological Releases

SRS operations can result in the release of nonradiological air pollutants that may affect the air quality of the surrounding area. SRS is located near the center of the Augusta-Aiken Interstate AQCR. The area encompassing SRS and its surrounding counties is classified as an attainment area for all six criteria pollutants (i.e., carbon monoxide, nitrogen dioxide, lead, ozone, sulfur dioxide, and particulate matter) (40 CFR 81.311 and 81.341). No PSD Class I areas exist within 100 km (62 mi) of SRS. None of the facilities at SRS have been required to obtain a PSD permit (DOE 2001d).

Significant sources of criteria and toxic air pollutants at SRS include coal-fired boilers for power and steam production, diesel generators, chemical storage tanks, Defense Waste Processing Facilities (DWPF), groundwater air strippers, and various other process facilities. Another source of criteria pollutant emissions at SRS is the prescribed burning of forested areas across the site by the U.S. Forest Service. Table 4.5.3.2–1 shows the actual atmospheric emissions from all SRS sources in 2000.

Prior to 1991, ambient monitoring of sulfur dioxide, nitrogen dioxide, TSP, carbon monoxide, and ozone was conducted at five sites across SRS. Because there is no regulatory requirement to conduct air quality monitoring at SRS, all of these stations have been decommissioned. Ambient air quality data collected during 1997 from monitoring stations operated by the South Carolina Department of Health and Environmental Control (SCDHEC) in Aiken County and Barnwell County, South Carolina, are summarized in Table 4.5.3.2–2. These data indicate that ambient concentrations of the measured criteria pollutants are generally much less than the standard.

Table 4.5.3.2–1. SRS Criteria Pollutant Air Emissions in 2000

Pollutant	SRS Emissions [a] (metric tons per year)
Carbon monoxide	2.66×10^3
Nitrogen dioxide	3.51×10^2
Sulfur dioxide	4.83×10^2
PM_{10}	1.49×10^2
Total Suspended Particulates	3.72×10^2
Lead	1.30×10^{-1}
VOC	1.44×10^2
Gaseous fluorides (as hydrogen fluoride)	1.23×10^{-1}

PM_{10} = particulate matter less than or equal to 10 microns in aerodynamic diameter.
VOC = Volatile organic compounds. VOC are ozone precursors.
[a] From all SRS sources (permitted and non-permitted).
Source: WSRC 2001.

Table 4.5.3.2–2. SCDHEC Ambient Air Monitoring Data for 2001

Pollutant	Averaging Period	Most Stringent Standard[a] (micrograms per m^3)	Ambient Concentration (micrograms per m^3)
Carbon monoxide	8-hour	10,000	6,800
	1-hour	40,000	10,100
Nitrogen dioxide	Annual	73.7	9
Sulfur dioxide	Annual	80	4
	24-hour	365	18
	3-hour	1,300	50
PM_{10}	Annual	50	19
	24-hour	150	41
Lead	Quarterly	1.5	0.03
Total suspended particulates	Annual	75	28
Ozone	1-hour	235	220

[a] The more stringent of the Federal and state standards is presented if both exist for the averaging period. The NAAQS (40 CFR 50), other than those for ozone, particulate matter, lead, and those based on annual averages, are not to be exceeded more than once per year. The annual arithmetic PM_{10} mean standard is attained when the expected annual arithmetic mean concentration is less than or equal to the standard.
Source: SCDHEC 2002.

SCDHEC also requires dispersion modeling as a means of evaluating local air quality. Periodically, all permitted sources of regulated air emissions at SRS must be modeled to determine estimates of ambient air pollution concentrations at the SRS boundary. The results are used to demonstrate compliance with ambient standards and to define a baseline from which to assess the impacts of any new or modified sources.

Table 4.5.3.2–3 provides a summary of the most recent regulatory compliance modeling for SRS emissions. These calculations were performed with EPA's Industrial Source Complex air dispersion model and site-wide maximum potential emissions data. Model estimates of ambient SRS boundary concentrations for all air pollutants emitted at SRS are less than their respective ambient standards.

Table 4.5.3.2–3. Nonradiological Ambient Air Concentrations from SRS Sources, 2001

Pollutant	Averaging Period	Most Stringent Standard[a] (micrograms per m^3)	Ambient Concentration (micrograms per m^3)
Carbon monoxide	8-hour	10,000	263
	1-hour	40,000	67
Nitrogen dioxide	Annual	100	17
Sulfur dioxide	Annual	80	27
	24-hour	365	337
	3-hour	1,300	1,171
Ozone	1-hour	235	NA
PM_{10}	Annual	50	7
	24-hour	150	97
Total suspended particulates	Annual	75	46.6

PM_{10} = particulate matter less than or equal to 10 microns in aerodynamic diameter.
NA = Not available.
[a] The more stringent of the Federal and state standards is presented if both exist for the averaging period.
Source: Gordon 2001.

4.5.3.3 Radiological Releases

In the SRS region, airborne radionuclides originate from natural sources (i.e., terrestrial and cosmic), worldwide fallout, and SRS operations. DOE maintains a network of 23 air sampling stations on and around SRS to determine concentrations of radioactive particulates and aerosols in the air. DOE provides detailed summaries of radiological releases to the atmosphere from SRS operations, along with resulting concentrations and doses, in a series of annual environmental data reports. Table 4.5.3.3–1 lists 2001 radionuclide releases from each major operational group of SRS facilities. All radiological impacts are within regulatory requirements.

Table 4.5.3.3–1. Radionuclide Releases from SRS Facilities, 2001

Nuclide	Reactors (ci/yr)	Separations (ci/yr)	Reactor Materials (ci/yr)	SRTC (ci/yr)	Diffuse & Fugitive (ci/yr)	Total (ci/yr)
Gases and Vapors						
Tritium	2.41×10^{3}	4.44×10^{4}			6.07×10^{2}	4.74×10^{4}
Carbon-14		1.70×10^{-1}			8.76×10^{-5}	1.7×10^{-1}
Krypton-85		6.47×10^{4}				6.47×10^{4}
Xenon-133		4.82×10^{-6}				4.82×10^{-6}
Xenon-135		7.57×10^{-2}				7.57×10^{-2}
Iodine-129		1.29×10^{-2}			1.29×10^{-6}	1.29×10^{-2}
Iodine-131		2.05×10^{-6}		6.13×10^{-6}		8.18×10^{-6}
Iodine-133				4.26×10^{-4}		4.26×10^{-4}
Particulates						
Actinium-228					4.07×10^{-6}	4.07×10^{-6}
Americium-241		1.52×10^{-4}	5.72×10^{-9}		1.15×10^{-4}	2.67×10^{-4}
Americium-243					9.90×10^{-7}	9.90×10^{-7}
Antimony-124					8.09×10^{-9}	8.09×10^{-9}

Table 4.5.3.3–1. Radionuclide Releases from SRS Facilities, 2001 *(continued)*

Nuclide	Reactors (ci/yr)	Separations (ci/yr)	Reactor Materials (ci/yr)	SRTC (ci/yr)	Diffuse & Fugitive (ci/yr)	Total (ci/yr)
Particulates *(continued)*						
Antimony-125					5.37×10^{-5}	5.37×10^{-5}
Bismuth-214					1.29×10^{-6}	1.29×10^{-6}
Cerium-141					4.16×10^{-5}	4.16×10^{-5}
Cerium-144					1.43×10^{-4}	1.43×10^{-4}
Curium-242					1.43×10^{-8}	1.43×10^{-8}
Curium-244		3.9×10^{-6}	2.23×10^{-9}		4.76×10^{-5}	5.15×10^{-5}
Curium-245					4.18×10^{-7}	4.18×10^{-7}
Curium-246					1.01×10^{-6}	1.01×10^{-6}
Cobalt-58					1.27×10^{-4}	1.27×10^{-4}
Cobalt-60		4.4×10^{-8}		3.25×10^{-7}	8.59×10^{-4}	8.59×10^{-4}
Chromium-51					1.21×10^{-4}	1.21×10^{-4}
Cesium-134		1.94×10^{-8}			1.31×10^{-4}	1.31×10^{-4}
Cesium-137		1.18×10^{-3}			2.22×10^{-3}	3.40×10^{-3}
Europium-152					4.15×10^{-5}	4.15×10^{-5}
Europium-154					1.53×10^{-5}	1.53×10^{-5}
Europium-155					7.85×10^{-7}	7.85×10^{-7}
Mercury-203					2.29×10^{-10}	2.29×10^{-10}
Manganese-54					2.52×10^{-8}	2.52×10^{-8}
Sodium-22					2.09×10^{-8}	2.09×10^{-8}
Niobium-94					4.56×10^{-8}	4.56×10^{-8}
Niobium-95					1.13×10^{-4}	1.13×10^{-4}
Nickel-63					4.38×10^{-6}	4.38×10^{-6}
Neptunium-237					1.09×10^{-8}	1.09×10^{-8}
Neptunium-239					1.24×10^{-7}	1.24×10^{-7}
Protactinium-233					2.29×10^{-10}	2.29×10^{-10}
Protactinium -234					1.76×10^{-8}	1.76×10^{-8}
Lead-212					2.74×10^{-6}	2.74×10^{-6}
Lead-214					6.58×10^{-7}	6.58×10^{-7}
Plutonium-147					1.34×10^{-5}	1.34×10^{-5}
Plutonium -236					1.22×10^{-10}	1.22×10^{-10}
Plutonium -238		9.15×10^{-5}	3.67×10^{-9}		3.99×10^{-5}	1.31×10^{-4}
Plutonium -239		2.62×10^{-4}	1.37×10^{-8}		1.94×10^{-3}	2.20×10^{-3}
Plutonium -240					8.51×10^{-7}	8.51×10^{-7}
Plutonium -241					6.70×10^{-6}	6.70×10^{-6}
Plutonium -242					2.09×10^{-8}	2.09×10^{-8}
Radium-226					5.25×10^{-6}	5.25×10^{-6}
Radium-228					4.16×10^{-6}	4.16×10^{-6}
Ruthenium-103					4.23×10^{-5}	4.23×10^{-5}
Ruthenium-106					9.92×10^{-7}	9.92×10^{-7}

Table 4.5.3.3–1. Radionuclide Releases from SRS Facilities, 2001 *(continued)*

Nuclide	Reactors (ci/yr)	Separations (ci/yr)	Reactor Materials (ci/yr)	SRTC (ci/yr)	Diffuse & Fugitive (ci/yr)	Total (ci/yr)
Particulates *(continued)*						
Selenium-79					4.58×10^{-9}	4.58×10^{-9}
Tin-126					1.69×10^{-7}	1.69×10^{-7}
Strontium-89					3.34×10^{-7}	3.34×10^{-7}
Strontium-90		1.42×10^{-4}			3.57×10^{-3}	3.71×10^{-3}
Technetium-99					1.89×10^{-6}	1.89×10^{-6}
Thorium-228					3.97×10^{-6}	3.97×10^{-6}
Thorium -230					2.71×10^{-6}	2.71×10^{-6}
Thorium -232					1.75×10^{-6}	1.75×10^{-6}
Thorium -234					1.03×10^{-4}	1.03×10^{-4}
Thalium-208					2.58×10^{-6}	2.58×10^{-6}
Uranium-232					4.46×10^{-11}	4.46×10^{-11}
Uranium-233					3.90×10^{-8}	3.90×10^{-8}
Uranium-234		3.85×10^{-5}	3.43×10^{-6}		2.84×10^{-4}	3.26×10^{-4}
Uranium-235		3.91×10^{-6}	5.16×10^{-7}		6.59×10^{-6}	1.10×10^{-5}
Uranium-236					7.17×10^{-10}	7.17×10^{-10}
Uranium-238		9.33×10^{-5}	4.93×10^{-7}		3.18×10^{-4}	4.12×10^{-4}
Zinc-65					2.23×10^{-5}	2.23×10^{-5}
Zirconium-95					1.68×10^{-5}	1.68×10^{-5}
Alpha	5.49×10^{-5}	3.69×10^{-5}		1.49×10^{-8}	1.33×10^{-3}	1.42×10^{-3}
Beta-Gamma	3.81×10^{-4}	1.70×10^{-4}	1.10×10^{-5}		3.22×10^{-2}	3.28×10^{-2}
Total	$\mathbf{2.41 \times 10^{3}}$	$\mathbf{1.09 \times 10^{5}}$	$\mathbf{1.55 \times 10^{-5}}$	$\mathbf{4.32 \times 10^{-4}}$	$\mathbf{6.07 \times 10^{2}}$	$\mathbf{1.12 \times 10^{5}}$

Source: WSRC 2002h.

4.5.3.4 Noise

Major noise sources at SRS are primarily in developed or active areas and include various industrial facilities, equipment, and machines (e.g., cooling systems, transformers, engines, pumps, boilers, steam vents, paging systems, construction and materials-handling equipment, and vehicles). Major noise emission sources outside of these active areas consist primarily of vehicles and rail operations.

Existing SRS-related noise sources of importance to the public are those related to transportation of people and materials to and from the site, including trucks, private vehicles, helicopters, and trains. Another important contributor to noise levels is traffic to and from SRS operations along access highways through the nearby towns of New Ellenton, Jackson, and Aiken. Noise measurements recorded during 1989 and 1990 along State Route 125 in the town of Jackson at a point about 15 m (50 ft) from the roadway indicate that the 1-hour equivalent sound level from traffic ranged from 48 to 72 dBA. The estimated day-night average sound levels along this route were 66 dBA for summer and 69 dBA for winter. Similarly, noise measurements along State Route 19 in the town of New Ellenton at a point about 15 m (50 ft) from the roadway indicate that the 1-hour equivalent sound level from traffic ranged from 53-71 dBA. The estimated average day-night average sound levels along this route were 68 dBA for summer and 67 dBA for winter.

Most industrial facilities at SRS are far enough from the site boundary that noise levels from these sources at the boundary would not be measurable or would be barely distinguishable from background levels. The States of Georgia and South Carolina, and the counties in which SRS is located, have not established any noise regulations that specify acceptable community noise levels, with the exception of a provision in the Aiken County Zoning and Development Standards Ordinance that limits daytime and nighttime noise by frequency band (DOE 2001d).

The EPA guidelines for environmental noise protection recommend an average day-night average sound level of 55 dBA as sufficient to protect the public from the effects of broadband environmental noise in typically quiet outdoor and residential areas (EPA 1974). Land use compatibility guidelines adopted by the Federal Aviation Administration and the Federal Interagency Committee on Urban Noise indicate that yearly day-night average sound levels less than 65 dBA are compatible with residential land uses and levels up to 75 dBA are compatible with residential uses if suitable noise reduction features are incorporated into structures (14 CFR 150). It is expected that for most residences near SRS, the day-night average sound level is less than 65 dBA and is compatible with the residential land use, although for some residences along major roadways noise levels may be higher.

4.5.4 Water Resources

4.5.4.1 Surface Water

The Savannah River bounds SRS on its southwestern border for about 32 km (20 mi), approximately 257 river km (160 river mi) from the Atlantic Ocean. Five upstream reservoirs—Jocassee, Keowee, Hartwell, Richard B. Russell, and Strom Thurmond Clarks Hill—reduce the variability of flow downstream in the area of SRS. River flow averages about 283 m^3/s (10,000 ft^3/s) at SRS (DOE 2002f).

Upstream of SRS, the Savannah River supplies domestic and industrial water for Augusta, Georgia, and North Augusta, South Carolina. Approximately 209 river km (130 river mi) downstream of SRS, the river supplies domestic and industrial water for Savannah, Georgia, and Beaufort and Jasper Counties in South Carolina through intakes at about River Mile 29 and River Mile 39, respectively (DOE 2002f).

Figure 4.5.1.1–2 in Section 4.5.1 shows the surface water features at SRS. There are two lakes or ponds on SRS: L-Lake and Par Pond. Five tributaries discharge directly to the Savannah River from SRS: Upper Three Runs, Beaver Dam Creek, Fourmile Branch, Steel Creek, and Lower Three Runs. A sixth stream, Pen Branch, which does not flow directly into the river, joins Steel Creek in the Savannah River floodplain swamp. Each of the six streams originates on the Aiken Plateau in the Coastal Plain and descends 15-60 m (50-200 ft) before discharging into the river (DOE 2002f). The streams, which historically have received varying amounts of effluent from SRS operations, are not commercial sources of water.

Water has been withdrawn from the Savannah River for use mainly as cooling water; some, however, has been used for domestic purposes. Most of the water that is withdrawn is returned to the river through discharges to various tributaries (DOE 2002f).

Upper Three Runs, the longest of the SRS streams, is a large blackwater stream that discharges to the Savannah River. It drains an area of over 505 km^2 (195 mi^2) and is approximately 40 km (25 mi) long, with its lower 27 km (17 mi) within SRS. It is the only major stream on SRS that has not received thermal discharges (DOE 2002f).

Fourmile Branch is a blackwater stream that originates near the center of SRS and flows southwest for 24 km (15 mi) before emptying into the Savannah River (DOE 2002f). It drains an area of about 57 km^2 (22 mi^2) inside SRS, including much of F-, H-, and C-areas. Fourmile Branch flows parallel to the Savannah River behind natural levees and enters the river through a breach downriver from Beaver Dam Creek. In its lower reaches, Fourmile Branch broadens and flows via braided channels through a delta.

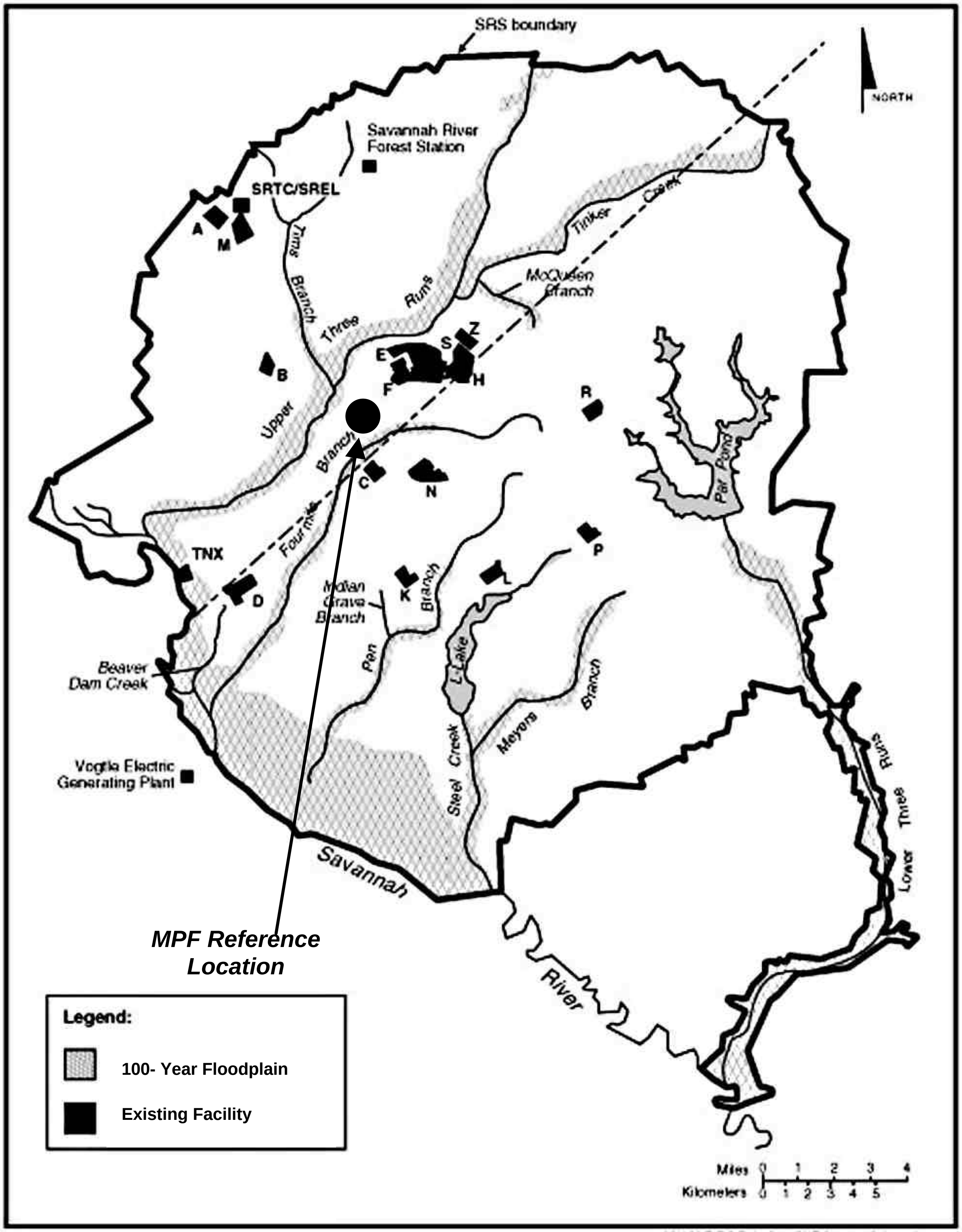
Downstream of the delta, the channels rejoin into one common channel. Most of the flow discharges into the Savannah River, while a small portion flows west and enters Beaver Dam Creek (DOE 2002f).

The natural flow of SRS streams ranges from about 0.3 m^3/s (0.39 yd^3/s) in smaller streams to 7 m^3/s (9 yd^3/s) in Upper Three Runs. From 1974-1995, the mean flow of Upper Three Runs at Road A was 7 m^3/s (9 yd^3/s), and the 7Q10 (minimum 7-day average flow that occurs with an average frequency of once in 10 years) was 3 m^3/s (4 yd^3/s) (DOE 2002l). The mean flow of Fourmile Branch southwest of South Carolina State Highway (S.C.) 125 from 1976-1995 was 3 m^3/s (4 yd^3/s) and the 7Q10 was 0.2 m^3/s (0.26 yd^3/s) (DOE 2002f).

The 100-year floodplain is shown on Figure 4.5.4.1–1. Site-wide information concerning 500-year floodplains at SRS is not available. Based on review of the U.S. Geological Survey topographic map (New Ellenton SW quad), the elevation of the reference location is approximately 73 m (240 ft) above mean sea level. Upper Three Runs lies approximately 1.6 km (1 mi) to the west of the reference location at an elevation of approximately 35 m (115 ft) above mean sea level. Fourmile Branch lies approximately 0.6 km (0.4 mi) southeast of the reference location at an elevation of approximately 53 m (175 ft) above mean sea level. No federally designated Wild and Scenic Rivers occur within the site (DOE 2002f).

Surface Water Quality

The SCDHEC regulates the physical properties and concentrations of chemicals and metals in SRS effluents under the NPDES program. SCDHEC, which also regulates water quality standards for SRS waters, has classified the Savannah River and SRS streams as “Freshwater.” In 1998, 99.3 percent of the NPDES water quality analysis on SRS effluents were in compliance with the SRS NPDES permit; only 42 of 5,790 analyses exceeded permit limits (DOE 2002f).



Source: DOE 2000c.

Figure 4.5.4.1–1. 100-Year Flood Plain on the Savannah River Site

In 2001, SRS discharged water into site streams and the Savannah River under three NPDES permits. In 2001, 28 of the 31 outfalls permitted were used for discharge. Results from 24 of the 5,386 sample analyses performed during the year exceeded permit limits. A list of 2001 NPDES exeedances appears in Table 4.5.4.1–1. The toxicity failures of A-11 and G-10 outfalls are believed to be caused by the softness of the effluent.

Table 4.5.4.1–1. 2001 Exceedances of NPDES Permit Liquid Discharge Limits

Outfall	Date	Parameter Exceeded	Results	Possible Causes	Corrective Action
K-06	Jan. 24	pH	8.7 SU	High-pH Boiler discharge	Coordinate discharge with cooling water
K-06	Jan. 25	pH	8.8 SU	High-pH boiler discharge	Coordinate discharge with cooling water
A-01	Oct. 8	C-TOX	Fail	Unknown	Under Investigation
A-01	Nov. 5	C-TOX	Fail	Unknown	Under Investigation
A-11	Jan. 8	C-TOX	Fail	Unknown	Under Investigation
A-11	Feb. 12	C-TOX	Fail	Unknown	Under Investigation
A-11	March 5	C-TOX	Fail	Unknown	Under Investigation
A-11	April 16	C-TOX	Fail	Unknown	Under Investigation
A-11	May 7	C-TOX	Fail	Unknown	Under Investigation
A-11	June 6	C-TOX	Fail	Unknown	Under Investigation
A-11	July 26	C-TOX	Fail	Unknown	Under Investigation
A-11	Aug. 7	C-TOX	Fail	Unknown	Under Investigation
A-11	Sept. 14	C-TOX	Fail	Unknown	Under Investigation
A-11	Oct. 8	C-TOX	Fail	Unknown	Under Investigation
A-11	Nov. 5	C-TOX	Fail	Unknown	Under Investigation
A-11	Dec. 4	C-TOX	Fail	Unknown	Under Investigation
X-08	Jan. 25	TSS	43 mg/L	S-8B system work led to detritus discharge	Conduct work in no-discharge mode
G-10	April 30	C-TOX	Fail	Unknown	Under Investigation
G-10	May 20	C-TOX	Fail	Unknown	Under Investigation
G-10	Nov. 26	C-TOX	Fail	Unknown	Under Investigation
G-10	Aug. 11	C-TOX	Fail	Unknown	Under Investigation
G-10	Aug. 12	C-TOX	Fail	Unknown	Under Investigation
H-16	Sept. 4	Frequency of BOD analysis	3 of 30 reported; 4 of 30 required	Subcontract lab missed hold time	Lab revised procedures/responsibilities

BOD = Biochemical oxygen demand.
C-TOX = Chronic toxicity.
SU = Standard unit.
TSS = Total suspended solids.
Source: WSRC 2002h.

Liquid effluents are sampled continuously by automatic samples at or very near their points of discharge to the receiving streams. The SRS liquid radioactive releases for 2001 are shown in Table 4.5.4.1–2.

Table 4.5.4.1–2. Annual Radioactive Liquid Releases by Source for 2001 (Including Direct and Seepage Basin Migration Releases)

Radionuclides	Reactors (Ci)	Separations[a] (Ci)	Reactor Materials (Ci)	SRTC (Ci)	Total (Ci)	MCL or DCG (pCi/L)
Hydrogen-3	$1.28x10^{3}$	$3.03x10^{3}$	—	$7.94x10^{-1}$	$4.32x10^{3}$	2,000,000
Strotium-90	$5.92x10^{-5}$	$2.04x10^{-2}$	—	—	$2.05x10^{-2}$	1,000
Technetium-99	—	$4.56x10^{-2}$	—	—	$4.56x10^{-2}$	100,000
Iodine-129	—	$7.82x10^{-2}$	—	—	$7.82x10^{-2}$	500
Cesium-137	$2.25x10^{-2}$	$5.80x10^{-2}$	—	—	$8.05x10^{-2}$	3,000
Uranium-234	—	$2.09x10^{-5}$	$3.10x10^{-5}$	$4.28x10^{-5}$	$9.47x10^{-5}$	500
Uranium-235	—	$9.05x10^{-7}$	—	$7.92x10^{-7}$	$1.70x10^{-6}$	600
Uranium-238	—	$3.97x10^{-5}$	$2.85x10^{-5}$	$2.92x10^{-6}$	$4.50x10^{-5}$	600
Plutonium-238	—	$1.36x10^{-5}$	$2.85x10^{-5}$	—	$7.43x10^{-6}$	40
Plutonium-239	—	$5.12x10^{-6}$	$2.31x10^{-6}$	—	$7.43x10^{-6}$	30
Americium-241	—	$1.35x10^{-6}$	$5.72x10^{-6}$	—	$7.09x10^{-6}$	NS
Curium-244	—	$1.22x10^{-6}$	$5.87x10^{-6}$	—	7.09x10-6	
Alpha	$3.26x10^{-3}$	$1.98x10^{-2}$	$2.59x10^{-3}$	$3.09x10^{-3}$	$2.87x10^{-2}$	15
Beta-Gamma	$2.56x10^{-2}$	$5.63x10^{-2}$	$1.73x10^{-4}$	$3.05x10^{-3}$	$8.51x10^{-2}$	4 mrem/yr

"—" Indicates no quantifiable activity
pCi/L = picocuries/Liter
SRTC = Savannah River Technology Center.
TNX = a technology development facility adjacent to the Savannah River.
NS = No standard.
[a] Includes separations, waste management, and tritium facilities.
Source: WSRC 2002h.

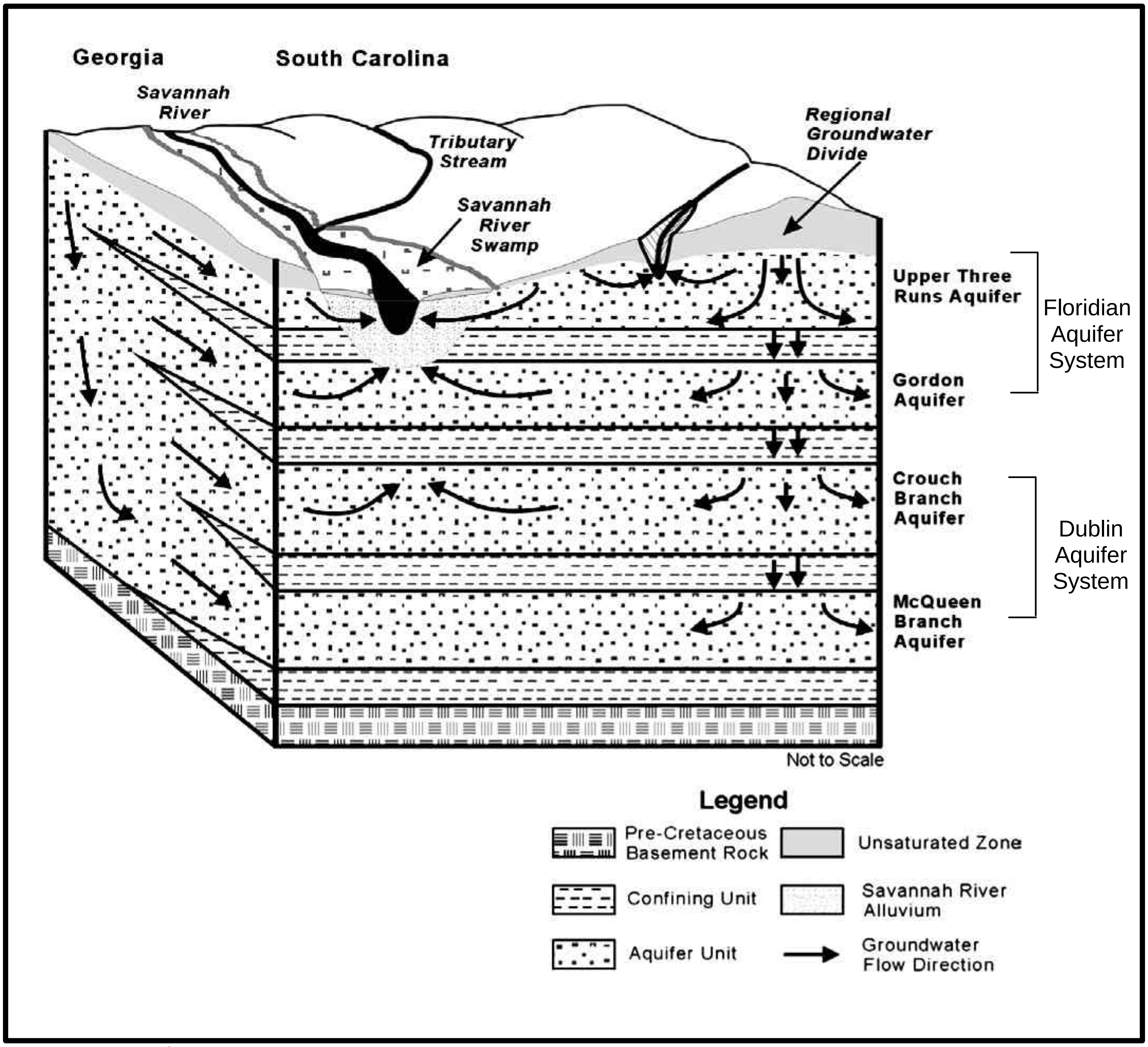
Each SRS stream receives treated wastewater and stormwater from site facilities. Stream locations are sampled for water quality on monthly and quarterly frequencies (WSRC 2002h). Nitrate levels for the majority of river and stream locations ranged below 0.5 mg/L, which is below the legal EPA MCL of 10 mg/L. Average phosphate levels were typically higher in the Savannah River than in onsite streams. River levels ranged from an average of 0.0105 mg/L to 0.151 mg/L, below the EPA MCL of 5.0 mg/L. Total suspended solids averaged lower onsite than in the river, with the average ranging from 2.5 mg/L to 6.5 mg/L. There is no EPA MCL established for total suspended solids. Aluminum, cadmium, chromium, copper, iron, manganese, nickel, and zinc were all detected in surface waters at all river and stream locations. Mercury was detected above the PQL in the Savannah River and in onsite streams. Levels ranged from 0.05 mg/L to below the PQL of 0.0005 mg/L. One pesticide, Beta BHC, was found in 2001 near the quantitation limit of 0.050 µg/L, but no herbicides were detected during 2001 (WSRC 2002h).

4.5.4.2 Groundwater

In the SRS region, the subsurface contains two hydrogeologic provinces. The uppermost, consisting of a wedge of unconsolidated Coastal Plain sediments of Late Cretaceous and Tertiary age, is the Atlantic Coastal Plain Hydrogeologic Province. Beneath the sediments of the Atlantic Coastal Plain Hydrogeologic Province are rocks of the Piedmont Hydrogeologic Province. These rocks consist of Paleozoic igneous and metamorphic basement rocks and lithified mudstone, sandstone, and conglomerates of the Dunbarton basin of the Upper Triassic. Sediments of the Atlantic Coastal Plain Hydrogeologic Province are divided into two main aquifer systems, the Floridan Aquifer System, and the Dublin Aquifer System. These systems are separated from one another by the Meyers Branch Confining System.

Groundwater within the Floridan Aquifer System (the shallow aquifer beneath SRS) flows slowly toward SRS streams and swamps and into the Savannah River at rates ranging from inches to several hundred feet per year. The Floridan Aquifer System is divided into the overlying Upper Three Runs Aquifer and the underlying Gordon Aquifer. The depth to which onsite streams cut into sediments, the lithology of the sediments, and the orientation of the sediment formations control the horizontal and vertical movement of the groundwater. The valleys of smaller perennial streams allow discharge from the shallow saturated geologic formations. The valleys of major tributaries of the Savannah River (e.g., Upper Three Runs) drain formations of intermediate depth, and the river valley drains deep formations. With the release of water to the streams, the hydraulic head (i.e., pressure) of the aquifer unit releasing the water can become less than that of the underlying unit. If this occurs, groundwater has the potential to migrate upward from the lower unit to the overlying unit.

Groundwater flow in the shallow aquifer (Floridan) system is generally horizontal, but may have a vertically downward component. In the regional groundwater divide (areas between surface water drainages), the vertical component of groundwater flow is downward. In areas along the lower reaches of most of the site streams, groundwater moves generally in a horizontal direction and has vertically upward potential from deeper aquifers to the shallow aquifers. In the vicinity of these streams, the potential for vertically upward flow occurs across a confining unit where the underlying aquifer has not been incised by an overlying stream (DOE 2002f). For example, in the area south of H-Area where Fourmile Branch cuts into the Upper Three Runs Aquifer, but does not cut into the Gordon Aquifer, the Gordon Aquifer discharges into the Fourmile Branch because of its greater hydraulic head. At these locations, any contaminants in the overlying aquifer system are prevented from migrating into deeper aquifers by the greater hydraulic head in the underlying aquifer system as well as the low permeability of the confining unit. Groundwater flow in the General Separations Area, which includes F- and H-areas, is toward Upper Three Runs and its tributaries to the north and Fourmile Branch to the south. Figure 4.5.4.2–1 illustrates the aquifer systems beneath SRS.



Source: WSRC 2002h.

Figure 4.5.4.2–1. Groundwater at the Savannah River Site

Groundwater is the source of domestic, municipal, and industrial water throughout the Upper Coastal Plain. Regional domestic water supplies come primarily from the shallow aquifers, including the Gordon Aquifer and the Upper Three Runs Aquifer (water-table aquifer). Most municipal and industrial water supplies in Aiken County are from the Crouch Branch and McQueen Branch Aquifers. In Barnwell and Allendale Counties, some municipal water supplies are from the Gordon Aquifer and overlying units that thicken to the southeast. SRS derives its own drinking and production water supply from groundwater from the Crouch Branch and McQueen Branch Aquifers. SRS ranks as South Carolina's largest self-supplied industrial consumer of groundwater, utilizing approximately 20 million L (5.3 million gal) per day. SRS domestic and process water systems are supplied from a network of approximately 40 groundwater wells in widely scattered locations across the site. Treated well water is supplied to the larger site facilities by the A-Area, D-Area, and K-Area domestic water systems. The wells range in capacity from 757-5,678 L/min (200-1,500 gal/min) and supply an average of 4.1 million L/day (1.1 million gal/day) of domestic water to customers in the area. The central domestic water system has an estimated excess capacity of 1,680 L/min (444 gal/min), which could be increased by installing an additional elevated storage tank (DOE 2000e).

Groundwater rights in South Carolina are traditionally associated with the absolute ownership rule. The owners of land overlying a groundwater resource are allowed to withdraw from their wells all the water they wish for whatever purpose they desire. However, the South Carolina *Surface Water Withdrawal and Reporting Act* (Title 49, Waters, Water Resources and Drainage, Chapter 4) requires that all users of 379,000 L (100,000 gal) or more per day (136 million L/yr [35.9 million gal/yr]) of water to report their withdrawal rates to the South Carolina Water Resource Commission. SRS exceeds this amount of groundwater use and must report its withdrawal rates to the commission.

Groundwater Quality

Monitoring wells are extensively used at SRS to assess the effect of site activities on groundwater quality. Most of the wells monitor the upper groundwater zone, although wells in lower zones are present at the sites with the larger groundwater contamination plumes. The SRS groundwater program was audited in 2000 and 2001 by both DOE and the Westinghouse Savannah River Company (WSRC), the management and operations contractor at SRS. Findings of these assessments resulted in the early revision of the site Groundwater Protection Management Program Plan to codify improvements to the program (WSRC 2002h). A summary of groundwater contamination by area and its corrective actions is listed in Table 4.5.4.2–1.

Table 4.5.4.2–1. Summary of Groundwater Monitoring in 2001

Area	Contamination	Corrective Action
A-Area and M-Area	VOC, particularly trichloroethylene and tetrachloroethylene	Dynamic underground stripping technology (DUS)
C-Area	Tritium and trichloroethylene	
D-Area	VOC, particularly trichloroethylene	Phytoremediation system being tested for treatment of groundwater contaminated with trichloroethylene
TNX-Area	Radionuclides, heavy metals, VOC	Geosiphon wells
General Separation and Waste Management Areas	Tritium, metals, other radionulcides, VOCs	Complex groundwater cleanup system in operation
K-Area	Trichloroethylene, tetrachloroethylene and tritium	Investigation under RCRA/CERCLA
L-Area and Chemicals, Metals, and Pesticides Pits	L-Area- burning/rubble pit, carbon tetrachloride Trichloroethylene, tetrachloroethylene and tritium	Groundwater modeling begins in fiscal year 2002
N-Area	Organic compounds, heavy metals	Effort under way to administratively create new groundwater operable unit in this area
P-Area	Tritium and trichloroethylene plumes	No site specific groundwater modeling document available yet in this area
R-Area	Tritium, strontium-90, tetrachloroethylene, and trichloroethylene	Vadose zone modeling and flow and transport modeling in progress
Sanitary Landfill	General wastes, low concentrations of VOC, tritium, metals, and other radionuclides	RCRA-style cap installed over the main and southern expansion sections, biosparging system

Source: WSRC 2002h.

4.5.5 Geology and Soils

4.5.5.1 Geology

SRS is located in west-central South Carolina, approximately 161 km (100 mi) from the Atlantic Coast (Figure 4.5.1.1–1). It is on the Aiken Plateau of the Upper Atlantic Coastal Plain, about 40 km (25 mi) southeast of the Fall Line that separates the Atlantic Coastal Plain from the Piedmont.

The Aiken Plateau, the subdivision of the Coastal Plain that includes SRS, is highly dissected and characterized by broad, flat areas between streams and narrow, steep-sided valleys. It slopes from an elevation of approximately 200 m (650 ft) at the Fall Line to an elevation of about 75 m (250 ft) on the southeast edge of the plateau.

The sediments of the Atlantic Coastal Plain dip gently seaward from the Fall Line thickening from essentially 0 m (0 ft) thick at the Fall Line to more than 1,219 m (4,000 ft) at the coast. At SRS, the plateau is underlain by 150-420 m (500-1,400 ft) of sands, clays, and limestones of

Tertiary and Cretaceous age. These sediments are underlain, in turn, by sandstones of Triassic age and older metamorphic and igneous rocks (Arnett and Mamatey 1996).

Because of the proximity of SRS to the Piedmont Province, it has more relief than areas that are nearer the coast, with onsite elevations ranging from 27-128 m (89-420 ft) above mean sea level.

Geologic Conditions

This subsection describes the geologic conditions that could affect the stability of the ground and infrastructure at SRS and includes potential volcanic activity, seismic activity (earthquakes), slope stability, surface subsidence, and soil liquefaction.

Volcanism

There is no geologic evidence of volcanism in the region.

Seismic Activity

Identification of faults is important because earthquakes can occur along these faults. Several fault systems occur offsite, northwest of the Fall Line. The most active seismic zones in the southeastern United States are all located over 160 km (100 mi) away from the site. The *Final Environmental Impact Statement for the Continued Operation of K, L and P Reactors at SRS* contains a detailed discussion of these offsite geologic features (DOE 1990). Faults identified onsite include the Pen Branch, Steel Creek, Advanced Tactical Training Area, Crackerneck, Ellenton, and Upper Three Runs. The Upper Three Runs Fault, which passes approximately 1.6 km (1 mi) northwest of F-Area, is a Paleozoic fault that does not cut Coast Plain sediments (DOE 2002f). The *Environmental Impact Statement Accelerator Production of Tritium at the Savannah River Site* (DOE 1997c) contains information on SRS fault location and earthquake occurrences. A study of geophysical evidence (Wike, Moore-Shedrow, and Shedrow 1996) identified an unnamed fault just south of the MPF reference location. The lines shown on Figure 4.5.5.1–1 represent the projection of the faults to the ground surface. The actual faults do not reach the surface, but rather stop several hundred feet below.

Based on information developed to date, none of the faults discussed in this section are considered “capable,” as defined by the Nuclear Regulatory Commission in 10 CFR 100.23. The capability of a fault is determined by several criteria, one of which is whether the fault has moved at or near the ground surface within the past 35,000 years.

Earthquakes of large magnitude may cause considerable damage to structures and underground pipes. Two major earthquakes have occurred within 300 km (186 mi) of SRS. The Charleston, South Carolina, earthquake of 1886 had an estimated Richter scale magnitude of 6.8; it occurred approximately 145 km (90 mi) from the SRS area, which experienced an estimated peak horizontal acceleration of 10 percent of gravity (URS/Blume 1982). The Union County, South Carolina, earthquake of 1913 had an estimated Richter scale magnitude of 6.0 and occurred about 160 km (99 mi) from the site (Bollinger 1973). The magnitudes of these earthquakes are estimated from reports of damage and effects (see Table 4.2.5.1–2). Because these earthquakes are not associated conclusively with a specific fault, researchers cannot determine the amount of displacement resulting from the earthquakes. A small earthquake (with approximate Richter scale magnitude of 4.2) occurred off the coast about 48 km (30 mi) south-southwest of Charleston, South Carolina, on November 11, 2002. It shook doors and rattled windows but did no damage. Three days earlier a smaller earthquake (with approximate Richter scale magnitude of 3.5) occurred 249 km (155 mi) south-southwest of Charleston, South Carolina.

In recent years, three earthquakes occurred inside the SRS boundary. An earthquake occurred on May 17, 1997, with a Richter scale magnitude of 2.3 and a calculated focal depth (depth below the surface of the earth where the earthquake begins) of 5.44 km (3.38 mi). Its epicenter (position on the surface of the earth where the earthquake begins) was southeast of K-Area. On August 5, 1988, an earthquake occurred with a local Richter scale magnitude of 2.0 and a focal depth of 2.68 km (1.66 mi). Its epicenter was northeast of K-Area. On June 8, 1985, an earthquake occurred with a local Richter scale magnitude of 2.6 and a focal depth of 0.96 km (0.59 mi). Its epicenter was south of C-Area and west of K-Area. Existing information does not relate these earthquakes conclusively with known faults under the site. Figure 4.5.5.1–1 shows the locations of the epicenters of these earthquakes.

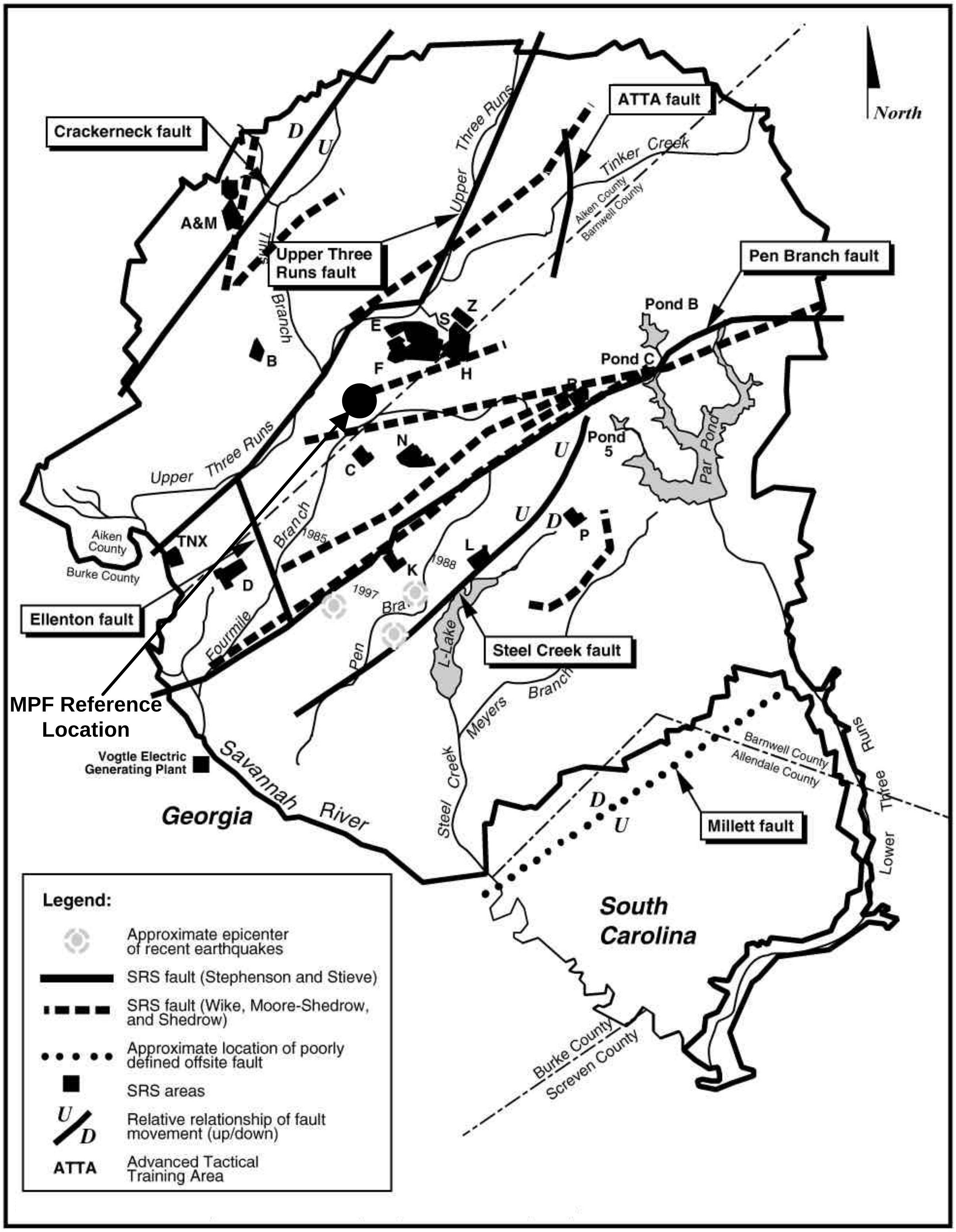
Outside the SRS boundary, an earthquake with a Richter scale magnitude of 3.2 occurred on August 8, 1993, approximately 16 km (10 mi) east of the city of Aiken near Couchton, South Carolina. People reported feeling this earthquake in Aiken, New Ellenton (immediately north of SRS), North Augusta (approximately 40 km [25 mi]) northwest of the SRS, and onsite (Aiken Standard 1993).

Slope Stability, Subsidence, and Soil Liquefaction

Subsidence (lowering of the ground surface) and soil liquefaction are two geologic processes that are more likely to affect SRS than rockfalls or landslides. Rock strata under some areas of SRS include layers of pockets of carbonate rock that are subject to dissolution. Sites underlain by these “soft zones” are considered unsuitable for structural formations unless extensive soil stabilization is done. There are no carbonate soft zones in the overall area of the MPF representative location (WSRC 2000a).

4.5.5.2 Soils

Undisturbed soils at SRS generally consist of sandy surface layers above a subsoil containing a mixture of sand, silt, and clay. These soils are gently sloping to moderately steep (0 to 10 percent grade) and have a slight erosion hazard (USDA 1990). Some soils on uplands are nearly level, and those on bottomlands along the major streams are level. Soils in small, narrow drainage valleys are steep. Most of the upland soils are well drained to excessively drained. The well-drained soils have a thick, sandy surface layer that extends to a depth of 2 m (7 ft) or more in some areas. The soils on bottomlands range from well-drained to very poorly drained. Some soils on the abrupt slope breaks have a dense, brittle subsoil (DOE 1998b). About 15 percent of the soils at SRS is considered prime farmland (White and Gaines 2000).



Source: DOE 2002f.

Figure 4.5.5.1–1. Fault Lines and Earthquake Epicenters on Savannah River Site

Mineral Resources

There are no active mines, mills, pits, or quarries on DOE land at SRS.

4.5.6 Biological Resources

4.5.6.1 Terrestrial Resources

The United States acquired the SRS property in 1951. At that time, the site was approximately 60 percent forest and 40 percent cropland and pasture (DOE 1995b). Forest and agricultural land predominate in the areas bordering SRS. There are also significant open water and nonforested wetlands along the Savannah River. Incorporated and industrial areas are the only other significant land uses. There is limited urban and residential development bordering SRS. Land use at SRS can be classified into three major categories: forest/undeveloped, water/wetlands, and developed facilities. Approximately 58,500 ha (144,600 ac), or 73 percent of the site, is undeveloped. Wetlands, streams, and lakes account for 18,000 ha (44,500 ac), or 22 percent of the site. Developed facilities, including production and support areas, roads, and utility corridors, encompass 4,000 ha (9,900 ac), or 5 percent of SRS.

SRS land management practices have maintained the biodiversity in the region. Satellite imagery reveals that SRS is a circle of wooded habitat surrounded by a matrix of cleared uplands and narrow forested wetland corridors. SRS provides more than 730 km^2 (280 mi^2) of contiguous forest that supports plant communities in various stages of succession. Carolina bay depressional wetlands, the Savannah River Swamp, and several relatively intact longleaf pine-wiregrass (*Pinus palustris-Aristida stricta)* communities contribute to the biodiversity of SRS and the region. Woodland areas are managed primarily for timber production. At present, more than 90 percent of SRS is forested. An extensive forest management program conducted by the Savannah River Forest Station, which is operated by the U.S. Forest Service under an interagency agreement with DOE, has converted many former pastures and fields to pine plantations. Except for SRS production and support areas, natural succession has reclaimed many previously disturbed areas. The U.S. Forest Service harvests about 730 ha (1,800 ac) of timber from SRS each year. In 1972, SRS was the first site to be designated by DOE as a National Environmental Research Park. The National Environmental Research Park is used by the national scientific community to study the impacts of human activities on the cypress swamp and hardwood forest ecosystems. DOE has set aside approximately 5,700 ha (14,100 ac) of SRS exclusively for non-destructive environmental research (DOE 2000c).

The loblolly-longleaf-slash pine community *(P. taeda-P. palustris-P. elliottii)* is the dominant community covering approximately 65 percent of the site. Swamp forests and bottomland hardwood forests are found along the Savannah River. SRS is near the transition between northern oak-hickory-pine forest and southern mixed forest. Thus, species typical of both associations are found on SRS. Farming, fire, soil, and topography have strongly influenced SRS vegetation patterns. A variety of plant communities occur in the upland areas. Typically, scrub oak communities are found on the drier, sandier areas. Longleaf pine, turkey oak (*Quercus laevis*), bluejack oak (*Q. incana*), and blackjack oak (*Q. marilandica*) dominate these communities, which typically have understories of wire grass and huckleberry (*Vaccinium* spp.). Oak-hickory communities are usually located on more fertile, dry uplands; characteristic species are white oak *(Q. alba)*, post oak (*Q. stellata*), red oak *(Q. falcata)*, mockernut hickory (*Carya tomentosa*), pignut hickory (*Carya glabra*), and loblolly pine *(Pinus taeda)*, with an understory of sparkleberry (*Vaccinium arboreum*), holly (*Ilex* spp.), greenbriar (*Smilax* spp.), and poison ivy (*Toxicodendron radicans*).

The departure of residents in 1951 and the subsequent reforestation have provided the wildlife of SRS with excellent habitat. SRS supports a diverse and abundant wildlife community, including 43 amphibian, 58 reptile, 213 bird, and 54 mammal species. The reptiles and amphibian species of SRS include 17 salamanders, 26 frogs and toads, 1 crocodilian, 12 turtles, 9 lizards, and 36 snakes. Furbearers such as gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), and bobcat (*Felis rufus*) are relatively common throughout the site. Game species such as gray squirrel (*Sciurus carolinensis*), fox squirrel (*S. niger*), white-tailed deer (*Odocoileus virginianus*), eastern cottontail (*Sylvilagus floridanus*), mourning dove (*Zenaida macroura*), northern bobwhite (*Colinus virginianus*), and eastern wild turkey (*Meleagris gallopavo*) are also common. Waterfowl, which have been studied extensively, are common on most SRS wetlands, ponds, reservoirs, and in the Savannah River Swamp (DOE 1995b).

4.5.6.2 Wetlands

Wetlands on the SRS encompass approximately 19,850 ha (49,030 ac), or over 20 percent of the SRS area, and are extensively and widely distributed. These wetlands include bottomland hardwood forests, cypress-tupelo swamp forests, floodplains, creeks, impoundments, and over 300 isolated upland Carolina bays and wetland depressions. Carolina bays are unique wetland features of the southeastern United States. They are isolated wetland habitats dispersed throughout the uplands of SRS that exhibit extremely variable hydrology and a range of plant communities from herbaceous marsh to forested wetland (DOE 2002f, DOE 1999b). A major wetland area is the Savannah River swamp that borders the Savannah River and covers about 49 km^2 (19 mi^2) of SRS. The predominant forest cover in this swamp is second-growth bald cypress *(Taxodium distichum)*, water tupelo *(Nyssa aquatica)*, black-gum *(Nyssa sylvatica)*, and other hardwood species. The floodplains of the five major streams draining the site are composed of bottomland hardwood forests and scrub-shrub wetlands in varying stages of succession. Dominant species include red maple *(Acer rubrum)*, box elder *(Acer negundo)*, bald cypress, water tupelo, sweetgum *(Liquidambar styraciflua)*, and black willow *(Salix nigra)*. The bottomland hardwoods on SRS are typical of the mixed hardwood forests found in low wet areas of the southeastern Coastal Plain. Wetlands along Lower Three Runs downstream of Par Pond consist of bottomland hardwood swamps. Common tree species include oak species, sweetgum, cottonwood *(Populus heterophylla)*, American elm *(Ulmus americana)*, sycamore *(Platanus occidentalis)*, and red maple. Some cypress-tupelo areas are found near the confluence of Lower Three Runs and the Savannah River.

4.5.6.3 Aquatic Resources

The aquatic resources of SRS have been the subject of intensive study for more than 50 years (DOE 1997c, DOE 1999c). Research has focused on the flora and fauna of the Savannah River, the tributaries of the river that drain SRS, and the artificial impoundments on two of the tributary systems. In addition, several monographs, the eight-volume comprehensive cooling water study, and several site-specific EISs describe the aquatic biota (fish and macroinvertebrates) and aquatic systems of SRS.

The Savannah River, which forms the boundary between the States of Georgia and South Carolina, bounds the SRS on its southwestern border for about 32 km (20 mi). Three large upstream reservoirs—Hartwell, Richard B. Russell, and Strom Thurmond/Clarks Hill—minimize the effects of droughts and the impacts of low flow on downstream water quality and fish and wildlife resources in the river. The river floodplain supports an extensive swamp, covering about 49 km^2 (19 mi^2) of SRS and a natural levee separates the swamp from the river. Timber was cut in the swamp in the late 1800s. At present, the swamp forest consists of second-growth bald cypress, black gum, and other hardwood species.

The five principal tributaries to the Savannah River on the SRS are Upper Three Runs, Fourmile Branch, Pen Branch, Steel Creek, and Lower Three Runs. These tributaries drain almost all of SRS. Each of these streams originates on the Aiken Plateau in the Coastal Plain and descends 15-60 m (50-200 ft) before discharging into the river.

Six streams drain SRS and eventually flow into the Savannah River. Each stream has floodplains with bottomland hardwood forests or scrub-shrub wetlands in varying stages of succession. Dominant species include red maple, box elder, bald cypress, water tupelo, sweetgum, and black willow.

Based on studies by the Academy of Natural Sciences of Philadelphia and others, Upper Three Runs has one of the richest aquatic insect faunas of any stream in North America. At least 551 species of aquatic insects have been identified. Many insect species found in the creek are considered endemic, rare, or of limited distribution. Raccoon (*Procyon lotor*), beaver (*Castor canadensis*), and otter (*Lutra canadensis*) are relatively common throughout the wetlands of SRS. The Savannah River Ecology Laboratory has conducted extensive studies of reptile and amphibian use of the wetlands of SRS. Survey results indicate that fish communities are fairly typical of southeastern Coastal Plain streams. A mixed assemblage of sunfish, shiners, and pirate perch dominates the shallow, relatively narrow upstream areas. The wider, deeper downstream areas are dominated by spotted suckers *(Minytrema melanops),* largemouth bass *(Micropterus salmoides)*, and creek chubsuckers *(Erimyzon oblongus)* (WSRC 2000b). Fish densities have reached 380 fish per 100 m^2 (119 yd^2) with 37 different species recorded including the game fish species of largemouth bass, red-breasts *(Lepomis auritus),* and bullheads *(Ictalurus sp.)* (DOE 1999b).

4.5.6.4 Threatened and Endangered Species

Under the *Endangered Species Act* of 1973, the Federal Government provides protection to six species that are known to occur on the SRS: American alligator (*Alligator mississippiensis*, threatened due to similarity of appearance to the endangered American crocodile); shortnose sturgeon (*Acipenser brevirostrum*, endangered); bald eagle (*Haliaeetus leucocephalus*, threatened); wood stork (*Mycteria americana*, endangered); red-cockaded woodpecker (*Picoides borealis*, endangered); and smooth purple coneflower (*Echinacea laevigata*, endangered). Brief descriptions of those federally-listed species known to occur on SRS are provided later in this

Table 4.5.6.4–1. Listed Federal- and State-Threatened and Endangered Species that Occur or May Occur at the SRS, South Carolina

Species	Federal Classification	State Classification	Occurrence at SRS
Mammals			
Rafinesque's Big-eared Bat *Corynorhinus rafinesquii*	Not listed	Endangered	Present in Aiken County
Southeastern myotis *Myotis austroriparius*	Not listed	Threatened	Present at SRS
Birds			
Bald eagle *Haliaeetus leucocephalus*	Threatened	Endangered	Present at SRS
Red-cockaded woodpecker *Picoides borealis*	Endangered	Endangered	Present at SRS
Wood stork *Mycteria americana*	Endangered	Endangered	Present at SRS
Amphibians			
Gopher frog *Rana capito capito*	Not listed	Endangered	Present in Aiken County
Reptiles			
American alligator *Alligator mississippiensis*	Threatened	Not listed	Present at SRS
Gopher tortoise *Gopherus polyphemus*	Not listed	Endangered	Present in Aiken and Allendale Counties. Record for SRS
Fish			
Shortnose sturgeon *Acipenser brevirostrum*	Endangered	Endangered	Present at SRS
Plants			
Relict Trillium *Trillium reliquum*	Endangered	Endangered	Present in Aiken County
Canby's Dropwort *Oxypolis canbyi*	Endangered	Endangered	Present in Barnwell and Allendale Counties
Harperella *Ptilimnium Nodosum*	Endangered	Endangered	Present in Barnwell County
Pondberry *Lindera melissifolia*	Endangered	Endangered	Possible occurrence in Barnwell County
American chaffseed *Schwalbea americana*	Endangered	Endangered	Possible occurrence in Barnwell County
Smooth coneflower *Echinacea laevigata*	Endangered	Endangered	Present at SRS

Sources: SCDNR 2002, SC E&G 2002, WSRC 1997.

section. SRS contains no designated critical habitat for any listed threatened or endangered species (DOE 2001d). Table 4.5.6.4–1 presents the federally- and state-listed species that occur or may occur at SRS. There are over 50 other species that are not listed but are of special interest due to potential rarity or threats to their long-term stability.

The American alligator, an inhabitant of wetland ecosystems in the southeast and near its northern limits at SRS, occurs in a variety of SRS habitats, including rivers, swamps, small streams, abandoned farm ponds, and Par Pond and L-Lake. Par Pond contains the largest concentrations of alligators, with more than 200 animals present in 1996.

Shortnose sturgeon are only found on the east coast of North America and are typically residents of large coastal (tidal) rivers and estuaries. Shortnose sturgeon have not been collected in the tributaries of the Savannah River that drain the SRS, but do occur in the Savannah River up and downstream of SRS. Before 1982, shortnose sturgeon were not known to occur in the middle reaches of the Savannah River. However, 12 shortnose sturgeon larvae were collected near SRS during a 4-year (1982-1985) DOE study of ichthyoplankton abundance and entrainment in reactor cooling water systems. Sturgeon spawn in the main channel of the Savannah River in areas where current velocities and turbulence are high, maintaining a scoured clay-gravel bottom. There are three tentatively identified spawning locations in the Savannah River: one upstream, one adjacent to, and one downstream site from SRS.

Bald eagles are found on SRS in all months of the year, with most sightings in the winter and spring months (November through May). This is the time of the year when the birds are nesting and wintering in South Carolina. Eagles seen during the summer and early fall are most likely transients migrating either north or south. There are three bald eagle nesting territories on SRS. The Eagle Bay nest, discovered in 1986, is southwest of the Par Pond dam. Eagles have nested intermittently at the Eagle Bay location since its discovery in 1986. The Pen Branch nest, discovered in 1990, is west of L-Lake and the recently discovered Road G nest is east of Par Pond. Chicks have hatched at the Pen Branch nest every year from 1990-1996. To date, no young have been observed at the Road G nest. In the winter of 1997-1998, this nest was in a state of disrepair and was not used by eagles. Bald eagles forage in both Par Pond and L-Lake and in recent years, eagles have been observed on a regular basis foraging around Pond C and Pond B, and have been seen occasionally at Pond 2.

The wood stork, which is the only "true" stork to nest in the United States, feed in the Savannah River Swamp and the lower reaches of Steel Creek, Pen Branch, Beaver Dam Creek, and Fourmile Branch. They currently nest only in Florida, Georgia, and South Carolina. Wood storks do not nest at SRS.

The red-cockaded woodpecker population historically nested in open pine stands in wetlands. Encroachment of hardwood species has resulted in the deterioration of habitat quality and subsequent nesting success. Within the SRS, the red-cockaded woodpecker inhabits and uses open pine forest with mature trees (older than 70 years for nesting and 30 years for foraging).

The smooth coneflower is the only federally-listed plant species on SRS. The habitat of the smooth coneflower is open woods, cedar barrens, roadsides, clear-cuts, and power line rights-of-way. Optimum sites are characterized by abundant sunlight with little competition in the herbaceous layer (DOE 1997c, DOE 1999c).

4.5.7 Cultural and Paleontological Resources

4.5.7.1 Cultural Resources

All undertakings at SRS are conducted in compliance with relevant cultural resource Federal legislation, particularly Sections 110 and 106 of the NHPA, and DOE orders and policies that address cultural resource protection and management. Cultural resources at SRS are managed under the terms of a 1990 Programmatic Memorandum of Agreement among DOE Savannah River Operations Office, the South Carolina SHPO, and the Advisory Council on Historic Preservation. Guidance on the management of cultural resources at SRS is included in the *Archaeological Resources Management Plan of the Savannah River Archaeological Research Program* (SRARP 1989). Through a cooperative agreement with DOE, the South Carolina Institute of Archaeology and Anthropology at the University of South Carolina manages the Savannah River Archaeological Research Program to provide the services required by Federal law for the protection and management of cultural resources. Archaeological investigations are usually initiated by the Site Use Program, which requires completion of the Section 106 compliance process prior to issuing a permit for any land clearing on SRS (DOE 2002f). The ROI for cultural resources is the entire SRS site.

The archaeological survey program at SRS started in 1974 and has included reconnaissance inventories, shovel test transects, and intensive site testing and data recovery excavations. Approximately 60 percent of SRS has been inventoried and 858 archaeological (prehistoric and historic) sites have been identified (DOE 1999h, DOE 2000e) with sixty-seven of these sites are considered potentially eligible for listing on the NRHP; however, most of the sites have not been evaluated for eligibility. To facilitate management of these resources, SRS is divided into three archaeological zones based upon an area's potential for containing sites of historical or archaeological significance. Zone 1 areas have the greatest potential for possessing significant resources; Zone 2 areas have moderate potential; and Zone 3 areas have the lowest potential.

Prehistoric Resources

Prehistoric resources at SRS consist of villages, base camps, limited activity sites, quarries, and workshops. Evidence of prehistoric use of the area is present at approximately 800 of the 858 archaeological sites. Fewer than 8 percent of these sites have been evaluated for NRHP eligibility.

Historic Resources

Historic resources at SRS consist of farmsteads, tenant dwellings, mills, plantations and slave quarters, rice farm dikes, dams, cattle pens, ferry locations, towns, churches, schools, cemeteries, commercial building locations, and roads. Evidence of historic use of the area has been found at approximately 400 of the 858 recorded archaeological sites. About 10 percent of the historic sites have been evaluated for NRHP eligibility. Systematic historic building surveys have not yet been conducted at SRS. Many of the pre-SRS historic structures were demolished during the initial establishment of SRS in 1950. No nuclear production facilities have been nominated to the

NRHP and there are no plans for nominations. Existing SRS facilities lack architectural integrity and do not contribute to the broad historic theme of Manhattan Project or World War II-era nuclear materials. From a Cold War perspective, SRS has been involved in tritium operations and other nuclear material production for more than 40 years; therefore, some existing facilities and engineering records may become significant once they attain the 50-year age criterion.

Native American Resources

Native American groups with traditional ties to the SRS area include the Apalachee, Cherokee, Chickasaw, Creek, Shawnee, Westo, and Yuchi. At different times, each of these groups was encouraged by the English to settle in the area to provide protection from French, Spanish, or other Native American groups. During the 1800s, most of the remaining Native Americans residing in the region were relocated to Oklahoma Territory (DOE 1999h). Native American resources in the region include villages, ceremonial lodges, burials, cemeteries, and natural areas containing traditional plants used in ceremonies. In 1991, DOE conducted a survey of Native American concerns about religious rights in the central Savannah River Valley. Six Native American groups—the Yuchi Tribal Organization, the National Council of Muskogee Creek, the Indian People's Muskogee Tribal Town Confederacy, the Pee Dee Indian Nation, the Ma Chis Lower Alabama Creek Indian Tribe, and the United Keetoowah Band of the Cherokee—have expressed concerns about sites and items of religious significance within SRS, including plant species traditionally used by them in ceremonies that exist on the SRS (DOE 2000e, DOE 1999h). DOE has continued to consult with the interested tribal organizations by notifying them about major planned actions at SRS and by providing environmental reports that address proposed actions at SRS to the organizations for their review and comment (DOE 1999b, DOE 2000e).

Cultural Resources on the Reference Location

The reference location at SRS is located in an area surrounded by Archaeological Zones 1, 2, and 3. It is also located in an area that has not been disturbed by construction. Thus, it is likely that cultural resources are located at the reference location or in the area immediately surrounding it.

4.5.7.2 Paleontological Resources

Paleontological resources at SRS date from the Eocene Age (54-39 million years ago) and include fossil plants, numerous invertebrate fossils, and deposits of giant oysters, other mollusks, and bryozoa. All resources from SRS are marine invertebrate deposits and, with the exception of the giant oysters, are relatively widespread and common fossils. Therefore, the assemblages have relatively low research potential or scientific value (DOE 1999h; DOE 1996c).

4.5.8 Socioeconomics

Socioeconomic characteristics addressed at SRS include employment, income, population, housing, and community services. These characteristics are analyzed for a four-county ROI consisting of Aiken and Barnwell Counties in South Carolina, and Columbia and Richmond Counties in Georgia, where over 87 percent of site employees reside (DOE 1996c), as shown in Table 4.5.8–1.

Table 4.5.8–1. Four-County ROI where SRS Employees Reside

County	Percent of Total
Aiken	51.9
Barnwell	7.3
Columbia	10.6
Richmond	17.5
ROI Total	**87.3**

Source: DOE 1996c.

4.5.8.1 Employment and Income

The service and government sectors employ the greatest number of workers in the ROI. The government sector provides more than 20 percent of all employment, while the service sector provides 29 percent of the jobs in Columbia and Richmond Counties. Data on service sector employment is not available for Aiken or Barnwell Counties. Other important sectors of employment include retail trade (17.4 percent) and manufacturing (11.8 percent) (BEA 2002).

The labor force in the ROI increased 2.9 percent from 1990 to 2001, an average of 0.3 percent each year. In comparison, the state-wide labor force in both South Carolina and Georgia increased at a greater rate, a total of 12.1 percent in South Carolina and 25.2 percent in Georgia over the same time period. Total employment in the ROI increased at the same pace as the labor force, a total of 2.9 percent. Unemployment remained constant at 5.0 percent in both 1990 and 2001. In comparison, the state-wide average unemployment increased in South Carolina from 4.8 percent in 1990 to 5.4 percent in 2001 and decreased in Georgia from 5.5 percent to 4.0 percent (BLS 2002a).

In 2000, Per capita income in the ROI ranged from a high of $26,080 in Columbia County to a low of $21,027 in Barnwell County. The average per capita income in the ROI was approximately $24,175, compared to the South Carolina average of $24,000 and the Georgia average of $27,794. Per capita income increased in the ROI by almost 36.5 percent between 1990 and 2000, compared to a state-wide increase of 49.6 percent in South Carolina and 56.8 percent in Georgia (BEA 2002).

4.5.8.2 Population and Housing

Between 1990 and 2000, the ROI population grew from 397,034 to 455,093, an increase of 14.6 percent. This was a slower rate of growth than for either South Carolina or Georgia, which grew at rates of 15.1 percent and 26.4 percent, respectively, during the same time period. Columbia County had the highest rate of growth at 35.2 percent, while Richmond County experienced the lowest growth rate at 5.3 percent (Census 2002).

In 2000, the total number of housing units in the ROI was 187,811 with 169,648 occupied. There were 117,243 owner-occupied housing units and 52,405 occupied rental units. In 2000, the homeowner vacancy rate in the ROI ranged from a high of 2.9 percent in Columbia County to a low of 1.5 percent in Barnwell County. The rental vacancy rate ranged from 12.1 percent in Aiken County to 9.1 percent in Columbia County. This is slightly higher than the state rates of 1.9 percent homeowner vacancy and 8.2 percent rental vacancy in Georgia and 1.9 percent homeowner vacancy and 12 percent rental vacancy in South Carolina. The greatest number of housing units in the ROI is in Richmond County with almost 44 percent of the total housing units (Census 2002).

4.5.8.3 Community Services

There is a total of 6 school districts in the ROI serving almost 85,000 students. The student-to-teacher ratio in these districts ranges from a high of 17.5 in the Barnwell County School District 19 to a low of 14.3 in the Barnwell County School District 29. The average student-to-teacher ratio in the ROI is 16.6 (NCES 2002).

The ROI is served by 10 hospitals with a capacity of over 3,200 beds located throughout the ROI (AHA 1995). The closest hospital to SRS is the Aiken Regional Medical Center in Aiken, South Carolina. There are approximately 1,600 doctors in the ROI, the majority of which are concentrated in Augusta, Georgia, and Aiken, South Carolina.

4.5.9 Radiation and Hazardous Chemical Environment

4.5.9.1 Radiation Exposure and Risk

An individual's radiation exposure in the vicinity of SRS amounts to approximately 357 mrem (see Table 4.5.9.1–1), and is comprised of natural background radiation from cosmic, terrestrial, and internal body sources; radiation from medical diagnostic and therapeutic practices; weapons test fallout; consumer and industrial products, and nuclear facilities. All radiation doses mentioned in this EIS are effective dose equivalents. Effective dose equivalents include the dose from internal deposition of radionuclides and the dose attributable to sources external to the body.

Table 4.5.9.1–1. Sources of Radiation Exposure to Individuals in the SRS Vicinity Unrelated to SRS Operations

Source	Radiation Dose (mrem/yr)
Natural Background Radiation	
Total external (cosmic and terrestrial)	53
Internal terrestrial and global cosmogenic	40[a]
Radon in homes (inhaled)	200[a]
Other Background Radiation[a]	
Diagnostic x rays and nuclear medicine	53
Weapons test fallout	less than 1
Air travel	1
Consumer and industrial products	10
Total	**357**

[a] An average for the United States.
Source: Derived from data in NCRP 1987.

Annual background radiation doses to individuals are expected to remain constant over time. The total dose to the population, in terms of person-rem, changes as the population size changes. Background radiation doses are unrelated to SRS operations.

Releases of radionuclides to the environment from SRS operations provide another source of radiation exposure to individuals in the vicinity of SRS. Types and quantities of radionuclides released from SRS operations in 2001 are listed in *Savannah River Site Environmental Report for 2001* (WSRC 2002h). The doses to the public resulting from these releases are presented in Table 4.5.9.1–2. The radionuclide emissions contributing the majority of the dose to the offsite MEI from liquid releases were tritium, cesium-137, and plutonium-239 (WSRC 2002h). For atmospheric releases, the radionuclides contributing the majority of the dose to the offsite MEI were tritium, iodine-129, and plutonium-239. These doses fall within the radiological limits given in DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, and are much lower than those from background radiation.

Table 4.5.9.1–2. Radiation Doses to the Public From Normal SRS Operations in 2001 (Total Effective Dose Equivalent)

Members of the Public	Atmospheric Releases		Liquid Releases		Total	
	Standard[a]	Actual	Standard[a]	Actual	Standard[a]	Actual
Offsite MEI (mrem)	10	0.05	4	0.13	100	0.18
Population within 80 km (person-rem)	None	2.9	None	4.3	None	9.9

[a] The standards for individuals are given in DOE Order 5400.5. As discussed in that order, the 10-mrem/yr limit from airborne emissions is required by the *Clean Air Act* (40 CFR 61) and the 4-mrem/yr limit is required by the *Safe Drinking Water Act* (40 CFR 141). For this EIS, the 4-mrem/yr value is conservatively assumed to be the limit for the sum of doses from all liquid pathways. The total dose of 100 mrem/yr is the limit from all pathways combined. If the potential collective dose to the offsite population exceeds the 100 person-rem value, the contractor operating the facility would be required to notify DOE.

Source: WSRC 2002h.

Using a risk estimator of one latent cancer death per 2,000 person-rem to the public (see Appendix B), the fatal cancer risk to the offsite MEI due to radiological releases from SRS operations is estimated to be 9×10^{-8}, or 9 cancer deaths in a population of 10 million. The estimated probability of this maximally exposed person dying of cancer at some point in the future from radiation exposure associated with 1 year of SRS operations is less than one in 1 million (it takes several to many years from the time of radiation exposure for a cancer to potentially manifest itself).

According to the same risk estimator, 0.005 excess fatal cancers are projected in the population living within 80 km (50 mi) of SRS from normal SRS operations. To place this number in perspective, it may be compared with the number of fatal cancers expected in the same population from all causes. The mortality rate associated with cancer for the entire U.S. population is 0.2 percent per year. Based on this mortality rate, the number of fatal cancers expected during 1999 from all causes in the population of 689,486 living within 80 km (50 mi) of SRS was 1,379. This expected number of fatal cancers is much higher than the 0.005 fatal cancers estimated from SRS operations in 2000.

External radiation doses have been measured in areas of SRS for comparison with offsite natural background radiation levels. Measurements taken in 2000 showed average doses on SRS of about 75 mrem (WSRC 2002h).

SRS workers receive the same dose as the general public from background radiation, but they also may receive an additional dose from working in facilities with nuclear materials. The average dose to the individual worker and the cumulative dose to all workers at SRS from operations in 2001 are presented in Table 4.5.9.1–3. These doses fall within the radiological regulatory limits of 10 CFR 835. According to a risk estimator of one latent fatal cancer per 2,500 person-rem among workers (see Appendix B), the number of projected fatal cancers among SRS workers from normal operations in 2001 is 0.083. The risk estimator for workers is lower than the estimator for the public because of the absence from the workforce of the more radiosensitive infant and child age groups.

Table 4.5.9.1–3. Radiation Doses to Workers From Normal SRS Operations in 2001 (Total Effective Dose Equivalent)

Occupational Personnel	Standard	Actual
Average radiation worker dose (mrem)	5,000[a]	57
Collective radiation worker dose[b] (person-rem)	None	207.6

[a] DOE's goal is to maintain radiological exposure as low as is reasonably achievable. Therefore, DOE has recommended an administrative control level of 500 mrem/yr (DOE 1999e); the site must make reasonable attempts to maintain individual worker doses below this level.
[b] There were 3,640 workers with measurable doses in 2001.
Source: DOE 2001f.

4.5.9.2 Chemical Environment

The background chemical environment important to human health consists of the atmosphere, which may contain hazardous chemicals that can be inhaled; drinking water, which may contain hazardous chemicals that can be ingested; and other environmental media with which people may come in contact (e.g., soil through direct contact or via the food pathway).

Workers are protected from hazards specific to the workplace through appropriate training, protective equipment, monitoring, and management controls. SRS workers are also protected by adherence to OSHA and EPA occupational standards that limit atmospheric and drinking water concentrations of potentially hazardous chemicals.

Appropriate monitoring, which reflects the frequency and amounts of chemicals used in the operation processes, ensures that these standards are not exceeded. Additionally, DOE requirements ensure that conditions in the workplace are as free as possible from recognized hazards that cause or are likely to cause illness or physical harm.

Adverse health impacts to the public are minimized through administrative and design controls to decrease hazardous chemical releases to the environment and to achieve compliance with permit requirements. The effectiveness of these controls is verified through the use of monitoring information and inspection of mitigation measures. Health impacts to the public may occur during normal operations at SRS via inhalation of air containing hazardous chemicals released to the atmosphere by SRS operations. Risks to public health from ingestion of contaminated drinking water or direct exposure are also potential pathways.

Nonradioactive air emissions originating at SRS facilities are monitored at their points of discharge by direct measurement, sample extraction and measurement, or process knowledge. Air monitoring is used to determine whether all emissions and ambient concentrations are within applicable regulatory standards. At SRS, there are 172 permitted/exempted nonradiological air emission sources, 133 of which were in operation in some capacity during 2001. The remaining 39 sources either were being maintained in a "cold standby" status or were under construction (WSRC 2002h).

Major nonradiological emissions of concern from stacks at SRS facilities include sulfur dioxide, carbon monoxide, oxides of nitrogen, PM_{10}, VOCs, and toxic air pollutants. Emissions from SRS sources are determined during an annual emissions inventory from calculations using source operating parameters such as fuel oil consumption rates, total hours of operation, and the emission factors provided in the EPA "Compilation of Air Pollution Emission Factors."

Under existing regulations, SRS is not required to conduct onsite monitoring for ambient air quality; however, the site is required to show compliance with various air quality standards. To accomplish this, air dispersion modeling was conducted during 2001 for new emission sources or modified sources as part of the sources' construction permitting process. The modeling analysis showed that SRS air emission sources were in compliance with applicable regulations.

4.5.10 Traffic and Transportation

4.5.10.1 Regional Transportation Infrastructure

SRS is surrounded by a system of interstate highways, U. S. highways, state highways, and railroads. The regional transportation network services the four South Carolina counties (Aiken, Allendale, Bamberg, and Barnwell) and two Georgia counties (Columbia and Richmond) that generate nearly all of the SRS commuter traffic. Figure 4.5.10.1–1 shows the regional transportation infrastructure.

I-20 serves the SRS region, providing the primary east-west corridor. I-520 provides a partial loop around Augusta, Georgia. Truck shipments to (or from) the SRS or from (or to) other DOE sites normally enter the region from the west on I-20. In Augusta, Georgia, the trucks typically take I-520 to the Georgia/South Carolina border where U.S. 278 and S.C. 125 route the trucks into the site at the Jackson gate.

4.5.10.2 Local Traffic Conditions

As indicated in Figure 4.5.10.1–1, there are six principal access roads to the site: three from the north—S.C. 125, S.C. 57, and S.C. 19—and three from the east and south—S.C. 125, S.C. 64, and S.C. 39. The eastern and southern accesses are from rural areas and do not bear a large fraction of the SRS commuting traffic. Those from the north, however, provide access to SRS from the metropolitan areas surrounding Augusta, Georgia, and Aiken and North Augusta, South Carolina. The traffic on these access roads can be heavy at times, with a significant contribution from SRS traffic. Table 4.5.10.2–1 provides the current peak hourly traffic and the Level of Service for these roads.

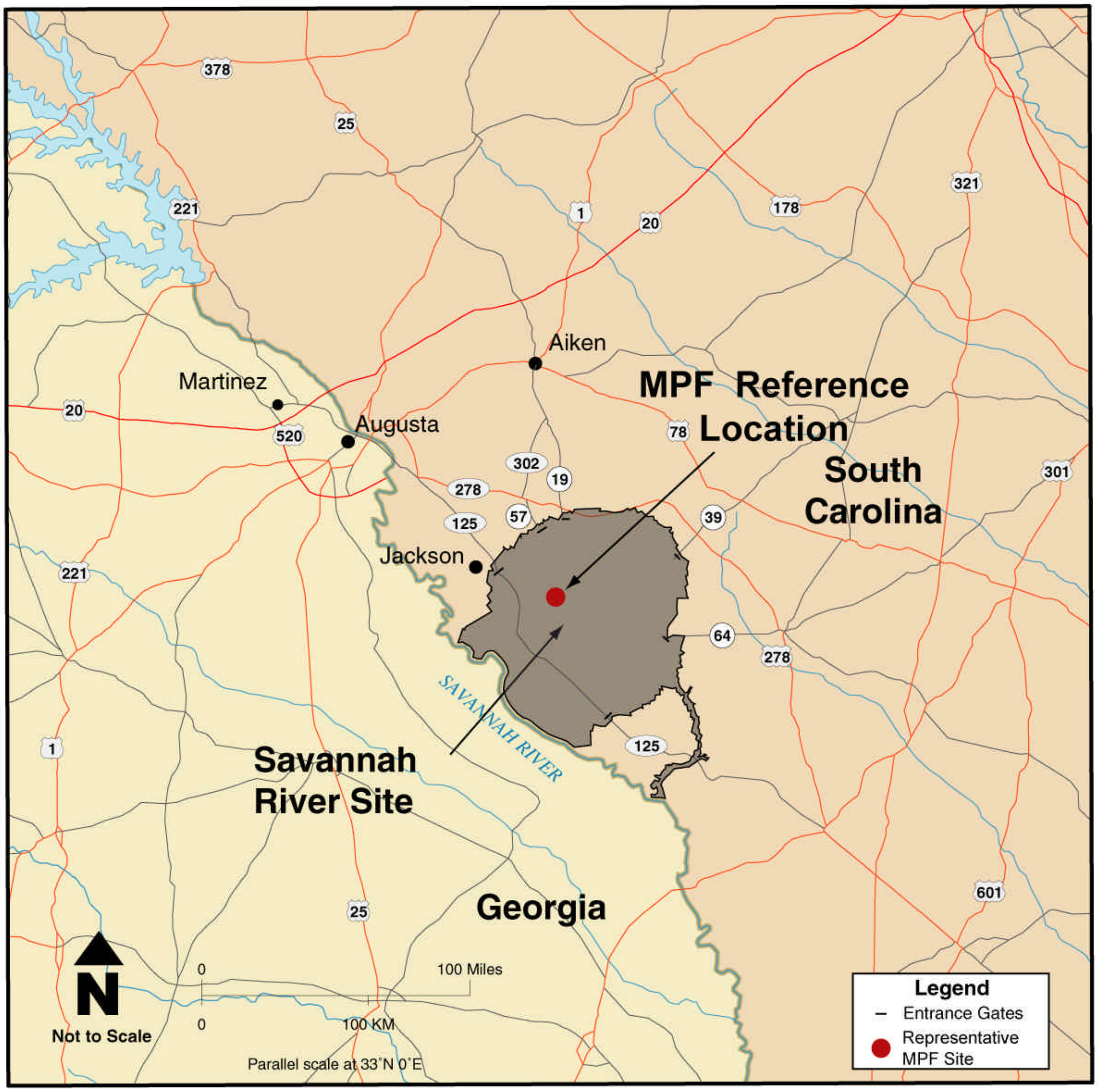


Figure 4.5.10.1–1. Highways in the Region of SRS

Table 4.5.10.2–1. Traffic Conditions on Principal Access Roads to the SRS

Access Road	Annual Average Daily Traffic	Peak Hourly Traffic	Volume to Capacity Ratio	Level of Service[a]
S.C. 125 at Jackson, South Carolina	12,600	588	1.02	D
State Road 57 (from S.C. 302 and US 278)	NA	NA	NA	NA
S.C. 19 at New Ellenton, South Carolina	12,500	583	1.01	D

NA = not available.
[a] Levels of Service:

A. Free flow of the traffic stream; users are unaffected by the presence of others.
B. Stable flow in which the freedom to select speed is unaffected, but the freedom to maneuver is slightly diminished.
C. Stable flow that marks the beginning of the range of flow in which the operation of individual users is significantly affected by interactions with the traffic stream.
D. High-density, stable flow in which speed and freedom to maneuver are severely restricted; small increases in traffic will generally cause operational problems.
E. Operating conditions at or near capacity level causing low but uniform speeds and extremely difficult maneuvering that is accomplished by forcing another vehicle to give way; small increases in flow or minor perturbations will cause breakdowns.
F. Defines forced or breakdown flow that occurs wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. This situation causes the formation of queues characterized by stop-and-go waves and extreme instability.

Source: Gunter 2002, Fulmer 2002.

4.5.11 Waste Management

This section describes DOE waste generation baseline that will be used to gauge the relative impact of MPF construction and operations on the overall waste generation at SRS and on DOE's capability to manage such waste. SRS manages high-level waste, LLW, mixed LLW, TRU (including alpha-contaminated) waste, hazardous waste, and sanitary waste. This EIS considers each of these waste types, except high-level waste. Table 4.5.11–1 provides the routine waste generation rates, excluding high-level waste, at SRS. Table 4.5.11–2 summarizes the waste management capabilities at SRS.

Table 4.5.11–1. Annual Routine Waste Generation from SRS Operations (m^3)

Waste Type	1996	1997	1998	1999	2000	2001
Transuranic	165	119	61.9	42.4	54	64.1
Low-level	5,780	6,620	6,520	4,970	5,220	4,610
Mixed	452	286	463	402	290	380
Hazardous[a]	57.0	55.0	177	26.5	30.8	45.3
Sanitary[b]	2,780	2,770	2,640	1,760	1,550	1,560

[a] Hazardous waste reported in metric tons.
[b] From DOE 2002o (1996 data) and DOE's Central Internet Database (available at http://cid.em.doe.gov). Sanitary waste reported in metric tons.
Source: DOE 2002o.

Table 4.5.11–2. Waste Management Facilities at SRS

Facility Name/ Description	Capacity	Status	Applicable Waste Types				
			LLW	Mixed LLW	TRU Waste	Hazardous Waste	Nonhazardous Waste
Treatment Facility (m^3/yr)							
Macroencapsulation	(a)	Submit permit application in FY03		X			
TRU waste characterization/ certification		Online			X		
Category II TRU waste facility[b]	(a)	2015			X		
Category III TRU waste facility[b]	(a)	2004			X		
Saltstone Manufacturing and Disposal Facility		Campaign	X				
Effluent Treatment Facility	NA	Online	X	X			
Storage Facility (m^3)							
Hazardous Waste Storage Facility (645-N, 645-2N, 645-4N, SWSP)	2,956	Online		X		X	
Mixed Waste Storage Building 643-29E	504	Online		X			
Mixed Waste Storage Building 643-43E	1,651	Online		X			
Mixed Waste Storage Building 316-M	117	Online		X			
TRU Waste Pads 1-19	15,257	Online			X		
Long-lived waste storage buildings	140[a]	Online	X				
DWPF OWST	568	Online		X			
STRC Mixed Waste Storage Tanks	198	Online		X			
Liquid Waste Solvent Tanks S33-S36	454	Online		X			

Table 4.5.11–2. Waste Management Facilities at SRS *(continued)*

Facility Name/ Description	Capacity	Status	Applicable Waste Types				
			LLW	Mixed LLW	TRU Waste	Hazardous Waste	Nonhazardous Waste
Disposal Facility (m^3)							
E-Area shallow land disposal trenches	(d)	Online	X				
E-Area low-activity waste vaults	30,500[e]	Online	X				
E-area intermediate-activity waste vaults	5,300[f]	Online	X				
Saltstone Manufacturing and Disposal Facility	80,000[g]	Online	X				
Burma Road structural fill	NA[h]						X
Three Rivers Landfill	NA[i]	Online					X

[a] Facility capacity has not yet been determined.
[b] Refers to hazard category of the treatment process. Category II facility would provide sorting and segregation capabilities for high activity TRU waste. Category III facility will provide repackaging, sorting, and size reduction capabilities for low activity TRU waste.
[c] Capacity per building. One exists. DOE plans to construct additional buildings as needed.
[d] Different types of trenches of varying capacities exist for different waste types.
[e] This is the approximate capacity of a double vault. One single and one double vault have been constructed. Future vaults are currently planned as double vaults.
[f] Capacity per vault. One vault exists and another vault is planned.
[g] Capacity per vault. Two vaults exist and five more may be constructed.
[h] Current destination for SRS demolition/construction wastes.
[i] Current destination for SRS sanitary waste. Located onsite at intersection of S.C. 125 and Road 2.
Source: DOE 2001d, Gould 2002, WSRC 2002h.

4.5.11.1 Low-Level Radioactive Waste

DOE uses a number of methods for treating and disposing of LLW at SRS, depending on the waste form and activity. The Waste Sort Facility, located in cell 12 of the Low Activity Waste Vaults, segregates LLW for future treatment and/or disposal. In FY2001, about 4,970 m^3 (175,515 ft^3) of LLW were processed at the Waste Sort Facility (WSRC 2002g). After sorting (if required), the LLW is disposed in low-activity waste vaults, intermediate-level waste vaults, engineered trench or slit trenches in E-Area.

Approximately 40 percent of SRS LLW is characterized as low-activity waste. After volume reduction (e.g., supercompaction), if applicable, this waste is packaged in B-25 boxes and placed in either shallow land disposal or vault disposal in E-Area. During FY2001, about 3,370 m^3 (119,011 ft^3) of compactible LLW was processed at the Supercompactor Facility located in cell 11 of the Low Activity Waste Vaults (WSRC 2002g).

DOE places LLW of intermediate activity and some tritiated LLW in intermediate activity vaults. In addition, long-lived LLW (e.g., spent deionizer resins) is placed in the long-lived waste storage buildings in E-Area, where it will remain until DOE determines the final disposition.

In 2001, SRS implemented a "components-in-grout" disposal method for equipment that is physically too large for vault disposal but contaminated at levels that require vault-like isolation. The technique consists of placing the item onto a grout base in the trench, filling any void space within the item with a specially formulated grout mixture, and placing grout around it using the trench walls as a form.

DOE uses offsite disposal for LLW that is not technically or economically suitable for disposal at SRS. In July 2001, DOE made its first shipment of LLW from SRS to NTS for disposal. That shipment contained demolition debris from an old tritium facility. Over a 10-year shipping campaign, DOE will dispose of several LLW streams that do not meet criteria for disposal at SRS or that are more economical to dispose at NTS.

The Saltstone Facility treats liquid wastes by mixing the waste with grout formers and pumping the mixture to engineered concrete vaults in Z-Area where it is allowed to cure. Operations of the Saltstone Facility were suspended in 1999 pending DOE's decision on processing the salt portion of the SRS high-level waste inventory. The facility resumed operations in 2002 to process the backlog of waste.

4.5.11.2 Mixed Low-Level Waste

As described in the *Approved Site Treatment Plan* (WSRC 2001), storage facilities for mixed LLW are in several different SRS areas. These facilities are dedicated to solid, containerized, or bulk liquid waste and all are approved for this storage under RCRA as interim status or permitted facilities, or as CWA-permitted tank systems.

Several treatment processes described in the *Approved Site Treatment Plan* (WSRC 2001) exist or are planned for mixed LLW. These facilities include the Consolidated Incineration Facility (CIF) and the Savannah River Technology Center Mixed Waste Storage Tanks. Additional waste treatment capabilities are provided as needed, such as decontamination of radioactively contaminated lead waste. In FY2003, DOE will submit a permit application for a macro-encapsulation process using vendor equipment housed in an existing SRS building. The macro-encapsulation facility will be used to treat contaminated debris and lead wastes.

Operations of the SRS CIF were suspended in April 2000. After completing a study of alternative treatment technology for CIF waste streams, DOE has decided not to restart the CIF. Legacy Plutonium-Uranium Extraction Process (PUREX) waste originally slated for treatment at CIF will instead be treated through a combination of direct stabilization (for the organic portion) and treatment at the Saltstone Facility (for the aqueous portion).

The Savannah River Technology Center Mixed Waste Storage Tanks are equipped with an ion exchange probe to remove toxic metals and benzene from laboratory wastewater. The facility has a treatment capacity of about 1.73 million L/yr (457,000 gal/yr), the majority of which is for treatment of low activity waste (WSRC 2001).

Some mixed LLW is shipped offsite for treatment and disposal. In August 2001, DOE initiated shipments of mixed LLW (consisting of treatment residues from the CIF) to the Envirocare facility in Utah. In September 2001, DOE initiated shipments of mixed waste (HEPA filters from the CIF's offgas treatment system) to the Materials and Energy Corporation in Oak Ridge, Tennessee, for treatment (WSRC 2002g). Also, in September 2001, DOE initiated shipments of radioactive waste contaminated with PCBs to the TSCA incinerator at Oak Ridge. Although not mixed waste, these PCB wastes are subject to TSCA regulation.

4.5.11.3 Transuranic and Alpha Waste

Current SRS efforts consist primarily of providing continued safe storage pending treatment and disposal. Currently, DOE manages low-level alpha waste with activities from 10-100 nanocuries per gram (nCi/g) (referred to as alpha waste) as TRU waste at SRS. At the end of FY2001, 11,000 m^3 (388,465 ft^3) of legacy solid TRU waste remained in storage at SRS (WSRC 2002g).

Before disposition, DOE plans to measure the radioactivity levels of the wastes stored on the TRU waste storage pads and segregate the alpha waste. After segregation and repackaging, DOE could dispose of much of the alpha waste as either mixed LLW or LLW.

DOE uses a mobile vendor for the inspection, characterization, and shipment of TRU waste from SRS to WIPP. The vendor's equipment was set up on TRU Pads 3 and 4 and began operations in FY2001 using three mobile systems: a real-time radiography trailer, nondestructive assay trailer, and drum headspace gas sampling system. After inspection/characterization of the waste is completed, a mobile loading unit places the drums into Transuranic Package Transporter (TRUPACT-II) containers for transport to WIPP. The vendor processes are supported by the SRS Visual Examination Facility located on Pad 6.

A low-activity TRU waste facility will be constructed to process the lower activity SRS waste in preparation for shipment to WIPP. A semi-remotely operated "handling and segregating system for 55-gallon drums" ("HANDSS-55") will be installed at an existing SRS facility that has been modified to provide containment, ventilation, fire protection, and other services. The facility will also allow visual examination of the waste to confirm radiography results. This Hazard Category-3 facility is scheduled to begin operations by September 30, 2004 (Gould 2002).

A high-activity TRU waste facility would be constructed to process the higher activity SRS waste. This facility would include culvert opening and drum removal equipment as well as repackaging, sorting, and size reduction technologies. It would also have the capability to open the "black boxes" used to store large bulk TRU waste equipment, and to remove, characterize, size reduce (as necessary), and repackage the items in standard waste boxes. DOE is scheduled to submit a RCRA permit application for this Hazard Category-2 facility in 2008 (WSRC 2001). Operations would begin in 2015.

In May 2001, DOE made its first shipment of SRS TRU waste to WIPP for disposal. The current SRS baseline calls for completing shipments of 4,900 m^3 (173,043 ft^3) of low-activity TRU waste to WIPP by 2034. SRS recently proposed to accelerate this schedule to complete low-level legacy waste shipments by 2014. In addition, SRS proposes to accelerate processing of approximately 5,400 m^3 (190,701 ft^3) of high-activity TRU waste and bulk equipment. This waste would be processed and shipped to WIPP by 2015, 9 years ahead of the current baseline of 2024. Instead of constructing a large Hazard Category-2 facility, DOE would use existing facilities as infrastructure and containment for TRU waste processing equipment, such as the Remotely Operated Size Reduction System that SRS obtained from Rocky Flats for processing large items of bulk equipment (WSRC 2002a). SRS is one of the sites being considered as the contract handled TRU waste hub under the Eastern Small Quantity Site Acceleration Program described in the *Transuranic Waste Performance Management Plan* (DOE 2002m).

4.5.11.4 Hazardous Waste

At present, DOE stores hazardous wastes in three buildings and on three pads that have RCRA permits. SRS hazardous waste streams consist of a variety of materials, including mercury, chromate, lead, paint solvents, and various laboratory equipment. Hazardous waste is sent to offsite treatment and disposal facilities. DOE also plans to continue to recycle, reuse, or recover certain hazardous wastes, including metals, excess chemicals, solvents, and chlorofluorocarbons.

4.5.11.5 Sanitary Waste

SRS sanitary waste volumes have declined due to increased recycling and the decreasing workforce. DOE uses the city of North Augusta's Material Recovery Facility as part of its recycling program. The facility recovered 448 metric tons (494 tons) of sanitary waste in 2001. A total of 1,750 metric tons (1,930 tons) of industrial wastes were recycled onsite through the SRS Salvage and BSRI Construction organizations. DOE sends sanitary waste that is not recycled or reused to the Three Rivers Regional Landfill located on SRS. Noncombustible materials from SRS environmental restoration activities are transferred to the Three Rivers Regional Landfill for use as daily cover (WSRC 2002g).

The SRS Burma Road construction and demolition waste landfill was filled to capacity in FY2001. A majority of the materials traditionally disposed at the Burma Road Landfill are now disposed in a state-approved borrow pit. About 15 percent of the material that would have been disposed at Burma Road is now sent to the Three Rivers Regional Landfill. For example, wood waste and untreated pallets are transferred to Three Rivers where they are shredded with a grinder and piled in long rows where leachate collected from the landfill is sprayed onto the material. This process helps to both treat the leachate and accelerate the breakdown of the wood waste into compost that can be recycled (WSRC 2002g).

In 2001, DOE constructed an onsite facility to convert combustible (paper and cardboard) sanitary waste to fuel. The pelletized paper is burned in the A-Area boiler, offsetting the need for coal as fuel.

4.5.11.6 Wastewater

The Effluent Treatment Facility processes low-level radioactive and chemically contaminated wastewater from the high-level waste Tank Farm and reprocessing facility evaporators. The facility has also treated wastewater from the CIF and contaminated well water from Environmental Restoration Program activities. Waste is transferred to the facility via pipeline from the Tank Farm and Separations facilities or is offloaded from tankers at the unloading station. Treatment processes include microfiltration, organic removal, ion exchange and reverse osmosis. After treatment, approximately 99 percent of the initial waste volume is discharged to an NPDES-permitted outfall. The remainder is transferred to Tank 50 and eventually to the Saltstone Facility where it is stabilized for disposal. In FY2001, the Effluent Treatment Facility treated more than 60.5 million L (16 million gal) of wastewater.

Sanitary wastewater is treated in the Centralized Sanitary Wastewater Treatment Facility and discharged to the Fourmile Branch tributary.

4.5.11.7 Pollution Prevention

The total waste (routine waste as well as environmental restoration and D&D waste) generated by SRS was 18,500 m^3 (653,327 ft^3) in FY2001, accounting for 3 percent of DOE's overall waste generation. Implementing pollution prevention projects reduced the total amount of waste generated at SRS in 2001 by approximately 4,270 m^3 (150,795 ft^3). Examples of SRS pollution prevention projects completed in 2001 include the reduction of LLW by 2,080 m^3 (73,455 ft^3) by *in situ* stabilization of radioactively contaminated soils in lieu of a "dig and haul" remediation strategy for the K-Area Basin and 281 m^3 (9,923 ft^3) through the recovery of active contamination areas within the Nuclear Materials Stabilization and Storage Division's facilities (DOE 2002g).

4.5.11.8 Waste Management PEIS Records of Decision

A discussion of DOE's hazardous waste, LLW, mixed LLW, and TRU waste decisions based on the Waste Management PEIS is provided in Section 4.2.11.8. The Waste Management PEIS RODs affecting SRS are shown in Table 4.5.11.8–1.

Table 4.5.11.8–1. Waste Management PEIS Records of Decision Affecting SRS

Waste Type	Preferred Action
TRU waste	DOE has decided to store and prepare TRU waste onsite prior to disposal at WIPP. DOE amended its decision to transfer approximately 300 m^3 (10,594 ft^3) of contact-handled TRU waste from the Mound Plant to SRS for storage, characterization, and repackaging prior to sending it to WIPP for disposal (66 FR 38646).[a]
LLW	DOE has decided to treat SRS's LLW onsite and continue onsite disposal.[b]
Mixed LLW	DOE has decided to regionalize treatment of mixed LLW at the Hanford Site, INEEL, the ORR, and the SRS. DOE has decided to ship SRS's mixed LLW to either the Hanford Site or NTS for disposal. [b]
Hazardous waste	DOE has decided to continue to use commercial facilities for treatment of most of SRS's non-wastewater hazardous waste.[c]

[a] From the ROD for TRU waste (63 FR 3629) and the ROD for the WIPP Disposal Phase Supplemental EIS (63 FR 3624).
[b] From the ROD for LLW and mixed LLW (65 FR 10061).
[c] From the ROD for hazardous waste (63 FR 41810).