2.0 Description of Nuclear Power Plant and Site and Plant Interaction with the Environment

The Edwin I. Hatch Nuclear Plant (HNP) is located in Appling County, Georgia, southeast of where U.S. Highway 1 crosses the Altamaha River. It is approximately 18 km (11 mi) north of Baxley, Georgia; 32 km (20 mi) south of Vidalia, Georgia; 160 km (98 mi) southeast of Macon, Georgia; 120 km (73 mi) northwest of Brunswick, Georgia; and 107 km (67 mi) southwest of Savannah, Georgia, as shown in Figure 2-1. HNP is a two-unit steam-electric generating plant. Each unit is equipped with a General Electric Nuclear Steam Supply System that uses a boiling-water reactor with a Mark I containment design. The plant uses a closed-loop cooling tower system for main condenser cooling that withdraws make-up water from and discharges to the Altamaha River via shoreline intake and offshore discharge structures. The electricity generated is transferred to the switchyards located at the HNP site. Each unit is licensed for 2763 megawatts-thermal (MW[t]) and rated at 924 megawatts-electric (MW[e]), for a combined power output of 1848 MW(e). The amount of electricity produced by HNP can supply the needs of more than 540,000 homes. Descriptions of the plant and its environs follow in Section 2.1 and the plant's interaction with the environment is presented in Section 2.2.

2.1 Plant and Site Description and Proposed Plant Operation During the Renewal Term

HNP is jointly owned by Georgia Power Company (GPC), Oglethorpe Power Corporation, the Municipal Electrical Authority of Georgia, and the City of Dalton, Georgia. The HNP site is located in a rural part of southeastern Georgia, and totals approximately 910 ha (2240 acres). The area is characterized by low, rolling sandy hills that are predominantly forested. Figure 2-1 shows the location of HNP in relationship to Georgia, South Carolina, and the Atlantic Ocean. Figure 2-2 shows the details of the 16-km (10-mi) region surrounding HNP. A property plan is shown in Figure 2-3. The property includes approximately 360 ha (900 acres) north of the Altamaha River in Toombs County and approximately 540 ha (1340 acres) south of the river in Appling County.

HNP lies on the southern shore of the Altamaha River, which runs eastward past the plant. The Altamaha is the largest river of the Georgia coast and the second largest basin in the eastern United States. Located in southeastern Georgia, the river drains an area of approximately 30,000 km^2 (11,600 mi^2). It is formed by the confluence of the Ocmulgee and Oconee rivers about 32 km (20 mi) upstream from HNP and ultimately discharges into the Atlantic Ocean just south of Darien, Georgia, approximately 187 river km (117 river mi) below HNP.

1 [Figure 2-1 is in a separate file.]

1 [Figure 2-2 is in a separate file.]

[Figure 2-3 is in a separate file.]

The region surrounding HNP was identified by the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437 (NRC 1996, 1999),[a] as having a low population density. Approximately 975 persons make up the non-outage workforce at HNP. Up to an additional 800 workers are onsite during plant outages.

All industrial facilities associated with the site are located in Appling County. The restricted area, which comprises the reactors, containment buildings, switchyard, cooling tower area, and associated facilities, is approximately 120 ha (300 acres) (Figure 2-4). Approximately 650 ha (1,600 acres) are managed for timber production and wildlife habitat.

Controlled areas available for use with prior permission include 30 ha (75 acres) of wetlands wildlife habitat area and a 40-ha (100-acre) tract of land west of U.S. Highway 1 (Figure 2-3) used as a Boy Scout camp. Uncontrolled areas available to the public include a wayside park, a recreation area, and Visitors Center (Figure 2-3).

HNP is one of three nuclear plants operated by the Southern Nuclear Operating Company (SNC). The others are the Joseph M. Farley Nuclear Plant and the Alvin W. Vogtle Electric Generating Plant. Combined, these three plants provide over 20 percent of the electricity used in Georgia and Alabama. Construction of HNP Unit 1 began in 1968, and commercial operation began in December 1975. Unit 2 construction began in 1972 and commercial operation began in September 1979. GPC constructed the units and had sole responsibility for their operation until March 21, 1997, at which time SNC became the exclusive operating licensee.

2.1.1 External Appearance and Setting

The main generating facilities at HNP (including reactor buildings, turbine buildings, and control buildings) are relatively unobtrusive, neutral-colored buildings, but are visible from portions of U.S. Highway 1 and from the adjacent reach of the Altamaha River. The central area of HNP consists of the two reactor buildings, two control buildings, and two turbine buildings clustered in the center. Around the perimeter are the cooling towers and switchyards. Various other buildings and facilities are located at HNP to support the plant (Figures 2-4 and 2-5). The existing HNP reactor building and single main exhaust stack are approximately 61 m (200 ft) and 120 m (393 ft) tall, respectively. The mechanical draft cooling towers are approximately 18 m (60 ft) tall.

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

[Figure 2-4 is in a separate file.]

[Figure 2-5 is in a separate file.]

HNP stores its spent nuclear fuel onsite in a spent fuel pool and in dry storage casks. The dry storage pad has room for up to 48 dry storage casks.

In addition to the restricted operations facilities, areas controlled by GPC include a wetlands wildlife habitat area and a Boy Scout camp. The wetlands have been certified as wildlife habitat since 1994 by the Wildlife Habitat Council. A lease agreement with the Area Council of the Boy Scouts of America allows scouting groups to use the Boy Scout Camping Area. In the past, the area has been used on weekends by scouts, with the number using the area ranging between 25 and 50 per weekend. The area may be used in the future for Boy Scout Camporees that involve as many as 400 to 500 scouts.

Uncontrolled areas available to the public include a wayside park, a recreation area, and a Visitors Center. The wayside park, east of U.S. Highway 1 and south of the river, provides simple recreational facilities overlooking the Altamaha River. The area has parking and picnicking facilities, and can accommodate up to 10 groups at a time. The 5.3-ha (13-acre) GPC Recreation Area includes softball fields, tennis courts, an archery range, a swimming pool, and an office building that includes a multipurpose activities room. The Visitors Center is reached from the main plant access road that originates at U.S. Highway 1. The Visitors Center includes hands-on exhibits on nuclear power and exhibits depicting the history of nuclear power, the history of HNP, and an environmental exhibit featuring the Altamaha River. The Visitors Center also includes conference rooms and an auditorium that seats approximately 70 people. The typical number of visitors is approximately 50 daily and 12,000 annually.

The HNP site lies within the Coastal Plain physiographic province and is underlain by approximately 1219 m (4000 ft) of relatively unconsolidated Mesozoic and Cenozoic sand, gravel, clay, marl, claystone, sandstone, and limestone. These strata overlie basaltic basement rock of pre-Cretaceous age, and dip and thicken seaward. There was no evidence of faulting during the exploratory drilling and construction of the facility. The formations at the site, of interest due to their water-bearing characteristics, consist of the alluvium beneath the Altamaha River floodplain, the Brandywine Formation (the perched aquifer), the Hawthorn Formation, the Tampa Formation, the Suwanee Formation, the Ocala Formation, and the Lisbon Formation. The Brandywine Formation caps the upland areas adjacent to the stream drainage areas.

The perched water aquifer at the site (Brandywine) is approximately 3 m (10 ft) thick. This aquifer is recharged through direct precipitation. A few springs exist approximately 2.4 km (1.5 mi) southwest of the site at the base of the Brandywine Formation. Discharge is to the ground surface or to streams that have cut through the confining layer at the base of the formation. These springs are dry during droughts. No permeability or safe-yield data are available for this unit.

The water table in the unconfined aquifer is the surficial unit south of the Altamaha River. This aquifer unit is 14 to 15 m (45 to 50 ft) thick and yields less than 38 L/min (10 gpm). The water table reflects the topography of the site area. High water levels underlie the surrounding hills and low water levels are near valleys. The flow direction beneath the plant site is north and east toward the Altamaha River floodplain, along gradients ranging from 4 to 24 m/km (14 to 80 ft/mi). High-clay-content soils near the top of the aquifer and at the ground surface locally form a discontinuous, relatively impermeable zone. Recharge to the unconfined aquifer is by the infiltration of precipitation through and around the leaky clay zones.

The minor confined aquifer is recharged locally in the southwest portion of the site where the middle portion of the Hawthorn Formation is exposed. Natural discharge of the aquifer takes place where the aquifer comes into contact with the alluvium of the Altamaha River. Permeability of the aquifer increases with depth. The potentiometric surface of the aquifer has a gradient of 7 m/km (23 ft/mi) to the north, toward the Altamaha River. The aquifer unit is approximately 20 m (65 ft) thick and can yield up to 38 L/d (10 gpd). A confining unit separates the minor confined aquifer from the underlying aquifer.

The principal artesian aquifer (Floridan) beneath the site is approximately 305 m (1,000 ft) thick. It is the major aquifer of interest. Recharge to the aquifer is about 97 km (60 mi) northwest of the site at the outcrop area for the formations that comprise the aquifer. The potentiometric surface of the aquifer slopes gently to the southeast beneath the site. The aquifer is isolated from the overlying aquifers and this prevents a downward migration of groundwater.

Within the immediate vicinity of HNP, the primary use of groundwater is for domestic needs, with a limited amount for livestock. Most domestic wells are screened within the unconfined aquifer. The closest offsite well that is screened to the principal aquifer is located approximately 305 m (1000 ft) southwest of the site (Figure 2-3). Currently, there is no industrial demand for groundwater within the vicinity of the site, and no groundwater is used for irrigation. The nearest appreciable demand is 16 km (10 mi) south of the site, where the town of Baxley has applied for a permit modification dated September 1, 1997. The permit modification request is for four wells withdrawing approximately 3217 m^3/d (850,000 gallons per day [gpd]) from the principal aquifer.

2.1.2 Reactor Systems

The two HNP reactors are boiling-water reactors operated by SNC with steam-electric turbines manufactured by General Electric Company. Both units were originally rated at 2436 MW(t) and designed for a power level corresponding to approximately 2537 MW(t). HNP is now licensed to operate at a maximum core thermal power output level of 2763 MW(t) (63 FR 53473). Each unit is rated for a net electrical output of 924 MW(e).

HNP fuel is slightly enriched (currently 3.8 percent, with an anticipated increase to 4.2 percent by weight) uranium dioxide in the form of high-density ceramic pellets. Each fuel rod consists of fuel pellets stacked in a Zircaloy-2 cladding tube, which is evacuated, back-filled with helium, and sealed by welding Zircaloy plugs in each end. SNC currently operates HNP at an equilibrium core average fuel discharge burnup rate of 42,100 megawatt-days per metric ton uranium (MWd/MTU), and plans to operate at 45,000 MWd/MTU in the future.

Reactor containment structures are designed with engineered safety features to protect the public and plant personnel from an accidental release of radioactive fission products, particularly in the unlikely event of a loss-of-coolant accident (LOCA). These safety features function to localize, control, mitigate, or terminate such events to limit exposure levels to below applicable dose guidelines. The reactor is controlled using control rods containing a neutron absorber material and by controlling the flow rate through the reactor.

2.1.3 Cooling and Auxiliary Water Systems

HNP withdraws groundwater for potable and process use from the Floridan Aquifer and surface water from the Altamaha River for cooling tower make-up water. The excess heat produced by HNP's two nuclear units is absorbed by cooling water flowing through the condensers and the service water system. Main condenser cooling is provided by mechanical draft cooling towers. Each HNP circulating-water system is a closed-loop cooling system that uses one counter-flow and three cross-flow cooling towers for dissipating waste heat to the atmosphere.

Cooling tower make-up water is withdrawn from the Altamaha River through a single intake structure. The intake structure is located along the shoreline of the Altamaha River and is positioned so that water is available to the plant at both minimum flow and probable flood conditions. The intake is approximately 46 m (150 ft) long, 18 m (60 ft) wide, and the roof is approximately 18 m (60 ft) above normal river level. To account for varying river stages, the water passage entrance extends from 4.6 m (16 ft) below to 10 m (33 ft) above normal water levels.

Water is returned to the Altamaha River via a submerged discharge structure that consists of two approximately 107-cm (42-in.) lines extending approximately 37 m (120 ft) out from the South shore at an elevation of 17 m (54 ft) mean sea level. The point of discharge is approximately 384 m (1260 ft) downriver from the intake structure and approximately 1.2 m (4 ft) below the surface when the river is at its lowest level.

2.1.4 Radioactive Waste Management Systems and Effluent Control Systems

HNP uses liquid, gaseous, and solid radioactive waste management systems to collect and treat the radioactive materials that are produced as a by-product of plant operations. These systems reduce radioactive liquid, gaseous, and solid effluents to levels as low as reasonably achievable (ALARA) before they are released to the environment. The HNP waste processing systems meet the design objectives of 10 CFR Part 50, Appendix I, and control the processing, disposal, and release of radioactive liquid, gaseous, and solid wastes. Radioactive material in the reactor coolant is the primary source of gaseous, liquid, and solid radioactive wastes in light-water reactors. Radioactive fission products build up within the fuel as a consequence of the fission process. These fission products are contained in the sealed fuel rods, but small quantities escape the fuel rods and contaminate the reactor coolant. Neutron activation of the primary coolant system is also responsible for coolant contamination.

Non-fuel solid wastes result from treating and separating radionuclides from gases and liquids and from removing contaminated material from various reactor areas. Solid wastes also consist of reactor components, equipment, and tools removed from service, as well as contaminated protective clothing, paper, rags, and other trash generated from plant design and operations modifications and routine maintenance activities. Solid wastes are shipped to a waste processor for volume reduction before disposal or are sent directly to the licensed disposal facility. Spent resins and filters are dewatered and stored or packaged for shipment to licensed offsite processing or disposal facilities; currently, solid wastes are shipped to Barnwell, South Carolina.

Reactor fuel assemblies that have exhausted a certain percentage of their fissile uranium content are referred to as spent fuel. Spent fuel assemblies are removed from the reactor core and replaced by fresh fuel during routine refueling outages. HNP currently operates on an 18-month refueling cycle for its two units. The spent fuel assemblies are currently stored onsite in a spent fuel pool and in dry storage casks. The dry storage pad has space for up to 48 dry storage casks.

HNP also provides for temporary onsite storage of mixed wastes, which contain both radioactive and chemically hazardous waste. Storage of radioactive material is regulated by the NRC under the Atomic Energy Act of 1954 (AEA), and storage of hazardous wastes is regulated by the U.S. Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act of 1976 (RCRA).

The HNP Offsite Dose Calculation Manual (ODCM) provides the methodology the licensee uses to calculate offsite doses based on gaseous and liquid effluent releases from the plant. These releases are reported in the licensee's annual radioactive effluent release report, which also

includes the ODCM as an appendix (Southern Company 2000a). The ODCM specifies the parameters to be used to calculate potential offsite doses due to radioactive liquid and gaseous effluents and to ensure compliance with the following limits:

- The concentration of radioactive liquid effluents released from the site to the unrestricted area will be limited to levels that meet regulatory requirements.

- The exposure to any individual member of the public from radioactive liquid effluents will not result in doses greater than the design objectives of 10 CFR Part 50, Appendix I.

- The exposure to any individual member of the public from radioactive gaseous effluents will not result in doses greater than the design objectives of 10 CFR Part 50, Appendix I.

- The dose to any individual member of the public from the nuclear fuel cycle will not exceed the limits in 40 CFR Part 190 and 10 CFR Part 20.

- The dose rate from radioactive gaseous effluents at any time at the site boundary will be limited to (a) less than or equal to 5 mSv/yr (500 mrem/yr) to the whole body and less than or equal to 30 mSv/yr (3000 mrem/yr) to the skin for noble gases, and (b) less than or equal to 15 mSv/yr (1500 mrem/yr) to any organ for iodine-131 and -133, tritium, and for all radioactive materials in particulate form with half-lives greater than 8 days.

The systems used for processing liquid waste, gaseous waste, and solid waste are described in the following sections.

2.1.4.1 Liquid Waste Processing Systems and Effluent Controls

HNP Units 1 and 2 have separate liquid radwaste treatment systems and release waste to separate discharge lines. Based on the water source and process train, radioactive liquid wastes from the operation of HNP are accumulated in storage tanks (i.e., waste collector tank, floor drain collector tank, and chemical waste tank). These wastes are collected in the Auxiliary Building and transferred to the radwaste facility for processing by filtration or demineralization or both. The radwaste facility processes high-activity, low-activity, and chemical liquid wastes from the Auxiliary Building.

HNP liquid wastes are disposed of by one of the following three methods based on the concentration of radioactive material in the waste:

- collected, sampled, analyzed, and then discharged directly to the discharge line, which flows into the Altamaha River

- processed by filtration or demineralization or both, collected, sampled, and then released to condensate storage tank for re-use as make-up water if radioactivity levels are low enough

- processed by filtration or demineralization or both, collected, sampled, analyzed with the filters or resins or both; and then dewatered, packaged, and shipped to a licensed disposal facility or an offsite vendor waste processor.

The actual liquid waste generated in 1999 is reported in the licensee's annual radioactive effluent release report (Southern Company 2000a). For 1999, approximately 19,500 m^3 (688,000 ft^3) of prediluted liquid waste were released.

The ODCM prescribes the effluent release rate that will ensure that offsite doses attributable to radioactive liquid effluents released from the site to the unrestricted area satisfy regulatory requirements. In addition, the ODCM provides calculations for the radiation monitor alarm/trip set points that define the relationship between the measured effluent activity, the maximum allowable effluent activity, and the effluent flowrate needed to ensure that an instantaneous release rate is not exceeded as well.

2.1.4.2 Gaseous Waste Processing Systems and Effluent Controls

Radioactive gases are generated by fission and neutron activation of materials in the plant. Gaseous wastes are monitored and released to the atmosphere at a permissible rate prescribed by the ODCM. HNP has four continuously monitored gaseous discharge points. The discharge points are (1) the Unit 1 reactor building vent stack, (2) the Unit 2 reactor building vent stack, (3) the Unit 1 recombiner building vent, and (4) the main stack. The maximum flow rate for the reactor building vents (Units 1 and 2) is 140 m^3/s (300,000 ft^3/min) for each vent; 0.24 m^3/s (500 ft^3/min) for the Unit 1 recombiner building vent (there is no such vent for Unit 2); and 9.4 m^3/s (20,000 ft^3/min) for the main stack. The reactor building vent stack is the discharge point for the following release sources: reactor building, refueling floor ventilation, turbine building, and radwaste facility. The main stack is the discharge point from the following release sources from each unit: mechanical vacuum pumps, off-gas treatment system, gland seal exhaust, and standby gas treatment system. All release points except the main stack are considered ground-level releases. At a height of 120 m (393 ft), the main stack is considered an elevated release point. Each of the four release points is continuously monitored for radioactive material.

The off-gas treatment system treats noncondensible off-gas that is continuously removed from the main condenser by air ejectors during plant operations. The gaseous effluent treated by this system is the major gaseous release source from the plant, larger than all others combined.

The system uses catalytic recombination and charcoal adsorption. The major system components are located in the turbine building and in the waste gas treatment building. The catalytic recombiner recombines radiolytically dissociated hydrogen and oxygen from the air ejector system. Air cooling strips the condensible gases and reduces the volume of material to be released. The remaining noncondensible gases (e.g., krypton, xenon) are delayed in the hold-up system to permit additional radioactive decay prior to release. The off-gas then passes through a charcoal adsorber, which further reduces the off-gas activity. The off-gas is monitored as it exits the charcoal adsorber, passes through the high-efficiency particulate air (HEPA) filter, and is then released through the monitored main stack.

Other gaseous effluent releases may occur from the reactor building, turbine building, and radwaste building. These effluents are either treated by hold-up or filtration prior to being released through the Unit 1 or Unit 2 reactor building vent stack.

The ODCM prescribes the effluent release rate to ensure that releases are less than the regulatory limits. In addition, the ODCM provides the calculational methodology for the radiation monitor alarm/trip set points that defines the relationship between the measured effluent activity, the maximum allowable effluent activity, and the effluent flowrate to ensure that the instantaneous release rate is below the licensed limit. For 1999, no gaseous release limits were exceeded at HNP (Southern Company 2000a).

2.1.4.3 Solid Waste Processing and Handling

Solid low-level radioactive waste at HNP is generated by removal of radionuclides from liquid waste streams, filtration of airborne gaseous emissions, and removal of contaminated material from the plant. Concentrated liquids, filter sludges, waste oils, and other liquid sources are segregated by type, flushed to storage tanks, stabilized for packaging in a solid form by dewatering, slurried into an appropriate container (i.e., carbon steel or high-integrity container), and stored onsite until suitable for offsite disposal. HEPA filters are compacted in volume-reduction facilities and disposed of as solid wastes. Dry active waste includes contaminated protective clothing, paper, rags, glassware, trash, and non-fuel irradiated reactor components. Volume reduction is performed both onsite and offsite.

Solid waste is packaged in containers to meet the U.S. Department of Transportation requirements in 49 CFR Parts 171 through 177. Disposal and transportation are performed in accordance with the applicable requirements of 10 CFR Part 61 and Part 71, respectively. There are no releases to the environment from radioactive solid wastes created at HNP. During 1999, 34 shipments of solid radwaste were made to Barnwell, South Carolina. The radwaste shipments may be shipped to a waste processor to reduce the volume before disposal or may be sent directly to a licensed disposal facility.

From year to year, the volume of radioactive contaminated waste generated will vary. The average value at HNP over the past 5 years is about 320 m^3 (11,300 ft^3).

2.1.5 Nonradioactive Waste Systems

The primary nonradioactive chemical wastes generated at HNP are from reactor coolant system make-up water and water-treatment demineralizers. Nonsanitary, nonradioactive wastes are neutralized, routed to holding ponds, and eventually discharged to the Altamaha River. Sanitary wastes from the HNP are treated in a secondary treatment plant that was designed and constructed, and is operated according to applicable State and Federal water-quality standards. The plant chlorinates the effluent prior to discharge. The plant can treat up to 28,400 L (7500 gal) of raw sewage per day and would use about 4.5 kg (10 lb) of chlorine at maximum volume. The plant operation is regulated so that the effluent contains no more than 2 parts per million (ppm) of chlorine. The effluent from this treatment plant is discharged into the Altamaha River. Solid wastes (i.e., paper, metals, garbage, and other nonradioactive items) are collected and removed to a landfill.

2.1.6 Plant Operation and Maintenance

Routine maintenance performed on plant systems and components is necessary for safe and reliable operation of a nuclear power plant. Some of the maintenance activities conducted at HNP include inspection, testing, and surveillance to maintain the current licensing basis of the plant and to ensure compliance with environmental and public safety requirements. Certain activities can be performed while the reactor is operating. Others require that the plant be shut down. HNP units are on an 18-month refueling interval, and SNC generally schedules outages on staggered schedules, resulting in one outage per year for 2 years and two outages in the third year (cycle repeats).

SNC performed an aging management review and developed an integrated plant assessment (IPA) for managing the effects of aging on systems, structures, and components in accordance with 10 CFR Part 54. The IPA identified the programs and inspections that are managing the effects of aging at HNP. SNC determined that no refurbishment activities will be required for license renewal. Existing programs for surveillance, monitoring, inspections, testing, and modifications to plant systems, structures, and components will continue through the period of extended operations as part of normal maintenance activities. Continuation of these programs will result in modifications to plant systems, structures, and components that are required to achieve performance improvements in the plant systems or by changes in regulations. The existing programs that control modifications at the plant require a review for environmental impact for each modification. SNC does not anticipate that any additional personnel or

resources above the current plant staffing will be required for the performance of the identified aging management programs.

During the license renewal period, SNC does not anticipate the need to increase onsite or offsite personnel and expects the outage workforce to be within the range supporting current operations. Strategic planning for HNP projects a constant or slightly reduced workforce in the future based on industry benchmarks for boiling-water reactor units similar to HNP.

2.1.7 Power Transmission System

According to the SNC Environmental Report (ER; SNC 2000), six transmission lines were built by GPC to connect the HNP to the transmission system. Four of the lines, Eastman, S. Hazlehurst (Douglas), North Tifton, and Bonaire, were evaluated as part of the HNP Final Environmental Statement (FES; AEC 1972). The first three of these lines were built in 1971 to support HNP Unit 1 operation, and the last was built in 1976 to support HNP Unit 2 operation. Two additional lines were built in 1981 to support expansion of the GPC transmission system to Florida. These lines, which were not evaluated in the 1972 FES, are evaluated in this draft supplemental environmental impact statement (SEIS).

The six transmission lines lie in four corridors as shown in Figure 2-6. Statistics associated with these corridors are listed in Table 2-1. SNC has stated that GPC plans to maintain these transmission lines indefinitely as a permanent part of the transmission system after HNP is decommissioned (SNC 2000).

The 1972 FES (AEC 1972) states that GPC constructed transmission lines according to criteria published by the U.S. Department of the Interior designed to minimize environmental effects. In general, routes are selected to minimize land-use conflicts, including selection to avoid all known national forests, areas of historical significance, and areas of archaeological significance. To minimize adverse visual effects, routes are selected to cross roads at an angle, where practical. When possible, trees and ground cover are left undisturbed near road crossings to provide additional visual protection. All rights-of-way are seeded with grasses, or other forage game foods after they are cleared. Owners of rights-of-way are encouraged to plant the rights-of-way in pasture, crops, or game-food plots. Uncultivated rights-of-way are cleared of brush about every 3 years.

According to the SNC ER (SNC 2000), GPC sold the Eastman, Douglas, North Tifton, and Bonaire lines to Oglethorpe Power Corporation, which transferred maintenance responsibility to

1 [Figure 2-6 is in a separate file.]

its subsidiary, Georgia Transmission Company (GTC). GTC uses maintenance practices similar to those used by GPC. The ER states

> HNP transmission line corridors pass through land that primarily is a mixture of cultivated land, grazing land, and managed timberlands (paper and pulp stock). Corridors that pass through farmlands generally continue to be used in this fashion. Corridors in timberlands and in the vicinity of road crossings are maintained on a 3-year cycle by mowing or, if inaccessible to mowers, by use of non-restricted herbicides.

These practices are consistent with the practices described in the FES (AEC 1972).

Table 2-1. Transmission Lines from Hatch Nuclear Plant (SNC 2000)

Corridor	kV	Date Built	Distance km (mi)			Right-of-way Width m (ft)		Area hectares (acres)	
Eastman	230	1971	85	(53)	joint	76	(250)	654	(1610)
Bonaire	500	1976	6	(4)	Eastman	38	(125)	25	(61)
			60	(37)	Bonaire	46	(150)	274	(673)
Douglas	230	1971	55	(34)	joint	76	(250)	419	(1030)
North Tifton	500	1971	16	(10)	Douglas	38	(125)	62	(152)
			77	(48)	North Tifton	46	(150)	355	(873)
Duval	500	1981	140	(87)		46	(150)	644	(1580)
Thalmann	500	1981	105	(65)		46	(150)	481	(1180)
Total			544	(338)				2914	(7159)

2.2 Plant Interaction with the Environment

Sections 2.2.1 through 2.2.8 provide general descriptions of the environment as background information. They also provide detailed descriptions where needed to support the analysis of potential environmental impacts of refurbishment and operation during the renewal term as discussed in Chapters 3 and 4. Section 2.2.9 describes the historical and archaeological resources in the area, and Section 2.2.10 describes possible impacts on other Federal project activities.

2.2.1 Land Use

HNP is located in Appling County, Georgia, southeast of where U.S. Highway 1 crosses the Altamaha River. The plant site is approximately 18 km (11 mi) north of Baxley, Georgia. Baxley is the county seat of Appling County.

The HNP site consists of two tracts of land. The first is an approximately 360-ha (900-acre) parcel located north of the Altamaha River in Toombs County. The second is an approximately 540-ha (1340-acre) parcel south of the Altamaha River on which the plant is sited. All industrial facilities associated with the site are located in Appling County.

Of the approximately 910 ha (2240 acres) that make up the site, approximately 120 ha (300 acres) are committed to generation facilities, parking lots, laydown areas, roads, and maintenance facilities. Approximately 140 ha (350 acres) comprise wetlands and/or transmission corridors. The remaining 650 ha (1600 acres) are actively managed for wildlife and timber production.

The HNP site is not subject to the Georgia Coastal Zone Management Act because the plant is not sited on tidally influenced waters where the tide ebbs and floods daily and because the site is not within one of the designated Georgia coastal zone counties (Official Code of Georgia Annotated, §12-5-322).

The HNP site is not in an incorporated area of Appling County. There are no land-use or zoning restrictions applicable to land within unincorporated portions of Appling County.

2.2.2 Water Use

The Altamaha River is the major source of water for the plant. The Altamaha River is approximately 150 m (500 ft) wide and a maximum of 9 m (30 ft) deep at HNP. The river remains relatively undisturbed and has no major channelization, dredging, or major reservoirs. The U.S. Geological Survey maintains a gauging station (Number 02225000) on the right bank of the river 121 m (400 ft) downstream from the U.S. Highway 1 bridge, approximately 160 m (530 ft) upstream from HNP. Based on 49 years of record, the average annual flow rate at this station is 328 m^3/s (11,580 ft^3/s). Highest monthly flows normally occur in March and lowest monthly flows normally occur in September. The historical single day low flow is 46 m^3/s (1620 ft^3/s).

Presently there are no other competing industrial consumptive users of water from the Altamaha River in the vicinity of HNP, nor are there plans for any new major consumptive users

in the foreseeable future. There are no water-quality issues with the river in the vicinity of HNP and no restrictions have been imposed on HNP during low-flow periods.

Water is withdrawn from the river to provide cooling for certain once-through loads and make-up water to the cooling towers. SNC is permitted (Georgia Department of Natural Resources [GADNR] Permit 001-0690-01) to withdraw a monthly average of up to 273,000 m^3/d (72 million gpd) with a maximum 24-hour rate of up to 392,000 m^3/d (104 million gpd). As a condition of this permit, SNC is required to monitor and report withdrawals. Based on reported withdrawals for the years 1989 through 1997, HNP withdraws an annual average of 216,000 m^3/d (57 million gpd).

Through the evaporative cooling process, water vapor is lost to the atmosphere ("consumed"), thus the volume of water returned to the river (approximately 95,000 m^3/d [25 million gpd]) is less than the volume withdrawn. Therefore, the average HNP surface water consumption rate is approximately 123,000 m^3/d (33 million gpd). When compared to the average river discharge, the consumptive loss represents about 0.44 percent of river flow. During minimum river discharge periods, the consumptive loss amounts to 3.1 percent.

The evaluation of surface water use in the 1978 FES (NRC 1978) concluded that the consumptive losses would be approximately 46 percent of the total water withdrawn from the river. In NRC's environmental assessment for an extended power uprate (63 FR 53474), NRC concluded that the necessary increase in make-up water to support the higher heat load would be insignificant and that cooling tower blowdown would decrease by approximately 2.4 m^3/min (626 gpm). As evaluated by NRC in the extended power uprate review, consumptive water use for the plant operating at the extended power level is expected to be 57 percent of the total withdrawal.

HNP withdraws groundwater for potable and process use from the Floridan Aquifer. HNP is permitted (GADNR Permit 001-0001) to withdraw a monthly average of 4200 m^3/d (1.1 million gpd) or 2.9 m^3/min (764 gpm) with an annual average of 2.1 m^3/d (0.5 million gpd) from four wells. Although the current permit indicates four onsite wells, there are actually only three wells providing groundwater for domestic and process use. The fourth well was intended to provide make-up water for a wildlife habitat pond that was not completed; therefore, the well has not been installed.

Site Well Number 3 provides water for potable use only at the site recreational facility. Operation of this well as the source water supply for the GPC Recreation Facility potable water system is conducted under GADNR Permit NG0010011. Site wells Number 1 and 2 provide water for potable use, sanitary facilities, and process use (e.g., demineralized water, fire protection). Operation of these wells as the source water supply for the plant is conducted

under GADNR Permit PG0010005. Figure 2-3 shows the locations of the three production wells.

GADNR requires SNC to monitor and report withdrawals from these three wells. Based on the reported withdrawals from 1990 to 1997, the two-unit operation requirements for this period averaged 0.48 m^3/min (126 gpm) with a high month (January 1992) average of 0.89 m^3/min (236 gpm).

2.2.3 Water Quality

Pursuant to the Federal Water Pollution Control Act of 1977 (FWCPA), also known as the Clean Water Act (CWA), the water quality of plant effluent discharges is regulated through the National Pollutant Discharge Elimination System (NPDES). The Environmental Protection Division (EPD) of GADNR is the State of Georgia agency delegated by EPA to issues discharge permits.

The NPDES permit for HNP (GA0004120) issued by GADNR's EPD in 1997 requires weekly monitoring of discharge temperatures, but it does not stipulate a maximum discharge temperature or maximum temperature rise across the condenser. Maximum discharge temperatures in the mixing box, which are reported to EPD quarterly, range from 17°C (62°F) in winter to 34°C (94°F) in summer.

To control biofouling of cooling system components, such as condenser tubes and cooling towers, an oxidizing biocide (typically sodium hypochlorite or sodium bromide) is injected into the system as needed to maintain a concentration of free oxidant sufficient to kill most microbial organisms and algae. When the system is being treated, blowdown is secured to prevent the discharge of residual oxidant into the river. After biocide addition, water is recirculated within the system until residual oxidant levels are below the discharge limits specified in the NPDES permit (GA0004120).

There are no water-quality issues related to the river in the vicinity of HNP. GADNR is unaware of any major issues likely to prevent renewal of the HNP NPDES permit due to expire in 2003. Any new regulation promulgated by EPA or GADNR would be included in future permits.

2.2.4 Air Quality

HNP is located on the Altamaha River between Savannah and Macon in western Georgia. It is approximately 18 km (11 mi) north of Baxley and 32 km (20 mi) south of Vidalia. Climatological

records for Macon, Georgia,[a] which should be generally representative of the site, show normal daily maximum temperatures ranging from about 14°C (57°F) in January to about 33°C (92°F) in July; normal daily minimum temperatures range from about 1°C (34°F) in January to about 21°C (70°F) in July. Precipitation averages about 115 cm (45 in.) per year.

Severe storms occur occasionally in the area, with thunderstorms occurring on about 40 percent of the days from June through August. Because of its distance from the coast, hurricanes do not generally pose a direct threat to HNP, although secondary effects may be felt at the site. Based on statistics for the 30 years from 1954 through 1983 (Ramsdell and Andrews 1986), the probability of a tornado striking the site is estimated to be approximately 9×10^{-5} per year.

The wind resource in Georgia near HNP is limited. The annual average wind power is rated as 1 on a scale of 1 to 7 with 1 being the lowest (Elliott et al. 1987). The closest region with a significant wind resource is the southern Appalachian Mountains in northeastern Georgia. Even there, the resource is limited because the area is highly confined and represents an extremely small percentage of the exposed land.

HNP has several diesel generators and boilers. Emissions from these generators and boilers are covered by a GADNR permit (4911-001-0001-V-01-0) under the Clean Air Act (CAA). Typically each source is operated 1 to 2 hr/month. In addition, the emergency diesel generators are operated for a 24-hour period each fuel cycle.

During most of the year, the region is under the influence of the Bermuda high-pressure system. High-pressure systems are typically associated with low winds and increased potential for air pollution problems. However, the region of Georgia in which HNP is located is in attainment of the National Air Quality Standards (40 CFR 81.311). The closest nonattainment area is the Atlanta area, which is more than 160 km (100 mi) to the northwest. The wilderness areas closest to HNP, designated in 40 CFR 81.408 as mandatory Class I Federal areas in which visibility is an important value, are the Okefenokee and Wolf Island wilderness areas. These wilderness areas are more than 80 km (50 mi) south and southeast, respectively, from HNP.

2.2.5 Aquatic Resources

The fish of the Altamaha River in the vicinity of the HNP are characterized by the fish collections made during the monitoring of entrained and impinged fish at the water-intake structure. Five years (1975, 1976, 1977, 1979, and 1980) of impingement samples were

(a) Climatological data for Macon, Georgia are available at http://www.ncdc.noaa.gov/ol/climate/climatedata.html

collected at the plant (Nichols and Holder 1981). One hundred and sixty-five fish representing twenty-two species were collected (Table 2-2). The lowest rate of impingement during the 5-year study was 0.4 fish per day. The highest for the same period was 1.2 fish per day. The hogchoker, *Trinectes maculatus*, was the most abundant and the only species collected consistently each year. Most species were only collected once during the 5 years.

Table 2-2. Scientific and Common Names of Fish Collected During Entrainment and Impingement Studies at Hatch Nuclear Plant

Scientific Name	Common Name
Alosa aestivalis	Blueback herring
Alosa sapidissima	American shad
Dorosoma spp.	Shad
Clupeidae	Herring and shad
Esox spp.	Pickerel
Esox americanus	Redfin pickerel
Hybognathus nuchalis	Silvery minnow
Notropis chalybaeus	Ironcolor shiner
Notropis petersoni	Coastal shiner
Cyprinidae	Minnows
Carpiodes velifer	Highfin carpsucker
Minytrema melanops	Spotted sucker
Moxostoma anisurum	Silver redhorse
Ictalurus brunneus	Snail bullhead
Ictalurus nebulosus	Brown bullhead
Ictalurus punctatus	Channel catfish
Noturus gyrinus	Tadpole madtom
Aphredoderus sayanus	Pirate perch
Labidesthes sicculus	Brook silverside
Strongylura marina	Atlantic needlefish
Lepomis spp.	Sunfish
Lepomis auritus	Redbreast sunfish
Micropterus salmoides	Largemouth bass
Pomoxis spp.	Crappie
Perca flavescens	Yellow perch
Percidae	Darters
Trinectes maculatus	Hogchoker

One Federally listed aquatic species, the anadromous shortnose sturgeon, *Acipenser brevirostrum*, is known to occur in the Altamaha River in the vicinity of HNP. One adult

shortnose sturgeon and three larval sturgeon were collected during 3 years of pre- and post operational monitoring in the river near the plant.

SNC has committed to the conservation of significant natural habitats and protected species (SNC 1999). SNC has no plans to alter current patterns of operation over the license renewal period. SNC states that (1) any maintenance activities necessary to support license renewal would be limited to previously disturbed areas, (2) no expansion of existing facilities is planned, and (3) no major structural modifications are anticipated in support of license renewal.

The shoreline of the Altamaha River in the vicinity of HNP and immediately downstream for several miles is characterized by steep bluffs, floodplain forests, and sandbars. The riparian communities experience an average annual surface elevation fluctuation of approximately 2.7 m (9 ft). This conclusion is based on average daily flows for a 1-month period over the last 22 years. The consumptive loss incurred by plant operations has the greatest effect on surface elevation during low-flow periods. The duration of low-flow conditions is approximately 2 to 3 months during the late summer. The shoreline exposed during these periods is under water during the other 9 to 10 months of the year. Vegetation is found at elevations that are not flooded for most of the year by the river.

2.2.6 Terrestrial Resources

The HNP site encompasses approximately 910 ha (2240 acres), including 360 ha (900 acres) in southern Toombs County and 540 ha (1340 acres) south of the Altamaha River in northern Appling County, Georgia. Approximately 120 ha (300 acres) are used by SNC for general operation and maintenance of HNP (i.e., generation facilities, roads, parking lots, support buildings, laydown areas, etc). Approximately 140 ha (350 acres) are composed of wetlands and transmission corridors, and approximately 650 ha (1600 acres) are actively managed for wildlife and timber production (SNC 2000).

The largest wetland area covers approximately 40 ha (100 acres) just east of the generating facilities and cooling towers. Wetlands on the site are typically dominated by cypress and black gum. There are approximately 280 ha (700 acres) of deciduous floodplain forest in the Altamaha River floodplain; this forest is dominated by black gum, cypress, oak, and hickory trees. There are approximately 160 ha (400 acres) of planted pine forests (Loblolly and long-leaf pines) on the HNP site, mostly south and southwest of the generating facilities.

The HNP transmission lines are primarily within the Coastal Plain physiographic province, but the western portion of the Bonaire 500-kV line enters the Sandhills physiographic province. These lines extend for a distance of nearly 160 km (100 mi) in several different directions from

the plant site, and therefore traverse the full range of habitat types and geophysical conditions typically found in south-central Georgia.

SNC commissioned a survey of the HNP site and transmission lines to evaluate the presence of plant and animal species listed or proposed by the U.S. Fish and Wildlife Service (FWS) as endangered or threatened, or listed by GADNR as endangered, threatened, rare, or unusual. This survey also included several 115-kV transmission lines that are not considered elsewhere in this draft SEIS; these lines were in place prior to plant construction and extend to the vicinities of Vidalia and Baxley, Georgia. Tables 2-3 and 2-4 list the plant and animal

Table 2-3. Federal and State Protected Plant Species Evaluated as Potentially Occurring at the HNP Site or Within the Associated Transmission Line Rights-of-Way

Species	Common Name	Federal Status[(a)]	State Status[(a)]
Baptisia arachnifera	Hairy rattleweed	E	E
Echinacea laevigata	Smooth purple coneflower	E	E
Lindera melissifolia	Pondberry	E	E
Oxypolis canbyi	Canby dropwort	E	E
Ptilimnium nodosum	Mock bishop-weed	E	E
Rhus michauxii	Dwarf sumac	E	E
Sarracenia oreophila	Green pitcherplant	E	E
Schwalbea americana	Chaffseed	E	E
Thalictrum cooleyi	Cooley meadowrue	E	E
Trillium reliquum	Relict trillium	E	E
Hymenocallis coronaria	Shoals spiderlily	SC	E
Panicum hirstii	Hirst panic grass	SC	E
Sarracenia leucophylla	Whitetop pitcherplant	SC	E
Sideroxylon thornei	Swamp buckthorn	SC	E
Asplenium heteroresiliens	Wagner spleenwort	SC	T
Calamintha ashei	Ohoopee dunes wild basil	SC	T
Cuscuta harperi	Harper dodder	SC	T
Hartwrightia floridana	Hartwrightia	SC	T
Litsea aestivalis	Pondspice	SC	T
Matelea alabamensis	Alabama milkvine	SC	T
Myriophyllum laxum	Lax water-milfoil	SC	T
Scutellaria ocmulgee	Ocmulgee skullcap	SC	T
Stylisma pickeringii var. pickeringii	Pickering morning-glory	SC	T
Balduina atropurpurea	Purple honeycomb head	SC	R
Marshallia ramosa	Pineland barbara buttons	SC	R

(a) Status Codes: E= Endangered, T = Threatened, R = Rare, SC = Federal species of concern (unofficial category, primarily former Category 2 candidates).

Table 2-4. Federal and State Protected Terrestrial Animal Species Evaluated as Potentially Occurring at the HNP Site or Within the Associated Transmission Line Rights-of-Way

Species	Common Name	Federal Status[(a)]	State Status[(a)]
Dendroica kirtlandii	Kirtland's warbler	E	E
Mycteria americana	Wood stork	E	E
Myotis sodalis	Indiana myotis	E	E
Picoides borealis	Red-cockaded woodpecker	E	E
Vermivora bachmanii	Bachman's warbler	E	E
Sterna antillarum	Least tern	E	R
Haliaeetus leucocephalus	Bald eagle	T	E
Ambystoma cingulatum	Flatwoods salamander	T	R
Drymarchon couperi	Eastern indigo snake	T	T
Alligator mississippiensis	American alligator	T(S/A)	-
Falco peregrinus	Peregrine falcon	SC*	E
Gopherus polyphemus	Gopher tortoise	SC**	T
Macroclemys temminckii	Alligator snapping turtle	SC	T
Neofiber alleni	Round-tailed muskrat	SC	T
Aimophila aestivalis	Bachman's sparrow	SC	R
Corynorhinus rafinesquii	Rafinesque's big-eared bat	SC	R
Notophthalmus perstriatus	Striped newt	SC	R

(a) Status Codes: E= Endangered, T = Threatened, T(S/A) = Threatened due to similarity of appearance, R = Rare, U = unusual, SC = Federal species of concern (unofficial category, primarily former Category 2 candidates), SC* the Peregrine falcon was removed from the Federal list of threatened or endangered species (64 FR 46541), SC** The Gopher tortoise is Federally listed as threatened in Louisiana, Mississippi, and in Alabama west of the Alabama River, but is not listed as threatened in Georgia (52 FR 25376), - = no listing status.

species that are either listed or proposed for listing by FWS or species that are listed by the State of Georgia and are former FWS candidate species that were considered in the field evaluations. The complete list of species evaluated, including a number of additional State-listed species is provided in the threatened and endangered species survey report (Tetra Tech, Inc. 1999).

The applicant's survey identified several State- and Federally listed species of concern on the HNP site or within the transmission corridors (Table 2-5). Bald eagles and wood storks were not detected during the 1998 and 1999 field surveys. They have been observed near the HNP site at other times, but are not considered residents of the area (SNC 2000).

GPC participates in several cooperative wildlife management programs, and maintains numerous feed plots for deer and turkey within transmission corridors as well as on portions of the HNP site. HNP also has an active onsite program to encourage wildlife usage of the HNP site, including the construction and monitoring of numerous nest boxes for song birds, kestrels, and wood ducks, as well as bat boxes (Southern Company 1999).

Table 2-5. Federal or State Protected Species Identified Within the HNP Site or Associated Transmission Line Rights-of-Way

Species	Common Name	Federal Status[a]	State Status[a]	Location[b]
PLANTS				
Balduina atropurpurea	Purple honeycomb head	SC	R	T, V, F
Penstemon dissectus	Cutleaf beardtongue	-	R	Th
Sarracenia flava	Yellow pitcherplant	-	U	B, T, Th, V, HNP
Sarracenia minor	Hooded pitcherplant	-	U	B, T, Th, V, Bx
Sarracenia psittacina	Parrot pitcherplant	-	T	F, T
Sioxylon sp. nov.	Ohoopee bumelia	-	N	F, T, V
ANIMALS				
Picoides borealis	Red-cockaded woodpecker	E	E	F
Drymarchon corais couperi	Eastern indigo snake	T	T	T
Haliaeetus leucocephalus	Bald eagle	T	E	HNP
Mycteria americana heronry	Wood stork	E	E	HNP
Gopherus polyphemus	Gopher tortoise	SC*	T	F, T, D, Th, B, V, HNP
Aimophila aestivalis	Bachman's sparrow	SC	R	F, Th
Alligator mississippiensis	American alligator	T(SA)	-	B, T, Th

(a) Status Codes: E= Endangered, T = Threatened, T(S/A) = Threatened due to similarity of appearance, R = Rare, U = unusual, SC = Federal species of concern (unofficial category, primarily former Category 2 candidates), SC* = gopher tortoise is not listed in the State of Georgia, but is listed as threatened in other parts of its range, N - species new to science.

(b) Location codes: HNP = Hatch Nuclear Plant Site, B = Bonaire 500-kV transmission line, T = North Tifton 500-kV transmission line, Th = Thalmann 500-kV transmission line, F = Florida (Duval) 500-kV transmission line, D = Douglas (South Hazlehurst) 230-kV transmission line, V = Vidalia 115-kV transmission line, Bx = Baxley 115-kV transmission line.

2.2.7 Radiological Impacts

SNC and its predecessor organizations have conducted a Radiological Environmental Monitoring Program (REMP) around the HNP site since 1974. The radiological impacts to the public and the environment have been carefully monitored, documented, and compared with the appropriate standards. The purposes of the REMP are to

- verify that radioactive materials and ambient radiation levels attributable to plant operation are within the NRC regulatory limits and the U.S. Environmental Protection Agency environmental radiation standards in 40 CFR Part 190

- detect any measurable buildup of long-lived radionuclides in the environment

- monitor and evaluate ambient radiation levels

- determine whether any statistically significant increase occurs in the concentration of radionuclides in important pathways.

Radioactivity in the environment that is sampled and measured as part of the REMP is reported in the licensee's annual radiological environmental operating report (e.g., Southern Company 2000b). The REMP includes monitoring of the aquatic environment (aquatic organisms, shoreline sediment and water samples from the Altamaha River, and drinking water samples), atmospheric environment (air particulates and iodine), and terrestrial environment (vegetation, milk, and direct radiation).

Review of historical data on releases and the resultant dose calculations revealed that the doses to the maximally exposed individual for each pathway in the vicinity of HNP were a small fraction of the limits specified in EPA's environmental radiation standards, 40 CFR Part 190, as required by 10 CFR 20.1301(d). For 1999 (the most recent year that data were available), dose estimates were calculated based on actual 1999 liquid and gaseous effluent release data. Calculations were performed using the plant effluent release data, onsite meteorological data, and appropriate pathways identified in the ODCM.

Southern Company reported the following estimated whole body doses to the most limiting member of the public for 1999:

- approximately 0.00064 mSv/yr (0.064 mrem/yr), based on vegetation, fish, and sediment results from the HNP environmental monitoring program (Southern Company 2000b)

- approximately 0.00074 mSv/yr (0.074 mrem/yr) based on gaseous and liquid effluent releases (Southern Company 2000a).

Cesium-137 was the major contributing radionuclide. These doses, which are representative of the doses from the past 5 years, are illustrative of the fact that doses are very small fractions of the 40 CFR Part 190 limits.

In addition to the SNC REMP, GADNR conducts an environmental surveillance program around the HNP site and to a distance of up to 140 km (90 mi) for different sample types. State program monitors the following: direct radiation, air, precipitation, vegetation, soil, groundwater, Altamaha River water, river sediment, and fish.

In its Environmental Radiation Surveillance Report, 1997-Mid 1999 (GADNR 1999), GADNR found only trace quantities of zinc-65, manganese-54, and cesium-137 within 8 km (5 mi) downstream of the plant. In addition, trace quantities of cobalt-60 were observed over a 140-km (90-mi) stretch of the Altamaha River downstream to Darien, Georgia. GADNR concluded that measured concentrations were well below levels of concern and that there was no measurable impact on water, fish, or seafood downstream of HNP.

The applicant does not anticipate any significant changes to the radioactive effluent releases or exposures from HNP operations during the renewal period and, therefore, the impacts to the environment are not expected to change.

2.2.8 Socioeconomic Factors

The staff reviewed the applicant's ER and information obtained from several county staff members, local real estate agents/appraisers, and social services providers during the May 2000 site visit. The following sections describe the economy, population, and communities near HNP. The discussion is limited primarily to Toombs and Appling counties, which are the most impacted by actions undertaken by SNC.

2.2.8.1 Housing

Housing availability in Appling and Toombs counties is not limited by growth-management measures. The total housing and vacant units in Toombs and Appling counties in 1990 are shown in Table 2-6. More recent information is not available.

Table 2-6. Housing Units and Housing Units Vacant (Available) by County (1990)

	Appling	Toombs
Housing Units	6629	9952
Occupied Units	5843	8804
Vacant Units	795	1148

Source: SNC 2000.

SNC has approximately 950 employees at HNP during routine operations. The number of onsite vendor and contract staff varies throughout the year by as many as 50 workers, yielding a total onsite workforce that ranges between 925 and 975 during routine operations. The onsite workforce increases by as many as 800 temporary duty employees for a period of 1 to 2 months during refueling outages, which are on an 18-month cycle (SNC 2000). In addition to the site employees, there are approximately 130 corporate staff dedicated to HNP who are located offsite in Birmingham, Alabama.

The SNC employees employed at the site reside in 33 Georgia counties. More than 85 percent of the employees reside in the five counties shown in Table 2-7. Seventy-one percent of those employees live in Appling (30 percent) and Toombs (41 percent) counties. The remaining employees' residences are distributed throughout the remaining 28 counties, mostly within 80 km (50 mi) of the site.

Table 2-7. Hatch Nuclear Plant—Employee Residence Information

County	Number of Personnel	Percent of Total Personnel
Tombs	367	41
Appling	290	30
Montgomery	61	6
Tattnall	46	5
Jeff Davis	40	4
Other	129	14
Total (approximately)	950	100

Source: SNC 2000.

As displayed in Table 2-8, the 1970 resident population in Appling County was 12,726. In 1980, the population was 15,565, rising to 15,744 by 1990 (Georgia Department of Community Affairs [GDCA] 2000a) and increasing to an estimated 16,675 by July 1, 1999 (U.S. Census Bureau [USCB] 2000) or 5.9 percent over 1990 values. The 2010 population projection is 18,318 (Georgia Office of Planning and Budget [GOPB] 2000) or 9.9 percent over 1999.

Table 2-8. Population Growth in Appling and Toombs Counties, Georgia (1970-2010)

	Appling		Toombs	
Year	Population	Growth %	Population	Growth %
1970	12,726	--	19,151	--
1980	15,565	22.3	22,592	18
1990	15,744	1.2	24,072	6.6
1999 (estimated)	16,675	5.9	25,990	8
2010 (estimated)	18,318	9.9	28,934	11.3

Sources: GDCA 2000a; GDCA 2000b; USCB 2000; GOPB 2000.

Table 2-8 also contains data on Toombs and Appling counties population growth and projections. The 2010 population projection is 28,934 (GOPB 2000) or 11.3 percent over 1990 values. It was only during the 1970 to 1980 period that Appling County had a higher percentage population growth rate than Toombs County. One potential reason for the higher growth rate was the construction of HNP Units 1 and 2 during the decade of the seventies.

2.2.8.2 Public Services

- **Water Supply**

Table 2-9 provides a summary of water supply, use, and reserve capacity for public water supplies in Appling and Toombs counties. In Appling County, the municipalities of Baxley and Surrency are the only county areas served by public water supply systems. Baxley provides water service within the city and outside the city limits in certain areas through a distribution system that currently uses four wells screened to the Floridan Aquifer. The wells can produce approximately 11,800 m^3/d (3.1 million gpd). The estimated demand on

Table 2-9. Groundwater Supply and Use

County	Town	Capacity (mgd)	Use (mgd)	Reserve Capacity (mgd)
Appling	Baxley	3.1	0.6	2.5
	Surrency	0.3	Unknown	Unknown
Toombs	Lyons	4.3	0.7	3.6
	Santa Claus	Unknown	Unknown	Unknown
	Vidalia	4.9	2	2.9

Source: SNC 2000.

the wells is 2300 m^3/d (600,000 gpd). Considering the current demand, Baxley has approximately 9500 m^3/d (2.5 million gpd) of available capacity (SNC 2000). The Town of Surrency has two wells also pumping from the Floridan Aquifer. These wells are capable of producing 1100 m^3/d (290,000 gpd) (SNC 2000).

Toombs County has three municipal water systems—Vidalia, Lyons, and Santa Claus. All three municipalities withdraw their water from the Floridan Aquifer. Lyons has a capacity of 16,300 m^3/d (4.3 million gpd), with current demand of 2700 m^3/d (700,000 gpd). This leaves a reserve capacity of 14,000 m^3/d (3.6 million gpd). Vidalia has the capacity to pump 18,500 m^3/d (4.9 million gpd). Current demands require 7600 m^3/d (2.0 million gpd), leaving a reserve capacity of approximately 11,000 m^3/d (2.9 million gpd). Santa Claus is served by one well. Its current demand was not available (SNC 2000).

- **Education**

Appling County has four elementary schools, one middle school, and one high school. Total enrollment in all the schools was 3510 during the 1998-1999 school year. Appling County is considering building a new high school because of the condition of the high school's aging physical plant (SNC 2000).

Toombs County has two elementary schools, one middle school, and one high school. Total enrollment for the 1998-1999 school year was approximately 2660 (SNC 2000). The City of Vidalia has its own school system. It has primary, elementary, and middle schools, and one high school. Total enrollment in the Vidalia school system for the 1999-2000 school year for preschool through grade twelve is 2367 students.[(a)]

The Southeastern Technical Institute (STI) is located in Vidalia. The mission of the Institute "...is to contribute to the economic, educational, and community development of Montgomery, Tattnall, and Toombs counties by providing quality technical education, adult literacy education, continuing education, and customized business training" (STI 2000). Total enrollment for the 1999-2000 school year at the main and branch campuses in Vidalia and Toombs County averaged 864.[(b)]

Of the adult population (age 25 and over) in Toombs County in 1990, 31.7 percent had completed high school, which was greater than the Georgia State average of 29.6%. A total of 27.4 percent of the county's population had at least some college education compared with the State average of 41.3 percent. Between 1990 and 1994, Toombs County spent an

(a) Personal Communication, Lucy Calroni, Curriculum Director, June 2, 2000
(b) Personal Communication, Diana Lang (Registrar), STI, August 24, 2000

average of $3413 per pupil per year for public education, which was less than the statewide average of $4002 for the same period (GDCA 2000b).

In contrast, 34 percent of the adult population (age 25 and over) in Appling County had completed their high school education. A total of 23 percent of the county's population had at least some college-level education. Appling County spent an average of $4150 per pupil per year for the period 1990 through 1994, higher than Toombs County by 22 percent (GDCA 2000a). One reason for the higher expenditure is that HNP is located largely in Appling County. HNP is the largest contributor to the ad valorem property tax base of the county (see discussion in Section 2.2.8.6 of this report).

- **Transportation**

U.S. Highway 1 is the major north-south highway route bisecting Appling and Toombs counties. U.S. Highway 1 is a four-lane highway from Baxley past HNP where it enters Toombs County and becomes a two-lane road north of HNP to Interstate 16. Interstate 16 is the major east-west freeway serving the area. In 1998, the annual average daily traffic count for the highway south of the HNP site was 5314 vehicles and 4339 vehicles north of the site (SNC 2000). The State plans to widen the entire highway to four lanes, which would provide four-lane access from Baxley all the way to Interstate 16. The widening project is expected to be undertaken within 5 years (SNC 2000).

U.S. Highway 341 runs east-west, linking the municipalities and developed areas of Appling County. It and U.S. Highway 1 are part of the Governor of Georgia's Economic Development System established to provide access to smaller cities and to encourage economic development. U.S. Highway 280 and State Highway 292 are the major east-west highways in Toombs County.

2.2.8.3 Offsite Land Use

- **Appling County**

Land-use projections for the county show that new commercial and industrial developments are expected to concentrate in Baxley and along the U.S. Highway 341 corridor, which parallels the Norfolk Southern rail line. New residential development is being encouraged near the cities of the county, particularly Baxley. The rest of the county is expected to remain in agricultural and forest use. Appling County does not have specific regulations concerning zoning, subdivisions, or land-use controls to implement or control development (SNC 2000).

The Appling County Joint Planning Board has prepared a comprehensive plan to guide county development and growth. The county has an industrial park of approximately 30 ha (77 acres) with water, natural gas, and sewer available. Sites are available in the industrial park adjacent to the Norfolk Southern rail line. Fiber-optic lines and industrial buildings are also available.

The county's property tax rate is among the lowest 10 percent in Georgia (due in part to the presence of HNP in the county). Appling County has put together a package of incentives to assist industry in locating to the County, including, but not limited to, tax incentives, reduced interest loans, relocation assistance for equipment and facilities, and one-stop county permitting (Appling County Development Authority, Not Dated).

The county also can avail itself of Georgia State incentive programs, including job tax credits, a $2 million revolving loan fund for wastewater treatment and pretreatment facilities, and education tax credits, among other incentives (Appling County Development Authority, Not Dated)

- **Toombs County**

Toombs County has an agricultural and industrial base. The most well-known agricultural crop in the county is the Vidalia sweet onion. Other crops contributing to the agricultural base include row crops, livestock, dairy products, poultry, eggs, and timber. The industrial base includes manufacturing facilities that in the past have focused on the textile industry. This is now changing, with more economic diversification taking place in the areas of retail trade, medical services, and non-textile manufacturing.

Toombs County has made an assertive effort to promote economic development. The county is the regional retail, wholesale, transportation, and distribution center for a population base of 126,000 in a 10-county area. Vidalia is the regional shopping center for a 48-km (35-mi) radius.[(a)]

The Toombs County Development Authority (TCDA) and the Toombs County Chamber of Commerce promote economic development through programs that focus on expansion and leveraging of the existing industrial base. The TCDA has a new industrial park available in Lyons of 110 ha (260 acres) near U.S. Highway 1. The Toombs Corporate Center has a 5600-m^2 (60,000-ft^2) speculative building expandable to 6500 m^2 (70,000 ft^2). The Center is

(a) Personal Communication. May 11, 2000. John Ladson, Chairman Toombs County Economic Development.

located on 80-plus ha (200-plus acres), most of which are developed. The county does not have growth-control measures that limit housing development (SNC 2000).

2.2.8.4 Visual Aesthetics and Noise

Access to the site is provided by U.S. Highway 1, which runs north-south by the plant site. The buildings on the site are largely screened from public view by the woods that surround the plant. Travelers on U.S. Highway 1 from the north, heading south, can see the steam rising from the cooling towers from several miles north of the plant site and entrance.

Because of the woods, topography, and lack of any close neighbors, noise from HNP is generally not an issue. The only sounds that may be heard offsite are the plant loudspeakers and gun firing range.

2.2.8.5 Demography

Resident and transient populations are described in the following sections.

- **Resident Population Within 16 km (10 mi)**

  Table 2-10 shows the estimated population distribution between zero and 16 km (10 mi) of the HNP site in the 16 sectors centered on the points of the compass. Of note is the fact that there is zero population within 1.6 km (1 mi) of the site. In several sectors, there is zero or little population living within the sectors up to approximately 6.5 km (4 mi) to 8 km (5 mi) from the plant.

  Table 2-11 shows the estimated population within a 16-km (10-mi) radius of the HNP site in 2030. Of note is the fact that, just as in 1990, there is little expected increase in population (in absolute, not percentage, terms) within the first 8 km (5 mi) of the site. Again of note is the fact that there is zero population within 1.6 km (1 mi) of the site. And, as before with the 1990 population data (Table 2-10), the same sectors have zero or little population living within them up to approximately 6.5 km (4 mi) to 8 km (5 mi) from the plant.

- **Resident Population Within 80 km (50 mi)**

  The population projection for the 80-km (50-mi) radius surrounding HNP in 1970 was 211,145 and was projected to increase to 245,335 by 2012 (NRC 1978). Total population within the 80 km (50-mi) radius increased 1.9 percent between 1970 and 1975.

Table 2-10. Estimated Population Distribution in 1990 Within a 16-km (10-mi) Radius of HNP

Sector	0 - 1 Miles	1 - 2 Miles	2 - 3 Miles	3 - 4 Miles	4 - 5 Miles	5 - 10 Miles	10-Mile Total
N	0	10	26	0	81	378	495
NNE	0	1	0	0	6	280	287
NE	0	0	0	15	27	259	301
ENE	0	0	0	0	3	108	111
E	0	0	0	0	22	23	45
ESE	0	0	34	0	0	229	263
SE	0	0	19	12	45	275	351
SSE	0	0	38	24	122	428	612
S	0	21	137	53	46	1900	2157
SSW	0	27	82	62	32	313	516
SW	0	55	23	15	9	218	320
WSW	0	0	32	0	14	372	418
W	0	72	0	128	0	103	303
WNW	0	0	0	38	0	324	362
NW	0	0	0	8	21	384	413
NNW	0	2	95	70	40	343	550
Total	0	188	486	425	468	5937	7504

Source: SNC 2000.

Table 2-11. Estimated Population Distribution in 2030 Within a 16-km (10-mi) Radius of HNP

Sector	0 - 1 Miles	1 - 2 Miles	2 - 3 Miles	3 - 4 Miles	4 - 5 Miles	5 - 10 Miles	10-Mile Total
N	**0**	**14**	**38**	**0**	**116**	**540**	**708**
NNE	0	1	0	0	10	400	411
NE	0	0	0	23	39	370	432
ENE	0	0	0	0	3	155	158
E	0	0	0	0	30	30	60
ESE	0	0	46	0	0	306	352
SE	0	0	27	16	61	368	472
SSE	0	0	50	32	163	573	818
S	0	29	185	70	62	2545	2891
SSW	0	35	109	83	44	420	691
SW	0	74	31	19	13	312	449
WSW	0	0	44	0	20	542	606
W	0	97	0	180	0	150	427
WNW	0	0	0	51	0	445	496
NW	0	0	0	12	29	534	575
NNW	0	2	136	100	57	490	785
Total	0	252	666	586	647	8180	10,331

Source: SNC 2000.

The actual increase has been somewhat greater than that projected in 1978. The 1990 resident population distributed between zero and a 80-km (50-mi) radius of HNP is shown by Table 2-12. By 1990, the total population living within a 80-km (50-mi) radius of HNP had increased to over 336,600—an increase of more than 125,500 (or 60 percent) over 1970 (SNC 2000). Populations for the sectors were calculated using population values at the census block level, the smallest enumeration used by the USCB. The 80-km (50-mi) radius from HNP contained 78 census blocks. The census blocks were included in the analysis if 50 percent of their area lay within the 80-km (50-mi) radius. Census blocks with less than 50 percent of their area within the 80-km (50-mi) radius were excluded from the analysis (SNC 2000).

Table 2-12. Estimated Population Distribution in 1990 Within a 80-km (50-mi) Radius of HNP

Sector	0 - 10 Miles	10 -20 Miles	20 - 30 Miles	30 - 40 Miles	40 - 50 Miles	50-Mile Total
N	495	10,706	4375	1239	11,652	28,525
NNE	287	1007	1932	6657	5207	15,090
E	301	3812	2833	2505	29,497	38,948
ENE	111	3008	4120	3916	5369	16,524
E	45	748	6868	1348	38,160	47,169
ESE	263	448	1278	3538	8931	14,458
SE	351	275	2002	15,477	881	18,986
SSE	612	922	1221	3880	2446	9081
S	2157	6646	1693	1983	32,090	44,569
SSW	516	1210	6203	2758	2193	12,880
SW	320	1457	1113	5178	18,479	26,547
WSW	418	7510	1041	2262	2407	13,638
W	303	2156	1654	1407	2682	8202
WNW	362	585	2308	6376	2721	12,352
NW	413	1335	4589	985	4347	11,669
NNW	550	4351	3802	5250	4040	17,993
Total	7504	46,176	47,032	64,817	171,102	336,631

Source: SNC 2000.

The projected population for 2030 within the 80-km (50-mi) radius is 498,834, or an increase of 48 percent over the 40-year period (SNC 2000). The distribution of the population is shown in Table 2-13. Total population by age distribution for 1990 (as of July 1, 1990) is shown in Table 2-14 for Appling and Toombs counties and the State of Georgia.

- **Transient Population**

Data on the transient population in the vicinity of HNP and Appling and Toombs counties were generally not available in the SNC ER application. The onsite workforce increases by as many as 800 temporary (1 to 2 months) duty employees during refueling outages. HNP

Table 2-13. Estimated Population Distribution in 2030 Within a 80 km (50 mi) Radius of HNP

Sector	0 - 10 Miles	10 - 20 Miles	20 - 30 Miles	30 - 40 Miles	40 - 50 Miles	50-Mile Total
N	708	15,316	5979	1566	15,056	38,625
NNE	411	1439	2575	7994	7051	19,470
NE	432	5199	3784	3409	51,355	64,179
ENE	158	3997	5356	5603	10,224	25,338
E	60	1051	8894	2100	77,421	89,466
ESE	352	949	1657	4272	11,779	18,657
SE	472	840	2740	21,220	1215	26,015
SSE	818	2053	1619	5407	3601	12,680
S	2891	11,745	1923	2541	45,212	61,421
SSW	691	2186	7126	3286	2800	15,497
SW	449	2537	1666	8278	28,568	41,049
WSW	606	11,559	1510	3476	3366	19,911
W	427	3392	2292	1948	3462	11,094
WNW	496	1241	2985	8320	3088	15,634
NW	575	2327	5818	1400	6530	16,075
NNW	785	6691	4985	6450	5597	23,723
Total	10,331	63,999	60,909	82,270	276,325	498,834

Source: SNC 2000.

Table 2-14. July 1, 1990 Population Estimates for Appling and Toombs Counties and the State of Georgia by Age Group

	Appling County	Toombs County	Georgia
Total Population	15,761	24,116	6,506,377
0 - 4	1100	1954	509,661
5 - 17	3519	5222	1,236,115
18 - 24	1552	2249	741,018
25 - 44	4715	7258	2,198,561
45 - 64	2970	4431	1,166,470
65+	1905	3002	654,552

Source: USCB 1999.

units are on an 18-month refueling interval, and SNC generally schedules outages on staggered schedules, resulting in one outage per year for 2 years and two outages in the third year (cycle repeats). The 800 temporary employees include contractors, employees from other SNC nuclear facilities, and corporate support staff.

Agriculture makes up a predominant part of the economy of Appling and Toombs counties. Row crops are predominant in both counties and the Vidalia sweet onion (a major crop in Toombs County) is known nationwide. In addition, there is some transient population related to the weekly and seasonal use of recreational facilities near and on the HNP site.

2.2.8.6 Economy

Between 1990 and 1997, Appling County marginally improved its position relative to State per capita income figures, while Toombs County's position worsened. These differences partly reflect the economic boom in Atlanta, and other places in northern and coastal Georgia, while the south-central Georgia region continues to be economically disadvantaged.

Toombs County had a number of manufacturing firms (mostly textile firms) leave the county during the 1990s. The per capita income gap between the two counties narrowed from 15 percent in 1990 to 6 percent in 1997. Replacement industry coming into Toombs County has kept employment in the county growing slowly, despite the loss of the textile firms.

The top three industrial sectors in Appling County in 1998 were manufacturing, transportation, and public utilities and services. SNC is the fifth largest employer (Georgia Department of Labor [GDL] 1998a) and is a high-wage employer for this area. The top three industrial sectors in Toombs County in 1998 were manufacturing, services, and retail trade (GDL 1998b).

In 1990, there were 6470 employed residents of Appling County, of which 78 percent or 5059 residents, were employed within the county (GDL 1998a). In 1998, the unemployment rate in Appling County was 10 percent compared to the State of Georgia at 4 percent (GDL 1998a). In 1990, there were 9843 employed residents in Toombs County, of which 77 percent worked within the county. Approximately 9 percent of the residents work in Appling County, and many of these are probably employed at the HNP (GDL 1998b). In 1998, the unemployment rate in Toombs County was 9 percent.

Per capita income in Appling County was $16,998 in 1997. In 1990, the county's per capita income was $11,702. Georgia's per capita income in 1990 was $17,123 or 46 percent higher. In 1996, while Appling's per capita income was $16,318, Georgia's per capita income was $23,028 or 41 percent higher. While the gap between Appling's per capita income level and the State's is closing, it is still substantial (GDL 1998a; Georgia Department of Audits [GDA] 1999).

Per capita income in Toombs County was $17,950 in 1997, or 6 percent higher than Appling County. Part of the reason for the higher per capita income of Toombs County is the fact that many of the highly paid executives and operators employed by HNP reside in Vidalia in Toombs County. In 1990, the County's per capita income was $13,477. This is 15 percent higher than Appling County. The State of Georgia per capita income was 27 percent higher (GDL1998a; GDA 1999).

HNP is a major contributor to the taxes collected by Appling County. Table 2-15 presents the taxes paid to Appling County by HNP between 1994 and 1998. The "Appling County Digest" is the total property tax revenue that the county collects. The payments attributed to HNP come from three entities: Georgia Power, Oglethorpe Power, and the City of Dalton. During 1994, the total HNP tax payment represented $7,430,139 or 74 percent of the payments to the Digest. By 1998, the payments had increased to $8,484,489, or an increase of 14 percent when compared to 1994. HNP contributed 68 percent of the tax funds collected by the Digest in 1998, or a decline of 6 percent when compared to 1994 (SNC 2000). The reason for the decline is the depreciation of the HNP's physical plant and the fact that other businesses have contributed more to the assessed property rolls of Appling County.

Table 2-15. HNP Tax Payments to Appling County (in millions of dollars)

	1994	1995	1996	1997	1998
Appling County Digest	$10.0	$10.1	$11.5	$11.6	$12.4
Georgia Power	$4.2	$4.1	$4.5	$4.5	$4.6
Oglethorpe Power	$3.0	$3.0	$3.5	$3.5	$3.7
City of Dalton	$0.2	$0.2	$0.2	$0.1	$0.2
Total HNP Tax Payment	$7.4	$7.3	$8.2	$8.1	$8.5
HNP Percent of County Digest	74 percent	73 percent	71 percent	70 percent	68 percent

Source: SNC 2000.

2.2.9 Historic and Archaeological Resources

This section discusses the cultural background and the known historic and archaeological resources at the HNP site and in the surrounding area.

2.2.9.1 Cultural Background

The region around the HNP site is rich in prehistoric and historic Native American and historic Euroamerican resources. This part of southeastern Georgia has an archaeological sequence that extends back about 12,000 years, although human use of the central Altamaha River drainage basin seems to have been limited throughout much of this sequence. Similar to much of the surrounding southeastern states, archaeological eras defined for this part of Georgia fall into several sequential cultural periods of Native American occupation: the Paleo-Indian era (about 10,000 B.C. to 7800 B.C.); the Archaic era (7800 B.C to 500 B.C.); the Woodland era (500 B.C. to A.D. 1000); the Mississippian era (A.D. 1000 to A.D. 1541); and the Historic era, initiated by the initial intrusion of Spanish explorers into the area (A.D. 1541 to A.D. 1850). The prehistoric eras were marked by initial reliance on big game hunting subsistence, followed by increased use of smaller game animals and plant foods in the Archaic era. Beginning late in the Woodland era, and increasing in importance in the following Mississippian era, were trends toward more sedentary villages, with more reliance on cultivated crops.

Occupation of the immediate vicinity of the HNP area seems to have been continuous in prehistoric times, although somewhat limited. According to Gresham (1996), nearly all prehistoric sites recorded in Toombs and Appling counties occur within or adjacent to the Altamaha River floodplain, with a near void of prehistoric sites away from the river. Barron (1981) discusses several Native American mound sites and cemeteries occurring a few miles downriver from HNP in Appling County.

At the time of contact by Euroamerican explorers, the Native American populations in the vicinity of the project area were generally attributed to groups of the larger Creek Indian Confederacy, although specific information for the central Altamaha River is scant. Swanton (1922) generally notes the presence of two Creek groups, the Hitchiti and the Tamati, near the confluence of the Ocmulgee and Oconee Rivers that combine to form the Altamaha River. However, the major concentrations of Creeks were upriver on the Ocmulgee and Oconee, and downriver near the coast.

Through a series of land cessions by the Creeks to the U.S. Government between 1790 and 1827, Creek occupation of Georgia ended with their removal to Indian Territory, where the Creeks exist today as the Muskogee Nation (Debo 1941; Green 1982). Appling County was formed after a Creek cession in 1818 (Barron 1981). Teasley (1940) has identified three periods in the history of Toombs County that apply to Appling County as well. These include an initial farming and stock-raising period from the late 1700s to about 1880; the timber and turpentine period of 1880 to about 1910; and finally an agricultural period from 1910 to the present.

The Altamaha River that runs through HNP has figured prominently in the history of the area (Barron 1981). During the early history of Georgia, the river was used to float oak masts to Darien for the ships of the English Navy. Subsequently, the river was used to transport cotton and lumber to the coast, by pole boats, rafts, and steamboats. Crossings played an important historical role as well, including several ferries. Adjacent to HNP, U.S. Highway 1 was preceded by a short-lived wooden road across the swamp in 1924, followed by the first bridge and concrete highway in 1927. The present Altamaha River Bridge was built in 1948 when the highway was enlarged (Gresham 1996).

2.2.9.2 Historic and Archaeological Resources at HNP

Historic and archaeological site file searches were conducted at the Georgia Historic Preservation Division, University of Georgia State Archaeological Site Files, the National Park Service's National Register Information System, and National Archaeological Database. In addition, sources at the University of Hargrett Rare Book and Manuscript Library, the Map Library at the University of Georgia Science Library, the Vidalia Public Library, and Appling County Heritage Center holdings were examined for literature and/or maps that would indicate the potential for historical and archaeological sites at HNP.

No historical or archaeological sites have been recorded on the HNP site, although no cultural resource inventories have been completed for any of the plant site acreage. Three

archaeological surveys conducted within a mile of the HNP site indicate the potential existence of archaeological and historical sites in unsurveyed areas. In a larger area survey of the lower Ocmulgee River drainage, Snow (1977) recorded four archaeological sites about 0.8 km (0.5 mi) west of the HNP boundary in the Altamaha River Park. In a more recent survey of the same area, Wood (1984) relocated two of Snow's sites and discovered another three in the same vicinity. Wood evaluated two of these archaeological sites as being potentially eligible for listing on the National Register of Historic Places. The archaeological sites recorded by these two surveys reflected a Native American presence in this area that extends back some 4000 years, from the Late Archaic to the Mississippian eras. One of the sites yielded early historic era artifacts dating to the middle 1800s.

The third cultural resource survey was conducted for widening of U.S. Highway 1; it included a stretch of the highway along the western plant site boundary starting northward from the road entering the plant site from the highway (Gresham 1996). No historical or archaeological sites were noted along the small segment south of the Altamaha River. North of the river, 11 historical sites were recorded, including 2 cemeteries and 9 19th-20th century houses.

The closest historical sites to HNP formally listed on the National Register of Historic Places include four in Appling County, all within the town of Baxley, and eight in Toombs County, two in the town of Lyons and the rest in Vidalia. A nomination for the Moody Farm Complex, located about 6.4 km (4 mi) southeast of the plant site is also on file at the Georgia Historic Preservation Division.

Only one unrecorded historical site is known to exist on the HNP site. This is the Bell Cemetery that is indicated on the U.S. Geological Survey Baxley NE quadrangle map. The cemetery is presently located within the HNP family recreation area, and is fenced and maintained by plant site personnel.

Reviews of historic maps and early aerial photographs and highway maps for the area did not indicate a potential for homesteads, at least during the 19th century. Although most early maps show primary transportation routes following the north bank of the Altamaha River (Georgia Department of Transportation, no date), two maps did indicate the presence of historic trails that extended along the south bank, and presumably through or very close to HNP property. These include Bernard's Path, which paralleled the south bank of the river eastward from Fort James (ca. 1793-1820) (Georgia Department of Archives and History, no date), and a road shown on an 1878 hand drawn map on file at the Appling County Heritage Center that is labeled as the "public road from Macon to Darien."

2.2.10 Related Federal Project Activities

The staff reviewed the possibility that activities of other Federal agencies might impact the renewal of the operating license for HNP. Any such activities could result in cumulative environmental impacts and the possible need for the Federal agency to become a cooperating agency for preparation of the SEIS.

The staff determined that there were no Federal project activities directly related to renewal of the operating license for HNP that could result in cumulative environmental impacts or that would make it desirable for another Federal agency to become a cooperating agency for preparation of the SEIS. No Federal agencies participated in the scoping meetings or submitted written comments during the comment period following the scoping meetings.

2.3 References

10 CFR Part 20, "Standards for Protection Against Radiation."

10 CFR 20.1301(d), "Dose limits for individual members of the public."

10 CFR Part 20, Appendix B, Table 2, "Annual limits on intake (ALIs) and derived air concentrations (DACs) of radionuclides for occupational exposure; effluent concentrations; concentrations for release to sewerage."

10 CFR Part 50, Appendix I, "Numerical guides for design objectives and limiting conditions for operation to meet the criterion 'as low as is reasonably achievable' for radioactive material in light-water-cooled nuclear power reactor effluents."

10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste."

10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

40 CFR 81.311, "Section 111 Attainment Status Designations: Georgia."

40 CFR 81.408. "Identification of Mandatory Class 1 Federal Areas Where Visibility is an Important Value: Georgia."

40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations."

49 CFR Parts 171 through 177, "Transportation."

52 FR 25376-2580, "Determination of Threatened Status for Gopher Tortoise (Gopherus Polyphemus)." July 7, 1987.

63 FR 53473-53478, "Southern Nuclear Operating Company, Inc., Edwin I. Hatch Nuclear Plant, Units 1 and 2; Environmental Assessment and Finding of No Significant Impact." October 5, 1998.

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