

4.0 AFFECTED ENVIRONMENT

This chapter describes the environment that will be affected by the construction and operation of the Fuel Production Facility (FPF) in H-Area at the Savannah River Plant (SRP).

4.1 SITE LOCATION

The proposed site of the FPF will occupy about 15 acres of mostly open ground in the north central portion of SRP (Figure 4-1). The site is just north of Building 221-H and just outside the H-Area perimeter fence. H-Area is one of the principal industrialized areas at SRP and contains facilities for dissolving irradiated fuel and target materials and separating and decontaminating the various products.

No wetlands areas exist on the proposed site. The facility will be constructed on 15 acres that are already cleared for the H-Area complex. The proposed location of Building 225-H is shown in Figure 4-1.

SRP occupies an area of about 300 square miles on the upper Atlantic Coastal Plain of South Carolina about 25 miles southeast of the Fall Line. The site is bounded for about 17 miles on the southwest by the Savannah River and lies about 25 miles southeast of Augusta, GA and 20 miles south of Aiken, SC (Figure 4-2). Portions of the counties of Barnwell (121,503 acres), Aiken (66,665 acres), and Allendale (4,155 acres), SC, lie within the site boundary (Figure 4-3).

SRP is a controlled area with public access limited to through traffic on SC Highway 125 (SRP Road A), U.S. Highway 278, SRP Road 1; the Seaboard Coast Line Railroad; approved tour groups; forest management activities; controlled hunting and organized deer hunts; and environmental studies. Highway 125 connects the site to Augusta to the northwest and to Allendale to the southeast. U.S. Highway 278 also leads westward to Augusta. Within 15 miles of the site are two small South Carolina towns--Jackson (population 1,780) and New Ellenton (population 2,630)--Chem-Nuclear Services, Inc., the Barnwell Nuclear Fuel Plant (currently closed) and Georgia Power Company's Vogtle Nuclear Power Plant.

SRP facilities include five nuclear production reactors (four operating currently), two chemical separations areas, a fuel and target fabrication facility, and various supporting facilities. Onsite waste management and disposal facilities include tank farms near the chemical separations areas for storage of high-level waste and burial grounds near the chemical separations areas for burial of low-level radioactive waste. Construction is underway on the Defense Waste Processing Facility north of H-Area.

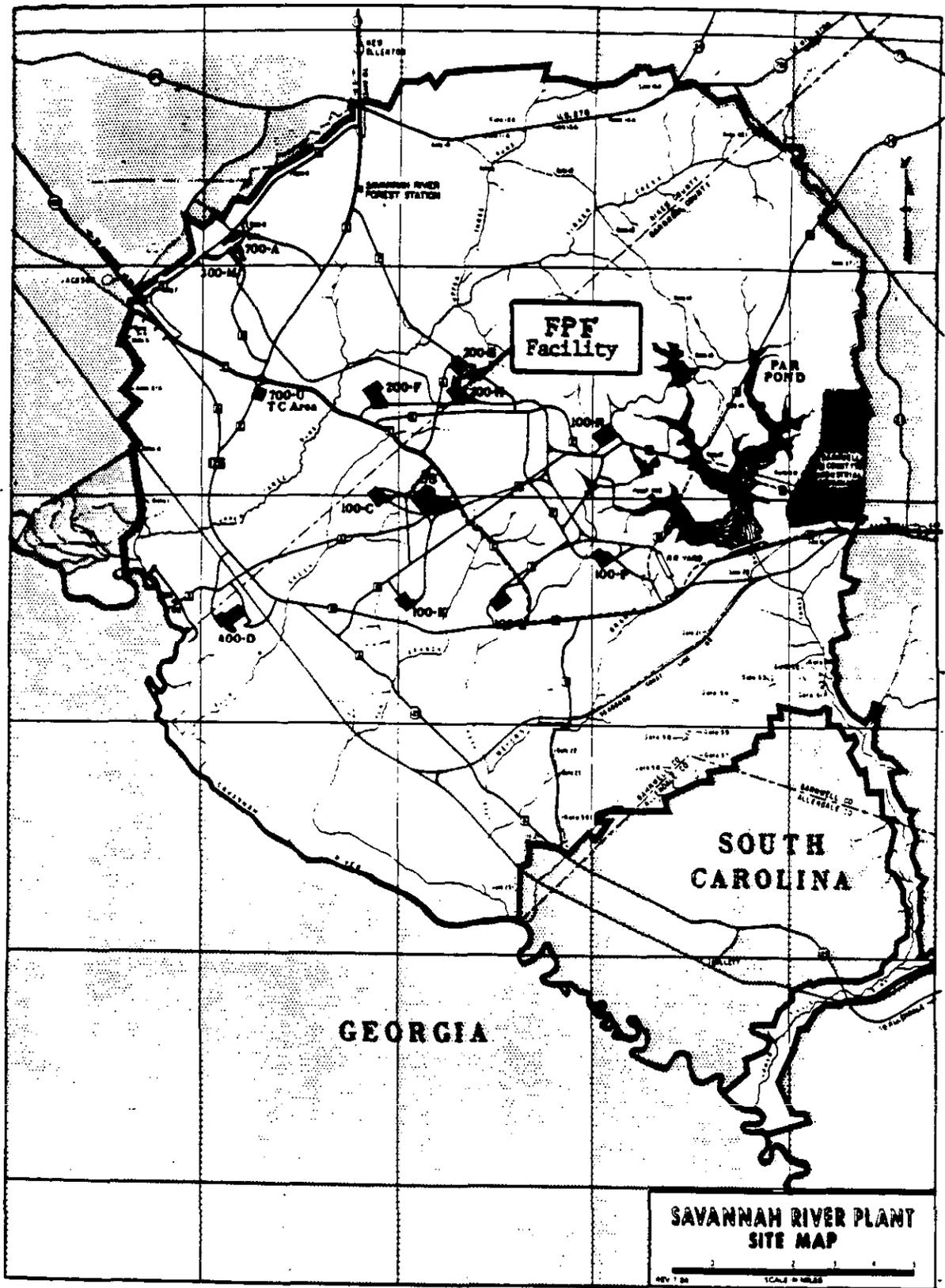


FIGURE 4-1 Savannah River Plant Site

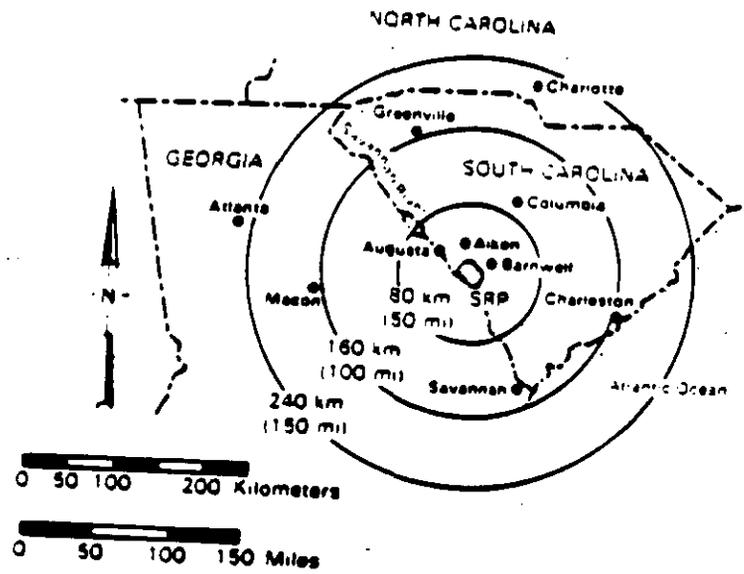


FIGURE 4.2 The SRP Location in Relation to Surrounding Population Centers

4.2 DEMOGRAPHY AND SOCIOECONOMICS

Approximately 90 percent of the current SRP work force resides in the SC counties of Aiken, Bamberg, Barnwell, and Allendale; and in the GA counties of Columbia and Richmond (Figure 4-3). The urban counties - Aiken, Columbia, and Richmond - experienced a population growth of approximately 19 percent between 1970 and 1980. The rural counties - Allendale, Bamberg, and Barnwell - which had a net population decline from 1950 to 1970, experienced significant reversals of this trend between 1970 and 1980, when their population increases ranged from 9 to 16 percent.

The 13-county area surrounding SRP includes Columbia, Burke, Screven, and Richmond counties in GA; and Aiken, Allendale, Bamberg, Barnwell, Edgefield, Hampton, Lexington, Orangeburg, and Saluda counties in SC. In this area urban uses account for approximately 5 percent of the total land area. The most intensively developed land areas occur in and around the cities of Aiken, SC, and Augusta, GA. Agriculture accounts for about 24 percent of total land use; forests, wetlands, and water bodies account for almost 70 percent of the land area.

Generally, the six counties surrounding SRP provide adequate public services and facilities to the existing population. In the 1979 through 1980 school year, approximately 5,000 classroom spaces were available for new students; however, some districts and schools operated near or above capacity levels. Similarly, public water and municipal waste treatment systems have the capacity to provide additional services; however, some communities are experiencing waste treatment problems. Health and fire protection services tend to be concentrated in the urban areas of Aiken and Augusta.

Since 1970, the largest increases in the number of housing units have occurred in the counties of Columbia, Aiken, and Richmond. Columbia County has grown the fastest, nearly doubling its number of housing units. Between 1970 and 1980, Aiken and Richmond Counties each experienced an approximately 36 percent increase in the number of housing units. In Aiken County, half of this increase resulted from the high growth rate in the number of mobile homes.

Nonfarm employment is concentrated in the manufacturing industries. Manufacturing constitutes the largest employment category in each county except Richmond County. Significant percentages of employment in retail and wholesale trade establishments also exist in the counties of Allendale and Richmond.

Employment levels have increased in recent decades as both the total labor force and participation rates have increased. Per capita incomes in Aiken and Richmond Counties were the highest in the study area, and in 1974 ranked in the top 50 percent of the national average. Most of the other counties, however, ranked in the bottom 11 percent of the national average.

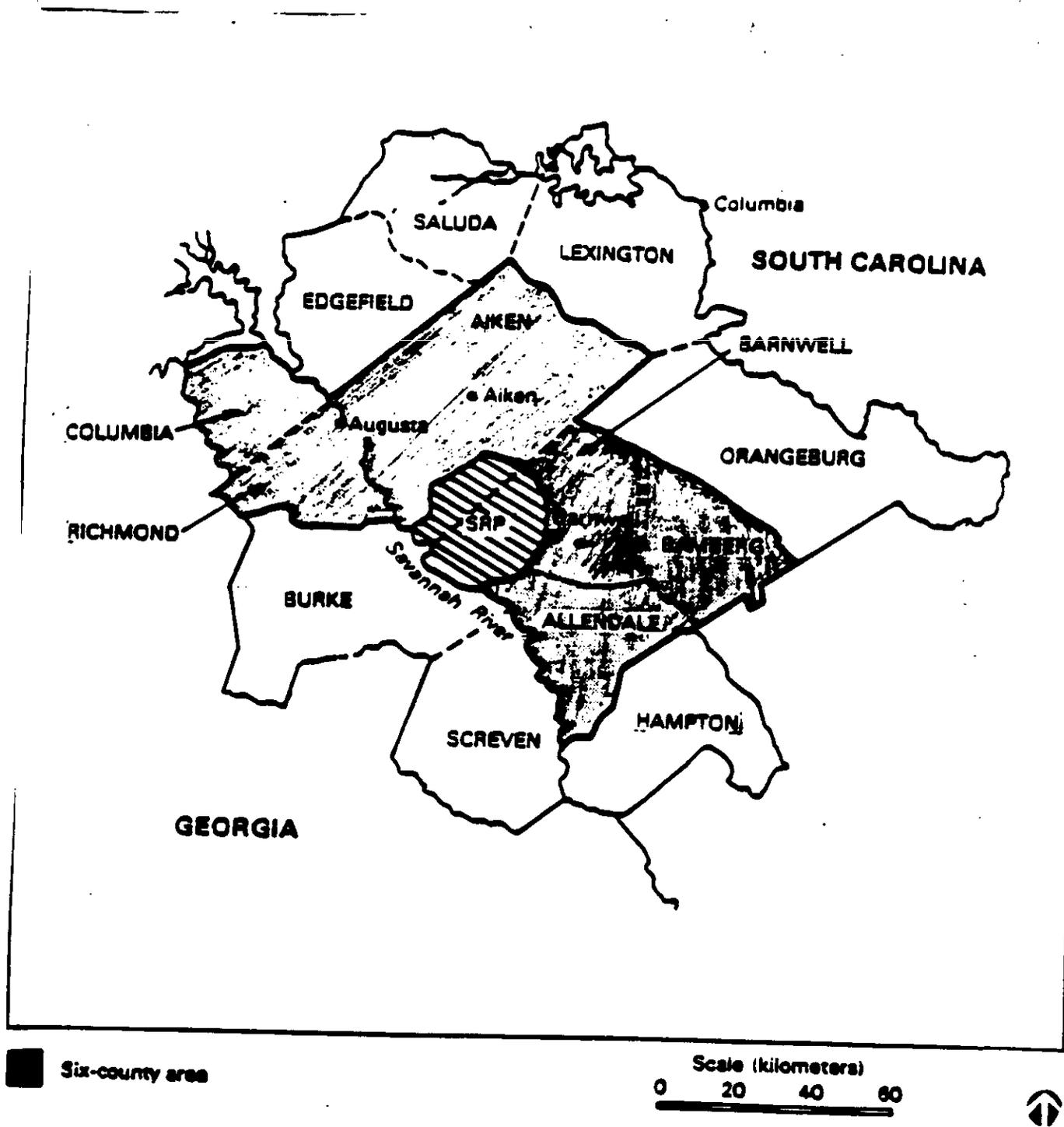


FIGURE 4-3: Counties in the SRP Area

4.3 GEOLOGY AND SEISMOLOGY

SRP is located in the Upper Atlantic Coastal Plain in Aiken and Barnwell counties about 25 miles southeast of the fall line that separates the Atlantic Coastal Plain and the Piedmont tectonic province of the Appalachian system. The topographic surface of the coastal plain slopes gently seaward and is underlain by a wedge of seaward-dipping unconsolidated and semiconsolidated sediments which increase in thickness from zero at the fall line to the coast of South Carolina.

The geologic layers affect the migration rates and direction of radionuclides in groundwater and soils. Compact, clayey sand, and sandy clay with a few beds of sand and a few beds of hard clay exist under the proposed site. Geologic formations beneath the site are shown in Figure 4-4 and described in Table 4-1.

SRP is in an area that has a rather low seismic frequency. Based on three centuries of recorded history of earthquakes, an earthquake above Intensity VII on the Modified Mercalli Scale (MM) would not be expected at SRP. Only two earthquakes of Intensity VII or greater have occurred within 200 miles of the site. They were the Charleston, SC, earthquake of 1886 (MM Intensity of X) and the Union County, SC, earthquake of 1913 (MMI of VII-VIII). Both were less than 0.2 acceleration at SRP.

Several fault systems occur in and adjacent to the Piedmont and the Valley and Ridge Tectonic provinces of the Appalachian system; the closest of these is the Belair Fault Zone, about 25 miles from the site. No evidence exists of any recent displacement along the inferred fault movement in the areas of the major Charleston, SC, earthquake and the very small Dunbarton Basin (Figure 4-4) earthquake at SRP. No capable faults have been found within 200 miles of the site.

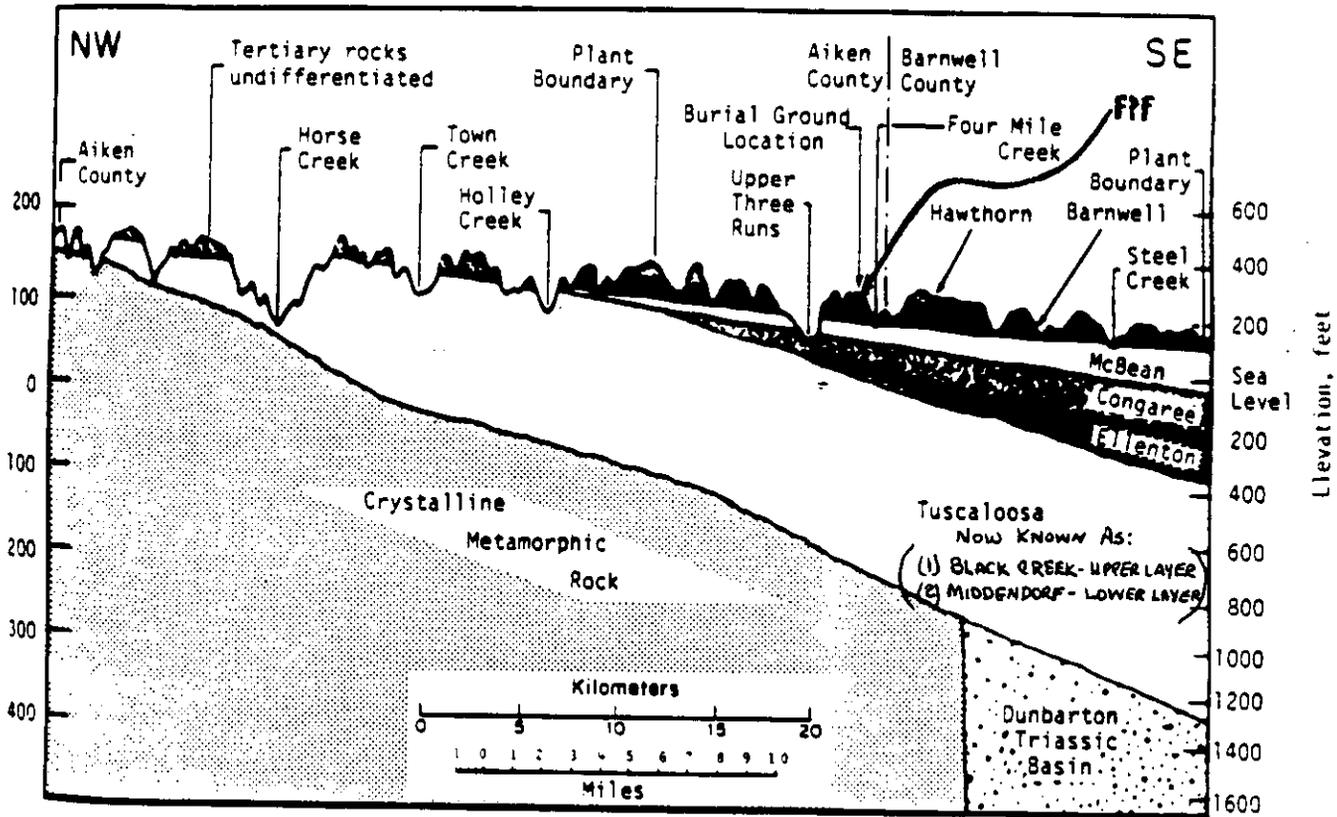


FIGURE 4-4. PROFILE OF GEOLOGIC FORMATIONS BENEATH THE SRP

TABLE 4-1
GEOLOGIC FORMATIONS AND HYDROSTRATIGRAPHIC UNITS IN THE VICINITY OF SRP

<u>Geologic Unit</u>	<u>Geologic Age</u>	<u>Outcrop</u>	<u>Description</u>	<u>Water Yield</u>	<u>Thickness, m</u>
Alluvium	Recent Epoch	River and Creek bottoms	Fine to coarse sand, silt, and clay	Very little	0 to 9.5
Terrace Deposits	Pleistocene Epoch	In flood plains and terraces of stream valleys	Tan to gray sand, clay, silt, and gravel on higher terraces	Moderate to none	0 to 9.5
Alluvium	Pliocene Epoch	Surface of Aiken Plateau	Gravel and sandy clay	Little or none	0 to 6
Hawthorn	Miocene Epoch	Large part of ground surface	Tan, red, and purple sandy clay with numerous clastic dikes	Little or none	0 to 25
Barnwell	Ecocene Epoch	Large part of ground surface near streams	Red, brown, yellow, and buff, fine to coarse sand and sandy clay	Limited but sufficient for domestic use	0 to 30
McBean Congaree	Ecocene Epoch	In banks of larger streams	Yellow-brown to green, fine to coarse, glauconite quartz sand, intercalated with green, red, yellow, and tan clay, sandy marl, and lenses of siliceous limestone	Moderate to large	30 to 75
Ellenton	Upper Cretaceous Epoch	None on SRP	Dark-gray to black sandy lignitic micaceous clay containing disseminated crystalline gypsum and coarse quartz sand	Moderate to large; Higher sulfate and iron content than water from other formations	1 to 30
Tuscaloosa (Now known as: (1) BLACK CREEK- UPPER LAYER (2) MIDDEN DORF- LOWER LAYER)	Upper Cretaceous Epoch	None on SRP	Tan, buff, red, and white; crossbedded, micaceous quartzitic and arkosic sand and gravel interbedded with red, brown, and purple clay and white kaolin.	Large well production up to 7.6 m ³ /min; Soft; low in total solids	170 to 250
Newark Series "Red Beds"	Triassic Period	None on SRP	Dark-brown, and brick-red sandstone siltstone, and claystone containing gray calcareous patches.	Very little	>900
Basement Rocks of the Slate Belt and Charlotte Groups	Precambrian and Paleozoic Eras	None on SRP	Hornblende gneiss, chlorite-hornblende schist, lesser amounts of quartzite. Covered by saprolite layer derived from basement rock.	Very little	Many thousands

4.4 HYDROLOGY

SRP is drained by the Savannah River, one of the major drainage networks in the southeastern United States. Two upstream reservoirs, Clarks Hill and Hartwell, and the New Savannah River Bluff Lock and Dam at Augusta, GA, have stabilized the river flow. Russell reservoir, which began filling in 1983, will further stabilize Savannah River flows. The proposed FPF site is entirely within the drainage basin of Upper Three Runs Creek, a tributary of the Savannah River. Downstream from Augusta, GA, the Savannah River is classified as a Class B waterway, suitable for agricultural and industrial use, and for the propagation of fish. It provides drinking water to Port Wentworth, GA, and Beaufort, SC.

Groundwater occurs in three distinct hydrogeologic systems that underlie SRP: (1) the Coastal Plain sediments, where water occurs in porous sands and clays; (2) the buried crystalline metamorphic rock beneath the sediments, where water occurs in small fractures in rocks; and (3) the Dunbarton Basin within the crystalline metamorphic complex, where water occurs in intergranular spaces in mudstones and sandstones. The latter two systems are unimportant as groundwater sources near SRP. The Coastal Plain sediments contain several prolific and important aquifers across the SRP, generally consisting of the Barnwell, McBean, Congaree, Black Creek, and Middendorf Formations. The Black Creek and Middendorf Formations were formerly known as the Tuscaloosa Formation. Among these formations the Black Creek and the Middendorf Formations are particularly prolific groundwater units because of their thickness, together approximately 600 feet beneath H-Area, and their high permeability.

4.5 METEOROLOGY AND CLIMATOLOGY

SRP has a temperate climate, characterized by mild winters and long summers. The region is subject to continental influences, but it is protected from the more severe winters in the Tennessee Valley by the Blue Ridge mountains to the north and northwest. Temperatures average 48°F in the winter, 85°F in the summer, and 65°F annually. The average rainfall at SRP is 47 inches. Although tornadoes and hurricanes occur infrequently, they are most common in the spring and early fall respectively. Hurricanes along the coastal region have some influence on SRP, although their high winds are greatly diminished by the time they reach the plantsite some 100 miles inland. Only three tornadoes have been confirmed on or near SRP. On no occasion has there been tornado damage to any production facility on SRP.

4.6 ECOLOGY

SRP was approximately one-third forested and the remaining area consisted of cropland when it was acquired by the U.S. Government in 1951. During the past 35 years forestry management practices, natural succession, and the construction and operation of nuclear reactors and their support facilities have resulted in the ecological complexity and diversity of the site. SRP has one of the most intensively studied environments in this country. Presently, 90 percent of SRP lands are forested with pine trees and bottom land hardwoods. These forested areas support a diversity of wildlife habitats that are restricted from the public use. Forest and wildlife management practices include controlled cutting, reforestation, and hunting.

The proposed FPF site is located just outside of the H-Area security fence and adjacent to the DWPF (S-Area). A small sedimentation basin constructed in response to DWPF construction lies just north of the site and will not be impacted. No protected species of plants or animals exist on the proposed site. No wetlands or historic or archeological sites exist on the proposed site. This site is located in the drainage area of Upper Three Runs Creek, a relatively undisturbed, blackwater stream typical of the southeastern United States.

4.7 RADIATION ENVIRONMENT

Environmental radiation in the vicinity of SRP consists of natural background radiation from cosmic (32 mrem/yr) and terrestrial (33 mrem/yr) radiation and radiation from weapons test fallout (4.6 mrem/yr). In addition to environmental radiation people living in the SRP vicinity are exposed to medical radiation (92.5 mrem/yr), radiation from internal body sources (28 mrem/yr), radiation from consumer and industrial products (4.5 mrem/yr), and radiation from other sources (0.7 mrem/yr).

During 1985, the population dose from SRP atmospheric releases to the 555,100 people who live within 50 miles of the center of SRP was 42 person-rem with an average dose of 0.08 mrem per person. This same population received an estimated radiation dose of 51,000 person-rem from natural radiation and an additional 51,000 person-rem from medical procedures.