

equivalent limit of 10 millirem (mrem) per year to members of the public for the atmospheric pathway is also incorporated in DOE Order 5400.5, "Radiation Protection of the Public and the Environment." To demonstrate compliance with the NESHAP regulations, DOE annually calculates maximally exposed offsite individual (MEI) and collective doses and a percentage of dose contribution from each radionuclide, using the CAP88 computer code. The dose to the MEI from 1997 SRS emissions was estimated at 0.05 mrem which is 0.5 percent of the 10 mrem-per-year EPA standard. The CAP88 collective dose was estimated at 5.5 person-rem. Tritium oxide accounts for 94 percent of both the MEI and the population dose (Arnett and Mamatey 1998b). The contributions to dose from other radionuclides can be found in *SRS Environmental Data for 1997* (Arnett and Mamatey 1998a). Table 3-13 lists average and maximum atmospheric concentrations of radioactivity at the SRS boundary and at background monitoring locations (100-mile radius) during 1997. SRS-specific computer dispersion models, such as MAXIGASP and POPGASP, were used to calculate radiological doses to members of the public from the 1997 releases, based on the amounts released and the estimated concentration in the environment. Whereas the CAP88 code assumes that all releases occur from one point (for SRS, at the center of the site), MAXIGASP models multiple release locations, which is more representative of actual conditions.

### 3.4 Ecological Resources

#### 3.4.1 NATURAL COMMUNITIES OF THE SAVANNAH RIVER SITE

The SRS comprises a variety of diverse habitat types that support terrestrial, aquatic, and semi-aquatic wildlife species. These habitat types include upland pine forests, mixed hardwood forests, bottomland hardwood forests, swamp forests, and Carolina bays. Since the early 1950s, the site has changed from 60 percent forest and 40 percent agriculture to 90 percent forest, with the remainder in aquatic habitats and developed (facility) areas (Halverson et al. 1997). The wildlife correspondingly shifted from forest-farm edge species to a predominance of forest-dwelling species. The SRS now supports 44 species of amphibians, 59 species of reptiles, 255 species of birds, and 54 species of mammals (Halverson et al. 1997). Comprehensive descriptions of the SRS's ecological resources and wildlife can be found in documents such as *SRS Ecology Environmental Information Document* (Halverson et al. 1997) and the *Final Environmental Impact Statement for the Shutdown of the River Water System at the Savannah River Site* (DOE 1997a).

SRS has extensive, widely distributed wetlands, most of which are associated with floodplains, creeks, or impoundments. In addition, approximately 200 Carolina bays occur on SRS (DOE 1995b).

**Table 3-13.** Radioactivity in air at the SRS boundary and at a 100-mile radius during 1997 (picocuries per cubic meter).

Location	Tritium	Gross alpha	Gross beta	Cobalt-60	Cesium-137	Strontium-89,90	Plutonium-238	Plutonium-239
Site boundary								
Average <sup>a</sup>	11	9.8×10 <sup>-4</sup>	0.015	5.7×10 <sup>-4</sup>	1.5×10 <sup>-4</sup>	8.0×10 <sup>-5</sup>	(b)	(b)
Maximum <sup>c</sup>	65	0.0033	0.032	0.024	0.0073	3.6×10 <sup>-4</sup>	4.1×10 <sup>-6</sup>	7.0×10 <sup>-6</sup>
Background (100-mile radius)								
Average	3.2	0.0011	0.011	(b)	(b)	8.9×10 <sup>-4</sup>	6.9×10 <sup>-6</sup>	(b)
Maximum	5.4	0.0030	0.018	0.0073	0.0055	0.0019	4.2×10 <sup>-5</sup>	2.6×10 <sup>-5</sup>

Source: Arnett and Mamatey (1998a).

- a. The average value is the average value of the arithmetic means reported for the Site perimeter sampling locations.
- b. Below background levels.
- c. The maximum value is the highest value of the maximums reported for the Site perimeter sampling locations.

The Savannah River bounds SRS to the southwest for approximately 20 miles. The river floodplain supports an extensive swamp, covering about 15 square miles of SRS; a natural levee separates the swamp from the river (Halverson et al. 1997).

The aquatic resources of SRS have been the subject of intensive study for more than 30 years. Several monographs (Britton and Fuller 1979; Bennett and McFarlane 1983), the eight-volume comprehensive cooling water study (du Pont 1987), and a number of environmental impact statements (EISs) (DOE 1987, 1990, 1997a) describe the aquatic biota (fish and macroinvertebrates) and aquatic systems of SRS. The *SRS Ecology Environmental Information Document* (Halverson et al. 1997) and the *Final Environmental Impact Statement for the Shutdown of the River Water System at the Savannah River Site* (DOE 1997a) review ecological research and monitoring studies conducted in SRS streams and impoundments over several decades.

Under the Endangered Species Act of 1973, the Federal government provides protection to six species that 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) (SRFS 1994; Halverson et al. 1997). None of these species is known to occur on or near the proposed sites in S and Z Areas, which are surrounded by roads, parking lots, construction shops, and construction laydown areas and are continually exposed to high levels of human disturbance (SRFS 1996).

### **S and Z Areas**

Site B, the identified site for the Small Tank Precipitation, Ion Exchange, and Solvent

Extraction technologies, is in S Area, approximately one-quarter mile south of DWPF. This open grassy area, which is currently being used as an equipment laydown and storage area, lies in a transitional zone between the heavily-developed central portion of S Area and the relatively undeveloped woodlands to the east (see Figure 2-1). The wildlife of these open, grassy habitats of the SRS that are adjacent to heavy-industrial areas include ground-foraging birds (e.g., American robin, killdeer, mourning dove), small mammals (e.g., cotton mouse, cotton rat, and Eastern cottontail), and reptiles, (e.g., Eastern hognose snake, rat snake, black racer) (Mayer and Wike 1997). East of Site B, the terrestrial habitat grades from pine plantation into a riparian bottomland hardwood community along McQueen Branch.

The site for the Direct Disposal in Grout facilities occupies the eastern half of Z Area, a 180-acre area dedicated in the mid-1980s for the Saltstone Manufacturing and Disposal and support facilities (see Figure 2-2). The western part of Z Area encompasses approximately 70 acres of planted pines. This community is dominated by 35-foot and taller slash pine, with a dense mid-story hardwood component. Dominant tree and shrub species in the mid-story and understory include southern red oak (*Quercus rubra*), water oak (*Q. nigra*), willow oak (*Q. phellos*), hickory (*Carya* spp.), sassafras (*Sassafras albidum*), cherry (*Prunus* spp.), wild plum (*Prunus* spp.), and smooth sumac (*Rhus glabra*) (WSRC 2000a). The developed portion of Z Area consists of the Saltstone Manufacturing and Disposal Facility, vaults, and parking areas. The eastern portion of Z Area consists of old fields and early successional wooded habitats (herbaceous vegetation, small slash pine, and small hardwoods). A few scattered mature southern red oaks are also present (WSRC 2000a). Wildlife of SRS old fields and open woodlands includes upland game birds (e.g., bobwhite quail, Eastern wild turkey), songbirds (e.g., Eastern meadowlark, field sparrow, song sparrow), small mammals (e.g., cotton mouse, cotton rat, and Eastern cottontail), reptiles (e.g., fence lizard, pine snake, scarlet snake, black racer), and amphibians (e.g., southern toad, eastern narrow-mouthed toad) (Sprunt and Cham-

berlain 1970; Cothran et al. 1991; Gibbons and Semlitsch 1991; Halverson et al. 1997). The terrestrial habitat adjacent to Z Area consists primarily of pine plantations that grade into a riparian hardwood community along the McQueen Branch stream corridor.

There are no jurisdictional wetlands (wetlands protected by law) within or immediately adjacent to either of the proposed salt processing sites. However, there are jurisdictional wetlands along McQueen Branch in the general vicinity of Z Area. There are no threatened or endangered species or critical habitats on the sites proposed for development (WSRC 2000a).

### **3.4.2 ECOLOGICAL COMMUNITIES POTENTIALLY AFFECTED BY DEVELOPMENT AND OPERATION OF SALT PROCESSING FACILITIES**

#### **Aquatic Communities Downstream of S and Z Areas**

##### ***Upper Three Runs***

According to summaries of studies on Upper Three Runs documented in the *SRS Ecology Environmental Information Document* (Halverson et al. 1997), the macroinvertebrate communities of Upper Three Runs are characterized by unusually high measures of taxa richness and diversity. Upper Three Runs is a spring-fed stream and is colder and generally clearer than most streams in the upper Coastal Plain. As a result, species normally found in the Northern U.S. and southern Appalachians are found here, along with endemic lowland (Atlantic Coastal Plain) species (Halverson et al. 1997).

A study conducted from 1976 to 1977 identified 551 species of aquatic insects within this stream system, including a number of species and genera new to science (Halverson et al. 1997). A 1993 study found more than 650 species in Upper Three Runs, including more than 100 caddisfly species. Although no threatened or endangered species have been found in Upper Three Runs, there are several environmentally sensitive

species. Davis and Mulvey (Halverson et al. 1997) identified a rare clam species (*Elliptio hepatica*) in this drainage. Also, the American sand-burrowing mayfly (*Dolania americana*), a mayfly relatively common in Upper Three Runs, was until 1996 listed by the U.S. Fish and Wildlife Service as a Category 2 candidate species for listing under the Endangered Species Act. Between 1987 and 1991, the density and variety of insects collected from Upper Three Runs decreased for unknown reasons. More recent data, however, indicate that insect communities are recovering (Halverson et al. 1997).

The fish community of Upper Three Runs is typical of third- and higher-order streams in the southeast that have not been greatly affected by industrial operations, with shiners and sunfish dominating collections. The smaller tributaries to Upper Three Runs are dominated by shiners and other small-bodied species (i.e., pirate perch, madtoms, and darters) indicative of unimpacted streams in the Atlantic Coastal Plain (Halverson et al. 1997). In the 1970s, the U.S. Geological Service designated Upper Three Runs as a National Hydrological Benchmark Stream, due to its high water quality and rich fauna. However, this designation was rescinded in 1992, due to increased residential development of the Upper Three Runs watershed north of SRS (Halverson et al. 1997).

##### ***Fourmile Branch***

Until C Reactor was shut down in 1985, the distribution and abundance of aquatic biota in Fourmile Branch were strongly influenced by reactor operations (high water temperatures and flows downstream of the reactor discharge). Following the shutdown of C Reactor, macroinvertebrate communities began to recover and, in some reaches of the stream, began to resemble those in nonthermal and unimpacted streams of the SRS (Halverson et al. 1997). Surveys of macroinvertebrates in more recent years showed that some reaches of Fourmile Branch had healthy macroinvertebrate communities (high measures of taxa richness), while others had depauperate macroinvertebrate communities (low measures of diversity or communities dominated by pollution-tolerant forms). Differ-

ences appeared to be related to variations in dissolved oxygen levels in different portions of the stream. In general, macroinvertebrate communities of Fourmile Branch show more diversity (taxa richness) in downstream reaches than upstream reaches (Halverson et al. 1997). Recent fish sampling (Specht and Paller 1998) indicates that fish diversity is greater at downstream locations than at upstream locations. This is probably related to factors other than NPDES discharges (Specht and Paller 1998).

To assess potential impacts of groundwater outcropping to Fourmile Branch, WSRC in 1990 surveyed fish populations in Fourmile Branch up- and downstream of F- and H-Area seepage basins (Halverson et al. 1997). Upstream stations were dominated by pirate perch, creek chubsucker, yellow bullhead, and several sunfish species (red-breast sunfish, dollar sunfish, and spotted sunfish). Downstream stations were dominated by shiners (yellowfin shiner, dusky shiner, and taillight shiner) and sunfish (red-breast sunfish and spotted sunfish), with pirate perch and creek chubsucker present, but in lower numbers. Differences in species composition were believed to be due to habitat differences, rather than to the effect of contaminants entering the stream in groundwater.

### ***Savannah River***

An extensive information base is available regarding the aquatic ecology of the Savannah River in the vicinity of SRS. The most recent water quality data available from environmental monitoring conducted on the river in the vicinity of SRS and its downstream reaches can be found in *Savannah River Site Environmental Data for 1997* (Arnett and Mamatey 1998a). These data demonstrate that the Savannah River is not adversely impacted by SRS wastewater discharges to its tributary streams. A full description of the ecology of the Savannah River in the vicinity of SRS can be found in the *SRS Ecology Environmental Information Document* (Halverson et al. 1997), the *Final*

*Environmental Impact Statement for the Shutdown of the River Water System at the Savannah River Site* (DOE 1997a), and the EIS for *Accelerator Production of Tritium at the Savannah River Site* (DOE 1999a).

## **3.5 Land Use**

The SRS is in west-central South Carolina (Figure 3-3), approximately 100 miles from the Atlantic Coast. The major physical feature at SRS is the Savannah River, which is the southwestern boundary of the Site and is also the South Carolina-Georgia border. The SRS includes portions of Aiken, Barnwell, and Allendale counties in South Carolina.

The SRS occupies an almost circular area of approximately 300 square miles (or 192,000 acres) and contains production, service, and research and development areas (Figure 3-7). The production facilities occupy less than 10 percent of the SRS; the remainder of the site is undeveloped forest or wetlands (DOE 1997b) (see Section 3.4).

S and Z Areas are in the north-central portion of the SRS, bounded by Upper Three Runs to the north and Fourmile Branch to the south. Land within a 5-mile radius of these areas lies entirely within the SRS boundaries and is either industrial or forested (DOE 1997b).

In March 1998, the *Savannah River Site Future Use Plan* (DOE 1998b) was formally issued. It was developed in partnership with all major site contractors, support agencies, and DOE Headquarters counterparts and with the input of stakeholders; it defines the future use for the Site. The plan states as policy the following important points: (1) SRS boundaries shall remain unchanged, and the land shall remain under the ownership of the Federal government, consistent with the Site's designation as a National Environmental Research Park; (2) residential uses of all SRS land shall be prohibited; and (3) an Integral Site Model that incorporates three planning zones (industrial, industrial support, and restricted public uses) will be utilized. The land around the industrial areas (i.e., between Upper Three Runs and Fourmile Branch) will be con-

sidered in the industrial use category (DOE 1998b). Consequently, DOE's plan is to continue active institutional control for those areas as long as is necessary to protect the public and the environment (DOE 1998b).

### **3.6 Socioeconomics and Environmental Justice**

#### **3.6.1 SOCIOECONOMICS**

The socioeconomic region of influence (ROI) for the proposed action is a six-county area around the SRS, where the majority of Site workers reside and where socioeconomic impacts are most likely to occur. The six counties are Aiken, Allendale, Barnwell, and Bamberg in South Carolina, and Columbia and Richmond in Georgia. *Socioeconomic Characteristics of Selected Counties and Communities Adjacent to the Savannah River Site* (HNUS 1997) contains details on the ROI, as well as most of the information discussed in this section. The study includes full discussions of regional fiscal conditions, housing, community services and infrastructure, social services and institutions, and educational services. This section will, however, focus on population and employment estimates that have been updated to reflect the most recently available data.

#### **Population**

Based on state and Federal agency surveys and trends, the estimated 1998 population in the ROI was 466,222. About 90 percent lived in Aiken (29 percent), Columbia (20 percent), and Richmond (41 percent) Counties. The population in the region grew at an annual rate of about 6.5 percent between 1990 and 1998 (Bureau of the Census 1999). Columbia County and, to a lesser extent, Aiken County, contributed to most of the growth due to in-migration from other ROI counties and other states. Over the same period, Bamberg and Barnwell Counties experienced net out-migration.

Population projections indicate that the overall population in the region should continue to grow at less than 1 percent per year until about 2040, except Columbia County, which could experience 2 to 3 percent annual growth. Table 3-14 presents projections by county through 2040.

Based on the most recent information available (1992), the estimated median age of the population in the region was 31.8 years. Median ages in the region are generally lower than those of the nation and the two states. The region had slightly higher percentages of persons in younger age groups (under 5 and 5 to 19) than the U.S. while, for all other age groups, the region was comparable to U.S. percentages. The only exception to this was Columbia County, with only 6 percent of its population 65 years or older, while the other counties and the U.S. had 10 percent or greater in this age group. The proportion of persons younger than 20 is expected to decrease, while the proportion of persons older than 64 is expected to increase (DOE 1999a).

#### **Employment**

In 1994, the latest year consistently developed information is available for all counties in the ROI, the total civilian labor force for the region was 206,518, with 6.9 percent unemployment. The unemployment rate for the U.S. for the same period was 6.1 percent. For the Augusta-Aiken Metropolitan Statistical Area, which does not exactly coincide with the counties in the ROI, the 1996 labor force totaled 202,400, with an unemployment rate of 6.7 percent. The most recent unemployment rate for the Augusta-Aiken Metropolitan Statistical Area (issued for February 1999) was 5.0 percent.

In 1994, total employment according to Standard Industrial Code sectors ranged from 479 workers in the mining sector (e.g., clay and gravel pits) to 58,415 workers in the services sector (e.g., health care and education). Average per capita personal income in 1993 (adjusted to 1995 dollars) was \$18,867, in comparison to the U.S. figure of \$21,937.

**Table 3-14.** Population projections and percent of region of influence.

Jurisdiction	2000		2010		2020	
	Population	% ROI	Population	% ROI	Population	% ROI
South Carolina						
Aiken County	135,126	28.7	143,774	27.9	152,975	26.9
Allendale County	11,255	2.4	11,514	2.2	11,778	2.1
Bamberg County	16,366	3.5	17,528	3.4	18,773	3.3
Barnwell County	21,897	4.6	23,517	4.6	25,257	4.5
Georgia						
Columbia County	97,608	20.7	120,448	23.3	148,633	26.9
Richmond County	189,040	40.1	199,059	38.6	209,609	37.0
Six-county total	471,292	100	515,840	100	567,025	100

Jurisdiction	2030		2040	
	Population	% ROI	Population	% ROI
South Carolina				
Aiken County	162,766	26.0	173,182	24.9
Allendale County	12,049	1.9	12,326	1.8
Bamberg County	20,106	3.2	21,533	3.1
Barnwell County	27,126	4.5	29,134	4.2
Georgia				
Columbia County	184,413	29.4	226,332	32.6
Richmond County	220,718	35.2	232,417	33.4
Six-county total	627,178	100	694,924	100

Source: HNUS (1997), scaled from HNUS (1997) and Bureau of the Census (1999).  
ROI = region of influence.

Based on a detailed workforce survey completed in the fall of 1995, the SRS had 16,625 workers (including contractors, permanent and temporary workers, and persons affiliated with Federal agencies and universities who work on the Site) with a total payroll of slightly over \$634 million. By September 1997, DOE had reduced the total workforce to 14,379 (DOE 1998c).

### 3.6.2 ENVIRONMENTAL JUSTICE

In 1995, DOE completed an analysis of the economic and racial characteristics of the population in areas affected by SRS operations for the *Interim Management of Nuclear Materials Environmental Impact Statement* (DOE 1995c). That EIS evaluated whether minority

or low-income communities could receive disproportionately high and adverse human health and environmental impacts from the alternatives included in that EIS. The EIS examined the population within a 50-mile radius of the SRS boundary, plus areas downstream of the Site that withdraw drinking water from the Savannah River. The area encompasses a total of 147 census tracts, (if any portion of a census tract fell within the 50-mile radius, the entire tract was included for purposes of analysis), with a total affected population of 993,667. Of that population, 618,000 (62 percent) are Caucasian. In the minority population, approximately 94 percent are African-American; the remainder consists of small percentages of Asian, Hispanic, and Native American (Table 3-15).

**Table 3-15.** General racial characteristics of population in the Savannah River Site region of influence.

State	Total population	Caucasian	Total Minority	African American	Hispanic	Asian	Native American	Other	Percent minorities <sup>a</sup>
South Carolina ROI	418,685	267,639	151,046	144,147	3,899	1,734	911	355	36.1%
Georgia ROI	<u>574,982</u>	<u>350,233</u>	<u>224,749</u>	<u>208,017</u>	<u>7,245</u>	<u>7,463</u>	<u>1,546</u>	<u>478</u>	<u>39.1%</u>
Total	993,667	617,872	375,795	352,164	11,144	9,197	2,457	833	37.8%

a. Minority population divided by total population.  
 ROI = region of influence.

The *Interim Management of Nuclear Materials EIS* used data on minority and low-income populations from the 1990 census. Although the Bureau of Census publishes county- and state-level population estimates and projects in odd (inter-census) years, census-tract-level statistics on minority and low-income populations are only collected for decennial censuses. Updated census tract information is expected to be published by the Bureau of Census in 2001.

Of the 147 census tracts in the combined region, 80 contain populations of 50 percent or more minorities. An additional 50 tracts contain between 35 and 50 percent minorities. These tracts are well distributed throughout the region, although there are more of them toward the south and in the immediate vicinities of Augusta and Savannah (Figure 3-11).

Low-income communities (25 percent or more of the population living in poverty [i.e., annual income of \$10,915 for a family of two]) occur in 72 census tracts distributed throughout the ROI, but primarily to the south and west of SRS (Figure 3-12). This represents more than 169,000 persons or about 17 percent of the total population (Table 3-16).

### 3.7 Cultural Resources

Through a cooperative agreement, DOE and the South Carolina Institute of Archaeology and Anthropology of the University of South Carolina conduct the Savannah River Archaeological Research Program to provide services re-required by Federal law for the protection and management of archaeological

resources. Ongoing research programs work in conjunction with the South Carolina State Historic Preservation Office.

Savannah River archaeologists have examined 60 percent of the 300-square-mile area and recorded more than 1,200 archaeological sites (HNUS 1997). Most (approximately 75 percent) of these sites are prehistoric. To facilitate the management of these resources, SRS is divided into three archaeological zones, based on an area's potential for containing sites of historical or archaeological significance (DOE 1995b). Zone 1 represents areas with the greatest potential for having significant resources; Zone 2 areas possess sites with moderate potential; and Zone 3 has areas of low archaeological significance.

Studies of S and Z Areas prior to construction of DWPF found no evidence of historic or cultural resources (DOE 1982). Because S and Z Areas are in industrialized sections of the SRS, it is likely that any resources that may have been present were destroyed during initial construction activities in the 1950s.

### 3.8 Public and Worker Health

Radiological and nonradiological hazardous materials released from SRS reach the workers and public through various environmental transport pathways. The primary transport pathways include inhalation, ingestion, or direct contact exposure pathways from air and drinking water. This SEIS evaluates the collective impacts to workers and the public from radiological and nonradiological pollutant transport pathways.





**Table 3-16.** General poverty characteristics of populations in the Savannah River Site region of influence.

Area	Total population	Persons living in poverty <sup>a</sup>	Percent living in poverty
South Carolina	418,685	72,345	17.3%
Georgia	<u>574,982</u>	<u>96,672</u>	<u>16.8%</u>
Total	993,667	169,017	17.0%

a. Families with income less than the statistical poverty threshold, which in 1998 was an annual income of \$10,915 for a family of two.

### 3.8.1 PUBLIC RADIOLOGICAL HEALTH

Because there are many sources of radiation in the human environment, evaluations of radioactive releases from nuclear facilities must consider all ionizing radiation to which people are routinely exposed.

Doses of radiation are expressed as millirem (mrem), rem (1,000 mrem), and person-rem (sum of dose to all individuals in population). An individual's radiation exposure in the vicinity of SRS is estimated to be approximately 357 mrem per year, which 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. Figure 3-13 shows the relative contribution of each of these sources to the dose that would be received by an individual living near SRS. All radiation doses mentioned in this SEIS are committed effective dose equivalents, which include both the dose from internal deposition of radionuclides and the dose attributable to sources external to the body.

Releases of radioactivity from SRS to the environment account for less than 0.1 percent of the total annual average environmental radiation dose to individuals within 50 miles of the Site. Natural background radiation contributes about 293 mrem per year, or 82 percent of the annual dose of the estimated 357 mrem received by an average member of the population within 50 miles of the Site. Based on national averages, medi-

cal exposure accounts for an additional 14.8 percent of the annual dose and combined doses from weapons test fallout, consumer and industrial products, and air travel account for about 3 percent (NCRP 1987).

Other nuclear facilities within 50 miles of SRS include a low-level waste disposal site operated by Chem-Nuclear Systems, Inc., near the eastern Site boundary and approximately 11 miles from S Area and Georgia Power Company's Vogtle Electric Generating Plant, directly across the Savannah River from SRS and approximately 13 miles from S Area. In addition, Starmet CMI (formerly Carolina Metals), Inc., which is northwest of Boiling Springs in Barnwell County, approximately 15 miles from S Area, processes depleted uranium.

The SCDHEC *South Carolina Nuclear Facility Monitoring Annual Report 1995* (SCDHEC 1995) indicates that the Chem-Nuclear and Starmet CMI facilities do not influence radioactivity levels in the air, precipitation, groundwater, soil, or vegetation. Plant Vogtle began commercial operation in 1987: 1992 releases produced an annual dose of 0.54 mrem to the MEI at the plant boundary and a total population dose within a 50-mile radius of 0.045 person-rem (NRC 1996).

In 1997, releases of radioactive material to the environment from SRS operations resulted in an estimated MEI air pathway dose of 0.05 mrem at the Site boundary in the west-southwest sector of the Site, and an estimated maximum dose from water of 0.13 mrem, for an estimated maximum total annual dose at the boundary of 0.18 mrem.



The estimated maximum dose from water pathways to downstream consumers of Savannah River water – 0.07 mrem – occurred to users of the Port Wentworth and the Beaufort-Jasper public water supplies (Arnett and Mamatey 1998b).

In 1990, the population within 50 miles of the Site was approximately 620,100. The estimated collective effective dose equivalent to that population in 1997 was 2.2 person-rem from atmospheric releases. The 1997 population of 70,000 people using water from the Port Wentworth, Georgia, public water supply and 60,000 people using water from the Beaufort-Jasper Water Treatment Plant near Beaufort, South Carolina, received an estimated collective dose equivalent of 2.4 person-rem in 1997 (Arnett and Mamatey 1998b).

Population statistics indicate that cancer caused 23.3 percent of the deaths in the United States in 1997 (CDC 1999). If this percentage of deaths from cancer continues, 23.3 percent of the U.S. population would contract a fatal cancer from all causes. Thus, in the 1990 population of 620,100 within 50 miles of SRS, approximately 144,000 persons would be likely to contract fatal cancers from all causes. The total calculated population dose from SRS of 4.6 person-rem (2.2 person-rem from atmospheric pathways plus 2.4 person-rem from water pathways) could result in 0.0023 additional latent cancer death in the same population [based on 0.0005 cancer death per person-rem] (NCRP 1993).

### **3.8.2 PUBLIC NONRADIOLOGICAL HEALTH**

The hazards associated with the alternatives described in this SEIS include exposure to nonradiological chemicals in the form of water and air pollution (see Sections 3.2 and 3.3). Nonradiological chemical air pollutants are released from SRS facilities that involve chemical processes, such as separations and high-level waste (HLW) treatment and storage. Due to dilution and dispersion,

lower levels of these air pollutants would occur at locations near the Site boundary, offsite, and farther away from the sources. Table 3-11 lists ambient air quality standards and estimated SRS baseline concentrations for selected criteria and toxic pollutants. The purpose of these standards is to protect public health. As discussed in Section 3.3, all estimated SRS baseline concentrations are below the ambient standards for all air pollutants emitted at SRS (Table 3-11).

Nonradiological pollutants from past SRS operations have been identified in other environmental pathways (such as groundwater, surface water, and soils). Environmental sampling programs for these resources indicate that the public is not exposed to these pollutants at concentrations that would impact its health. Groundwater monitoring results in recent years have indicated that ongoing remediation efforts at A and M Areas have diminished the spread of contamination (primarily organics and metals) and reduced the groundwater impact of operations in those areas. Each SRS stream receives varying amounts of treated wastewater and rainwater runoff from site facilities. Stream water quality is sampled monthly and quarterly. In addition, river sampling sites are located upriver of, adjacent to, and downriver of the Site in order to compare the SRS contribution of pollutants to background levels of chemicals from natural sources and upriver non-SRS industrial sources. Analysis of the data for samples collected in 1997 indicates that SRS discharges are not adversely affecting the water quality of the site streams or the river. Table 3-1 lists selected water quality standards, guidelines, and measured concentrations at the Upper Three Runs sampling location downstream of McQueen's Branch. SRS's sediment surveillance program also indicates that inorganic contaminant results were within the expected range (Arnett and Mamatey 1998b).

### **3.8.3 WORKER RADIOLOGICAL HEALTH**

One of the major goals of the SRS Health Protection Program is to keep worker exposures to radiation and radioactive material as low as reasonably achievable. Such a program must