Appendix D

Applicant's Environmental Report – Operating License Renewal Stage Edwin I. Hatch Nuclear Plant

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

ACRONYMS

AEC	Atomic Energy Commission
BTU	British Thermal Unit
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EPD	Environmental Protection Division
FES	Final Environmental Statement
GADNR	Georgia Department of Natural Resources
GEIS	Generic Environmental Impact Statement
GPC	Georgia Power Company
HNP	Edwin I. Hatch Nuclear Plant
IPE	Independent Plant Examination
kV	kilovolt
MW	Megawatt
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
SAMA	Severe Accident Mitigation Alternative
SMITTR	Surveillance, On-line Monitoring, Inspections, Testing, Trending, and Recordkeeping
SNC	Southern Nuclear Operating Company

1.0 INTRODUCTION

1.1 PURPOSE OF AND NEED FOR ACTION

The U.S. Nuclear Regulatory Commission (NRC) licenses the operation of domestic nuclear power plants in accordance with the Atomic Energy Act and implementing NRC regulations. Southern Nuclear Operating Company (SNC) operates the Edwin I. Hatch Nuclear Plant (HNP) Units 1 and 2 pursuant to NRC Operating Licenses DPR-57 and NPF-5, respectively. HNP Unit 1 began commercial operation December 31, 1975, and is licensed to operate through August 6, 2014. HNP Unit 2 began commercial operation September 5, 1979, and is licensed to operate through June 13, 2018. SNC has prepared this environmental report in connection with its application to NRC, as provided for by NRC regulation, to renew the HNP licenses.

The purpose and need for the proposed action, HNP license renewal, as stated by NRC is as follows:

> The purpose and need for the proposed action (renewal of an operating license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by State, utility, and, where authorized, Federal (other than NRC) decision makers. (Volume 61 Number 251 Federal Register [FR] pages 28467 - 28496, at page 28472)

The renewed operating licenses would allow for 20 additional years of plant operation beyond the current HNP licensed operation period of 40 years.

1.2 ENVIRONMENTAL REPORT SCOPE AND METHODOLOGY

The NRC regulations, at 10 CFR 51.53(c)[1], require that an applicant for renewal of a license to operate a nuclear power plant submit with its application a separate document entitled "Applicant's Environmental Report - Operating License Renewal Stage." In determining the information to include in the HNP Environmental Report, SNC has relied on the regulatory language and the following supporting documents that provide insight into the regulatory requirements:

- NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," May 1996
- NUREG-1440, "Regulatory Analysis for Amendments to Regulations for the Environmental Review for Renewal of Nuclear Power Plant Operating Licenses," May 1996
- NUREG-1529, "Public Comments on the Proposed 10 CFR Part 51 Rule for Renewal of Nuclear Power Plant Operating Licenses and Supporting Documents: Review of Concerns and NRC Staff Response," May 1996
- DG-4005, "Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses," Draft, July 1998

It is SNC's understanding that NRC will use this environmental report as input in preparing a supplemental environmental impact statement (EIS) for HNP license renewal. SNC has

1. Title 10, Code of Federal Regulations, Part 51, Section 51.53(c).

organized this environmental report to reflect NRC EIS format guidance.[2] Therefore, the environmental report format should facilitate NRC review and EIS preparation. Table 1-1 indicates where the environmental report responds to each requirement of 10 CFR 51.53(c). In turn, each responsive section is prefaced by a boxed quote of the regulatory language and applicable supporting document language.

1.3 HATCH NUCLEAR PLANT LICENSEE AND OWNERSHIP

The HNP is co-owned by Georgia Power Company (GPC), Oglethorpe Power Corporation, the Municipal Electric Authority of Georgia, and the city of Dalton, Georgia. GPC built HNP and had sole responsibility for the operation of the plant through March 21, 1997. Pursuant to an application dated September 18, 1992, the NRC issued an operating license amendment on March 17, 1997, effective March 22, 1997, designating SNC as the exclusive operating licensee of HNP. As the sole operating licensee, SNC is responsible for the planning, design, licensing, operation, maintenance, repair, modification, license renewal, and retirement and decommissioning of HNP pursuant to a Nuclear Operating Agreement between SNC and GPC (Reference 1). Southern Company, based in Atlanta, Georgia, is the parent company of five electric utilities (Alabama Power, Georgia Power, Gulf Power, Mississippi Power, and Savannah Electric) as well as Southern Nuclear Operating Company (SNC), which provides services to Southern Company's nuclear power plants.

2. 10 CFR 51, Subpart A, Attachment A, as adopted by reference at 10 CFR 51.70(b).

Table 1-1. Environmental report responses to license renewal environmental regulatory requirements.

Regulatory requirement	Responsive environmental report section		Support sections
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)	2.1	Proposed Action	
10 CFR 51.53(c)(2)	2.1.7	Modifications	
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(3)	3.2	Alternatives	2.2
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)	1.1	Purpose of and Need for Action	
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(2)	3.3.1	Unavoidable Adverse Impacts	3.1
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(4)	3.4	Short-Term Use Versus Long-Term Productivity	3.1
10 CFR 51.53(c)(2) and 10 CFR 51.45(b)(5)	3.3.2	Irreversible or Irretrievable Resource Commitments	3.3.1
10 CFR 51.53(c)(3)(ii)(A)	3.1.2	Water Use	2.1.4, Attachment B
10 CFR 51.53(c)(3)(ii)(C)	3.1.3	Groundwater Use	2.1.5
10 CFR 51.53(c)(3)(ii)(E)	3.1.4	Terrestrial Resources	2.1.7
10 CFR 51.53(c)(3)(ii)(E)	3.1.5	Threatened and Endangered Species	2.1.7, Attachment C
10 CFR 51.53(c)(3)(ii)(F)	3.1.6	Air Quality	2.1.7
10 CFR 51.53(c)(3)(ii)(G)	3.1.7	Microbial Organisms	2.1.3, Attachment E
10 CFR 51.53(c)(3)(ii)(H)	3.1.8	Electric Shock	2.1.6
10 CFR 51.53(c)(3)(ii)(I)	3.1.9	Housing Impacts	2.1.7, 2.1.8
10 CFR 51.53(c)(3)(ii)(I)	3.1.10	Public Services, Public Utilities	2.1.7, 2.1.8, 3.1.3
10 CFR 51.53(c)(3)(ii)(I)	3.1.11	Public Services, Education	2.1.7, 2.1.8
10 CFR 51.53(c)(3)(ii)(I)	3.1.12	Offsite Land Use, Refurbishment	2.1.7, 2.1.8
10 CFR 51.53(c)(3)(ii)(I)	3.1.13	Offsite Land Use, License Renewal Term	2.1.8
10 CFR 51.53(c)(3)(ii)(J)	3.1.14	Public Services, Transportation	2.1.7, 2.1.8
10 CFR 51.53(c)(3)(ii)(K)	3.1.15	Historic and Archaeological Resources	2.1.7, Attachment D
10 CFR 51.53(c)(3)(ii)(L)	3.1.16	Severe Accident Mitigation Alternatives	Attachment F
10 CFR 51.53(c)(3)(iv)	3.1.17	New and Significant Information	
10 CFR 51.53(c)(2) and 10 CFR 51.45(d)	Chapter 4	Compliance Status	Attachments C and D

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The proposed action is the renewal of existing NRC operating licenses for Edwin I. Hatch Nuclear Plant Units 1 and 2, which are operated in accordance with NRC operating licenses NPF-5 and DPR-57, respectively. HNP Unit 1 began commercial operation December 31, 1975, and is licensed to operate through August 6, 2014. HNP Unit 2 began commercial operation September 5, 1979, and is licensed to operate through June 13, 2018. NRC regulations (10 CFR Part 54) allow license renewal for periods of up to 20 years, which would extend the operation of Unit 1 through August 6, 2034 and extend the operation of Unit 2 through June 13, 2038.

2.1.1 General Plant Information

The Edwin I. Hatch Nuclear Plant (HNP) is a steam-electric generating facility operated by Southern Nuclear Operating Company (SNC). The Plant is located in Appling County, Georgia, southeast of where U.S. Highway 1 crosses the Altamaha River. It is approximately 11 miles north of Baxley, Georgia; 98 miles southeast of Macon, Georgia; 73 miles northwest of Brunswick, Georgia; and 67 miles southwest of Savannah, Georgia. The Universal Transverse Mercator coordinates of the Unit 2 reactor (to the nearest 100 meters) are Zone 17R LF 3,533,700 meters North and 372,900 meters East. These coordinates correspond to latitude 31 degrees, 56 minutes, and 4 seconds North and longitude 82 degrees, 20 minutes, and 39 seconds West. Figures 2-1 and 2-2 illustrate the HNP location.

The HNP is a two-unit plant. Each unit is equipped with a General Electric Nuclear Steam Supply System that utilizes a boiling-water reactor with a Mark I containment design. Both units were originally rated at 2,436 megawatts-thermal and designed for a power level corresponding to approximately 2,537 megawatts-thermal. Both units are now licensed for 2,763 megawatts-thermal (63 FR 53473-53478, October 5, 1998). The Plant uses a closed-loop system for main condenser cooling that withdraws from and discharges to the Altamaha River via shoreline intake and offshore discharge structures. Descriptions of HNP can be found in documentation submitted to U.S. Nuclear Regulatory Commission (NRC) for the original operating license and subsequent license amendments. Georgia Power Company (GPC) submitted environmental reports for the construction stage and operating license stage for HNP in 1971 and 1976, respectively (References 2 and 3). In 1972, the Atomic Energy Commission (AEC)[3] issued a Final Environmental Statement (FES) for Units 1 and 2 (Reference 4), and in 1978 issued a FES for Unit 2 (Reference 5). The FESs evaluate the environmental impacts from plant construction and operation in accordance with the National Environmental Policy Act (NEPA).

The property at the HNP site totals approximately 2,240 acres and is characterized by low, rolling sandy hills that are predominantly forested. A property plan is shown in Figure 2-3. Figure 2-4 provides a more detailed site plan. The property includes approximately 900 acres north of the Altamaha River in Toombs County and approximately 1,340 acres south of the River in Appling County. 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 300 acres (Figure 2-4). Approximately 1,600 acres are managed for timber production and wildlife habitat.

Controlled areas available for use with prior permission include a wildlife habitat area and a Boy Scout Camp. The wildlife habitat area is 75 acres of wetlands east of the restricted area. Efforts have been made in the past to interest ecological groups in conducting research in this wetland area. The 100-acre tract of land west of U.S. Highway 1 (Figure 2-3) is used as a Boy Scout

3. Predecessor agency to NRC.

Camp. A lease between GPC and 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 Visitors Center (Figure 2-3). The wayside park, east of Highway 1 and south of the River, provides simple recreational facilities overlooking the Altamaha River for public use. The area has parking and picnicking facilities, and can accommodate up to 10 groups at a time. The GPC Recreation Area is accessed by County Road 451, off U.S. Highway 1, south of the Plant entrance. This 13-acre facility includes softball fields, tennis courts, an archery range, swimming pool, and an office building which includes a multipurpose activities room. The facility is available to employees, their families, and guests. The Visitors Center is accessed 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 an auditorium that seats approximately 70 people and conference rooms. The typical number of visitors is approximately 50 daily and 12,000 annually.

2.1.2 Nuclear Fuel and Radioactive Waste

The two HNP reactors are boiling water reactors operated at a maximum core thermal power output level of 2763 megawatts - thermal. HNP fuel is slightly enriched (currently 3.8, with an anticipated increase to 4.2, percent by weight) uranium dioxide in the form of high-density ceramic pellets stacked in zirconium alloy fuel rods. Each fuel rod consists of high-density 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. Fuel assemblies at HNP are either 8 by 8 (62 fuel rods and 2 water rods), 9 by 9 (79 fuel rods and 2 water rods), or 10 by 10 (92 fuel rods and 2 water rods) arrays. Different U-235 enrichments are used within each fuel assembly to reduce the local power peaking factor. SNC currently operates HNP at an equilibrium core average fuel discharge burnup rate of 42,100 megawatt-days per metric ton uranium (MWd/MTU), with a future goal of 45,000 MWd/MTU. HNP operates on a 18-month refueling cycle and currently stores all its spent nuclear fuel onsite in a spent fuel pool.

In 1994, a spent fuel storage expansion plan was prepared by Plant Hatch. The plan called for spent fuel pool re-work and the installation of an interim on-site storage facility in late 1999. The Plan recommended a dry storage system as the most desirable approach, using the DOE Multipurpose Canister (MPC) or an improved, NRC-certified dry storage container (cask) provided by an approved vendor. The dry storage area and pad, completed in 1999, have space for 48 dry cask storage systems.

HNP currently makes the following shipments of radioactive materials offsite by truck:

- HNP to high-level waste examination sites;
- HNP to a low-level waste disposal site (Barnwell, South Carolina);
- HNP to an offsite processing facility for segregation, recycling, compaction, incineration and disposal;
- Offsite processing facility to HNP for reuse or storage.

HNP also temporarily stores mixed waste onsite, consistent with NRC and U.S. Environmental Protection Agency (EPA) requirements. All HNP radioactive waste shipments are packaged in accordance with NRC and U.S. Department of Transportation requirements and regulations.

2.1.3 Heat Dissipation System

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 utilizes three cross-flow and one counter-flow mechanical-draft cooling towers for dissipating waste heat to the atmosphere.

Cooling tower makeup water for Units 1 and 2 is withdrawn from the Altamaha River through a single intake structure. The intake structure is located along the shoreline of the Altamaha River (Figure 2-3) and is positioned so that water is available to the plant at both minimum flow and probable flood conditions. The intake is approximately 150 feet long, 60 feet wide, and the roof is approximately 60 feet above normal river level. To account for varying river stages, the water passage entrances are from 16 feet below to 33 feet above normal water levels.

Water is returned to the Altamaha River via a submerged discharge structure that consists of two 42-inch lines extending approximately 120 feet out from the shore at an elevation of 54 feet mean sea level. The point of discharge is approximately 1,260 feet down-river from the intake structure and approximately 4 feet below the surface when the river is at its lowest level (Figure 2-3).

The National Pollutant Discharge Elimination System (NPDES) Permit for HNP (GA0004120) issued by the Environmental Protection Division (EPD) of the Georgia Department of Natural Resources (GA DNR) in 1997 requires weekly monitoring of discharge temperatures, but 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 on a quarterly basis, range from 62°F in winter to 94°F in summer (see Table 2-1).

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 discharge limits specified in the NPDES permit (GA0004120).

2.1.4 Surface Water Use

The Altamaha River is the major source of water for the plant. Water is withdrawn from the River to provide cooling for certain once-through loads and makeup water to the cooling towers. SNC is permitted (GADNR Permit 001-0690-01) to withdraw a monthly average of up to 72 million gallons per day with a maximum 24-hour rate of up to 103.6 million gallons. As a condition of this permit, SNC is required to monitor and report withdrawals. Table 2-2 provides the annual average daily withdrawal and the maximum daily withdrawal for the years 1989 through 1997. As shown in Table 2-2, HNP withdraws an annual average of 57.18 million gallons per day.

The evaluation of surface water use in the 1978 FES (Reference 5) 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 (Volume 63 Number 192 FR pages 53473-53478, at page 53474), NRC concluded that the necessary increase in makeup water to support the higher heat load would be insignificant and that cooling tower blowdown would decrease by approximately 626 gallons per minute. 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 (Reference 7).

2.1.5 Groundwater Use

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 1.1 million gallons per day or 764 gallons per minute with an annual average of 0.550 million gallons per day from 4 wells. Although the current permit indicates 4 onsite wells, there are actually only 3 wells providing groundwater for domestic and process use. The fourth well was intended to provide makeup water for a wildlife habitat pond that was not completed; and 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 Number 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 indicates the locations of the three production wells.

GADNR requires SNC to monitor and report withdrawal from these three wells. Table 2-3 lists the monthly withdrawal volumes and annual average pumping rates (in gallons per minute) from these wells for the period from 1990 to 1997. The two-unit operation requirements for this period averaged 126 gallons per minute with a high month (January 1992) average of 236 gallons per minute.

2.1.6 Transmission Facilities

GPC built four transmission lines for the specific purpose of connecting HNP to the transmission system. Two additional 500-kV lines were added to HNP in 1981 to support an expansion of the GPC transmission system to Florida. The additional two lines have been evaluated as part of this environmental report.

The list below identifies the lines by the name of the substation at which each line connects to the transmission system. The list indicates the general direction of line routes from HNP, voltage, date of construction, and whether NRC has previously analyzed the line. Figure 2-5 shows the locations of the lines and substations together with some regional features.

- Eastman Line – The 230-kilovolt (kV) Eastman line was constructed in 1972 and extends northwest from the Site. The AEC analyzed the environmental impacts of this line in the final environmental statement for HNP Unit 1 operation and Unit 2 construction (Reference 4 at pages III-1, IV-3, and V-1).

- S. Hazelhurst (Douglas) Line – The 230-kV Douglas line was constructed in 1971 and extends southwest from the Site. The environmental impacts of this line were analyzed by AEC in the 1972 FES (ibid.).

- North Tifton Line – The 500-kV North Tifton line was constructed in 1971 and extends southwest from the Site. AEC analyzed the environmental impacts of this line in the 1972 FES (ibid.).

- Bonaire Line – The 500-kV Bonaire line was constructed in 1976 and extends northwest from the Site. AEC analyzed the environmental impacts of this line in the 1972 and 1978 FESs (ibid. and Reference 5 at pages 2-1, 2-3, 2-6, 3-12, and 5-1 in the 1978 FES).

- Duval Line – The 500-kV Duval line was constructed in 1981 and extends south from the Site. AEC (and NRC) did not analyze this line because GPC constructed it after start of HNP Unit 2 operation.

- Thalmann Line – The 500-kV Thalmann line was constructed in 1981 and extends southeast from the Site. AEC (and NRC) did not analyze this line because GPC constructed it after start of HNP Unit 2 operation.

GPC constructed HNP adjacent to an existing 230-kV line from East Vidalia to Offerman and an existing 115-kV line from Vidalia and Baxley. GPC looped the East Vidalia-to-Offerman line into the HNP switchyard, creating the Hatch-to-East Vidalia and the Hatch-to-Offerman lines but did not construct the lines for the specific purpose of connecting HNP to the transmission system. As AEC noted, the loop was not a new line; therefore, this environmental report does not address them further. GPC sold the Eastman, Douglas, North Tifton, and Bonaire lines to Oglethorpe Power Corporation and Oglethorpe transferred maintenance responsibility to its subsidiary, Georgia Transmission Company. Georgia Transmission Company and GPC use similar maintenance practices, however, and the following discussions apply regardless of transmission line ownership.

HNP transmission lines constructed for the specific purpose of connecting HNP to the transmission system occupy four corridors. "Corridor" is a general term used to identify the land over which a transmission line travels. A utility can own the land, in which case it holds the corridor as a property owner. More commonly, others own the land and utilities own the right, called an easement, to install and maintain the transmission line on the land. In the case of an easement, the corridor is commonly called a right-of-way. Most HNP transmission line corridors are rights-of-way with 1 to 2 percent of the acreage being owned outright.

GPC established standard transmission corridor widths, as follows:

Line Voltage	Corridor Width
500 kV	150 feet
230 kV	125 feet
115 kV	100 feet

When transmission lines were adjacent, GPC reduced the corridor width by 25 feet. The following paragraphs describe the HNP transmission line corridors.

- Eastman/Bonaire Corridor – The Eastman and Bonaire lines share a 250-foot wide corridor for 53 miles to the vicinity of Eastman, Georgia. There, the Eastman line diverges for 4 miles into Eastman. The Bonaire line continues for another 37 miles to a substation near Bonaire, Georgia. After diverging from the Bonaire line, the Eastman line joins another 230-kV line going into Eastman. These lines form a 225-foot wide corridor, of which 125 feet is attributed to HNP. Similarly, within 11 miles of Bonaire, the Bonaire line joins several other lines to form a wider corridor, but only 150 feet are attributed to HNP. The total corridor area that is attributable to HNP is approximately 2,300 acres.[4]

- Douglas/North Tifton Corridor – The Douglas and North Tifton lines share a 250-foot wide corridor for 34 miles to a point north of Douglas, Georgia. There, the Douglas line turns south in a 125-foot wide corridor for the 10 miles to the GPC substation. The North Tifton

4. Total acreage is calculated by multiplying the length (feet) × width (feet) × 43,560 square feet per acre. For example [(53 miles × 5,280 feet per mile × 250 feet) + (4 miles × 5,280 feet per mile × 125 feet) + (37 miles × 5,280 feet per mile × 150 feet)] ÷ 43,560 square feet per acre = 2,340 acres.

line continues for 48 more miles in a 150-foot wide corridor to a substation near Tifton, Georgia. The total corridor area is approximately 2,100 acres.

- Duval Corridor – The Duval corridor extends 87 miles to the Florida state line, where Florida Power and Light Company takes ownership responsibility. The corridor width is 150 feet. For 20 miles of its length, from south of Baxley to Offerman, the Duval line shares a 250-foot wide corridor with a 230-kV line with 150 feet of its width attributed to HNP. The total corridor area is approximately 1,600 acres.

- Thalmann Corridor – The Thalmann corridor extends 65 miles to the GPC substation near Thalmann, Georgia. The corridor width is 150 feet. For 28 miles of its length, from Odum, Georgia, to Everett, Georgia, the Duval line shares a 225-foot wide corridor with a 115-kV line. For the last 7 miles into the GPC substation at Thalmann, Georgia, the Duval line shares a 275-foot wide corridor with another 500-kV line. For the shared corridors, 150 feet of the width is attributed to HNP. The total corridor area is approximately 1,200 acres.

In total, for the specific purpose of connecting HNP to the transmission system, HNP has approximately 340 miles[5] of transmission line corridors that occupy approximately 7,200 acres[6].

At this time, GPC is a vertically integrated electric utility. GPC as a part of its electricity generation, transmission and distribution business, plans to maintain these transmission lines, which are integral to the larger transmission system, indefinitely. They will remain a permanent part of the transmission system after HNP is decommissioned.

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-use herbicides.

GPC designed and constructed all HNP transmission lines in accordance with the edition of the National Electrical Safety Code® (Reference 9)[7] and industry guidance that was current when the line was built. Ongoing right-of-way supervision and maintenance of HNP transmission facilities ensures continued conformance to governing standards and includes routine aerial patrol, helicopter inspection, and ground inspection. At this time, routine aerial patrols of all corridors are conducted every other month and include checks for encroachments, broken conductors, broken or leaning structures, and signs of trees burning, any of which would be evidence of clearance problems. Slow helicopter inspections (45 miles per hour or less) are conducted annually for 500-kV lines to allow more careful checks of facilities and rights-of-way. Currently all lines are inspected from the ground and measured for clearance at questionable locations every 6 years. Problems noted during any inspection are brought to the attention of the appropriate organizations for corrective action.

5. Calculated as follows: 53 miles (Eastman and Bonaire lines) + 4 miles (Eastman line) + 37 miles (Bonaire line) + 34 miles (Douglas and North Tifton lines) + 10 miles (Douglas line) + 48 miles (North Tifton line) + 87 miles (Duval line) + 65 miles (Thalmann line) = 338 miles.
6. Calculated as follows: 2,340 acres (Eastman/Bonaire Corridor) + 2,055 acres (Douglas/Tifton Corridor) + 1,582 acres (Duval Corridor) + 1,182 acres (Thalmann Corridor) = 7,159 acres.
7. A publication that provides standards for safeguarding persons from hazards arising from the installation, operation, or maintenance of electric supply stations and electrical supply lines and equipment. The American National Standards Institute has recognized the NESC as a consensus standard.

2.1.7 Modifications

NRC

The report must contain a description of . . . the applicant's plans to modify the facility or its administrative control procedures as described in accordance with §54.21 of the Chapter. This report must describe in detail the modifications directly affecting the environment or affecting plant effluents that affect the environment. [10 CFR 51.53(c)(2)]

The incremental aging management activities carried out to allow operation of a nuclear power plant beyond the original 40-year license term will be from one of two broad categories: (1) SMITTR actions, most of which are repeated at regular intervals, and (2) major refurbishment or replacement actions, which usually occur fairly infrequently and possibly only once in the life of the plant for any given item. (Generic Environmental Impact Statement Section 2.6.3.1, page 2-41.) [SMITTR defined at GEIS Section 2.4, page 2-30 as surveillance, on-line monitoring, inspections, testing, trending, and recordkeeping]

The Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS, Reference 10) identifies surveillance, monitoring, inspections, testing, trending, and recordkeeping (SMITTR) and major refurbishment activities that utilities might perform for license renewal. Performing such SMITTR and major refurbishment activities would necessitate first changing administrative control procedures, and major refurbishment activities also would involve modifying the facility. This section describes HNP license renewal SMITTR and refurbishment plans to satisfy the NRC requirement to describe facility and administrative control procedure modification plans in accordance with 10 CFR Section 54.21

SMITTR Activities

The integrated plant assessment (IPA), required by 10 CFR Section 54.21, identified the programs and inspections managing aging effects at Plant Hatch. These programs are described in the Application for Renewed Operation Licenses, Plant E. I. Hatch, Units 1 and 2, Appendix A. SNC does not anticipate any additional personnel or resources above the current plant staffing will be required for the performance of the identified aging management programs.

Refurbishment Activities

SNC has completed the integrated plant assessment (IPA) required by 10 CFR Section 54.21 and 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 in 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.

2.1.8 Employment

SNC has approximately 925 employees at HNP during routine operations. On-site vendor and contract staff vary throughout the year by as many as 50 workers, yielding a total on-site workforce that ranges between 925 and 975 during routine operations. In addition to the site employees, there are approximately 130 corporate staff dedicated to Plant Hatch who are located offsite in Birmingham, Alabama. The SNC employees employed at the site reside in 33 Georgia

counties with more than 85 percent of the employees residing in the 5 counties listed below. The remaining employee residences are distributed throughout 28 counties, mostly within 50 miles of the site.

County	Number of Personnel	Percent of Total Personnel
Toombs	387	41
Appling	290	30
Montgomery	61	6
Tattnall	46	5
Jeff Davis	40	4
Other	129	14
Total	953	100

The on-site workforce increases by as many as 800 temporary (1 to 2 months) duty employees during refueling outages. HNP units are on an 18-month refueling interval, and SNC generally schedules outages on staggered schedules, resulting in one outage per year for two 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.

During the license renewal period, SNC does not anticipate the need to increase on-site or off-site 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.

2.2 ALTERNATIVES

NRC

The environmental report shall discuss "alternatives to the proposed action…" 10 CFR 51.45(b)(3), as adopted by reference at 10 CFR 51.53(c)(2).

While many methods are available for generating electricity, and a huge number of combinations or mixes can be assimilated to meet a defined generating requirement, such expansive consideration would be too unwieldy to perform given the purposes of this analysis. Therefore, NRC has determined that a reasonable set of alternatives should be limited to analysis of single, discrete electric generation sources and only electric generation sources that are technically feasible and commercially viable. (GEIS Section 8.1)

The consideration of alternative energy sources in individual license renewal reviews will consider those alternatives that are reasonable for the region, including power purchases from outside the applicant's service area. (Supplementary information to Final Rule, 61 FR 66537 - 66554, December 18, 1996, at Section II.H, page 66541, column 3)

NRC regulations require discussion of alternatives and draft NRC regulatory guidance (Reference 61) calls for discussion of the following:

- No action alternative, defined as the alternative of not renewing the license, and
- Alternatives that meet system generating needs, a refinement of the no-action alternative.

The electric generation needs for the state of Georgia are addressed by the joint planning of the joint owners and relative to Georgia Power and other investor-owned utilities integrated resource planning reviews conducted by the Georgia Public Service Commission, which regulates rates and other practices of investor-owned electric utilities. As indicated in Section 1.1, the purpose of the proposed action (license renewal) is to retain an option for meeting future system generating needs. Section 2.2 focuses on the range of alternatives that would also satisfy this purpose.

Section 2.2 begins with a discussion, called "no action," of activities that would take place if HNP did not seek renewal of operating licenses, regardless of what additional steps are taken to replace HNP generating capacity. Next, the section examines three scenarios that SNC has determined to be feasible alternatives for meeting system needs (coal-fired generation, gas-fired generation, and imported electric power). In considering the level of detail and analysis that it should provide for each alternative, SNC relied on the NRC decision-making standard for license renewal:

> . . . the NRC staff, adjudicatory officers, and Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision-makers would be unreasonable. [10 CFR 51.95(c)(4)].

SNC determined that, as long as the environmental report provided sufficient information to clearly indicate whether an alternative would have comparable or greater environmental impact than the proposed action (i.e., license renewal), the document would contain sufficient information to support the NRC decision-making. Providing additional detail or analysis would serve no function if it would only bring to light more adverse impacts of alternatives to license renewal. This approach is consistent with regulations of the Council on Environmental Quality, which require that the consideration of alternatives (including the proposed action) devote substantial enough treatment that reviewers may evaluate their comparative merits [40 CFR 1502.14(b)].

Section 2.2.2 provides only sufficient detail about feasible alternatives to establish the basis for necessary Chapter 3 analysis of impacts. Finally, Section 2.2.3 identifies other alternatives considered and discusses why SNC has determined that they are not feasible.

2.2.1 No Action

The no action alternative refers to a scenario in which SNC would decommission HNP after license expiration. HNP provided approximately 12,000,000 megawatt-hours (Reference 19) of electricity in 1997 to customers in Georgia via the Georgia Power Company electric grid that serves approximately 1.7 million customers in 57,000 square miles of the state (Reference 11). This 12,000,000 megawatt-hours represented approximately 12 percent of the electricity generated in the state of Georgia in 1997. SNC presumes that the HNP demand would be met by one of the generation alternatives presented in this document or in the GEIS. However, potential for deregulation of the electric retail market in Georgia and possible changes in wholesale supply of electricity may affect whether the joint owners will be the ultimate supplier of power to these customers. The range of feasible replacement power options is addressed in the following sections.

Regardless of license renewal, SNC will have to comply with NRC decommissioning requirements. When nuclear power plants permanently cease operation, they must be decommissioned in accordance with NRC regulations. The NRC defines decommissioning as safe removal from service, reduction of residual radioactivity to a level that permits release of the property, and termination of the NRC license (10 CFR 50.2). NRC regulations define acceptable levels of residual radioactivity. GEIS Section 7.3 provides a description of decommissioning activities. If NRC renews the HNP operating licenses, decommissioning would be postponed for an additional 20 years. If NRC does not renew the licenses, SNC would initiate decommissioning activities upon expiration of the current HNP operating licenses. Under the feasible alternatives addressed below, HNP decommissioning would be concurrent with operation of the alternatives. SNC adopts by reference the GEIS description of decommissioning activities, but notes that the description is based on a larger reactor (the GEIS "reference" boiling-water reactor is the Washington Public Power System's 1,155 megawatt-electric WNP-2 reactor).

2.2.2 Feasible Alternatives

In the GEIS, NRC discusses alternatives to license renewal of nuclear power generating units. The document states that coal- and gas-fired generation technologies are feasible alternatives to nuclear power plants based upon current technological and cost efficiencies, and generally discusses the types of impacts that would occur as a result of construction and operation of these types of facilities.

The principal fuel burned in Georgia's power plants is coal. As of August 1998, coal-fired units accounted for roughly 57 percent of the existing generation capacity in Georgia; nuclear generation (represented by SNC nuclear production units at Plant Hatch and Plant Vogtle) accounted for approximately 17 percent; oil- and gas-fired units combined accounted for approximately 11 percent; and hydroelectric generating facilities accounted for approximately 15 percent of capacity (Reference 11). Since coal-fired electric generation is currently widely utilized in Georgia, SNC considers this technology a feasible alternative to nuclear generation, and Section 2.2.2.1 presents coal as a feasible alternative to HNP license renewal. Gas-fired generation technology (combined cycle) offers efficiency improvements, pollutant emissions reductions, and fewer overall environmental impacts from plant operations (Reference 10) as compared to coal-fired generation. Further, capital costs are low, and lead time (from time at which need is identified to startup date) is relatively short. For these reasons, Section 2.2.2.2 presents gas-fired generation as a feasible alternative to HNP license renewal.

The alternatives presented assume that existing facilities and infrastructure would be used to the extent practicable, limiting the amount of new construction that would be required. Specifically, it is assumed that the alternatives would use the existing intake and discharge structures, switchyard, offices, and transmission line corridors. This was done primarily to minimize the predicted environmental impacts of these alternatives during construction. Using existing intake and discharge structures could also reduce operational impacts because it is reasonable to assume that aquatic communities in the immediate vicinity of the plant have already adapted to HNP patterns of water withdrawal and thermal discharge. Construction of new intake and discharge structures at a new site would necessitate aquatic community adaptations at the new site, adding to the environmental impact of the alternatives.[8] The gas-fired alternative could also make use of existing gas pipeline capacity located approximately 4.5 miles south of the Site. By utilizing existing structures such as these, the environmental impact of construction would be reduced. Although the alternatives are presented as construction at a defined site, the sections also discuss how design and site variations could affect the alternative definition and the resulting environmental consequences.

The descriptions of the coal-fired and gas-fired power plants utilized in this environmental report for the sake of comparison are intended to be reasonable representations of facilities that could be used as alternative sources of energy. The descriptions are based on a combination of several existing facilities that together include the major components and technology GPC would use as feasible alternate energy sources. SNC chose these facilities because they are recent projects that present current technology and are documented in publicly available reports. In addition, industry and government technical publications are cited as sources of technical data and information regarding the types and quality (e.g., ash content, British thermal units [BTU] per pound) of fossil fuels that might be burned at electrical power generating units. More detailed technical discussion defining representative coal- and gas-fired plants as alternative power sources is included in Section 2.2.2.1 and 2.2.2.2, respectively.

2.2.2.1 Coal-Fired Generation

Representative Plant

The primary source of information used to describe and size (megawatts and land use) the coal-fired alternative is Delmarva Power and Light Company documentation for its Dorchester Power Plant. In addition, documentation for the South Carolina Electric and Gas Company Cope Power Plant was also used. These facilities are typical of currently available coal-fired technology being constructed and operated today. Information from the EPA and the U.S. Department of Energy's (DOE's) Energy Information Administration technical publications on fuel specifications and best available emission control technology was utilized to specify fuel types and emission control technology for the alternative. In some cases, SNC uses referenced data directly; in other cases, SNC appropriately scaled data to fit the size plant needed for a HNP alternative energy source.

For the purposes of this environmental report, it is assumed that it would take 1,800 megawatts-electric (MWe) coal-fired generation to replace the 1,690-MWe HNP. The increased size over current HNP capacity would be necessary to offset increased internal electrical usage for auxiliary pollution control, pumping water for cooling, or coal or ash handling (Reference 14).

The typical size (megawatts) and configuration utilized by the electrical power industry in the application of coal-fired generation technology varies. Nationally, coal-fired unit sizes range up to more than 1,000 MWe (Reference 15). The Delmarva Power and Light Company and the South Carolina Electric and Gas Company sized and phased construction of their units to match load growth projections. The Delmarva power plant consists of two 300-MWe units constructed at the

8. Additionally, it is reasonable to assume that construction and operations at a new site would mean that intake and discharge at the HNP site would stop, necessitating adaptation of the HNP-site aquatic communities to the change in their environment.

same site sharing common facilities and infrastructure such as rail, fuel storage, and ash disposal (Reference 16). The Cope Power Plant consists of three 385-MWe pulverized coal-fired units (Reference 14).

The coal-fired alternative in this report would consist of three 600-MWe units (ISO rating)[9] that would burn pulverized bituminous coal. The choice of pulverized coal combustion technology, as opposed to other coal combustion technologies, is consistent with recent, regional practice for new generation capacity (e.g., South Carolina Electric and Gas Company's Cope Facility) and is considered a reasonable alternative (Reference 14). Bituminous coal is the most common coal burned in coal-fired units because of its higher heating values (Reference 17). Coal would have a heating value of 13,000 British Thermal Units (BTU) per pound, an ash content of 10 percent, and a sulfur content of 0.8 percent (Reference 18). A maximum of 15,500 tons[10] of coal and 880 tons of lime/limestone per day (Reference 14)[11] would be delivered by railcar on the existing rail spur that serves the HNP site (Figure 2-2).

Coal for the plant would be delivered by rail trains of 115 cars each. Each open-top rail car holds about 100 tons of coal (Reference 14). An additional 65 rail cars per week would be required to deliver the lime for plant operations. In all, approximately 520 trains per year, or an average of 10 trains each week, would deliver the coal and lime for all three units.[12] Since for each full train delivery, there is an empty train, a total of 20 train trips per week are expected.

Each of the three units would be 200-foot tall, tangentially-fired, dry-bottom boilers (Reference 17), and would include an approximately 600-foot stack (Reference 14). This firing configuration was chosen because of the moderate uncontrolled nitrogen oxides emissions from burning coal compared with other applications. Nitrogen oxides emissions controls would include low nitrogen oxide burners, overfire air, and post-combustion selective catalytic reduction. The combination of low nitrogen oxide burners and overfire air would achieve a nitrogen oxides reduction of 40 to 60 percent from uncontrolled levels. These combustion controls, along with selective catalytic reduction can achieve the current upper limit of nitrogen oxides control (95 percent reduction) (Reference 17). Based on an operating capacity factor of 83.9 percent (Reference 16), the resulting annual nitrogen oxides emissions would be approximately 570 tons per unit.[13]

Each unit would have fabric filters or electrostatic precipitators (99.9 percent particulate removal efficiency) and a wet lime/limestone flue gas de-sulfurization system (95 percent scrubber removal efficiency) (Reference 17). Based on an operating capacity factor of 83.9 percent (Reference 16), the resulting annual emissions per unit would be 79 tons of filterable

9. An ISO (International Standards Organization) rating identifies the generator rating at standard atmospheric conditions. Standard atmospheric conditions are 59°F, 60 percent relative humidity, and 14.696 pounds per square inch atmospheric pressure.
10. Calculate coal use as follows: 1,200-MW Cope Facility uses 3,760,000 tons coal per year. Therefore, 3,760,000 tons coal per 1,200 MW × 600 MW per unit ÷ 365 days per year × 3 units = 15,452 tons coal per day.
11. Calculate lime use as follows: 1,200-MW Cope Facility uses 215,000 tons of lime per year. Therefore, 215,000 tons of lime per 1,200 MW × 600 MW per unit ÷ 365 days per year × 3 units = 884 tons of lime per day.
12. Calculate number of trains as follows: 15,452 tons of coal per day × 365 days per year ÷ 100 tons of coal per rail car = 56,400 rail cars per year. For lime, 884 tons of lime per day × 365 days per year ÷ 95 tons of lime per rail car = 3,396 rail cars per year. 56,400 rail cars of coal per year + 3,396 rail cars of lime per year = 59,796 total rail cars per year. Assuming 115 rail cars per train, 59,796 rail cars per year ÷ 115 rail cars per year ÷ 52 weeks per year = 10 trains per week.
13. Calculated as follows using AP-42 (Reference 17) Table 1.1-3: 5,151 tons coal per day per unit × 365 days per year × 0.839 capacity factor × 14.4 pounds nitrogen oxides per ton coal ÷ 2,000 pounds per ton = 11,357 tons nitrogen oxides per year (uncontrolled). Assuming 95 percent reduction efficiency: 11,357 tons nitrogen oxides per year (uncontrolled) × 0.05 = 568 tons nitrogen oxides per year per unit (controlled).

particulates,[14] 18 tons of PM_{10},[15] and 1,200 tons of sulfur oxides.[16] Carbon monoxide emissions would be approximately 390 tons per year per unit.[17]

The plant would use the existing HNP intake, discharge structures, and cooling towers as part of a closed-loop cooling system. This alternative would minimize environmental impacts since minimal construction would be required to adapt the system to the coal-fired alternative. It is assumed that the coal-fired alternative would require a water use (including cooling water, wet scrubber sulfur oxides emission controls, and boiler makeup) volume of approximately 30 million gallons per day[18] which would be less than the existing HNP withdrawal of approximately 57 million gallons per day (Section 2.1.4). Based on the design and efficiency of the existing cooling towers, discharge temperatures would be less than or equal to those currently observed.

Construction of the coal-fired alternative would take approximately five years. The workforce during the construction period would average 1,500, with a peak of 2,000, and during operations would average 250. The reduced work force size for the coal-fired alternative (950 to 250) would reduce the groundwater withdrawals for potable water use. Assuming 35 gallons per day per person (Reference 14), maximum groundwater usage would be 8,750 gallons per day or 6.1 gallons per minute.

The power block and coal pile would occupy approximately 300 acres (Reference 16). The units would be constructed at the same time with phased-in service dates to replace the power demands supplied by HNP and would have an operational life of 40 years (Reference 14). Constructing more, smaller units instead of three 600-MWe units would offer no known environmental benefits.

Approximately 1.5 million tons of coal-combustion by-products per year (ash and scrubber sludge) would be disposed of onsite, requiring a plant lifetime (40 years) total of approximately 600 acres (Reference 14). Facilities would be constructed to control and treat leachate from coal storage areas and ash and scrubber sludge disposal areas. The existing switchyard and transmission system would be used. It is assumed that coal-fired generation structures and

14. Calculated using the uncontrolled emission factor for filterable particulates given in AP-42 Table 1.1-4 as 10A, where A is the weight percent ash of the coal as fired; therefore, 10 × 10 percent ash = 100 pounds filterable particulates per ton coal. Filterable particulate emission calculated as follows: 5,151 tons coal per day per unit × 365 days per year × 0.839 capacity factor × 100 pounds filterable particulates per ton coal ÷ 2,000 pounds per ton = 78,871 tons filterable particulates per year per unit (uncontrolled). Assuming 99.9 percent removal efficiency: 78,871 tons filterable particulates per year per unit (uncontrolled) × 0.001 = 79 tons filterable particulates per year per unit (controlled).
15. Calculated using the uncontrolled emission factor for PM_{10} given in AP-42 Table 1.1-4 as 2.3A, where A is the weight percent ash content of coal as fired; therefore, 2.3 × 10 = 23 pounds PM_{10} per ton of coal. PM_{10} emission calculated as follows: 5,151 tons coal per day per unit × 365 days per year × 0.839 capacity factor × 23 pounds PM_{10} per ton coal ÷ 2,000 pounds per ton = 18,140 tons PM_{10} per year per unit (uncontrolled). Assuming 99.9 percent removal efficiency: 18,140 tons PM_{10} per year per unit (uncontrolled) × 0.001 = 18 tons PM_{10} per year per unit (controlled).
16. Calculated using the uncontrolled emission factor for sulfur oxides given in AP-42 Table 1.1-3 as 38S, where S is the weight percent sulfur content of coal as fired; therefore, 38 × 0.8 = 30.4 pounds sulfur per ton coal. Sulfur oxides emission calculated as follows: 5,151 tons coal per day per unit × 365 days per year × 0.839 capacity factor × 30.4 pounds sulfur oxides per ton coal ÷ 2,000 pounds per ton = 23,977 tons sulfur oxides per year per unit (uncontrolled). Assuming 95 percent removal: 23,977 tons sulfur oxides per year per unit (uncontrolled) × 0.05 = 1,199 tons sulfur oxides per year per unit (controlled).
17. Calculated as follows using AP-42 Table 3.1-2: 5,151 tons coal per day per unit × 365 days per year × 0.839 capacity factor × 0.5 pound carbon monoxide per ton coal ÷ 2,000 pounds per ton = 394 tons carbon monoxide per year per unit.
18. Scaled from the SCE&G Cope facility (Reference 14) as follows: 1,200-MW unit uses 19,000,000 gallons per day. 19,000,000 gallons per day ÷ 2 600-MW units = 9,500,000 gallons per day per 600-MW unit × 3 600-MW units = 28,500,000 gallons per day for the 1,800 MW facility.

facilities, including coal storage and ash and scrubber sludge disposal areas, would all be located within the current HNP site boundaries.

As described above, the coal-fired generation alternative would necessitate converting an additional 900 acres of the HNP site to industrial use (plant, coal storage, ash and scrubber sludge disposal, and expansion of the onsite rail system to accommodate 115 unit coal trains). Currently, this land is mostly wooded, however, there are open areas in the vicinity of the existing plant.

New Site

Construction of the coal-fired generation alternative at a new site could impact up to 1,100 acres. In addition to the 900 acres needed for the plant, coal storage, and ash and scrubber sludge disposal areas described above, an additional 150 acres (Reference 16) for offices, roads, parking areas, and a switchyard would be required. Cooling water intake and discharge structures and mechanical or natural draft cooling towers would have to be constructed. An additional 300 acres would be needed for transmission lines, assuming the plant is sited 10 miles from the nearest substation.[19] An additional 160 acres would also be needed for a rail line for coal delivery[20] (assuming site location is 10 miles from nearest railway connection).

2.2.2.2 Gas-Fired Generation

Representative Plant

The primary source of information used to describe and scale for size (megawatt and land use) the gas-fired alternative is the EPA documentation for the Tampa Electric Company Polk Power Station (Reference 20). The Polk facility is typical of current available gas-fired technology being constructed and operated today. In addition, information from the EPA and DOE's Energy Information Administration technical publications on fuel specifications and best available emission control technology was utilized to specify fuel types and emission control technology that would be used in the gas-fired alternative. In some cases, SNC uses referenced data directly; in other cases, SNC appropriately scaled data to fit the size plant needed for a HNP alternative energy source.

For the purposes of this environmental report, it is assumed that it would take 1,760-MWe gas-fired generation to replace the 1,690-MWe HNP. The increase in generating capacity would be necessary to offset increased internal electrical usage for pollution control and pumping water for cooling, but would not be as great as for the coal-fired alternative due to reduced cooling water flow and pollution control needs.

There are several generation technologies that use natural gas as fuel. Gas-fired steam generator technology utilizes hot combustion gases to heat water to produce steam, which in turn rotates a generator to produce electricity. In simple-cycle combustion turbine technology, fuel is burned in a combustion turbine and the resulting hot combustion gases rotate the turbine to generate electricity before being emitted to the air. Combined-cycle technology uses a combination of combustion turbine technology and steam generator technology. In the combined cycle unit, hot combustion gases in the combustion turbine rotate the turbine to generate electricity; and waste combustion heat from the combustion turbine is routed through a heat recovery steam generator. There, water is turned to steam, which rotates a steam turbine to generate additional electricity. The size, type, and configuration of gas-fired generation units and plants currently operational in the United States vary and include simple-cycle combustion and

19. Based on 250-foot right-of-way (10 miles × 5,280 feet per mile × 250 feet ÷ 43,560 square feet per acre = 303 acres).
20. Based on 130-foot right-of-way (10 miles × 5,280 feet per mile × 130 feet ÷ 43,520 square feet per acre = 158 acres).

combined cycle units that range from 25 MWe to 600 MWe (References 20 and 21). As with coal-fired technology, units may be configured and combined at a location to produce the desired amount of megawatts, and construction can be phased to meet electrical power needs.

The gas-fired generation alternative consists of four 440-MWe (ISO rating) combined-cycle units each consisting of two 155-MWe simple-cycle combustion turbines and a 130-MWe heat recovery steam generator. On an average annual basis, these units would generate up to 440 MWe per hour each, providing the 1,760 MWe needed to replace HNP. The power block area and associated electrical facilities would occupy approximately 500 acres (Reference 21).

Natural gas typically having an average heating value of 1,000 BTU per cubic foot (Reference 11) would be the primary fuel; the gas-fired alternative plant would burn approximately 10 million cubic feet per hour (Reference 17). Low-sulfur No. 2 fuel oil would be the backup fuel (Reference 22). Natural gas would be delivered via an existing pipeline located approximately 4.5 miles from the HNP site (Figure 2-2). Approximately 55 acres would be disturbed during pipeline construction.[21] The existing line currently has sufficient reserve capacity to supply the needs of the gas-fired alternative.

Each unit would be less than 100 feet high and would be designed with dry, low nitrogen oxides combusters, water injection, and selective catalytic reduction (Reference 17), and would exhaust through a 230-foot stack after passing through heat recovery steam generators. This stack height is consistent with EPA Regulation 40 CFR 51.100, which addresses requirements for determining the stack height of new emission sources. Regulation 40 CFR 51.100 allows stack heights based on good engineering stack height (defined in the regulation) or modeling, but does not allow credit for offsite contaminant level reduction for taller stacks. The 230-foot height is based on the regulation's good engineering practice formula using the tallest proposed onsite facility (i.e., the 92-foot turbine building). While modeling would have to be used to justify stack height greater than 230 feet, the relatively flat terrain and low structures of the area probably mean that modeling would not support a greater stack height.

Nitrogen oxides emissions from the gas-fired alternative would be 386 tons per year.[22] There would be no solid waste products (i.e., ash) from natural gas fuel burning.

The plant would use the existing HNP intake and discharge and the existing mechanical cooling towers. Cooling requirements would be less; average withdrawal flows would be approximately 15 million gallons per day (Reference 64).

Construction of the gas-fired alternative would take approximately 3 years and the work force during the construction period would average 500, with a peak of 750. The work force during operations would average 125.

New Site

Construction of the gas-fired generation plant at a new site could impact approximately 600 acres. In addition to the 500 acres needed for the power block area and pipeline construction described above, approximately 100 acres would be required for offices, roads, parking areas,

21. Based on 100-foot right-of-way (4.5 miles × 5,280 feet per mile × 100 feet ÷ 43,560 square feet per acre = 55 acres).
22. Calculated as follows using AP-42 Table 3.1-2 and assuming a 60 percent thermal efficiency: 1,760 MW ÷ 0.6 = 2,933 MW input. 2,933 MW × (1 × 10^6 watts per MW) × (0.0009486 BTU per second per watt) × (60 seconds per minute) × (60 minutes per hour) × (24 hours per day) × (365 days per year) = (8.77 × 10^{13} BTU per year) × (0.0088 pounds nitrogen oxides per 1 × 10^6 BTU) × (1 ton per 2,000 pounds) = 386 tons nitrogen oxides per year.

and a switchyard. In addition, 300 acres would be needed for transmission lines, assuming the plant is sited 10 miles from the nearest substation.[23]

2.2.2.3 Imported Electrical Power

"Imported power" refers to power purchased and transmitted from electric generation plants that SNC does not own and that are located elsewhere within the region or nation. In 1995, Georgia was a substantial net seller of electricity. During 1995, the net interstate flow of electricity was -15,246 million kilowatt-hours or about 5 percent of all electricity produced in Georgia (Reference 11). During 1996, Southern Company facilities in Georgia (including those of subsidiaries Georgia Power and Savannah Electric) generated approximately 90 percent (90,000 million kilowatt-hours) of the power in Georgia (Reference 11). HNP generated approximately 13,000 million kilowatt-hours during 1996 (Reference 19).

Even though Georgia is a net exporter of electric power, GPC cannot discard imported power as a feasible alternative to HNP license renewal. Market conditions, particularly the anticipated free market created by deregulation, could result in a company finding it advantageous to import power to replace a retired Georgia plant while exporting other power generated in state. Such a situation could be caused by differential costs of generation or transmission, contractual relationships, or even strategic planning.

2.2.3 Other Alternatives

This section identifies alternatives to HNP license renewal that are not feasible, and describes why the alternatives are not feasible and will not be considered further in this environmental report.

Wind

Wind speeds in central and eastern Georgia (Macon and Savannah data) average 7.8 miles per hour (Reference 23), whereas average wind speeds of more than 13 miles per hour are required for wind turbines to generate electricity. Regions with wind speeds of this magnitude include the Great Plains, the West, coastal areas, and parts of the Appalachians (Reference 10). HNP is located approximately 80 miles inland (Reference 2). Based on the GEIS land use estimate for wind power,[24] replacement of HNP generating capacity, even assuming ideal wind conditions, would require dedication of almost 270,000 acres (422 square miles). The current HNP Site is about 2,244 acres (Section 2.1.1), and the county in which the facility is located is about 514 square miles (Reference 26). Based on the lack of adequate wind speeds and the amount of land that would be required for wind-powered generating facilities, SNC has determined that the wind alternative is not feasible.

Solar

Solar power technologies, photovoltaic and thermal, cannot currently compete with conventional fossil-fueled technologies in grid-connected applications due to higher capital costs per kilowatt of capacity. There also are substantial impacts to natural resources (wildlife habitat, land use, and aesthetic impacts) from construction of these facilities. It is estimated that at least 35,000 acres at a single site or at multiple sites would be required to build a 1,000 MW(e) facility. In addition, the HNP site receives less than 3.9 kilowatt-hours of solar radiation per square meter per day, compared to 5 to 7.2 kilowatt-hours of solar radiation per square meter per day in areas of the West, such as California, which are most promising for solar technologies (GEIS Sections 8.3.2

23. Based on 250-foot right-of-way (10 miles × 5,280 feet per mile × 250 feet ÷ 43,560 square feet per acre = 303 acres).
24. GEIS Section 8.3.1 estimates 150,000 acres per 1,000 megawatts-electric for wind power.

and 8.3.3). Because of the natural resource impacts, the area's low rate of solar radiation and high technology costs, SNC views the role of solar power in Georgia as limited to niche applications and not a feasible baseload alternative to HNP license renewal.

Hydropower

Approximately 15 percent, or 3,412 MWe, of Georgia's generating capacity is hydroelectric (Reference 11). As GEIS Section 8.3.4 points out, hydropower's percentage of the country's generating capacity is expected to decline because hydroelectric facilities have become difficult to site as a result of public concern over flooding, destruction of natural habitat, and alteration of natural river courses. Based on the GEIS land use estimate for hydroelectric power of 1 million acres per 1,000 megawatts-electric, replacement of HNP generating capacity would require flooding more than 2,800 square miles. Due to the large land-use and related environmental and ecological resource impacts associated with siting a hydroelectric facility large enough to replace HNP, SNC has determined that this is not a feasible alternative to HNP license renewal.

Geothermal

As illustrated by GEIS Figure 8.4, geothermal plants might be located in the western continental United States, Alaska, and Hawaii where hydrothermal reservoirs are prevalent, but would not be a feasible alternative to HNP license renewal in Georgia.

Wood Energy

The pulp, paper, and paperboard industries, which consume large quantities of electricity, are the largest consumers of wood and wood waste for energy, benefiting from use of waste materials that could otherwise represent a disposal problem. In 1995, processing of wood products in Georgia generated 478 million cubic feet of wood and bark residues. Approximately 48 percent, or 230 million cubic feet, of the residue was used as industrial fuel (Reference 11). The 90 trillion BTU of energy[25] estimated to be available annually from Georgia forests would only produce the amount of electricity that HNP produces in 7 hours.[26] Due to uncertainties associated with obtaining sufficient wood and wood waste to fuel a baseload generating facility, SNC has determined that wood waste is not a feasible alternative to renewing the HNP license. In addition, ecological impacts of large-scale timber cutting (e.g., soil erosion and loss of wildlife habitat) make this alternative less acceptable.

Municipal Solid Waste

The decision to burn municipal waste to generate energy is usually driven by the need for an alternative to land-filling rather than by energy considerations. The use of landfills as a waste disposal option is likely to increase in the near term; however, it is unlikely that many landfills will begin converting waste to energy because of unfavorable economics, particularly with electricity prices declining (Reference 28). SNC has determined that municipal solid waste would not be a feasible alternative to HNP license renewal.

Other Biomass-Derived Fuels

In addition to wood and municipal solid waste fuels, there are several other concepts for fueling electric generators, including burning energy crops, converting crops to a liquid fuel such as ethanol, and gasifying energy crops (including wood waste). None of these technologies has

25. Calculated as follows: 1 cubic foot of wood = 187,500 BTU (Reference 11). Therefore, 478,000,000 cubic feet of wood × 187,500 BTU per cubic foot of wood = 89,625,000,000,000 (90 trillion) BTU.
26. At an average of 10,000 BTUs per kilowatt-hour (kWh), 90 trillion BTUs would yield 9.0 million kWh per year. In 1997, HNP generated slightly more than 12,000 million kWh (Reference 19) or about 1.3 million kWh per hour.

progressed to the point of being competitive on a large scale or of being reliable enough to replace a baseload plant such as HNP (ethanol is primarily used as a gasoline additive for automotive fuel). For these reasons, SNC has determined that such fuels do not offer a feasible alternative to HNP license renewal.

Oil

GPC has 6 oil-fired units. It has been GPC's experience that the cost of oil-fired operation is about 6 times that of nuclear operation and 2 times that of coal-fired operation (Reference 12). In addition, increases in oil prices are expected to make oil-fired generation increasingly more expensive than coal-fired generation (Reference 28). For these reasons, SNC has determined that oil-fired generation is not a feasible alternative to HNP license renewal.

Nuclear Power

Work on advanced reactor designs has continued and nuclear plant construction continues overseas. However, the cost of building a new nuclear plant and the political uncertainties that have historically surrounded many nuclear plant construction projects are among the factors that have led energy forecasters such as the Energy Information Administration to predict no new domestic nuclear power plant orders for the duration of current forecasts - through the year 2020 generation (Reference 28). Therefore, SNC concludes that new nuclear plant construction is not a feasible alternative to HNP license renewal.

Delayed Retirement

HNP provides approximately 12,000,000 megawatt-hours of GPC's generating capacity and approximately 14 percent of its energy requirements (Reference 12). As a subsidiary of Southern Company, GPC supplies electrical power to the Southern Company regional electric grid (which includes Savannah Electric, Alabama Power, Gulf Power, and Mississippi Power). Southern Company expects the demand on its regional grid to increase approximately 2 percent (700 MW per year) including reserve capacity through the year 2018. In its planning, SNC considered the delayed retirement of older, less-efficient baseload plants. However, the cost of refurbishing these plants to make them more efficient and meet future emission limits would exceed the cost of building new plants. For this reason, SNC has determined that delayed retirement of other Southern Company generating units would not be a feasible alternative to HNP license renewal.

Conservation

GPC has developed residential, commercial, and industrial programs to reduce both peak demands and daily energy consumption (demand-side management). Program components include the following:

- Peak clipping programs – Include energy saver switches for air conditioners, heat pumps, and water heaters, allowing GPC to interrupt electrical service to reduce load during periods of peak demand; dispersed generation, giving GPC dispatch control over customer backup generation resources; and curtailable service, allowing GPC to reduce customers' load during periods of peak demand.

- Load shifting programs – Use time-of-use rates to encourage shifting loads from on-peak to off-peak periods. Use of computerized real time displays allowing the customer to monitor power usage and to keep power usage below peak thresholds while maintaining optimal product production.

- Conservation programs – Promote use of high-efficiency heating, ventilating, and air conditioning; encouraging construction of energy-efficient homes and commercial

buildings; improving energy efficiency in existing homes; providing incentives for use of energy-efficient lighting, motors, and compressors.

The GPC demand-side management program currently produces an estimated annual peak demand generation reduction of about 885 MWe. The GPC load growth projection anticipates a demand-side management savings of about 1,120 MWe in 2016. Because these savings are part of the long-range plan for meeting projected demand, it is not available as an "offset" for HNP, and Southern Company does not foresee availability of another 1,690 MWe (HNP capacity). For these reasons, SNC has determined that demand-side management is not a feasible alternative to renewing the HNP license.

2.3 SUMMARY COMPARISON

Table 2-4 summarizes the proposed action, feasible alternatives, and the environmental impacts that differentiate the proposed action from the alternatives. The primary differences would be impacts to air, land use, terrestrial resources, and aesthetics.

- Air Impacts – Coal- and gas-fired generation alternatives would introduce large and moderate air impacts, respectively, due to emission of pollutants such as nitrogen oxides, sulfur oxides, carbon oxides, and particulate emissions that would not occur if NRC renewed the HNP license. SNC assumes that the power purchase alternative could result in generator construction somewhere, which would introduce the same type of air impacts. These impacts are of concern due to their association with the issues of human health, regional acid rain, and global climatic change.

- Land Use Impacts – Both coal- and gas-fired alternatives would introduce some new land use impacts due to the need to convert predominantly forested land to industrial use. The coal-fired alternative would have the largest impact due to its need for ash and scrubber sludge disposal acreage that, in turn, would introduce a risk of groundwater contamination.

- Terrestrial Resource Impact – Both coal- and gas-fired generating alternatives would produce moderate to large ecological impacts to terrestrial resources as a result of the conversion of substantial forested acreage to industrial use. Impacts in either case would include wildlife habitat loss and reduced biological productivity, and could, depending on the location of new facilities, include habitat fragmentation and a localized reduction in biological diversity.

- Aesthetic Impacts – HNP's main generating facilities (including reactor buildings, turbine buildings, and control building) 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 coal-fired alternative would require the construction of a number of large structures, including three 600-foot stacks that would be visible for approximately 4 miles in summer months and 10 miles in winter. The coal-fired alternative would introduce a moderate aesthetic impact that would also be associated with coal-fired generation sources under the imported electrical power alternative.

Impacts to other resources (e.g., surface water, groundwater, socioeconomics, and cultural resources) would be similar in magnitude regardless of the generation alternative employed and would not be obvious discriminators.

A number of environmental impacts have been assigned a significance level of "small" by NRC in the GEIS. SNC has identified no new or significant information that would make these conclusions inapplicable to HNP. In compliance with NRC regulations, Chapter 3 discusses other environmental effects and concludes that they would be of small significance. Chapter 3 also discusses the environmental effects of the alternatives.

Table 2-1. Weekly discharge temperatures, Edwin I. Hatch Nuclear Plant, 1997-1998.

		Unit 1		Unit 2	
Month/Year		Average discharge temperature (°F)	Maximum discharge temperature (°F)	Average discharge temperature (°F)	Maximum discharge temperature (°F)
January	1997	63.0	68.0	63.8	67.0
February	1997	68.8	71.0	66.0	68.0
March	1997	71.6	79.0	70.0	80.0
April	1997	77.5	82.0	76.0	84.0
May	1997	78.3	85.0	78.3	86.0
June	1997	82.2	86.0	83.0	86.0
July	1997	88.0	91.0	87.5	90.0
August	1997	84.3	86.0	88.0	93.0
September	1997	84.6	88.0	86.6	86.6
October	1997	76.5	84.0	77.5	77.5
November	1997	62.3	68.0	62.0	62.0
December	1997	67.6	75.0	68.4	73.0
January	1998	61.8	69.0	62.7	69.0
February	1998	67.8	77.0	67.8	77.0
March	1998	71.4	77.0	71.0	77.0
April	1998	74.5	75.0	74.5	75.0
May	1998	83.8	89.0	81.8	86.0
June	1998	87.0	91.0	87.6	91.0
July	1998	89.8	92.0	90.3	92.0
August	1998	90.0	94.0	90.4	94.0
September	1998	87.5	89.0	85.0	91.0

Source: Reference 6.

Table 2-2. HNP surface water use.

Year	Average Daily Withdrawal (MGD)[a]	Maximum Daily Withdrawal (MGD)[a]	Average Daily Loss From Evaporation (MGD)[b]
1989	55.48	70.43	31.62
1990	56.88	80.50	32.42
1991	56.94	81.40	32.46
1992	58.02	82.73	33.07
1993	58.74	85.31	33.48
1994	57.30	83.61	32.66
1995	59.29	78.23	33.80
1996	57.07	78.03	32.53
1997	54.93	75.02	31.31
Average	57.18		32.59

MGD = million gallons per day.
a. Source: Reference 29.
b. Calculated based on an assumed consumptive loss of 57 percent (Section 2.1.4).

Table 2-3. HNP groundwater use (units: thousands of gallons, unless otherwise specified).[a,b]

Month	1990	1991	1992	1993	1994	1995	1996	1997
January	5,206.9	5,410.3	10,542.9	10,217.0	5,248.5	5,057.7	6,185.3	5,309.0
February	4,655.2	4,700.6	7,102.8	10,038.0	4,586.7	5,113.1	4,966.3	4,552.0
March	4,894.1	6,145.4	7,804.6	5,420.3	5,835.8	4,969.6	5,537.1	5,713.0
April	5,219.8	6,205.0	5,662.2	5,050.3	5,872.3	4,828.8	5,010.4	4,811.0
May	5,790.6	5,646.7	5,310.4	4,705.0	5,377.1	4,861.2	5,022.5	5,114.0
June	5,627.7	5,122.1	4,589.9	4,355.8	4,376.9	4,467.0	4,566.6	4,495.0
July	5,860.0	5,052.3	5,618.3	4,992.3	4,801.1	5,115.6	4,945.9	4,848.1
August	5,118.5	5,846.6	5,522.2	7,335.3	4,884.0	4,561.3	4,992.2	5,369.4
September	5,592.4	7,385.3	5,272.0	4,866.9	5,375.8	4,942.7	4,856.8	5,198.3
October	5,940.6	9,594.6	4,545.0	4,976.8	5,501.4	6,758.4	5,746.3	5,866.5
November	4,472.4	8,548.8	4,375.5	4,795.7	4,581.0	5,037.7	6,247.3	4,927.0
December	4,536.3	8,389.5	6,218.0	5,333.8	5,024.6	5,760.0	4,822.4	6,345.5
Yearly Total	64,904.5	80,038.2	74,555.8	74,080.2	63,459.2	63,468.1	64,895.1	64,545.8
Average pumping rate (gpm)	120	149	130	137	117	118	120	119

gpm = gallons per minute.
a. Source: Modified from Reference 30.
b. Represents total for site well numbers 1, 2, and 3.

Table 2-4. Comparison of alternatives for license renewal of the Edwin I. Hatch Nuclear Plant (Page 1 of 2).[a]

Resource	Proposed Action	Alternative 1 – Coal-Fired	Alternative 2 – Gas-Fired	Alternative 3 – Import
Description	HNP license renewal for 20 years No additional workers; bounding analysis assumes 60 additional full-time employees above existing site workforce (950)	New construction on Hatch site Three 600-MWe (ISO rating), tangentionally-fired, dry-bottom units Pulverized bituminous coal, 13,000 Btu/lb, 10% ash, 0.8% sulfur Low nitrogen burners, overfire air, selective catalytic reduction (95% NO_x reduction efficiency) Wet lime/limestone flue gas desulfurization system (95% removal efficiency) Fabric filters or electrostatic precipitators (99.9% particulate removal efficiency) Daily train delivery of 15,500 tons of coal and 880 tons of lime/limestone Average 1,500 construction workforce (peak 2,000) for 3 years, 250 permanent workers	New construction on Hatch site Four 440-MWe (ISO rating) combined units Natural gas, 1,000Btu/scf, 10 million ft^3/hr Backup low sulfur No. 2 fuel oil Fry, low nitrogen burners, selective catalytic reduction with water injection for backup oil firing Average 500 construction workers (750 peak), 125 permanent workers	Imported electric power (purchase) Could involve new construction of generation and transmission capacity
Resource impacts				
Air	Small, Category 1	Large – 3,600 tons SO_x/year; 1,710 tons NO_x/year; 240 tons filterable particulates/year; and 54 tons PM_{10}/year; 1,170 tons CO/year.	Moderate – 386 tons of NO_x/year.	Small to Large – Depends on technology used to generate power.
Aesthetics	Small - Category 1	Moderate – 3 new, 200-foot power plant structures and 600-foot stacks potentially visible for 4 to 10 miles in the summer and winter, respectively. Noise from trains and coal-handling equipment.	Small – New 100-foot turbine building, 230-foot exhaust stack.	Small to Large – For new construction, impacts could be similar to Alternative 1 depending on location.
Aquatic ecology	Small - operational history demonstrates small impacts	Small – Impacts would not exceed proposed action.	Small – Impacts would be less than proposed action.	Small to Large – New construction could cause habitat loss due to conversion to industrial use depending on location.

Table 2-4. Comparison of alternatives for license renewal of the Edwin I. Hatch Nuclear Plant (Page 2 of 2).[a]

Resource	Proposed Action	Alternative 1 – Coal-Fired	Alternative 2 – Gas-Fired	Alternative 3 – Import
Groundwater	Small - Withdrawal 130 gpm Operational history demonstrates small impacts	Small – Withdrawal of 6.1 gallons per minute for potable water use.	Small – Impacts would be less than proposed action.	Small to Large – New construction could add new source of groundwater withdrawal depending on location.
Land	Small - Land use changes due to license renewal not likely	Moderate – 300 acres for power block construction and coal pile; 600 acres for waste (ash and scrubber disposal).	Moderate – 500 acres for power block construction; 121 acres for pipeline construction.	Small to Large – New construction could convert existing land use to power generation.
Socioeconomic	Small – Changes due to license renewal not likely Bounding analysis indicates 9% decrease in housing availability; loss of less than 0.5% of the available local water supply system capacity; no anticipated impacts to transportation system and education system	Moderate – Temporary increase in impacts during 3-year construction period from 1,500 workers, then impact of loss of tax and employment base due to reduction in HNP workforce from 950 to 220. Small impact to transportation resources due to 4 interruption per day from trains, 5 minutes each, on 2 highways.	Moderate – Temporary increase during 3-year construction period of 500 workers, then impact of loss of tax and employment base due to reduction of size of HNP workforce from 950 to 125.	Small to Large – New construction could introduce worker population impacts on housing and public services depending on location and technology.
Terrestrial ecology	Small – Changes due to license renewal not likely	Moderate – Loss of habitat from construction in forested areas.	Moderate – Loss of habitat from construction in forested areas	Small to Large – New construction could involve loss of habitat due to conversion to industrial use depending on location.
Waste management	Small – Category 1	Moderate – 1.5 million tons of ash and scrubber sludge a year.	Small – Due to little combustion or pollution control byproducts	Small to Large – Depends on technology.

CO = carbon monoxide.
ft^3 = cubic feet.
lb = pound.
NO_x = nitrogen oxides.
scf = standard cubic foot.
SO_x = Sulfur oxides.

a. Category 1 = License renewal environmental issue that NRC has defined as small for all plants (10 CFR Part 51 Subpart A, Attachment B, Table B-1, Footnotes 2 and 3).

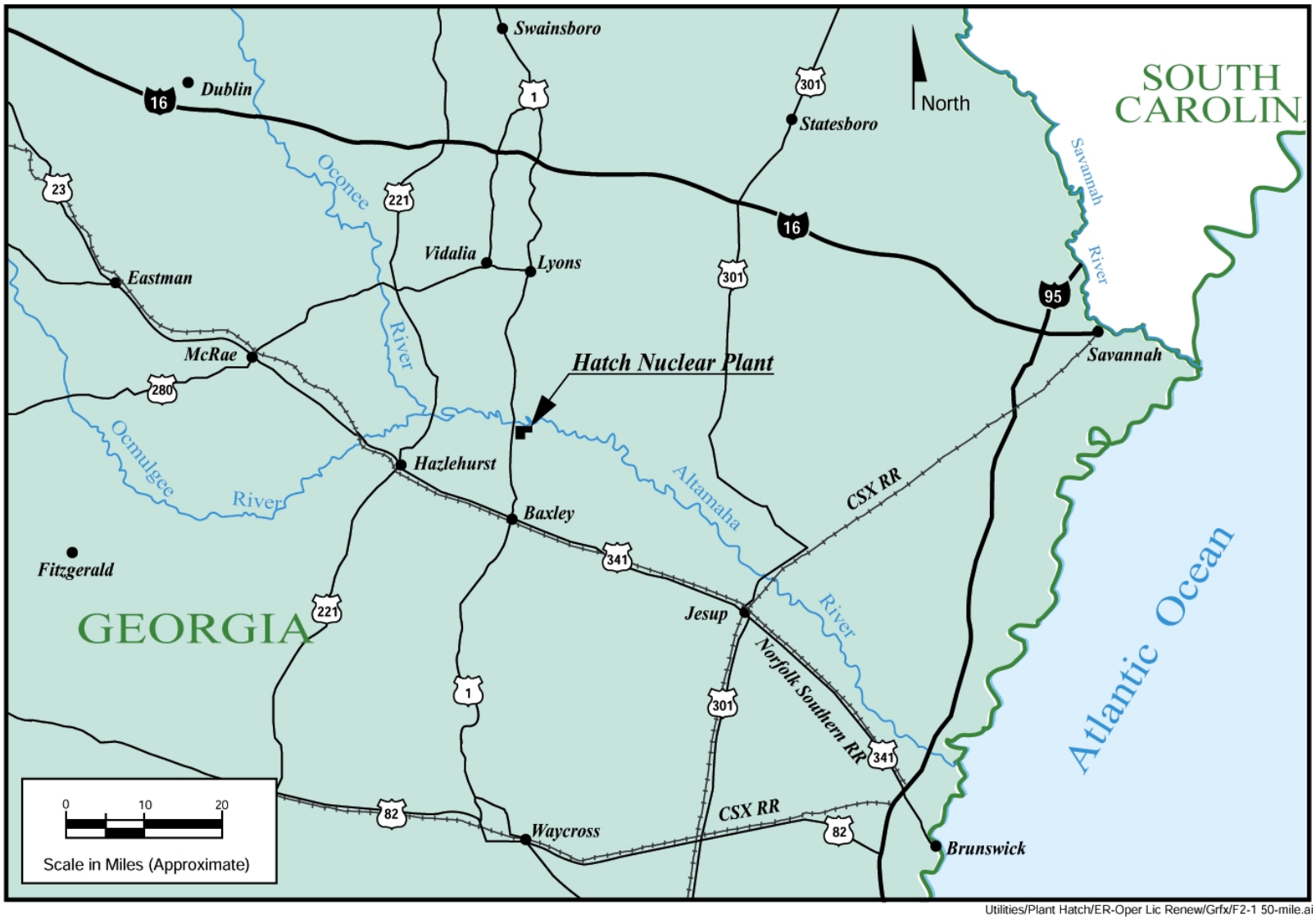

Figure 2-1. Edwin I. Hatch Nuclear Plant, 50-mile region.

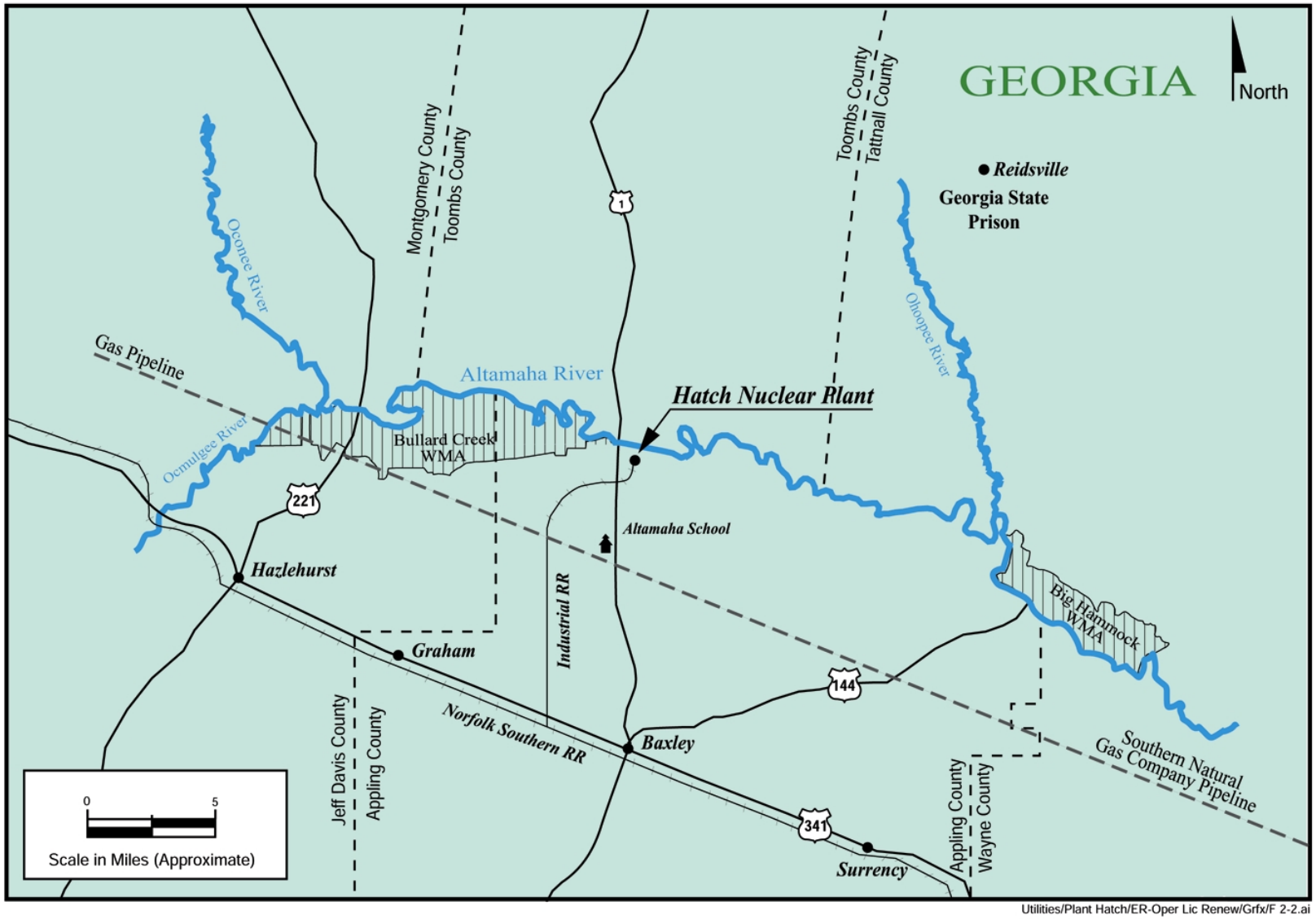

Figure 2-2. Edwin I. Hatch Nuclear Plant, 10-mile region.

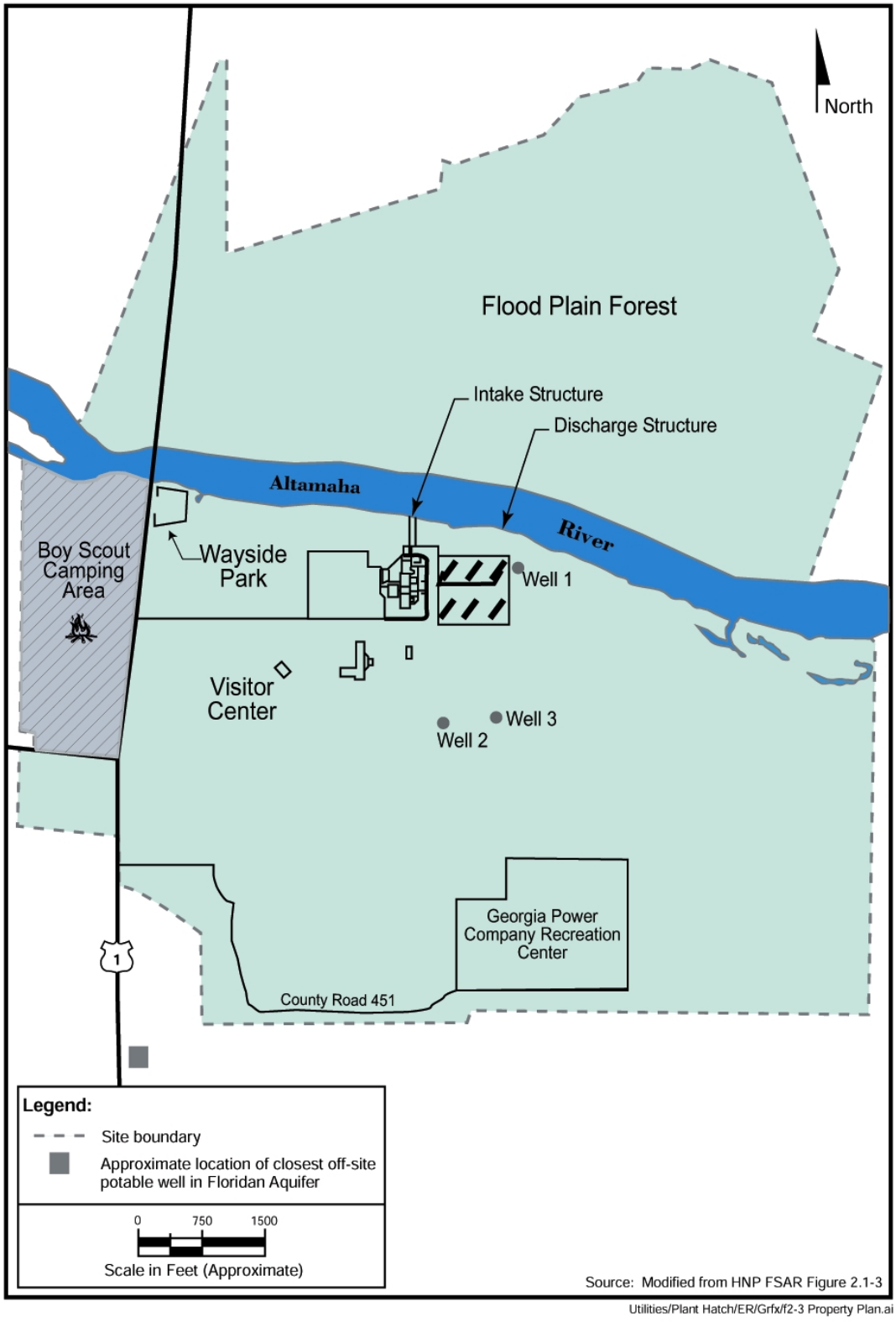

Figure 2-3. Edwin I. Hatch Nuclear Plant property plan

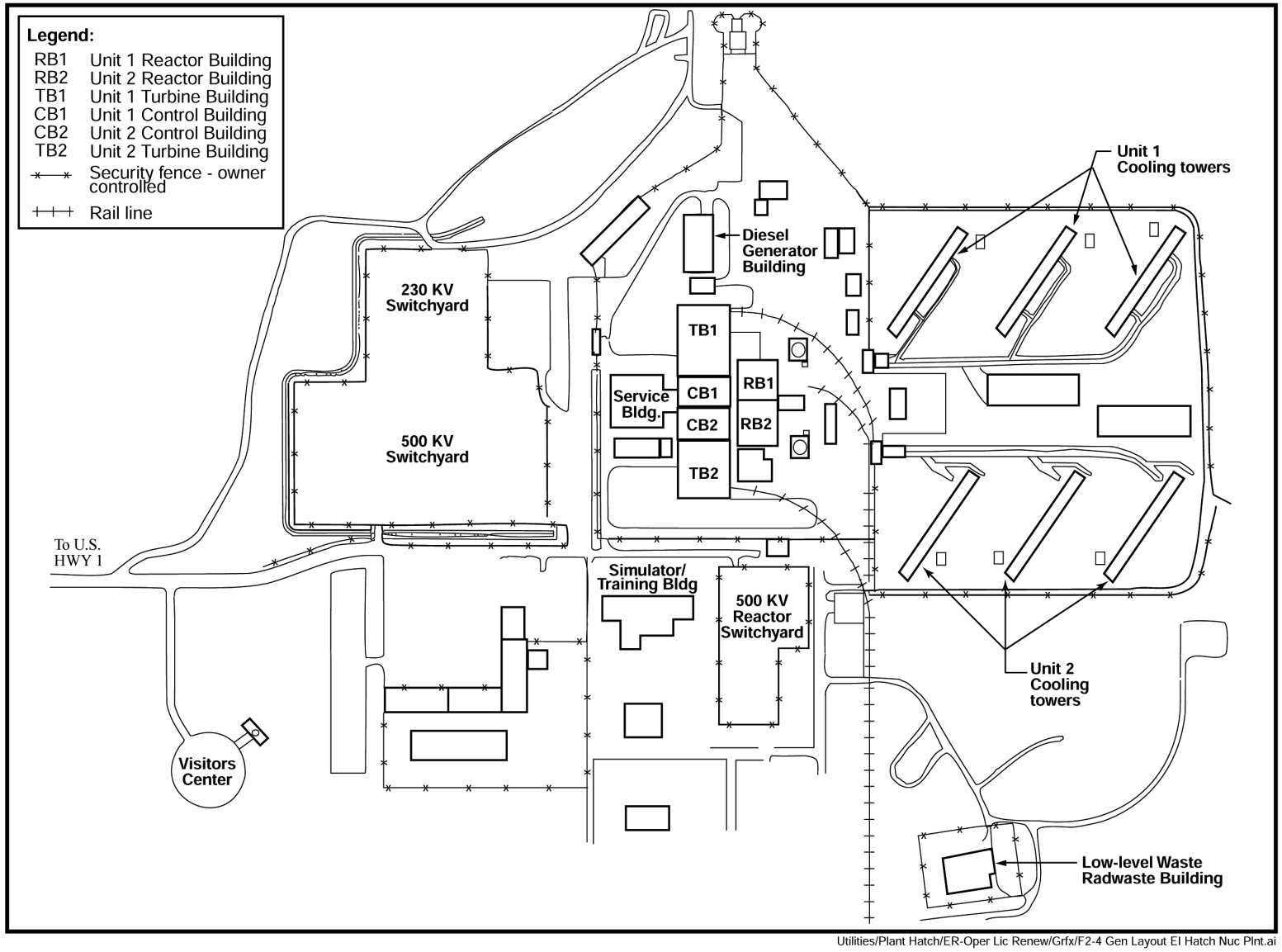

Figure 2-4. Edwin I. Hatch Nuclear Plant site plan.

Figure 2-5. Edwin I. Hatch Nuclear Plant transmission lines.

3.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATING ACTIONS

3.1 PROPOSED ACTION

The proposed action is the renewal of existing NRC licenses for Edwin I. Hatch Nuclear Plant Units 1 and 2.

3.1.1 Introduction

Section 3.1 presents an assessment of the environmental consequences and potential mitigating actions associated with the renewal of Edwin I. Hatch Nuclear Plant's (HNP's) operating license. The scope of this assessment is guided by the U.S. Nuclear Regulatory Commission's (NRC's) generic analysis presented in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS) (Reference 10). Through this analysis, NRC identified 92 environmental issues associated with the action of license renewal. These issues were categorized as Category 1 if the following criteria were met:

- The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristic.

- A single significance level (i.e., small, moderate, or large) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level-waste and spent-fuel disposal).

- Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation.

If the GEIS analysis concluded that one or more of the criteria of Category 1 could not be met, the issue was designated as a Category 2 issue and additional plant-specific review is required to be submitted by the applicant. These issues were listed with assigned categorization in Table B-1 of Appendix B to Subpart A of Part 51. This table has been reproduced and included in Attachment A of this report. For ease of reference, the issues have been numbered by the order in which they are listed in the regulation. Attachment A also provides a cross-reference to the section in this environmental report where each issue applicable to HNP is discussed and provides justification for those issues determined not to be applicable to HNP.

3.1.1.1 Category 1 License Renewal Issues

NRC

The environmental report for the operating license renewal stage is not required to contain analyses of the environmental impacts of the license renewal issues identified as Category 1 issues in Appendix B to subpart A of this part. [10 CFR 51.53(c)(3)(i)]

. . . absent new and significant information, the analysis for certain impacts codified by this rulemaking need only be incorporated by reference in an applicant's environmental report for license renewal . . . . (Discussion of Regulatory Requirements, 61 FR 109, June 5, 1996, pg. 28483)

NRC categorized 69 of the environmental issues related to the license renewal of nuclear power plants as Category 1 issues. Southern Nuclear Operating Company (SNC) having reviewed all Category 1 issues for new and significant information adopts by reference the conclusions of Table B-1 of Appendix B to Subpart A of Part 51 and the GEIS analysis for all Category 1 issues applicable to HNP. Therefore, Section 3 will not include discussion of Category 1 issues.

As discussed in Section 3.1.17, a SNC review of Category 1 issues determined that the conclusions of the GEIS remained valid with respect to Plant Hatch and uncovered no new and significant information regarding the HNP environment or HNP operations.

3.1.1.2 Category 2 License Renewal Issues

NRC

The environmental report must contain analyses of the environmental impacts of the proposed action, including the impacts of refurbishment activities, if any, associated with license renewal and the impacts of operation during the renewal term, for those issues identified as Category 2 issues in Appendix B to subpart A of this part. [10 CFR 51.53(c)(3)(ii)]

The report must contain a consideration of alternatives for reducing adverse impacts, as required by § 51.45(c), for all Category 2 license renewal issues . . . . [10 CFR 51.53(c)(3)(iii)]

NRC categorized 21 environmental issues as Category 2. Based on the characteristics of the HNP site and physical features of the Plant, only those Category 2 issues applicable to HNP will be analyzed in this section. There are five Category 2 issues that do not apply to HNP. These issues and the basis for exclusion are:

Issue	Basis for Exclusion
25. Entrainment of fish and shellfish in early life stages	Not applicable because HNP does not use a once-through heat dissipation system.
26. Impingement of fish and shellfish	Not applicable because HNP does not use a once-through heat dissipation system.
27. Heat shock	Not applicable because HNP does not use a once-through heat dissipation system.
35. Groundwater use conflicts (Ranney wells)	Not applicable because HNP does not use Ranney wells.
39. Groundwater quality degradation (cooling ponds at inland sites)	Not applicable because HNP does not use a cooling pond heat dissipation system.

For each Category 2 issue discussed in the following sections, SNC will state the issue, provide the reason NRC did not conclude it was a Category 1 issue, and explain in the impact analysis how that reason applies to HNP. SNC will complete the analysis by identifying the significance of the impacts relative to HNP and discuss potential mitigative alternatives when applicable and to the extent required. The significance of the impacts associated with each issue will be identified as either small, moderate, or large consistent with NRC's standard of significance established in the GEIS as follows:

- Small – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small.

- Moderate – Environmental effects are sufficient to alter noticeably but not to destabilize any important attribute of the resource.

- Large – Environmental effects are clearly noticeable and are sufficient to destabilize any important attribute of the resource.

3.1.2 Surface Water Use

3.1.2.1 Impacts to Ecological Communities

NRC

If the applicant's plant uses cooling towers or cooling ponds and withdraws make-up water from a river whose annual flow rate is less than 3.15 × 10^{12} ft^3/year (9 × 10^{10} m^3/year), an assessment of the impact of the proposed action on the flow of the river and related impacts on instream and riparian ecological communities must be provided. [10 CFR 51.53(c)(3)(ii)(A)]

This issue has been a concern at nuclear power plants with cooling ponds and at plants with cooling towers. Impacts on instream and riparian communities near these plants could be of moderate significance in some situations. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 13)]

The NRC made surface water use conflicts a Category 2 issue because consultations with regulatory agencies indicate that water use conflicts are already a concern at two closed-cycle plants (Limerick and Palo Verde) and may be a problem in the future at other plants. In the GEIS, NRC notes two factors that may cause water use and availability issues to become important for some nuclear power plants that use cooling towers. First, some plants equipped with cooling towers are located on small rivers that are susceptible to droughts or competing water uses. Second, consumptive water loss associated with closed-cycle cooling systems may represent a substantial proportion of the flows in small rivers (GEIS Section 4.3.2.1). Information to be ascertained includes: (1) Altamaha River flow characteristics, (2) HNP surface water withdrawals, (3) competing water users, and (4) impact of HNP surface water withdrawals on instream and riparian communities.

The Altamaha River is located in southeastern Georgia and drains an area of approximately 11,600 square miles. It is formed by the confluence of the Ocmulgee and Oconee Rivers about 20 miles upstream from HNP and ultimately discharges into the Atlantic Ocean just south of Darien, Georgia, approximately 117 river miles below HNP. The U.S. Geological Survey maintains a gauging station (Number 02225000) on the right bank of the River 400 feet downstream from the U.S. Highway 1 bridge, approximately 0.1 mile upstream from HNP. Attachment B presents river-flow data for this location. Based on 49 years of record, the average annual flow rate at this station is 11,580 cubic feet per second or 3.65 × 10^{11} cubic feet per year (see Attachment B, Equation B.1 for calculation of annual flow rate). Highest monthly flows normally occur in March and lowest monthly flows normally occur in September. The historical single day low flow is 1,620 cubic feet per second. Because the average annual flow rate is less than 3.15 $\times 10^{12}$ cubic feet per year, Issue 13 is applicable to HNP and an analysis is provided below.

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.

Section 2.1.4 describes HNP surface water withdrawals. For the period of 1989 through 1997, HNP withdrew an annual average of approximately 57 million gallons per day from the Altamaha River for cooling. Through the evaporative cooling process, water vapor is lost to the atmosphere ("consumed"), thus the volume of water returned to the river (approximately 25 million gallons per day) is less than the volume withdrawn. Therefore, the average HNP surface water consumption rate is approximately 32.6 MGD. When compared to the average river discharge as measured at gauging station 02225000, the consumptive loss represents 0.44 percent of river flow (Equation B.2). During minimum river discharge periods, the consumptive loss amounts to 3.1 percent (Equation B.3).

The impact of consumptive loss on the downstream riparian communities is associated with the small difference it causes in the river surface elevation. SNC has calculated the reduction in surface water elevation resulting from HNP withdrawals. These calculations are provided in Attachment B. During periods of average river discharge, consumptive loss amounts to about a 0.03 feet decrease (Equation B.4) in the downstream surface elevation. During periods of minimum river discharge, consumptive loss amounts to a lowering of the downstream surface elevation by approximately 0.08 feet (Equation B.5).

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. Based on average daily flows for a 1-month period over the last 22 years, the riparian communities experience an average annual surface elevation fluctuation of approximately nine feet. 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 2-3 months. 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. When the river stage is high enough to flood the riparian communities, the impact of consumptive loss from plant operations is negligible.

Consumptive loss from plant operations during the low flow periods would have the greatest impact on instream biological communities (e.g., mussels and fish) if it occurred during the spawning season. If, for example, a reduction in flow (or river level) were enough to hinder up- or downstream movement of anadromous fish or the movement of resident fish into shallow sloughs and oxbows to spawn there could be a reduction in spawning success. The spawning season for fish in the Altamaha River occurs in the spring and early summer, the period of highest flows in the Altamaha (Attachment B). Since the lowest average daily flow for a 1-month period occurs in September, and the highest average daily flow for a one month period occurs in March, consumptive loss from plant operations is not expected to have any impact on instream communities.

Freshwater mussels vary in their ability to withstand emersion (exposure to air). Some species are adapted to withstand prolonged periods of emersion, while others are emersion-intolerant (Reference 59). Mussels move over and through the substrate by means of a protrusible muscular foot. Some species are known to move several feet per hour in response to stagnant conditions or falling water levels (Reference 60). Other species respond to falling water levels by burrowing more deeply into the substrate, seeking moisture. However, most riverine species have evolved under seasonally-fluctuating water-level conditions and are unaffected by small fluctuations in water level. Under worst-case conditions, consumptive losses would result in a one-inch lowering of water level downstream of HNP. Any impacts to resident mussel communities would be "small" to insignificant.

Based on the analysis presented above, SNC concludes that the appropriate characterization of HNP impacts on ecological communities due to consumptive cooling would be "small." On October 13, 1999 GADNR Wildlife Resource Division provided their concurrence with this conclusion (Attachment C). The impacts would not be detectable or would be so minor that they would neither destabilize nor noticeably alter any important attribute of the resource. Because

SNC and the state have not identified any impacts, SNC also concludes that mitigation is unwarranted.

3.1.2.2 Impacts to alluvial aquifer

NRC

If the applicant's plant uses cooling towers or cooling ponds and withdraws make-up water from a river whose annual flow rate is less than 3.15 × 10^{12} ft^3/year (9 × 10^{10} m^3/year)…The applicant shall also provide an assessment of the impacts of the withdrawal of water from the river on alluvial aquifers during low flow. [10 CFR 51.53(c)(3)(ii)(A)]

Water use conflicts may result from surface water withdrawals from small water bodies during low flow conditions which may affect aquifer recharge, especially if other ground-water or upstream surface water users come on line before the time of license renewal. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 34)]

The NRC made this a Category 2 issue because the significance of the indirect groundwater use conflict resulting from surface water withdrawals could not be determined without site-specific information (GEIS Section 4.8.1.3). Information to be ascertained includes: (1) Altamaha River flow characteristics, (2) HNP surface water withdrawals, and (3) impacts to alluvial aquifer recharge.

A description of the Altamaha River including flow characteristics is provided in Section 3.1.2.1. Since the average flow (3.65 × 10^{11} cubic feet per year) is less than NRC's threshold criteria, an analysis of surface water withdrawals on the alluvial aquifer recharge is provided.

The alluvial aquifer at the site is primarily south of the River within the facility boundary, and consists of approximately 55 feet of poorly-sorted sand, gravel, and clay. The alluvial aquifer contains groundwater under water table conditions. Clayey soils dominate in the upper portion of the aquifer. Recharge to the aquifer is mainly through the infiltration of local precipitation. Recharge is also provided in a limited amount by discharge from the Altamaha River during high stages and by the minor confined aquifer of the Hawthorn Formation, to which the alluvium is hydraulically connected. Groundwater typically discharges to the Altamaha River. Although no aquifer data exist for the unit, the alluvium in the region is considered to be a large potential source of water.

Based on the information given in Section 3.1.2.1, the consumptive use by the facility was expected to lower the river by 0.08 feet during periods of minimum river discharge. During periods of average river discharge, consumptive losses amount to a 0.03 feet decrease in the downstream surface elevation. This small change in the level of the river would not appreciably alter the gradient of the groundwater flowing from the alluvial aquifer to the river.

Therefore, SNC has concluded that surface water withdrawal impacts to the alluvial aquifer recharge (Issue 34) is small. The impacts would not be detectable or would be so minor that they would neither destabilize nor noticeably alter any important attribute of the resource, and therefore, would not warrant mitigation.

3.1.3 Groundwater Use

NRC

If the applicant's plant . . . pumps more than 100 gallons (total onsite) of ground water per minute, an assessment of the impact of the proposed action on ground-water use must be provided. [10 CFR 51.53(c)(3)(ii)(C)]

Plants that use more than 100 gpm may cause ground-water use conflicts with nearby ground-water users. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 33)]

The NRC made this a Category 2 issue because it could not assign a single significance level (small, moderate, or large), and because, if there were moderate or large impacts, mitigation might be warranted. The effect of groundwater use on neighboring groundwater users would depend on the rate of withdrawal and the distance to the neighboring well (GEIS Section 4.8.1.1). Therefore, information to be ascertained includes: (1) HNP groundwater withdrawal rate (whether greater than 100 gallons per minute); (2) distance to neighboring well(s); and (3) impact on the neighboring well(s).

As described in Section 2.1.5, HNP withdraws an average of 126 gallons per minute, making this issue applicable to HNP. The following discussion describes the site geohydrology and local groundwater use and provides a discussion of the potential impacts to offsite users as a result of continued operations.

Geology and groundwater hydrology are described in Sections 2.4 and 2.5 of the Final Safety Analysis Report for HNP Unit 2 (Reference 32) and are summarized below. The HNP site lies within the Coastal Plain physiographic province and is underlain by approximately 4,000 feet of relatively unconsolidated Mesozoic and Cenozoic sand, gravel, clay, marl, claystone, sandstone, and limestone. These strata overlying 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 of interest at the site, 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. These formations and the aquifers they comprise are described in Table 3-1.

The alluvial aquifer is described in Section 3.1.2.2. The perched water aquifer at the site (Brandywine) is approximately 10 feet thick. This aquifer is recharged through direct precipitation. A few springs exist approximately 1.5 miles southwest of the Site at the base of the Brandywine. 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 45 to 50 feet thick and yields less than 10 gallons per minute. 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 14 to 80 feet per mile. High-clay-content soils near the top of the aquifer and at 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 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 23 feet per mile to the north, toward the Altamaha River. The aquifer unit is approximately 65 feet thick and can yield up to 10 gallons per day. A confining unit separates the minor confined aquifer from the underlying aquifer.

The principal artesian aquifer (Floridan) beneath the Site, and the aquifer of major interest, is approximately 1,000 feet thick. Recharge to the aquifer is about 60 miles 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 by a confining unit that prevents the vertical migration of groundwater. The Floridan Aquifer also has a higher potentiometric head than the overlying aquifers. The presence of the higher potentiometric head also prevents a downward migration of groundwater.

Site Wells Number 1 and Number 2, described in Section 2.1.5, are screened to the principal artesian (Floridan) aquifer. During HNP construction, pump tests were conducted to determine the groundwater characteristics for this unit. The wells pumped for 9 hours at rates of 752 gallons per minute (Well Number 1) and 797 gallons per minute (Well Number 2). Drawdown in the wells stabilized at 5 feet in Well Number 1 and 8 feet in Well Number 2. The results of the pumping tests indicated a specific capacity of 100 to 125 gallons per day per foot of drawdown within the well (Reference 32). Based on published literature, the transmissivity in the vicinity of the Site is approximately 130,000 gallons per day per foot, and the effective permeability is 0.1 and 0.2 feet per minute (Reference 32). Data gathered during pumping tests and existing data for this aquifer indicate that a properly designed well installed within this aquifer unit can safely yield over 1,100 gallons per minute. A third site well, Well 3 was added to supply domestic water to the recreation facility. The well yield for Well 3 (less than 1,000 gallons per day) will not significantly impact the water usage of the aquifer.

Within the immediate vicinity of the Site, 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 well to the Site boundary that is screened to the principal aquifer is located approximately 1,000 feet 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 10 miles 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 4 wells withdrawing approximately 850,000 gallons per day from the principal aquifer.

As described above, each of the onsite production wells is capable of producing approximately 750 gallons per minute. The pump test conducted during construction demonstrated that at this rate of pumping there was no interference between Site Wells 1 and 2. These two wells are located approximately 1,780 feet apart; therefore, the effective radius is conservatively assumed to be approximately 2,000 feet. The onsite well closest to the facility boundary is Well 1 at approximately 3,400 feet. Based on the conservative pumping rate of 750 gallons per minute and a conservative effective radius of 2,000 feet, the resulting drawdown in Well 1 would not extend to the facility boundary. Given that the actual plant groundwater requirements (126 gallons per minute) are about one fifth of that used to determine the effective radius, the drawdown of the groundwater potentiometric surface attributable to plant operations would be substantially less than that demonstrated by the original site pump test data, creating no interference with offsite wells.

The site production wells are located in the Floridan Aquifer. This aquifer unit is isolated geologically from the minor confined aquifer by a confining unit that is approximately 100 feet thick. Since monitoring began at the facility in 1969, there has been little to no fluctuation of the water level in the minor confined aquifer. Water levels in the unconfined aquifers have been

observed to vary according to normal seasonal fluctuations. There have been no observed effects in the monitoring wells installed in the shallow on-site aquifers from the pumping of groundwater from the Floridan on-site wells.

Due to the high potential yields the Floridan aquifer is capable of producing and the low production yields required by HNP, the Plant will have little to no effect on the aquifer. There is some limited domestic and agricultural use of groundwater in rural areas surrounding the site, but no groundwater use conflicts have been identified. SNC has concluded that HNP groundwater-use impacts (Issue 33) would be small. The impacts would not be detectable or would be so minor that they would neither destabilize nor noticeably alter any important attribute of the groundwater resources. Given the fact that groundwater usage during the period of continued operations would not have a noticeable impact boundary in the Floridan Aquifer at the Site and would not alter offsite groundwater usage either in the Floridan or the shallower aquifers, SNC has also concluded that mitigation measures would not be warranted.

3.1.4 Terrestrial Resources

NRC

The environmental report must contain an assessment of ". . . the impact of refurbishment and other license-renewal-related construction activities on important plant and animal habitats." [10 CFR 51.53(c)(3)(ii)(E)]

Refurbishment impacts are insignificant if no loss of important plant and animal habitat occurs. However, it cannot be known whether important plant and animal communities may be affected until the specific proposal is presented with the license renewal application. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 40)]

If no important resources would be affected, the impacts would be considered minor and of small significance. If important resources could be affected by refurbishment activities, the impacts would be potentially significant. (GEIS Section 3.6)

The NRC made impacts to terrestrial resources a Category 2 issue because the significance of ecological impacts cannot be determined without considering site-specific and project-specific details (GEIS Section 3.6). Aspects of the site and the project to be ascertained are: (1) the identification of important ecological resources; (2) the nature of refurbishment and other license-renewal-related construction activities; and (3) the extent of impacts to plant and animal habitat.

HNP Site and Environs

The HNP site consists of two tracts of land, an approximately 900-acre parcel north of the Altamaha River in Toombs County and a 1,340-acre parcel south of the Altamaha River in Appling County (see Figure 2-3). Of the 2,240 total acres that make up the site, approximately 300 acres are committed to generation facilities, parking lots, laydown areas, roads, and maintenance facilities. Approximately 350 acres are comprised of wetlands and transmission corridors. Approximately 1,600 acres are actively managed for wildlife and timber production. GPC prepared a comprehensive land management plan for HNP in 1987. The plan recommended land management practices (e.g., controlled burning and timber thinning) to enhance forest productivity while at the same time preserving the aesthetic qualities of the site and improving wildlife habitat. In 1994, in recognition of its successful natural resources management programs, HNP was awarded the Wildlife Habitat Council's Corporate Wildlife Habitat Certification.

The HNP site includes four basic ecological community types: wetlands, deciduous floodplain forests, upland areas, and pine plantations. The largest wetland area, more than 100 acres, lies just east of the generating facilities and consists of beaver ponds and blackwater sloughs with stands of cypress and blackgum. Wildlife found in wetland areas of the HNP site include amphibians (e.g., spring peeper and bullfrog), reptiles (e.g., Florida cooter and yellowbellied slider), semi-aquatic and terrestrial mammals (e.g., beaver and swamp rabbit), wading birds (e.g., great blue heron and little blue heron), and waterfowl (e.g., wood duck and mallard duck).

Deciduous floodplain forests of the HNP site include some 700 acres of blackgum, cypress, oaks, and hickories in the floodplain of the Altamaha River. The floodplain forests provide habitat for a variety of reptiles (e.g., Eastern cottonmouth "moccasin" and snapping turtle), songbirds (e.g., hermit thrush and summer tanager), birds of prey (e.g., great horned owl and barred owl), terrestrial mammals (e.g., opossum and raccoon), and semi-aquatic mammals (e.g., muskrat and river otter).

Upland areas include old fields and pine forests south and southwest of the generating facilities in various stages of succession, most of which are former agricultural lands and areas disturbed by construction activities in the 1960s and 1970s. Wildlife species characteristic of these dry upland areas include a variety of reptiles (e.g., six-lined racerunner and black racer), ground-nesting and ground-foraging birds (e.g., common bobwhite and mourning dove), and mammals (e.g., cotton rat, eastern cottontail rabbit, red fox, gray fox, and white-tailed deer). Several hundred acres of pines, including native longleaf pine, have been planted in these formerly agricultural upland areas. Georgia Power Company's goal is to re-establish the longleaf pine-wiregrass communities that were historically found in the sandhills and coastal plain of South Georgia.

Planted pines occupy roughly 400 acres of the HNP site, mostly south and southwest of the generating facilities. These pine plantations are dominated by loblolly pine, with an understory of grasses and forbs. Characteristic wildlife of these pine forests include reptiles (e.g., pine snake and gopher tortoise), songbirds (e.g., pine warbler and prairie warbler), woodpeckers (e.g., red-bellied woodpecker and yellow-shafted flicker), small mammals (e.g., fox squirrel and grey squirrel), and larger mammals (e.g., white-tailed deer).

Additional descriptions of the HNP site and its terrestrial resources may be found in the Final Environmental Statement for Edwin I. Hatch Nuclear Plant Unit 1 and Unit 2 (Reference 4), the *Edwin I. Hatch Nuclear Plant Unit Number 2 Environmental Report* (Reference 3) and the *Final Environmental Statement Related to Operation of Edwin I. Hatch Nuclear Plant Unit 2* (Reference 5).

HNP Transmission Corridors

As noted previously in Section 2.1.6, GPC built four transmission lines to connect HNP to the transmission system. Two additional lines were added in 1981 to support an expansion of the transmission system to Florida. These six transmission lines, which occupy four transmission line corridors, provide approximately 7,200 acres of potential wildlife habitat. Approximately 340 miles of transmission corridors are associated with HNP. The standard width of the 500-kV transmission corridors is 150 feet. The 230-kV transmission corridors are 125 feet wide, while the 115-kV corridors are 100 feet wide. Where the corridors overlap, the widths can be added together minus 25 feet (e.g., a 150-foot wide corridor plus a 125-foot wide corridor minus 25 feet equals 250 feet) to approximate the overall width.

The transmission corridors pass primarily through the Coastal Plain physiographic province with the western portion of one transmission corridor (Bonaire) potentially reaching into the sandhills province. Sandy soils and flat-to-gently rolling terrain largely characterize these regions. Low hills and broad shallow valleys can be found in the more deeply dissected sandhills region. The slope, aspect, and underlying substrate of these soils play a significant role in determining the assemblage of plants and animals that are likely to occur in a given area. Because of the

substantial length of the transmission corridors and the number of different directions they take from the HNP, they potentially transect a wide array of geophysical conditions that occur in the Coastal Plain of Georgia. The HNP transmission corridors pass through a number of different habitat types. Excluding those of a developed character (e.g., urban and suburban areas, agricultural areas), these habitats include pine flatwoods, pine plantations, pine-oak woodlands, longleaf pine/wiregrass communities, sandhills, floodplain/bottomland forests, swamps, marshes, seepage slopes, and abandoned (old) fields.

The Bonaire transmission corridor traverses portions of the Ocmulgee Wildlife Management Area at locations approximately eight and 10 miles northwest of Cochran, Georgia. The Thalmann transmission corridor crosses the western edge of Paulk's Pasture Wildlife Management Area near the Thalmann substation. The Florida transmission corridor traverses the southwestern portion of the Little Satilla Wildlife Management Area immediately southeast of Offerman, Georgia. There are no other wildlife sanctuaries, refuges, or preserves on the transmission corridors. These corridors do not cross any "critical habitats" as defined in Section 7 of the Endangered Species Act.

Georgia Power Company currently participates in a wildlife management program with GADNR on transmission line corridors. "The Wildlife Incentives for Non-Game and Game Species" (WINGS) program is designed to help land users convert Georgia Power transmission corridors into productive habitat for wildlife. WINGS offers grant money and land management expertise to landowners, hunting clubs, and conservation organizations who commit to participating in the program for 3 years. Georgia Power Company is one of two utilities funding the WINGS program in Georgia.

As described in Section 2.1.7, SNC has no plans to perform major refurbishment activities during the license renewal period; therefore, no refurbishment or other license-renewal-related construction activities would impact important plant and animal habitats. Because no major plant refurbishment activities are anticipated, no further analysis of impacts to terrestrial resources (Issue 40) is required. SNC notes that the HNP terrestrial environment would realize a positive impact from the continuation of existing habitat management programs. On-going habitat management programs are described more fully in the section that follows.

3.1.5 Threatened and Endangered Species

NRC

The environmental report must contain an assessment of ". . . the impact of the proposed action on threatened and endangered species in accordance with the Endangered Species Act." [10 CFR 51.53(c)(3)(ii)(E)]

Generally, plant refurbishment and continued operation are not expected to adversely affect threatened or endangered species. However, consultation with appropriate agencies would be needed at the time of license renewal to determine whether threatened or endangered species are present and whether they would be adversely affected. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 49)]

The NRC made impacts to threatened and endangered species a Category 2 issue because the status of many species is being reviewed, and site-specific assessment is required to determine whether any identified species could be affected by refurbishment activities and continued plant operations through the renewal period. In addition, compliance with the Endangered Species Act may require consultation with the appropriate Federal agency (GEIS Section 3.9 and 4.1).

Background

The (1978) FES for operation of HNP Unit 2 lists 11 amphibian and reptile species, 31 bird species, and 11 mammal species found on the HNP site (Reference 5). It notes that one terrestrial species (presumably the gopher tortoise) is "rare or endangered," but does not identify the species. The FES concludes that operation of HNP would have no effect on terrestrial wildlife, including sensitive species. The shortnose sturgeon (*Acipsenser brevirostrum*) was the only state- or Federally-protected aquatic species known to occur in the Altamaha River in the vicinity of the HNP site when the FES was prepared. One adult shortnose sturgeon and two larval sturgeon of unidentified species were collected during three years (1972-1975) of pre- and post-operational monitoring in the vicinity of HNP (Reference 5). Based on impingement and entrainment studies conducted over the 1974-1975 period (when Unit 1 was operating), the (1978) FES concluded that losses of adult fish and ichthyoplankton due to operation of both units at HNP would not be significant, even during low flow periods. No shortnosed sturgeon (adult, juvenile, larval, or egg) were identified in the impingement and entrainment studies. The FES also concluded that because the thermal (discharge) plume produced under two-unit operation would be small and restricted to a surface layer it would not present a barrier to migrating fish, such as the shortnose sturgeon. Subsequent data collected during 1980 confirmed that operation of two units have minimal impact on fish and icthyoplankton (Reference 58).

NRC evaluated potential impacts to threatened and endangered species of an 8 percent power uprate in 1997 and concluded in an Environmental Assessment that "…conclusions of the FES relative to impact on terrestrial ecology, including endangered or threatened plant or animal species, remain valid for extended power uprate" (63 FR 53473-53478, October 5, 1998). Similarly, the Environmental Assessment concluded that the proposed power uprate would not alter the findings of the FES including impingement and entrainment or the potential for the thermal plume to block up- and downstream movement of anadromous fish (including sturgeon).

In order to update a number of surveys and studies of benthic macroinvertebrates, fish, and wildlife conducted over more than 30 years and summarized in a number of unpublished documents and government reports, SNC in 1998 commissioned surveys of state- and Federally-listed plant and animal species on the HNP site and its transmission corridors. These surveys, described in an *Environmental Field Survey Plan* (Reference 33) were intended to: (1) identify listed species on the HNP site and its transmission corridors and (2) provide a sound basis for the assessment of potential impacts (of plant refurbishment activities and continued operations) to these species. Because of the unique status of the Altamaha River and concern about its freshwater mussel populations (see Attachment C-2), SNC in 1998 also included a survey of mussels in a 12-mile reach of the river up- and downstream of HNP in the environmental field surveys (Reference 33).

For the purposes of the surveys, "listed" species were to include species that the USFWS has listed or proposed for listing as threatened or endangered and species that GADNR has listed or proposed for listing as endangered, threatened, rare, or unusual. Although the NRC guidance (at 10 CFR 51.53) only requires licensees to assess the potential impacts of continuing operation on Federally-listed threatened and endangered species, species listed by GADNR (as endangered, threatened, rare, or unusual) were included in the survey plan in accordance with SNC's corporate commitment to environmental stewardship.

When certain plant species known to be of concern to GADNR but not formally assigned one of four "status designations" (i.e., endangered, threatened, rare, or unusual) were observed by biologists conducting field surveys, they were also documented. Information relating to the occurrences of species protected by the state of Georgia or known to be of special interest to GADNR's Natural Heritage Program (e.g., the Ohoopee bumelia, *Sideroxylon* sp., which has no special status at present) was provided to GADNR in the form of Special Concern Animal Observation Sheets and Special Plant Data Sheets.

Prior to the 1998-1999 surveys, the most recent survey of sensitive plant and animal species at the HNP site was conducted by the Nature Conservancy of Georgia in 1994 (Reference 54). The Nature Conservancy surveys focused on upland areas (primarily pine stands) and did not include transmission line corridors. Records of state- and Federally-listed plants within the transmission corridors are maintained by Georgia Power Company (Reference 66) and the Georgia Natural Heritage Program (Reference 67). No plants listed or proposed for listing by USFWS as endangered or threatened have been recorded on the HNP site, and none were discovered during the 1998-1999 surveys. No plants listed or proposed for listing by GADNR as endangered, threatened, rare, or unusual were previously recorded on the HNP site. A small population of the yellow pitcher plant (*Sarracenia flava*), a species listed as "unusual" by GADNR, was discovered at the HNP site during the 1998-1999 surveys. No other state-listed plants were discovered at the HNP site during the 1998-1999 surveys.

Prior to the 1998-1999 surveys, there were four documented occurrences of state- and Federally-listed plant species along the transmission line corridors: the yellow pitcher plant, the hooded pitcher plant (*Sarracenia minor*), the cutleaf beardtongue (*Penstemon dissectus*), and the hairy rattleweed (*Baptisia arachnifera*). Both pitcher plant species are listed by GADNR as "unusual," while the cutleaf beardtongue is listed by GADNR as "rare." Hairy rattleweed is listed by both GADNR and USFWS as "endangered." The single previously recorded population of hooded pitcher plant on the North Tifton corridor (Reference 66) was not located during the 1998 – 1999 surveys. The single previously recorded population of cutleaf beardtongue on the Thalmann corridor (Reference 66) was located during the surveys. Single previously recorded populations of yellow pitcher plant and hooded pitcher plant on the Thalmann corridor (Reference 66) were not verified during the 1998 - 1999 surveys. According to GADNR-Georgia Natural Heritage Program records (Reference 67), a population of hairy rattleweed was found in 1980 in the vicinity of the Thalmann corridor; it is not known if the population was actually in the corridor or in open woods nearby. These three recorded populations were in (or near) a portion of the corridor that was mowed immediately prior to the 1998-1999 surveys as part of routine corridor maintenance. As a result, plant surveys were not conducted in this portion of the transmission corridor.

No Federally-listed plants were found during the 1998-1999 surveys of the 2,240 acre HNP site and associated transmission line corridors (Reference 65). One plant species, *Sarracenia flava*, listed as "unusual" by GADNR was found on the HNP site proper. Five plant species listed as "threatened", "rare," or "unusual" by GADNR were observed in transmission line corridors. These included *Sarracenia psittacina* (threatened; found in 2 locations in two transmission corridors), *Balduina atropurpurea* (rare; found in 5 locations in 3 transmission corridors), *Penstemon dissectus* (rare; found in a single location), *Sarracenia flava* (unusual; found in 12 locations in 4 transmission corridors), and *Sarracenia minor* (unusual; found in 14 locations in 5 transmission corridors). Further details on these surveys and their findings can be found in *Threatened and Endangered Species Surveys: E. I. Hatch Nuclear Plant and Associated Transmission Line Corridors (1998-1999)* (Reference 65).

No Federally-listed wildlife species were found on the HNP site during the 1998-1999 surveys, but several state-and Federally-listed species were observed in (or evidence of these species was found) or adjacent to existing transmission line corridors. The shed skin of an Eastern indigo snake (listed as "threatened" by USFWS and GADNR), was found in one location in the North Tifton corridor (see Figure 2-5). American alligators (listed as "threatened due to similarity of appearance" by USFWS), were observed at survey locations in 3 transmission corridors. Red-cockaded woodpeckers (listed as "endangered" by USFWS and GADNR) were observed at two locations adjacent to the Duval transmission corridor. Bachman's sparrows (listed as "rare" by GADNR) were observed at locations in two transmission corridors, Duval and Thalmann. Two Federally-listed species not recorded in the 1998-1999 surveys, the threatened bald eagle and endangered wood stork, have been observed by GPC biologists and natural resources managers in the general area of HNP, but neither species is believed to nest in the vicinity of the Plant. Bald eagles have been seen foraging along the Altamaha River upstream and downstream of

HNP. Wood storks have been observed in a beaver pond wetland just east of the HNP cooling towers. The survey report (Reference 65) contains more detailed information on these species, their preferred habitats, and occurrences on SNC-managed lands.

A September 25-26, 1998 survey of the freshwater mussel community in a 12-mile reach of the Altamaha River in the vicinity of HNP documented viable populations of 12 mussel species (Reference 56). Collections were dominated by species that are endemic to the Altamaha River system and species that are considered "Species of Concern" by the USFWS and GDNR because the status of their populations is not known. None of the mussel species collected was state or Federally listed.

Based on historical information and the 1998-1999 surveys, SNC developed a list of state- and Federally-listed species that are known to occur (or believed to occur, based on substantial and credible evidence) on the site, its transmission corridors, or in the Altamaha River adjacent to the HNP site (see Table 3-2). As noted previously, these include species that the USFWS has listed (or proposed for listing) as threatened or endangered and species that GADNR has listed (or proposed for listing) as endangered, threatened, rare, or unusual.

Current Efforts to Enhance Wildlife/T&E Species Habitat

Based on a number of initiatives and programs designed to benefit wildlife, HNP applied for and received corporate certification from the Wildlife Habitat Council in 1994. The Wildlife Habitat Council cited HNP and SNC for a number of successful habitat enhancement projects on the HNP site including: (1) installation and monitoring of nest boxes for songbirds (eastern bluebirds and great-crested flycatchers), barred owls, American kestrels, and wood ducks; (2) establishment and maintenance of food and cover plots for white-tailed deer and eastern wild turkey; (3) the implementation of an extensive reforestation effort with the planting of approximately 1,200 cherry-bark and willow oak seedlings, and (4) the initiation of a timber management plan to produce superior (mast-producing) hardwood timber and enhance wildlife habitat (particularly for bobwhite quail, fox squirrel, and the state-listed gopher tortoise) associated with upland pine stands. Upland pine stands will be maintained through long-rotation timber management (40 to 60 years) and prescribed burning in 3- to 5-year intervals. A substantial amount of the native longleaf pine is planned to be re-established on the 900-acre tract north of the Altamaha River in Toombs County (References 68 and 69), and the area is expected to develop into a wiregrass-longleaf pine community. Several pine upland areas have been burned in recent years to enhance the sandy, prairie-like wiregrass habitat preferred by the gopher tortoise. A number of gopher tortoise burrows were observed on the HNP Site during the 1998-1999 surveys (Reference 65) south of the Altamaha River in areas north, northwest, northeast, and east of the HNP Recreation Center, especially in an area that had been recently subjected to a controlled burn. These gopher tortoise burrows provide cover and habitat for a number of other species, including the federally-listed Eastern Indigo snake.

Summary of Impacts of the Proposed Action

There is no evidence to suggest that any threatened and endangered species have been discernibly affected by more than twenty years of two-unit operation of HNP. SNC has no plans to alter current patterns of operation over the license renewal period. As noted in Section 2.1.7, SNC has no plans to significantly modify or expand HNP over the license renewal term; therefore, no impacts are expected to listed plant and animal species from refurbishment activities. In addition, on-going wildlife habitat improvements (such as the longleaf pine-wiregrass restoration efforts described in the previous paragraphs) are expected to benefit upland wildlife (including the state-listed gopher tortoise and the Federally-listed Eastern indigo snake) associated with this unique ecological community. SNC concludes that there would be no refurbishment-related impacts to threatened and endangered species and any operational impacts over the license renewal term would be small.

SNC contacted GADNR, USFWS, and the National Marine Fisheries Service regarding potential impacts of license renewal on threatened and endangered species. Copies of the SNC letters and agency responses are provided in Attachment C.

3.1.6 Air Quality

NRC
If the applicant's plant is located in or near a nonattainment or maintenance area, an assessment of vehicle exhaust emissions anticipated at the time of peak refurbishment workforce must be provided in accordance with the Clean Air Act as amended. [10 CFR 51.53(c)(3)(ii)(F)]
Air quality impacts from plant refurbishment associated with license renewal are expected to be small. However, vehicle exhaust emissions could be cause for concern at locations in or near nonattainment or maintenance areas. The significance of the potential impact cannot be determined without considering the compliance status of each site and the numbers of workers expected to be employed during the outage. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 50)]

The NRC made impacts to air quality during refurbishment a Category 2 issue because vehicle exhaust emissions could be cause for some concern, and a general conclusion about the significance of the potential impact could not be drawn without considering the compliance status of each site and the number of workers expected to be employed during the refurbishment outage (GEIS Section 3.3). Information needed would include: (1) the attainment status of the plant-site area; and (2) number of additional vehicles as a result of refurbishment activities.

A "nonattainment area" is defined in accordance with the Clean Air Act Amendments of 1990 as a locality where air pollution levels persistently exceed National Ambient Air Quality Standards. An area that a state has redesignated from nonattainment to attainment is considered a "maintenance area." The counties in which HNP is located, Appling and Toombs, are classified as in attainment for all criteria pollutants. The nearest nonattainment area for criteria pollutants is Henry County, which is approximately 140 miles northwest of HNP. Henry County, a southeastern suburb of Atlanta, is in nonattainment for ozone. Muscogee County (Columbus, Georgia), approximately 150 miles to the west of HNP, formerly a nonattainment area for lead, was recently redesignated (64 FR 17551-17555, April 12, 1999) an attainment ("maintenance") area. However, current EPA regulations require the state of Georgia (Georgia EPD) to demonstrate continued attainment with the lead NAAQS for at least ten years after the approval of a redesignation to attainment. Because the HNP site is not located in or near a nonattainment or maintenance area, an analysis of impacts to air quality (Issue 50) is not required.

3.1.7 Microbiological Organisms

NRC

If the applicant's plant uses a cooling pond, lake, or canal or discharges into a river having an annual average flow of less than 3.15 × 10^{12} ft^3/year (9 × 10^{10} m^3/year), an assessment of the impact of the proposed action on public health from thermophilic organisms in the affected water must be provided. [10 CFR 51.53(c)(3)(ii)(G)]

These organisms are not expected to be a problem at most operating plants except possibly at plants using cooling ponds, lakes, or canals that discharge to small rivers. Without site-specific data, it is not possible to predict the effects generically. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 57)]

NRC designated impacts on public health from thermophilic organisms a Category 2 issue because the magnitude of the potential public health impacts associated with thermal enhancement of *Naegleria fowleri* could not be determined generically. NRC noted in the GEIS that impacts of nuclear plant cooling towers and thermal discharges are considered to be of small significance if they do not enhance the presence of microorganisms that are detrimental to water quality and public health (GEIS Section 4.6). Information to be ascertained includes: (1) thermal discharge temperature, (2) thermal characteristics of the Altamaha River, (3) thermal conditions for the enhancement of *N. fowleri*, and (4) impacts to public health.

The NRC requires [10 CFR Part 51.53(c)ii(G)] an assessment of the potential impact of thermophilic organisms on the health of recreational users of receiving waters if a nuclear plant uses cooling ponds, cooling lakes, or cooling canals or discharges to a river with an average annual flow rate of less than 3.15×10^{12} cubic feet per year. Because the average discharge for the Altamaha River is 3.65×10^{11} cubic feet per year, NRC considers it a small river, making this issue applicable to HNP.

The Watershed Planning and Monitoring Program of the Environmental Protection Division (EPD) of GADNR was consulted about the possible presence of thermophilic pathogens in the HNP discharge. A copy of the consultation letter is provided in Attachment E. EPD was asked to provide information (including the results of any studies or reconnaissance) on the possible occurrence of pathogenic thermophilic microorganisms in the heated effluent of HNP and guidance on concentrations of these organisms that are considered hazardous to public health. Organisms of concern include the enteric pathogens *Salmonella* and *Shigella*, the *Pseudomonas aeruginosa* bacterium, gram-positive Actinomycetes "fungi," the many species of *Legionella* bacteria, and pathogenic strains of the amoeba *Naegleria*.

EPD has not conducted any studies of thermophilic microorganisms in the HNP discharge and has not set state standards for any of the aforementioned organisms. The only state water quality standard for microorganisms in the Altamaha River (which is classified by EPD as a "Fishing" stream, with water quality suitable for "propagation of fish, shellfish, game, and other aquatic life") applies to fecal coliforms, which are not to exceed 200 organisms per 100 milliliters (geometric mean of at least four samples) between May 1 and October 31 or 1,000 organisms per 100 milliliters between November 1 and April 30. Fecal coliform bacteria are used by many state agencies, including the EPD of GADNR, as indicators of other potentially harmful waterborne microorganisms. When significant levels of coliforms are found in a water supply, additional testing often is conducted to determine if other potentially pathogenic microorganisms are present.

Thermophilic bacteria generally occur at temperatures of 77 to 176 degrees Fahrenheit (°F), with maximum growth at 122 to 140°F. Pathogenic bacteria have evolved to survive in the digestive

tracts of mammals and, accordingly, have optimum temperatures of around 99°F (Reference 38). Pathogenic protozoans such as *Naegleria fowleri* have maximum growth and reproduction at temperatures ranging from 95 to 113°F and are rarely found in water cooler than 95°F (Reference 39).

HNP discharge temperatures are monitored weekly by plant personnel and reported to EPD on a quarterly basis. Discharge temperatures range from 60 to 94°F when the plant is operating, with highest temperatures occurring in summer (see Table 2-1). During summer months, when thermophilic organisms are most likely to be present, discharge temperatures have averaged 85.0°F (June), 88.9°F (July), and 88.2°F (August) over the last two years.

HNP discharge temperatures are always below those known to be optimal for growth and reproduction of pathogenic microorganisms but could theoretically permit limited survival of these organisms in summer months. Temperatures in the Altamaha River immediately downstream of the HNP discharge structure are several degrees cooler than those in the immediate area of the discharge outfall (Reference 5) and therefore under normal circumstances would not support the survival of these pathogenic organisms.

Another factor limiting concentrations of pathogenic microorganisms in the HNP discharge is the absence of a seed source or inoculant. Wastewater, whether domestic sewage or industrial wastewater, is usually the source of pathogens in natural waters. The sewage treatment facility at HNP originally consisted of two packaged secondary treatment plants (Plants #1 and #2), each capable of treating 7,500 gallons per day (Reference 3). In 1990, the sewage treatment plant was expanded and upgraded to accommodate an increased sewage treatment demand. The modernized Plant Hatch sewage treatment plant system consists of two 35,000 gallons per day extended aeration activated sludge treatment plants (Plants #3 and #4) which are normally operated in parallel to treat wastewater from site restrooms, shower facilities, and other non-industrial sources. The total discharge flowrate from the two systems is approximately 21,000 gallons per day.

Raw sewage from HNP is pumped to a large surge tank upstream of the sewage plant. The surge tank has a screen and comminutor (shredder) at the inlet to the tank which screen out large debris and break up smaller debris. Sewage is pumped from the surge tank to a distribution box from whence the sewage is distributed to Plants #3 and #4. Each plant has a digestor chamber, aeration chamber, and a clarifier. Effluent from the two plants is routed to the chlorine contact chamber, where calcium hypochlorite is applied at a concentration sufficient to control pathogenic organisms. Treated effluent merges with the combined plant waste streams and flows into a mixing chamber (where chlorine levels are monitored once per week) before discharging to the Altamaha River.

Disinfection in the sewage treatment facility reduces coliform bacteria and other microorganisms to levels that meet state water quality standards. As noted previously in Section 2.1.3, the circulating water system is also chlorinated to control microbial organisms. Moreover, there are no major upstream sources of bacterial organisms because the Altamaha River above HNP flows through a largely rural area and receives no substantial discharges of municipal, industrial, or agricultural wastes.

Given the thermal characteristics of the Altamaha River and the HNP discharge, SNC does not expect HNP operation to stimulate growth and reproduction of pathogenic microorganisms in the Altamaha River downstream of the plant. Under certain circumstances, these organisms might be present in the immediate area of the discharge outfall but would not be expected in sufficient concentrations to pose a threat to downstream water users. Many of these pathogenic microorganisms (e.g., *Pseudomonas*, *Salmonella*, and *Shigella*) are ubiquitous in nature, occurring in the digestive tracts of wild mammals and birds (and thus in natural waters), but are usually only a problem when the host is immunologically compromised. The thermal

characteristics of the HNP discharge would not promote the growth of microorganisms that are detrimental to water and public health; therefore, SNC concludes that the thermal discharge impacts to human health (Issue 57) would be small and mitigation would not be warranted.

3.1.8 Electric Shock

NRC

The environmental report must contain an assessment of the impact of the proposed action on the potential shock hazard from transmission lines ". . . [i]f the applicant's transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the National Electric Safety Code for preventing electric shock from induced currents . . . . [10 CFR 51.53(c)(3)(ii)(H)]

Electrical shock resulting from direct access to energized conductors or from induced charges in metallic structures have not been found to be a problem at most operating plants and generally are not expected to be a problem during the license renewal term. However, site-specific review is required to determine the significance of the electric shock potential at the site. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 59)]

The NRC made impacts of electric shock from transmission lines a Category 2 issue because without a review of each plant's transmission line conformance with the National Electrical Safety Code (Reference 9) criteria, NRC could not determine the significance of the electrical shock potential. Regulation 10 CFR 51.53(c)(3)(ii)(H) does not define the phrase "transmission line." The GEIS indicates that transmission lines use voltages of about 115 or 138 kilovolt (kV) and higher, and that, in contrast, distribution lines use voltages below 115 or 138 kV (Reference 10 at Section 4.5.1, page 4-59). The GEIS also indicates that the transmission line of concern is that between the plant switchyard and its connection with the existing transmission system (Reference 10 at Section 4.5, page 4-59). Information to be ascertained includes: (1) change in line use and voltage since last analysis; (2) conformance with National Electrical Safety Code (1981) standards; and (3) potential change in land use along transmission lines since initial NEPA review.

Objects located near transmission lines can become electrically charged due to the effect of what is often commonly called static electricity but is more precisely termed an electrostatic field. This charge results in a current that flows through the object to the ground. The current is called "induced" because there is no direct connection between the line and the object. The induced current can also flow to the ground through the body of a person who touches the object. An object that is particularly well insulated from the ground, such as a car on rubber tires, can actually store up an electrical charge, becoming what is called capacitively charged. A person standing on the ground and touching the car receives an electrical shock due to the sudden discharge of the capacitive charge through the person's body to the ground. The intensity of the shock depends on several things, including the following:

- The strength of the electrostatic field which, in turn, depends on the amount of electricity, called voltage, in the transmission line (more voltage = stronger field = larger shock potential)
- The height of the line above the ground, called vertical clearance (less clearance = larger shock potential)
- The size of the object (larger object = larger shock potential)

In 1977, the NESC adopted a provision that identifies how to establish minimum vertical clearances to the ground for electric lines having voltages exceeding 98 kV alternating current to ground[1] (Reference 57). The clearance must limit the induced current[2] due to electrostatic effects to 5 milliamperes if the largest anticipated truck, vehicle, or equipment were short-circuited to ground.[3] The NESC chose this limit as being protective of the health of a person who wears a heart pacemaker. By way of comparison, the shock that one feels on a dry day after walking on a carpet or sliding across a car seat and touching an object is the result of approximately 3 milliamperes of current (Reference 57).

GPC installed the Duval and Thalmann lines in conformance with the 5-milliampere limit but installed the HNP Eastman, Douglas, North Tifton, and Bonaire lines before its adoption by the NESC (see Figure 2-5 for location of lines). At that time, however, the 5-milliampere limit that the Code subsequently adopted was in use by the industry for high voltage lines and GPC used computer modeling in designing the 500-kV North Tifton and Bonaire lines to ensure that the limit was met. However, computer-modeling capabilities have improved greatly since that time and GPC had not modeled the 230-kV Eastman and Douglas lines. For this reason, SNC and GPC have conducted a new evaluation of all of the lines' adherence to the Code's present induced current limit (References 34 and 35). The evaluation is a two-step process in which the analyst first calculates the average strength of the electrostatic field 1 meter (3.28 feet) above the ground beneath the minimum line clearance, and second calculates the induced current value. The lines should be evaluated assuming a final unloaded sag at 120°F.

The largest vehicle that SNC anticipates being under the HNP lines is a tractor trailer parked on a public roadway. The GPC minimum line design vertical clearance, including above a public roadway, at the conductor temperature (120°F) specified by the Code was 33.7 feet for the 230-kV lines and 41.4 feet for the 500-kV lines.[4] GPC entered this input, together with line characteristics such as voltage, current, and conductor position into the Electric Power Research Institute AC/DCLINE program EFION (EPRI/HVTRC) (Reference 36) to obtain electric field strengths, 1 meter above the ground. Assuming a 55-foot object located under, and perpendicular to, the lines (representing a tractor-trailer) the calculated field strength for the 230-kV lines ranged from 0.994 to 2.195 kV per meter, with a maximum average of 1.780 kV per meter. Calculated field strengths for the 500-kV lines range from 3.353 to 6.162 kV per meter, with a maximum average of 4.625 kV.

Using the maximum average field strengths, GPC calculated the steady-state current for a tractor trailer 55 feet long, 8 feet wide, and 13.5 feet high. The resultant values, 1.25 milliamperes for the 230-kV lines and 3.84 milliamperes for the 500-kV lines, are less than the 5-milliampere limit imposed by the Code. Therefore, all the HNP transmission line designs conform to the National Electric Safety Code provisions for preventing electric shock from induced current.

No changes have been made to the lines' voltage since installation and, as described in Section 2.1.6, maintenance practices ensure continued conformance with design specifications. SNC concludes that HNP transmission lines meet the National Electrical Safety Code guidelines for preventing electric shock from induced currents and, therefore, further assessment of the impact of the proposed action on the potential shock hazard is not required. SNC adopts by reference the GEIS conclusion that electrical shock (Issue 59) is of small significance for such lines. Due to the small significance of the issue, mitigation measures, such as installing warning signs at road crossings or, in the extreme, increasing clearances, are not warranted.

1. Part 2, Rules 232C1c and 232D3c.
2. The National Electrical Safety Code and the GEIS use the phrase "steady-state current," whereas 10 CFR 51.53(c)(3)(ii)(H) uses the phrase "induced current." The phrases have the same meaning here.
3. Induced currents can also be caused by electromagnetic fields, but NESC provision is limited to electrostatic effects.
4. 41.4 feet was also the minimum design vertical clearance for the Duval and Thalmann lines.

3.1.9 Housing Impacts

NRC

The environmental report must contain " . . . [a]n assessment of the impact of the proposed action on housing availability . . . ." [10 CFR 51.53(c)(3)(ii)(l)]

Housing impacts are expected to be of small significance at plants located in a medium or high population area and not in an area where growth control measures that limit housing development are in effect. Moderate or large housing impacts of the workforce associated with refurbishment may be associated with plants located in sparsely populated areas or areas with growth control measures that limit housing development. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 63)]

. . . small impacts result when no discernible change in housing availability occurs, changes in rental rates and housing values are similar to those occurring statewide, and no housing construction or conversion occurs. [GEIS Section 4.7.1.1]

The NRC made housing impacts a Category 2 issue because impact significance depends on local conditions that NRC could not predict for all plants at the time of GEIS publication (GEIS Section 3.7.2). Local conditions to be ascertained are: (1) area population categorization as low, medium, or high; and (2) applicability of growth control measures, and (3) vacancy rate for area housing.

This issue addresses housing impacts resulting from refurbishment activities and continued operations. As described in Section 2.1.7, SNC has no plans to perform major refurbishment activities at HNP. SNC concludes that there would be no refurbishment-related impacts to area housing. Therefore, the following discussion focuses on assessing the impacts of continued operations on local housing availability.

Attachment C of the GEIS presents a population characterization method that is based on two factors, "sparseness" and "proximity" (GEIS Section C.1.4). Sparseness measures population density and city size within 20 miles of the site, and proximity measures population density and city size within 50 miles. Each factor has four categories of density and size (GEIS Table C.1), and a matrix is used to rank the population category as low, medium, or high (GEIS Figure C.1). Population in the HNP area was categorized by the NRC as "low" (GEIS Table C.2). Tables 3-3 and 3-4 provide the population distribution for the area surrounding HNP based on 1990 census data. The population density within a 20-mile radius of HNP is approximately 43 persons per square mile[5] and there is no city with a population of 20,000 within 20 miles, giving the site a sparseness Category 2. The population density within a 50-mile radius is approximately 43 persons per square mile and there is no city with a population of 100,000 within 50 miles, giving the site a proximity Category 1. These values combine to give the HNP population a category measure of 2.1; a "low" category as defined by GEIS Figure C.1.

In the GEIS, NRC describes the license renewal term workforce as those personnel on-site during the original operating period plus additional personnel to support the requirement for more frequent surveillance and inspection. NRC analysis of the potential license renewal term workforce requirements demonstrates that only one additional worker will be required on a continuous basis for maintenance and inspection; however, as many as 20 to 60 additional non-outage workers per unit may be required intermittently to perform maintenance and inspections. For the GEIS socioeconomic analyses, NRC assumes as many as 60 additional permanent workers per unit will be required to conduct increased inspection, surveillance, testing, and

5. The calculation for the number of persons per square mile for a 20-mile radius is as follows: 53,680 persons $\div$ [(20 miles)$^2 \times 3.14$] = 42.7 persons per square mile.

maintenance. NRC uses this conservative value to represent an upper bound of the potential socioeconomic impacts.

As described in Section 2.1.7, SNC does not anticipate the need to increase the on-site workforce during the license renewal period and therefore anticipates no housing impacts as a result of license renewal. However to demonstrate the upper bounds of potential impacts to area housing, SNC applies the bounding analytical approach used by NRC in the GEIS with one alteration. As described previously, NRC applied a bounding workforce estimate of 60 license renewal workers per unit to estimate potential housing impacts. SNC anticipates that the increased inspection and maintenance would be performed mostly during outages that generally are staggered so that they do not coincide. Therefore, SNC believes that it is unreasonable to assume that each unit would require an additional 60 workers. Instead, as a reasonably conservative estimate, SNC is assuming that HNP would require a total of 60 additional workers to perform the increased inspection and maintenance activities to support operations through the period of extended operations.

SNC bases the bounding housing analysis on the following assumptions: (1) a total of 60 additional full-time employees through the license renewal period; (2) all direct and indirect jobs would be filled by in-migrating workers; (3) the residential distribution of new workers would be similar to the residential distribution of current workforce; and (4) each new job created (direct and indirect) represents one housing unit. Adding fulltime workers would have the indirect effect of creating additional jobs and related population growth in the community. SNC uses the Georgia employment multiplier (4.0769) (Reference 37) to calculate the total direct and indirect jobs in service industries that would be supported by the spending of the HNP workforce. The addition of 60 license renewal employees would generate approximately 185 indirect jobs. With each new worker (direct and indirect) representing one housing unit, license renewal would generate a demand for 245 housing units.

SNC assumes that the residential distribution of the in-migrating license renewal workers would be similar to the distribution of existing workers. Approximately 71 percent of the HNP workforce reside in Appling and Toombs Counties (Section 2.1.8). Section 2.1.8 illustrates that the number of employees residing in any other one single county is not significant. As shown below, the combined number of housing units for the 2-county area is approximately 16,581 with a vacancy rate of approximately 11 percent (1,900 vacant units) (Reference 40). In this area there are no growth control measures that limit housing development.

County	Housing Units	Vacant Units
Toombs	9,952	1,148
Appling	6,629	795
Total	16,581	1,943

A demand for 174 housing units (71 percent of 245 housing units) would represent a 9 percent decrease in housing availability. SNC does not anticipate the resulting decrease in housing availability for the bounding case scenario (60 additional workers) to create a discernible change in housing availability, rental rates or housing values, or spur housing construction or conversion, and therefore concludes that license renewal impacts to housing (Issue 63) would be small, and would not warrant mitigation.

3.1.10 Public Services, Public Utilities

NRC

The environmental report must contain " . . . an assessment of the impact of population increases attributable to the proposed project on the public water supply." [10 CFR 51.53(c)(3)(ii)(l)]

An increased problem with water shortages at some sites may lead to impacts of moderate significance on public water supply availability. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 65)]

Impacts on public utility services are considered small if little or no change occurs in the ability to respond to the level of demand and thus there is no need to add capital facilities. Impacts are considered moderate if overtaxing of facilities during peak demand periods occurs. Impacts are considered large if existing service levels (such as quality of water and sewage treatment) are substantially degraded and additional capacity is needed to meet ongoing demands for services. [GEIS Section 3.7.4.5]

The NRC made public utility impacts a Category 2 issue because an increased problem with water availability may occur in conjunction with plant demand and plant-related population growth as a result of current water shortages in some areas (GEIS Section 4.7.3.5). Local information needed would be a description of water shortages experienced in the area and an assessment of the public water supply system's available capacity.

The NRC's analysis of impacts to the public water system considers both plant demand and plant-related population growth demand on local groundwater resources. As described in Section 2.1.5, HNP does not use a municipal water supply; therefore, operations do not directly affect any public water supply system. As described in Section 3.1.3, HNP groundwater use does not have a noticeable impact on offsite wells drawing from the Floridan Aquifer. Because plant demand is not expected to alter offsite groundwater use in the Floridan Aquifer, HNP operations is not expected to indirectly impact public water supply systems located in the vicinity of the Plant. Section 3.1.10 focuses on the potential indirect impact resulting from additional workers moving to the area and placing additional demands on public water supply systems.

As described in Section 2.1.7, SNC does not anticipate the need to increase the on-site workforce during the license renewal period and therefore anticipates no impacts to the public water systems as a result of license renewal. However, to demonstrate potential population-related impacts to area public water services, SNC assumes a bounding license renewal workforce of 60 additional full-time workers (described in Section 3.1.9). To determine the license renewal population growth, SNC assumes that (1) all direct and indirect jobs would be filled by in-migrating workers and that (2) each new worker would represent one family. As described in Section 3.1.9, the conservative estimate of 60 additional full time workers could generate as many as 245 direct and indirect jobs. If each new worker represents one new family, the population in the area could increase by approximately 785. SNC also assumes that the residential distribution of the workers would be similar to the current worker distribution provided in Section 2.1.8. Therefore, approximately 560 new residents (71 percent) would be expected to reside in Appling and Toombs Counties.

In Appling County, the municipalities of Baxley and Surrency are the only areas in the County served by public water supply systems. The city of Baxley provides water service within the city and outside the city limits in certain areas through a distribution system that currently utilizes four wells screened to the Floridan Aquifer. These wells are capable of producing approximately 3.1 million gallons per day. The estimated daily demand is approximately 600,000 gallons.

(Reference 46). Considering the current demand, the City of Baxley has approximately 2.5 million gallons per day of available capacity.

The water system serving the Town of Surrency consist of two wells that pump from the Floridan Aquifer and are capable of producing 290,000 gallons per day.

Toombs County has three municipal water supply systems owned and operated by the cities of Lyons, Santa Claus, and Vidalia. All three municipal systems withdraw water from the Floridan Aquifer. The City of Lyons has a capacity of 4.3 million gallons per day. Current demands are 0.70 million gallons per day, giving the City a reserve capacity of 3.6 million gallons per day. The City of Vidalia has a capacity of 4.9 million gallons per day and current demands require 1.98 million gallons per day. Therefore, the City of Vidalia has a reserve capacity of approximately 3 million gallons per day. The City of Santa Claus is served by one well; however, demand data is not available (Reference 52).

For Appling and Toombs Counties combined, the total available capacity is approximately 9.4 million gallons per day. The average American uses between 50 and 80 gallons per day for personal use (Reference 53). Using this consumption rate, the plant-related population increase would generate a demand on public water supply systems of 45,000 gallons per day. This demand represents less than 0.5 percent of the available capacity, assuming that 100 percent of the growth attributable to license renewal were served by these municipal systems. Based on the level of demand that would be placed on the public water systems serving Appling and Toombs Counties, SNC concludes that plant-related population growth would require no additional capacity. The impacts would be small, either not detectable or so minor that they would not destabilize nor noticeably alter any important attribute of the resource. The impacts from the bounding case scenario for projected HNP license renewal-related population growth would be small. Therefore, SNC has also concluded that mitigation, such as lowering of wells, would not be necessary.

3.1.11 Public Services, Education

NRC

The environmental report must contain " . . . [a]n assessment of the impact of the proposed action on . . . public schools (impacts from refurbishment activities only) within the vicinity of the plant . . . ." [10 CFR 51.53(c)(3)(ii)(l)]

Most sites would experience impacts of small significance but larger impacts are possible depending on site- and project-specific factors. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 66)]

. . . small impacts are associated with project-related enrollment increases of 3 percent or less. Impacts are considered small if there is no change in the school systems' abilities to provide educational services and if no additional teaching staff or classroom space is needed. Moderate impacts are associated with 4 to 8 percent increases in enrollment. Impacts are considered moderate if a school system must increase its teaching staff or classroom space even slightly to preserve its pre-project level of service . . . Large impacts are associated with enrollment increases greater than 8 percent. [GEIS Section 3.7.4.1]

The NRC made impacts to education a Category 2 issue because site-specific and project-specific factors determine the significance of impacts (GEIS Section 3.7.4.1). Local factors to be ascertained include: (1) project-related enrollment increases; and (2) status of the student/teacher ratio.

In Appling County there are four elementary schools, one middle school, and one high school. During the 1998-99 school year, total enrollment was approximately 3,510. During this period the average number of students per teacher was 15 (Reference 41). In Toombs County there are two elementary schools, one middle school, and one high school. The combined enrollment for the 1998-99 school year was approximately 2,660 (References 42, 43, 44, and 45). As described in Section 2.1.7, SNC has no plans for major refurbishment activities; therefore, there would be no impact from refurbishment activities on area public schools' ability to provide educational services, and no additional teaching staff or classroom space would be needed. Because of the lack of major plant refurbishment, no analysis of impacts to public schools (Issue 66) is required.

3.1.12 Offsite Land Use, Refurbishment

NRC

The environmental report must contain " . . . [a]n assessment of the impact of the proposed action on . . . land-use . . . within the vicinity of the plant . . . ." [10 CFR 51.53(c)(3)(ii)(l)]

Impacts may be of moderate significance at plants in low population areas. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 68)]

. . . if plant-related population growth is less than 5 percent of the study area's total population, off-site land-use changes would be small, especially if the study area has established patterns of residential and commercial development, a population density of at least 60 persons per square mile, (2.6 km^2) and at least one urban area with a population of 100,000 or more within 80 km (50 miles). [GEIS Section 3.7.5]

The NRC made impacts to offsite land use as a result of refurbishment activities a Category 2 issue because land-use changes could be considered beneficial by some community members and adverse by others. Local conditions to be ascertained include: (1) plant-related population growth; (2) patterns of residential and commercial development; (3) population density; and (4) proximity to an urban area of at least 100,000.

A description of the offsite land use for the HNP area is provided in Section 3.1.13.

As described in Section 2.1.7, SNC has no plans to perform major refurbishment activities; therefore, there would be no impact from refurbishment activities on land use within the vicinity of HNP. Because of lack of major plant refurbishment, no analysis of impacts to offsite land use owing to refurbishment (Issue 68) is required.

3.1.13 Offsite Land Use, License Renewal Term

NRC

The environmental report must contain " . . . [a]n assessment of the impact of the proposed action on . . . land-use . . . within the vicinity of the plant . . . ." [10 CFR 51.53(c)(3)(ii)(l)]

Significant changes in land use may be associated with population and tax revenue changes resulting from license renewal. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 69)]

. . . if plant-related population growth is less than five percent of the study area's total population off-site land-use changes would be small . . . [GEIS Section 3.7.5]

If the plant's tax payments are projected to be small relative to the community's total revenue, new tax-driven land-use changes during the plant's license renewal term would be small, especially where the community has preestablished patterns of development and has provided adequate public services to support and guide development. [GEIS Section 4.7.4.1]

The NRC made impacts to offsite land use during the license renewal term a Category 2 issue because land use changes may be perceived to be beneficial by some community members and adverse by others. Therefore, the NRC could not assess the potential significance of site-specific offsite land use impacts (GEIS Section 4.7.4.1). Site-specific factors to consider in an assessment of new-tax-driven land-use impacts include: (1) the size of plant-related population growth compared to area's total population; (2) the size of the plant's tax payments relative to the community's total revenue; (3) the nature of the community's existing land use pattern; and (4) the extent to which the community already has public services in place to support and guide development.

The Appling County Joint Planning Board has prepared a comprehensive plan to guide County development and growth (Reference 46). Unless otherwise specified, the Section 3.1.13 description of the County is from that plan.

The early economy of Appling County was based on farming, livestock, and timber industries. Municipalities of the County (Baxley, Surrency, and Graham) were locally incorporated in the late 1800's and early 1900's and located along the Brunswick to Macon Railroad (now owned and operated by Norfolk Southern Railroad). The City of Graham was only recently recognized by the Georgia State Legislature receiving its charter in 1991. Today, the County remains rural with approximately 98 percent of the land use in agriculture, forest, or vacant with most of the

developed acreage near the city of Baxley. Table 3-5 provides a breakdown of the County land use.

Land use projections show that new commercial and industrial developments are expected to concentrate in Baxley and along the Highway 341 corridor which runs parallel to the Norfolk Southern rail line, while new residential development will be encouraged in and near the cities, particularly Baxley (see Figure 2-2 for location of features). The rest of the County is expected to remain in agricultural and forest uses. The County does not have specific regulations concerning zoning, subdivisions, or other land development controls in place to implement or control development.

The population of Appling county is approximately 15,700. Appling County and its municipalities have not realized significant growth during the 30-year period of 1960 through 1990. The period of strongest growth was the 1970's (coincident with HNP construction). Since 1980, growth has been almost stagnant, with a 1 percent population increase, and there are indications of significant out-migration. Population projections indicate that the County population is expected to reach 23,000 by 2010.

The GEIS presents an analysis of offsite land use for the renewal term that is characterized by two components, population-driven and tax-driven impacts (GEIS Section 4.7.4.1). Based on the GEIS case study analysis, NRC concludes that all new population-driven land-use changes during the license renewal term at all nuclear plants would be small, because population growth caused by license renewal would represent a much smaller percentage of the local areas' total population than has operations-related growth. NRC also projects that new tax-driven land use changes may be moderate at a number of sites and large at some others (GEIS Section 4.7.4.2).

Population-Related Impacts

SNC does not anticipate the need to increase the on-site workforce during the license renewal period (Section 2.1.7). Therefore, SNC anticipates no population-related land use impacts as a result of license renewal. However, to demonstrate a bounding scenario of potential population-related impacts to area land use, SNC applies a bounding workforce estimate of 60 additional full-time workers (described in Section 3.1.9) in the following analysis.

To determine the license renewal population growth, SNC assumes that (1) all direct and indirect jobs would be filled by in-migrating workers to Appling County and that (2) each new worker would represent one family. According to the 1990 Census, the Appling County population is approximately 15,700 with an average family size of 3.21. As described in Section 3.1.9, the conservative estimate of 60 additional fulltime workers could generate as many as 245 direct and indirect jobs. If each new worker represents one new family, the population of Appling County could increase by approximately 785. Because the bounding population growth estimate associated with the HNP's continued operation would represent only a 5 percent increase in Appling County's population, SNC considers new population-related land use impacts of worker in-migration to be small.

Tax-Revenue-Related Impacts

NRC used a two-step process in analyzing tax-revenue-related impacts: first determining the significance of nuclear plant tax payments to the local taxing jurisdiction, and second defining and determining the significance of resultant land use changes. The NRC determined that the significance of tax payments as a source of local government revenue would be small if new tax payments are less than 10 percent of the taxing jurisdiction's revenue, moderate if payments are between 10 and 20 percent of a taxing jurisdiction's revenue, and large if the payments are greater than 20 percent of revenue (GEIS Section 4.7.2.1). The NRC defined the magnitude of land-use changes as follows (GEIS Section 4.7.4):

- Small – Very little new development and minimal changes to an area's land-use pattern
- Moderate – Considerable new development and some changes to land-use pattern
- Large – Large-scale new development and major changes in land use pattern

The NRC further determined that if a plant's tax payments are projected to be a dominant source of a community's total revenue (i.e., greater than 20 percent of revenue), new tax-driven land-use changes would be large.

Table 3-6 provides a comparison of total tax payments made for HNP and Appling County's total tax digest. For the 5-year period between 1994 and 1998, HNP tax payments represent approximately 70 percent of the County revenue. Using NRC's criteria, HNP tax payments are of large significance to Appling County. For the reasons presented below, however, SNC does not anticipate large land-use changes as a result of HNP tax revenues.

As described in Section 2.1.7, SNC does not anticipate major refurbishment or construction during the license renewal period. Therefore, SNC does not anticipate any increase in the assessed value of HNP due to refurbishment-related improvements nor any related tax-increase-driven changes to offsite land use and development patterns.

HNP has been and would probably continue to be the dominant source of tax revenue for the County. However, despite having this income source since plant construction, Appling County has not experienced large land-use changes. The HNP environs have remained largely rural, County population growth rates post-HNP-construction have been minimal, and County planners are not projecting large changes. SNC believes continued operation of HNP would be important to maintaining the current level of development and public services and does not anticipate plant-induced changes to local land-use and development patterns.

Conclusion

SNC views the continued operation of HNP as a significant benefit to Appling County through direct and indirect salaries and tax contributions to the County. Because population growth related to the renewal of HNP is expected to be relatively small and there would be no new-tax impacts to the Appling County land use, SNC concludes that HNP license renewal would have a continued beneficial impact on Appling County.

3.1.14 Public Services, Transportation

NRC

The environmental report must contain an assessment of " . . . the impact of highway traffic generated by the proposed project on the level of service of local highways during periods of license renewal refurbishment activities and during the term of the renewed license." [10 CFR 51.53(c)(3)(ii)(J)]

Transportation impacts are generally expected to be of small significance. However, the increase in traffic associated with the additional workers and local road and traffic control conditions may lead to impacts of moderate or large significance at some sites. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 70)]

Small impacts would be associated with a free flowing traffic stream where users are unaffected by the presence of other users (level of service A) or stable flow in which the freedom to select speed is unaffected but the freedom to maneuver is slightly diminished (level of service B). (GEIS Section 3.7.4.2)

The NRC made impacts to transportation a Category 2 issue because impact significance is determined primarily by road conditions, existing at the time of the project, that NRC could not forecast for all plants (GEIS Section 3.7.4.2). Local road conditions to be ascertained are: (1) level of service conditions and (2) incremental increase in traffic associated with refurbishment activities and license renewal staff.

The transportation system in Appling County includes two major highways, U.S. Highway 1 and U.S. Highway 341. U.S. Highway 1 runs north and south bisecting the County. This two-lane highway is located along the western border of HNP and provides the sole access to HNP. U.S. Highway 341 runs east and west along the Norfolk Southern rail line and links the municipalities and developed areas of the County. Both of the highways are part of the Governor of Georgia's Economic Development System which was established to provide access to smaller cities and encourage economic development throughout the State.

U.S. Highway 1 is considered a rural highway. In the vicinity of HNP (Lyons, Georgia to Baxley, Georgia), it is a two-lane highway with no traffic signals. In 1998, the annual average daily traffic count taken north of the Site was 4,339 and south of the Site was 5,314 (Reference 47). These values indicate that volume in the vicinity of HNP is low. Long-range plans for this developmental highway include a construction project to widen U.S. Highway 1 to four lanes, providing four-lane access to Baxley from Interstate 16. This project is anticipated to begin within 5 years and likely would be completed prior to the expiration of the current operating licenses.

As described in Section 2.1.7, SNC has no plans to perform major refurbishment activities; therefore, there would be no impact to local transportation from refurbishment activities. Because of the lack of major plant refurbishment, no analysis of local transportation during periods of license renewal refurbishment activities (Issue 70) is required.

SNC does not anticipate the need to increase the on-site workforce during the license renewal period (Section 2.1.7). Therefore, SNC anticipates no impacts to the local transportation system as a result of operations during the license renewal term. However, to demonstrate a bounding scenario of potential impacts to the local transportation system, SNC applies a workforce estimate of 60 additional workers (described in Section 3.1.9) in the following analysis. Using the traffic data presented above, the addition of 60 workers at the site would represent approximately 1.4 percent increase in traffic volume on U.S. Highway 1 north of the Plant and approximately 1.1 percent increase in traffic volume south of the Plant. Considering the fact that U.S. Highway 1 is scheduled to be a 4-lane highway at the time of license renewal, the increase in traffic volume attributable to license renewal will likely not be detectable. In addition, turn lanes and traffic signs on U.S. Highway 1 at the plant entrance contribute to the safety of the traveling public. Therefore, SNC concludes that impacts on the local transportation during the license renewal period (Issue 70) would be small and mitigation would not be warranted.

3.1.15 Historic and Archaeological Resources

NRC

The environmental report must contain an assessment of " . . . whether any historic or archaeological properties will be affected by the proposed project." [10 CFR 51.53(c)(3)(ii)(K)]

Generally, plant refurbishment and continued operation are expected to have no more than small adverse impacts on historic and archaeological resources. However, the National Historic Preservation Act requires the Federal agency to consult with the State Historic Preservation Officer to determine whether there are properties present that require protection. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 71)]

Sites are considered to have small impacts to historic and archeological resources if (1) the State Historic Preservation Office (SHPO) identifies no significant resources on or near the site; or (2) the SHPO identifies (or has previously identified) significant historic resources but determines they would not be affected by plant refurbishment, transmission lines, and license-renewal term operations and there are no complaints from the affected public about the character; and (3) if the conditions associated with moderate impacts do not occur. (GEIS Section 3.7.7)

The NRC made impacts to historic and archeological resource a Category 2 issue because determinations of impacts to historic and archeological resources are site-specific in nature, and the National Historic Preservation Act mandates that determination of impacts must be made through consultation with the State Historic Preservation Office (SHPO) (GEIS Section 4.7.7.3).

In Appling County three historic sites are listed on the National Register of Historic Places. Each of these sites is located within the city limits of Baxley, over ten miles south of HNP. The Georgia Register of Historic Places does not recognize any additional properties within a 10-mile radius of HNP. As described in Section 3.1.7, SNC does not anticipate major refurbishment or construction during the license renewal period on the Plant site or transmission lines. Therefore, SNC concludes that continued operation of HNP through the license renewal period will have no adverse affects on historic or archeologic resources (Issue 71). SNC has initiated consultations with the SHPO regarding HNP license renewal. A copy of the consultation letter is provided in Attachment D.

3.1.16 Severe Accident Mitigation Alternatives

NRC

The environmental report must contain a consideration of alternatives to mitigate severe accidents " . . . [i]f the staff has not previously considered severe accident mitigation alternatives for the applicant's plant in an environmental impact statement or related supplement or in an environmental assessment . . . ." [10 CFR 51.53(c)(3)(ii)(L)]

The probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts from severe accidents are small for all plants. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives. [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 76)]

The term "accident" refers to any unintentional event (i.e., outside the normal or expected plant operational envelop) that results in the release or a potential for release of radioactive material to the environment. Generally, NRC categorizes accidents as "design-basis" or "severe." Design-basis accidents are those for which the risk is great enough that an applicant is required to design and construct a plant to prevent unacceptable accident consequences. Severe accidents are those considered too unlikely to warrant design controls.

Historically, NRC has not included in its EISs or environmental assessments any analysis of alternative ways to mitigate the environmental impact of severe accidents. A 1989 court decision ruled that, in the absence of an NRC finding that severe accidents are remote and speculative, severe accident mitigation alternatives (SAMAs) should be considered in the NEPA analysis [*Limerick Ecology Action v. NRC*, 869 F.d 719 (3rd Cir. 1989)]. For most plants, including HNP, license renewal is the first licensing action that would necessitate consideration of SAMAs.

The NRC concluded in its generic license renewal rulemaking that the unmitigated environmental impacts from severe accidents met the Category 1 criteria, but NRC made consideration of mitigation alternatives a Category 2 issue because ongoing regulatory programs related to mitigation (i.e., Individual Plant Examination [IPE] and Accident Management) have not been completed for all plants. Since these programs have identified plant programmatic and procedural improvements (and in a few cases, minor modifications) as cost-effective in reducing severe accident and risk consequences, NRC thought it premature to draw a generic conclusion as to whether severe accident mitigation would be required for license renewal. Site-specific information to be presented in the environmental report includes: (1) potential SAMAs; (2) benefits, costs, and net value of implementing potential SAMAs; and (3) sensitivity of analysis to changes to key underlying assumptions.

Analysis

The results of the HNP-specific analyses for severe accidents (Attachment F) show that the total core damage frequency is estimated at 1.6384×10^{-5} per year (internal and external events) and the risk is estimated at 3.372 person-rem per year. For the current residual severe accident risk, a bounding SAMA analysis was performed using probabilistic risk assessment (PRA) techniques and making use of industry studies and NRC reports providing guidance on performing the cost-benefit analysis. This bounding analysis demonstrates that plant enhancements (severe accident mitigation and containment performance improvements) in excess of $500,000 are not cost-justified based on averted public health risk.

Although risk assessment studies are subject to varying degrees of uncertainty in the estimated core damage frequency, person-rem risk, and in the cost to implement alternatives, the results of SNC's analysis show that the cost of implementing any of the alternatives is as much as several orders of magnitude higher than the estimated averted risk values. Therefore, no additional severe accident mitigation alternatives are cost-beneficial even when the uncertainties in the risk assessment process are considered. Attachment F summarizes the evaluation of SAMAs for HNP.

As the environmental impacts of potential severe accidents are of small significance and because additional measures to reduce such impacts would not be justified from a public risk perspective, SNC concludes that no additional severe accident mitigation alternative measures beyond those already implemented during the current term license are warranted for HNP.

3.1.17 New and Significant Information

NRC

The environmental report must contain any new and significant information regarding the environmental impacts of license renewal which the applicant is aware. [10 CFR 51.53(c)(3)(iv)]

. . . absent new and significant information, the analyses for certain impacts codified by this rulemaking need only be incorporated by reference in an applicant's environmental report for license renewal . . . . (Discussion of Regulatory Requirements, 61 FR 109, June 5, 1996, page 2848)

Description of Process

The HNP Environmental Protection Plan (EPP) and SNC Environmental Services procedures govern review of environmental issues. Changes in plant design, operation, or tests and experiments with potential for environmental impact are reviewed in accordance with established procedures and responsibilities to ensure that such activities do not involve an unreviewed environmental question or change to the EPP. The environmental impacts of license renewal including new and significant information for Plant Hatch were evaluated prior to submittal of the Environmental Report. Established procedures and responsibilities ensure that any new and significant information related to renewal of Plant Hatch licenses will be identified, reviewed and addressed during the period of NRC review.

Review of Environmental Issues prior to ER Submittal

SNC Environmental Services performed an evaluation of environmental issues applicable to license renewal for Plant Hatch (Reference 70). This evaluation was performed on the Category 1 issues appearing in 10 CFR 51, subpart A, Appendix B, Table B-1 to verify that the conclusions of the GEIS remain valid with respect to Plant Hatch.

As a result of this review, SNC is not aware of new and significant information regarding the plant's environment or plant operations that would make a generic conclusion codified by the NRC for Category 1 issues not applicable for HNP, that would alter regulatory or GEIS statements regarding Category 2 issues, or that would suggest any other measure of license renewal environmental impact.

3.1.18 Environmental Justice

NRC

"The need for and the content of an analysis of environmental justice will be addressed in the plant-specific reviews." [10 CFR Part 51, Subpart A, Appendix B, Table B-1 (Issue 34)]

Background

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations" (59 FR 7629, Feb. 11, 1994), requires Federal agencies to identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects" from their programs, policies, and activities on minority and low income populations. The Presidential Memorandum that accompanied Executive Order 12898

emphasized the importance of using existing laws, including the National Environmental Policy Act (NEPA), to identify and address environmental justice concerns, "including human health, economic, and social effects, of Federal actions." The Council on Environmental Quality (CEQ), which oversees the Federal government's compliance with Executive Order 12898 and NEPA, issued "Environmental Justice Guidance Under the National Environmental Policy Act" (Reference 71) on December 10, 1997. This document provides general guidance and assists Federal agencies with the development of NEPA procedures so that environmental justice concerns are effectively identified and addressed.

Although the NRC is not subject to Executive Order 12898, it has voluntarily committed to conducting environmental justice reviews of actions under its jurisdiction. Specific guidance is provided in Attachment 4 to NRR (Office of Nuclear Reactor Regulation) Office Letter Number 906, Revision 1: "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues" (Reference 72).

These two documents (References 71 and 72) do not provide a standard approach or formula for identifying and addressing environmental justice issues. Instead, they offer Federal agencies general principles for conducting an environmental justice analysis under NEPA. They are the basis for the environmental justice review discussion that follows.

Environmental Impacts from the Proposed Action

SNC's analysis of the pertinent Category 2 issues [defined at 10 CFR 51.53(c)(3)(ii)] determined that impacts to human health and the environment from the operations of HNP over the license renewal term would be small. Based on this review of Category 2 issues as discussed in Sections 3.1.2 through 3.1.15 of this document, an exhaustive demographic analysis and assessment of potential environmental justice impacts were not conducted. This phased approach to the assessment of potential environmental justice impacts is consistent with both CEQ and NRC guidance. The NRC guidance makes clear that if no significant impacts are anticipated from the proposed action, then "…no member of the public will be substantially affected" and, as a consequence, "…there can be no disproportionate high and adverse effects or impacts on any member of the public including minority or low income populations."

Environmental Impact Site(s)

Per the NRR Interim Procedure for Environmental Justice Reviews (Reference 72), environmental impact sites must be designated for all adverse human health or environmental impacts which are known to be significant or perceived as significant by groups or individuals. As noted above, based on the review of Category 2 issues, SNC has determined that no "environmental impact sites" exist at or around HNP. No significant adverse human or environmental impacts are expected as a result of operations over the license renewal term.

Selection of Geographic Area

The geographic area is defined as a larger area that encompasses all of the potential environmental impact sites (Reference 72). SNC examined the geographic distribution of minority and low-income populations within a 50-mile radius of HNP. The 50-mile radius (geographic area) contains 78 census tracts (1990 US Census). Census tracts were included in the analysis if 50 percent of their area lay within the 50-mile radius. Those tracts with less that 50 percent of their area contained within the 50-mile radius were excluded from analysis. Census data from the 78 census tracts were compared to averages for the State of Georgia in order to determine the presence of low-income or minority populations.

Demographics within 50-Mile Radius of HNP

Minority populations as defined in the interim NRR Procedure (Reference 72) occur in 14 of the 78 census tracts (Figure 3-1). Minority populations were considered to be present when the percentage of minority individuals in a census tract exceeded the state average by 10 percent or more. For example, for a Black minority population to be present, the percentage of Blacks in a census tract had to greater than 37 percent. When individual minority populations were present, they were always Black. Other minorities were present, including substantial numbers of Hispanics in Long and Liberty counties, but they did not satisfy the definition of "minority populations" in the NRR Procedure (Reference 72) (Figure 3-2). The determination of minority population must consider both individual and aggregate minority populations. Aggregate minority populations were present in 11 of the 14 minority population tracts (Figure 3-3). Table 3-7 presents a more detailed breakdown of minority groups in each census tract containing a minority population.

Low income populations as defined in the interim NRR Procedure (Reference 72) occur in 28 of the 78 census tracts, as presented in Figure 3-4. The percentage of households below the poverty level for the state of Georgia (the total geographic region) is 15 percent. The 28 tracts containing low-income populations have a percentage of households under the poverty level greater than 25 percent (greater than or equal to 10 percent above the level for the total geographic region). Table 3-8 presents a more detailed description of each census tract containing a low-income population.

Based on low-income housing and minority population data from the 1990 census, the geographic area for HNP contains populations that would require an environmental justice review if environmental impact sites were present in these areas. Table 3-9 presents a population description of each county within the 50 mile radius that includes minority and low income details.

Conclusions

As part of its assessment of the proposed action, SNC examined potential impacts to air, land, water, and cultural resources within about 50 miles of HNP. SNC has determined that no significant offsite impacts would be created by the renewal of the HNP operating licenses. This conclusion is supported by the review performed of the Category 2 issues as defined in 10 CFR 51.53(c)(3)(ii). As the interim NRR Procedure acknowledges, if no significant offsite impacts occur in connection with the proposed action, then no member of the public will be substantially affected. Therefore, there can be no disproportionately high and/or adverse impacts on any member of the public, including minority and low-income populations, resulting from the renewal of the HNP licenses. In such instances, a qualitative review of potential environmental justice impacts is adequate and no mitigation measures need be described.

3.2 ALTERNATIVES

NRC

. . . the applicant shall discuss in this report the environmental impacts of alternatives . . . . [10 CFR 51.53(c)(2)]

. . . GEIS contains a discussion of the environmental impacts of alternative energy sources . . . . The information in the GEIS is available for use by the NRC and the licensee in performing the site-specific analysis of alternatives . . . . (Supplementary information to the final rule, 61 FR 28467 - 28497, June 5, 1996, at Section III.B.3, page 28472, column 3)

As discussed in Section 2.2 and consistent with the NRC license renewal decision-making standard, Section 3.2 provides sufficient information to clearly indicate whether an alternative would have greater environmental impact than the proposed action (i.e., license renewal), without trying to detail every adverse impact. Providing additional detail or analysis would serve no function if it would only bring to light more adverse impacts of alternatives to license renewal. SNC has made effort not to bias the comparison in favor of license renewal by reasonably underestimating, rather than overestimating, the environmental impacts of alternatives to license renewal. For example, SNC assumes maximum reuse of existing facilities and high emissions removal efficiencies.

Sections 3.2.2 and 3.2.3 discuss the following potential environmental impacts: land use, ecology, aesthetics, water quality, air quality, solid waste, human health, socioeconomics, and culture. These are the same impacts, in the same order, that NRC analyzes alternatives to license renewal in the GEIS (GEIS Section 8.1). Sections 3.2.2 and 3.2.3 make frequent reference to the impact significance categories that NRC used (i.e., small, moderate, and large). Section 3.1.1 defines these impact categories.

3.2.1 No Action

As described in Section 2.2.1, the no action alternative refers to a scenario in which SNC would decommission HNP after expiration of the current licenses. Impacts associated with decommissioning HNP would be bounded by the discussion in Chapter 7 of the GEIS and NUREG-0586 (Reference 62) and would occur regardless of which feasible alternative (discussed below) was implemented. Decommissioning after 60 years of operations (i.e., after license renewal) would not be significantly different from those occurring after 40 years (i.e., without license renewal).

3.2.2 Coal-Fired Generation

Land Use

The coal-fired generation alternative would necessitate converting roughly an additional 900 acres of the HNP Site to industrial use (plant, coal storage, ash and scrubber sludge disposal). Currently, most of this land is forested (Figure 2-3). These changes would noticeably alter current HNP Site land use patterns and would be a moderate impact. Additional land use changes in an undetermined coal-mining area outside of the HNP Site region of influence would likely result from mining necessary to supply 40 years worth of coal.

Construction at a new site would impact roughly an additional 150 acres for offices, roads, parking areas, and a switchyard. As stated in Section 2.2.2, an additional 300 acres would be needed for transmission lines (assuming the plant is sited 10 miles from nearest transmission line intertie connection). An additional 160 acres also would be needed for a rail line for coal delivery (assuming 10 miles from nearest railway connection). Depending particularly on transmission line and rail line routing, this alternative could result in moderate to large land use impacts.

Ecology

Siting at the existing HNP Site would have a moderately large to large ecological impact because of the need to convert roughly 900 acres of established forested land to industrial use (plant, coal storage, ash and scrubber sludge disposal). However, the use of an existing intake and discharge system, to which the area aquatic communities have become acclimated, would limit operational impacts.

Even at another existing power plant site, adding the HNP alternative coal-fired generation would introduce construction impacts and new incremental operational impacts. At a greenfield site, an undisturbed area, the impacts would certainly alter the ecology. These ecological impacts could be moderate to large. Impacts would include wildlife habitat loss and reduced productivity, and could include habitat fragmentation and a local reduction in biological diversity.

Aesthetics

The three power plant units, which could be as much as 200 feet tall, would be visible over intervening trees for miles around. The three 600-foot tall stacks could be visible at a distance of approximately 4 miles during the summer months and approximately 10 miles in the winter. In contrast, the existing HNP reactor buildings and single main exhaust stack are 200 and 393 feet respectively (References 2 and 4). The existing mechanical draft cooling towers are approximately 60 feet tall. The addition of three 600-foot tall stacks for the coal-fired alternative would contrast with what is otherwise the natural-appearing rural area, with woods and farming areas, and would be a moderate visual aesthetic impact compared to the existing HNP facility.

Coal-fired generation would introduce additional mechanical sources of noise that would be audible offsite. Sources contributing to total noise produced by plant operation are classified as continuous or intermittent. Continuous sources include the mechanical equipment (e.g., induced-draft fans and mechanical draft cooling towers) associated with normal plant operations. Intermittent sources include the equipment related to coal handling, solid waste disposal, transportation related to coal and lime delivery and the commuting of plant employees. The incremental noise impacts of a coal-fired plant compared to HNP are considered to be small to moderate. Further, because of the location of the facility, and the effects of shielding by physical barriers (e.g., coal pile, buildings, intervening trees, or other physical barriers) the effects of noise impacts offsite would be limited.

Coal and lime delivery would be expected to result in some noise impacts on residents living in the vicinity of the facility and along the rail route. Normally coal is delivered and unloaded during daylight hours. The existing rail spur has historically had infrequent use, with smaller unit trains. Delivery of coal and lime would add a new noise source for receptors along the rail corridor. Although noise from passing trains significantly raises noise levels near the rail corridor, the short duration of the noise reduces the impact. Therefore, the impacts of noise on residents in the vicinity of the facility and the rail line would be considered small.

Water Quality and Use

The coal-fired generation alternative is assumed to use the existing HNP intake and discharge structures. However, this alternative would require the withdrawal of roughly half as much water (approximately 30 million gallons per day) for condenser cooling and to meet existing limitations on discharge temperatures. Water quality impacts would continue to be small.

The reduced workforce size (down from 950 to 250) would reduce groundwater withdrawals for potable water use, but additional withdrawals would be needed for wet-scrubber sulfur oxides emissions control. Maximum groundwater consumption is assumed to be 6.1 gallons per minute. Leachate from coal storage areas and ash and scrubber sludge disposal areas would have to be controlled to avoid groundwater contamination.

Air Quality

Concerns over adverse human health effects and environmental effects from coal combustion have lead to important federal legislation such as the Clean Air Act (Reference 10). The following discussion takes these concerns into account.

Sulfur oxides emissions – Using sulfur oxides emissions control provisions that are currently reasonable (low sulfur coal and 90 percent sulfur oxides emissions removal efficiency), the annual stack emissions would include approximately 3,600 tons of sulfur oxides, most of which would be sulfur dioxide. (See Section 2.2.2.1.) Additional reductions could become necessary. The acid rain provision of the Act (Title IV) capped the nation's sulfur dioxide emissions and, under the Act, affected fossil fuel-fired steam units are allocated a number of sulfur dioxide emission allowances. To achieve compliance, each utility must hold enough allowances to cover its sulfur dioxide emissions annually or be subject to certain penalties. If the utility's sulfur dioxide emissions are less than its annually-allocated emission allowances, then the utility may bank the surplus allowances for use in future years. A sulfur dioxide allowances market has been established for the buying and selling of allowances. To build and operate an HNP coal-fired generation alternative beginning in the year 2014, Georgia Power Company would have to purchase sufficient sulfur dioxide allowances for the HNP-alternative plant or increase sulfur dioxide removal efficiency such that purchase of sulfur dioxide allowances is not required.

Nitrogen oxides emissions – Using currently available control technology (low nitrogen oxide burners), annual nitrogen oxides emission would be approximately 1,710 tons. Title IV, however, established an annual nitrogen oxides emissions reduction policy. In addition, EPA has promulgated (September 25, 1998) regulations which require the reduction of nitrogen oxide emissions by 1.1 million tons per year by 2003, or by 28 percent overall by 2007 (Reference 49). [On May 14, 1999, the U.S. Court of Appeals for the District of Columbia Circuit panel ruled that 8-hour standard for ozone was unconstitutional. In addition, on May 25, 1999, the same federal appeals court stayed the EPA's rule to implement the NOx SIP Call. As such, the due date for the NOx SIP Call (or "clean air" plan as it is incorrectly referred to) will be delayed indefinitely.] EPA has indicated it will work with states to develop a market-based emissions trading system for utilities. In order to implement a HNP coal-fired alternative, GPC would have to offset its corporate nitrogen oxides emissions in the state through further reductions in nitrogen oxides emissions elsewhere, by shutting other sources down or by back-fitting to reduce nitrogen oxides formation (e.g., installing over-fired air, low nitrogen oxide burners, flue gas re-circulation, and selective non-catalytic and catalytic reduction systems). Precise reduction requirements are speculative at this time.

Particulate emissions – As stated in Section 2.2.2.1, annual stack emissions would include 240 tons of filterable particulates and 54 tons of PM-10. In addition, coal-handling equipment would introduce fugitive particulate emissions.

Carbon oxides emissions – As stated in Section 2.2.2.1, carbon oxides emissions would be approximately 1,170 tons per year.

Air quality impacts of coal-fired generation would be largely due to sulfur dioxide, nitrogen oxides, particulate, and carbon monoxide emissions. While constituent emissions might have to be reduced more than current projections due to Clear Air Act requirements, the overall impact of a HNP coal-fired alternative would still be large. Siting the coal-fired generation elsewhere would not significantly change air quality impacts, although it could result in installing more or less stringent pollution control equipment to meet applicable standards. The impacts would still be moderate to large.

Coal Combustion By-Products

Coal combustion generates by-products in the form of ash and air pollution control equipment generates additional ash and scrubber sludge. Approximately 1.5 million tons of those by-products would be generated annually for 40 years and disposed of on-site, accounting for 600 of the 900 acres of land use. This is a moderate impact that could extend well after the 40-year operation life because re-vegetation management and groundwater monitoring for leachate contaminant impacts could be a permanent requirement. This impact would be moderate to

large. Siting elsewhere would not substantially affect the rate of by-products generation, although other sites might have more constraints on disposal locations.

Human Health/Population Impacts

Coal-fired generation introduces worker risks from fuel and lime/limestone mining and worker and public risks from fuel and lime/limestone transportation and stack emissions inhalation. Stack impacts can be very widespread and health risks difficult to quantify. This alternative also introduces the risk of coal fires and attendant inhalation risks.

Transportation

Coal and Lime Delivery - As discussed in Section 2.2.2.1, approximately 520 trains per year, or an average of 10 trains each week, would deliver the coal and lime for all three units. Since for each full train delivery, there is an empty train, a total of 20 train trips are expected per week, or at least 2.6 trips per day. On several days per week there could be 3 trains per day using the rail spur to the HNP site. Coal and lime delivery would occur during daylight hours.

The Industrial Spur rail line serving the plant is currently not in use, and the Norfolk Southern rail line is used four times per day. Therefore the use of rail for coal/lime delivery would not affect other rail use in the vicinity of the site. The rail line spur from the main railroad to HNP crosses U.S. Highway 341 and U.S. Highway 1, in addition to several county roads (Figure 2-2).

Based on the use of a 115-car coal train with three locomotives, and assuming a speed of 20 miles per hour through the town of Baxley and approaching the site, the affected at-grade crossing intersections are estimated to be blocked for about five minutes per train trip. For two train trips per day, this equates to two separate five minute periods for each highway, separated by the time (4.5 hours)[6] necessary to unload the rail cars at a minimum. As indicated in Section 3.1.14, HNP is located in a mostly rural area and the roads are lightly-traveled. Therefore, two separate 5 minute periods each day are not expected to have a significant effect on vehicular traffic in the area.

Commuting of Plant Operating Personnel - HNP is operated on a continuous basis (i.e., 24 hours per day, every day, except when down time for maintenance, inspection, etc. is required). The maximum number of plant operating personnel would be approximately 220 (Reference 14). The current HNP workforce is approximately 950. Therefore, traffic impacts associated with commuting plant personnel would be expected to be small compared to the current impacts from HNP operations.

Socioeconomics

It is assumed that construction of new coal-fired generating facilities would take place while HNP continues to operate, finishing at the time that the nuclear plant would halt operations. Therefore, for the 5-year construction period, the site would have between 1,500 and 2,000 additional workers. During this time, the surrounding communities would experience demands on housing and public services that could have large impacts. After construction, the communities would be impacted by the loss of jobs; construction workers would leave, the nuclear plant workforce (950) would decline through a decommissioning period to a minimal maintenance size, and the coal-fired plant would introduce only 250 new jobs. Socioeconomic impacts from start of construction through nuclear plant decommissioning would be moderate to large.

Construction at another site would transfer some socioeconomic impacts but would not eliminate them; the community around HNP would still experience the impact of HNP operational job loss,

6. Unloading of rail cars is accomplished at a maximum of 25 cars per hour; therefore, 115 cars per unit train ÷ 25 cars per hour = 4.6 hours. (Reference 14, Section 3.3.4.1)

and the communities around the new site would have to absorb the impacts of a large, temporary workforce and a moderate, permanent workforce.

Cultural Resources

Coal-fired generation at HNP would not directly affect cultural resources. Construction at another site could necessitate instituting cultural resource preservation measures (power block area or transmission line right-of-way), but impacts to cultural resources could generally be managed and kept as small.

Summary of Impacts

Development of a coal-fired generation alternative would produce moderate-to-large air quality impacts, depending on the location of the plant and the effectiveness of air pollution control equipment. Converting 900 acres of forested land to industrial use (generating facility, coal storage area, ash ponds) would produce moderate-to-large land use impacts and could produce moderate-to-large ecological impacts, including wildlife habitat loss, (potential) habitat fragmentation, and a local reduction in biological diversity. Impacts to surface water would be small, assuming coal storage areas and ash/sludge disposal areas were properly configured and monitored to prevent runoff to downgradient wetlands and streams. Impacts to groundwater would be moderate to large, depending on the degree to which contaminants in stored coal, ash, and scrubber sludge are contained and prevented from leaching into underlying groundwater. Socioeconomic impacts would be moderate to large, and would include pressures on housing and public services during the construction phase (from an influx of construction workers) and a reduction in operational jobs (net loss of approximately 700 jobs) relative to the existing HNP workforce.

3.2.3 Gas-Fired Generation

Land Use

Gas-fired generation at the HNP site would require converting an additional 500 acres of the site to industrial use. Currently, this land is mostly forested. These changes would noticeably alter current HNP land use patterns and would create moderate impacts. An additional 121 acres would be disturbed during pipeline construction but, because this disturbance would be temporary and would not alter existing land use patterns (access road right-of-way and cultivation), these land use impacts from pipeline construction would be small.

Construction at a new site would impact another approximately 100 acres for offices, roads, parking areas, and a switchyard, and another 300 acres for transmission lines. Depending particularly on transmission line routing, these alternatives could result in moderate to large land use impacts.

Ecology

Siting at the existing HNP site would have a moderately large to large ecological impact because of the need to convert roughly 500 acres of established forested land to industrial use. However, use of the existing intake and discharge system to which the area aquatic communities in the Altamaha River have become acclimated would limit operational impacts.

Even at an existing power plant site, adding the HNP alternative gas-fired generation would introduce construction impacts and new incremental operational impacts. At a greenfield site, an undisturbed area, the impacts would certainly alter the ecology. These ecological impacts could be moderate to large. Impacts would include wildlife habitat loss and reduced productivity, and could include habitat fragmentation and a local reduction in biological diversity.

Aesthetics

The combustion turbines and heat recovery boilers would be relatively low structures, less than 100 feet tall, and would be screened from most offsite vantage points by intervening woodlands. The steam turbine building would be taller, approximately 150 feet in height, and together with the exhaust stacks (230 feet in height), would be visible offsite, resulting in a moderate impact. The use of these facilities along with the existing mechanical draft cooling towers and associated facilities, would have less visual impact than the existing HNP reactor building and stack which are considerably taller (200 feet and 393 feet tall respectively).

Water Quality

The gas-fired generation alternative is assumed to use the existing HNP intake and discharge structures. However, this alternative would require the withdrawal of roughly one-fourth as much water (approximately 15 million gallons per day) for condenser cooling and meet existing limitations on discharge temperatures. Water quality impacts would continue to be small. The reduced workforce size (950 to 125) would reduce groundwater withdrawals for potable water use; however, the existing groundwater impact is already small (Section 3.1.3).

Air Quality

Natural gas is a relatively clean-burning fuel. Nitrogen oxide emissions, assuming low nitrogen oxide burners, would be 386 tons per year; by comparison, nitrogen oxide emissions assuming flue gas re-circulation would be 290 tons per year. As discussed in Section 3.2.2 for coal-fired generation, new Clean Air Act provisions might result in SNC having to further reduce nitrogen oxides by shutting other sources down or by back-fitting to reduce nitrogen oxides formation (e.g., installing over-fired air, low nitrogen oxide burners, flue gas re-circulation, and selective non-catalytic and catalytic reduction systems). Precise reduction requirements are speculative at this time.

Gas Combustion By-Products

Gas-fired generation would result in almost no by-product generation, producing impacts that are small.

Human Health

Gas-fired generation would produce combustion emissions, but impacts to human health would be small due to the clean-burning nature of the natural gas fuel.

Socioeconomics

It is assumed that construction of new gas-fired generating facilities would take place while HNP continues operation, with completion at the time that the nuclear plant would halt operations. Therefore, for the 3-year construction period, the site would have between 500 and 750 additional workers. During this time, the surrounding communities would experience demands on housing and public services that could have large impacts. After construction, the communities would be impacted by the loss of jobs; construction workers would leave, the nuclear plant workforce (of 950 workers) would decline through a decommissioning period to a minimal maintenance size, and the gas-fired plant would introduce only 125 new jobs. Socioeconomic impacts from start of construction through nuclear plant decommissioning would be moderate to large.

Construction at another site would transfer some socioeconomic impacts but would not eliminate them. The community around the HNP site would still experience the impact of HNP operational

job loss, and the communities around the new site would have to absorb the impacts of a large, temporary workforce and a moderate, permanent workforce.

Transportation

As indicated above, the HNP workforce (of 950 workers) would decline and the gas-fired plant would introduce only 150 new jobs. Therefore, traffic impacts associated with commuting plant personnel would be expected to be less than the current impacts from HNP operations

Cultural Resources

Gas-fired generation at HNP would not directly affect cultural resources. Construction at another site could necessitate instituting cultural resource preservation measures (power block area or transmission line right-of-way), but impacts to cultural resources could generally be managed and kept as small.

Summary of Impacts

Development of a gas-fired generation alternative would require converting approximately 500 acres of forested land to industrial use and could produce moderate-to-large land use and ecological impacts. Impacts to surface water and groundwater would be small. Air quality impacts would be small, assuming state-of-the-art pollution control equipment is installed and operated as designed. Socioeconomic impacts would be moderate to large, and would include pressures on housing and public services during the construction phase (from an influx of construction workers) and a reduction in operational jobs (net loss of approximately 800 jobs) relative to the existing HNP workforce.

3.2.4 Imported Electrical Power

As discussed in Section 2.2.2.3, Georgia is a net exporter of electric power. However, SNC cannot discard imported power as a feasible alternative to HNP license renewal. Market conditions, particularly the anticipated free market created by deregulation, could result in a company finding it advantageous to import power to replace a retired Georgia plant while exporting other power generated in state. Such a situation could be caused by differential costs of generation or transmission, contractual relationships, or even strategic planning.

SNC assumes that if it did import power to replace HNP-generated capacity, the power would be generated elsewhere using one or more of the technologies that NRC discusses in GEIS Chapter 8. SNC has no basis for estimating which generation technology, or what mix of technologies, would be used other than to point to the current mix of technologies available. The U.S. Department of Energy publications that SNC references in Section 2.2.2.3 are excellent sources of information on this subject.

SNC is adopting by reference, as representative of the environmental impacts of the imported electrical power alternative to HNP license renewal, the GEIS discussion of environmental impacts from generic alternatives. Under the imported power alternative, therefore, environmental impacts would still occur but would be located elsewhere within the region, nation, or Canada.

3.3 COMMITTED RESOURCES

3.3.1 Unavoidable Adverse Impacts

NRC

The environmental report shall discuss ". . . [a]ny adverse environmental effects which cannot be avoided should the proposal be implemented." [10 CFR 51.45(b)(2) as referenced in 10 CFR 51.53(c)(2)]

Section 3.1 adopts by reference the GEIS discussion of Category 1 issues, a discussion that addresses adverse environmental effects. For Category 2 issues, HNP has followed NRC regulatory requirements, analyzed the issues, and where required has addressed potential adverse effects (in Section 3.1). For the applicable issues presented in Section 3.1, SNC has categorized all impacts as "small" in accordance with NRC's impact significance definitions. NRC defines small as an effect that is either not detectable or so minor that it will neither destabilize nor noticeably alter any important attribute of the resource. SNC assumes that impacts that are "small" by this definition are not adverse, and that, therefore, the environmental report has identified no unavoidable adverse impacts.

3.3.2 Irreversible or Irretrievable Resource Commitments

NRC

The environmental report shall discuss ". . . [a]ny irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." 10 CFR 51.45(b)(5) as referenced in 10 CFR 51.53(c)(2)

HNP generates approximately 250 assemblies of spent fuel per year. Operation during the license renewal period would generate approximately 5,000 assemblies of spent fuel. This spent fuel is destined for disposal at the nation's high-level radioactive waste geologic repository, currently planned for construction at Yucca Mountain, Nevada. This activity is considered to be an irreversible and irretrievable commitment of the material in the spent fuel assemblies and the repository space in which the assemblies would be placed. The NRC has analyzed the radiological impacts of this disposal activity and has concluded that it is a Category 1 issue (10 CFR Part 51, Subpart A, Appendix B, Table B-1).

The NRC evaluated fish and shellfish mortality due to impingement and entrainment and concluded that the issue did not warrant further analysis at plants using cooling towers for heat dissipation. While mortality from impingement and entrainment would be an irreversible and irretrievable commitment of small numbers of fish and shellfish, this is an on-going impact from HNP operations and no irreversible or irretrievable impacts on fish or shellfish populations (population-level effects) in the Altamaha River have been shown.

3.4 SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

NRC

The environmental report shall discuss ". . . [t]he relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity . . . ." 10 CFR 51.45(b)(4) as referenced in 10 CFR 51.53(c)(2)

HNP operation during the license renewal period would result in the short-term resource uses described in Section 3.1, including those described in the GEIS and adopted by reference in Section 3.1. As a result of normal operations, short-term uses of the atmosphere, surface waters, and land surface as receptors for emissions, discharges, and wastes would have an incremental but small effect on long-term air, water, and land conditions. SNC has not identified any clear indication of adverse impacts on long-term productivity in the area. Ongoing efforts to restore the longleaf pine-wiregrass community on the HNP site are expected to enhance long-term productivity of at least two listed species, the gopher tortoise and the Eastern indigo snake.

Table 3-1 Local aquifers to E.I. Hatch Nuclear Plant

Geologic age	Aquifer	Description	Physical description	Water-bearing properties	Formation thickness at Hatch (feet)	Approximate aquifer elevation at Hatch (feet msl)
Holocene	Alluvial	Alluvium beneath the Altamaha River floodplain	Sand, gravel, and carbonaceous silty clay	Potential for high yields	55	Less than +75
Pliocene (?) to Pleistocene	Perched	Brandywine Formation	Sand and gravel	No values recorded	10	+165 to +175
Miocene	Unconfined	Upper Hawthorn	Clayey sand	Less 10 gpm	45 to 50	+165 to +170
Miocene	Confining Unit	Upper Hawthorn	Sandy clay and clay with locally cemented sand	Relatively impermeable	40 to 50	+100 to +120
Miocene	Minor Confined	Middle Hawthorn	Sand and clayey sand	10 gpm	65	0 to +65
Miocene	Confining Unit	Lower Hawthorn	Sandy clay	Permeability of 1 x 10^{-7} ft/min	100 to 110	0
Miocene	Principal Artesian (Floridan)	Extreme Lower Hawthorn Formation	Sandy limestone and calcareous clayey sand	1100gpm in properly designed well	190	-105
Miocene	Principal Artesian (Floridan)	Tampa Formation	Sandy limestone and calcareous clayey sand		160	
Oligocene	Principal Artesian (Floridan)	Suwanee Formation (Undifferentiated ?)	Limestone		120(?)	
Eocene	Principal Artesian (Floridan)	Ocala Formation	Limestone		280	
Eocene	Principal Artesian (Floridan)	Lisbon Formation	Sandy limestone and calcareous clayey sand		610	

a. Source: Reference 32.

Table 3-2 Listed species known to occur in the vicinity of HNP or in associated rights-of-way.

Common Name	Scientific Name	Federal Status	State Status	Occurrence	Source
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	Endangered	Altamaha R. adjacent to HNP	Reference 5
Eastern indigo snake	*Drymarchon corais couperi*	Threatened	Threatened	North Tifton transmission corridor	Reference 65
Gopher tortoise	*Gopherus polyphemus*	---	Threatened	HNP site; Duval, North Tifton, Douglas, Thalmann, Bonaire, and Vidalia transmission corridors	References 5, 54, 65
American alligator	*Alligator mississippiensis*	Threatened (S/A)	---	HNP site; Bonaire, North Tifton, and Thalmann transmission corridors	References 3, 65
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Endangered	Altamaha R. adjacent to HNP	(b)
Wood stork	*Mycteria americana*	Endangered	Endangered	Wetland east of HNP cooling towers	(b)
Red-cockaded woodpecker	*Picoides borealis*	Endangered	Endangered	Duval transmission corridor[c]	Reference 65, 66
Bachman's sparrow	*Aimophila aestivalis*	---	Rare	Duval and Thalmann transmission corridors	References 65, 66
Purple honeycomb head	*Balduina atropurpurea*	---	Rare	Duval, North Tifton, and Vidalia transmission corridors	Reference 65
Cutleaf beardtongue	*Penstemon dissectus*	---	Threatened	Thalmann transmission corridor	References 65, 66
Hairy rattleweed	*Baptisia arachnifera*	Endangered	Endangered	Thalmann corridor	Reference 66
Parrot pitcher plant	*Sarracenia psittacina*	---	Threatened	Duval and North Tifton transmission corridors	References 65, 66
Yellow pitcher plant	*Sarracenia flava*	---	Unusual	HNP site; Bonaire, Thalmann, North Tifton, and Vidalia transmission corridors	References 65, 66
Hooded pitcher plant	*Sarracenia minor*	---	Unusual	Bonaire, Duval, Thalmann, Tifton, and Vidalia transmission corridors	References 65, 66

a. Species that USFWS or NMFS has listed or proposed for listing as threatened or endangered; species that GADNR has listed or proposed for listing as endangered, threatened, rare, or unusual.
b. Observed by Georgia Power Company biologists.
c. Observed in wooded area adjacent to right-of-way.

Table 3-3. Estimated population distribution in 1990 within 10 miles of HNP.[a]

Sector[b]	0-1 mile	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	1,900	2,157
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	5,937	7,504

a. Source: Reference 50.

Table 3-4. Estimated population distribution in 1990 within 50 miles of HNP.[a]

Sector	0-10 miles	10-20 miles	20-30 miles	30-40 miles	40-50 miles	50-mile total
N	495	10,706	4,375	1,239	11,652	28,525
NNE	287	1,007	1,932	6,657	5,207	15,090
NE	301	3,812	2,833	2,505	29,497	38,948
ENE	111	3,008	4,120	3,916	5,369	16,524
E	45	748	6,868	1,348	38,160	47,169
ESE	263	448	1,278	3,538	8,931	14,458
SE	351	275	2,002	15,477	881	18,986
SSE	612	922	1,221	3,880	2,446	9,081
S	2,157	6,646	1,693	1,983	32,090	44,569
SSW	516	1,210	6,203	2,758	2,193	12,880
SW	320	1,457	1,113	5,178	18,479	26,547
WSW	418	7,510	1,041	2,262	2,407	13,638
W	303	2,156	1,654	1,407	2,682	8,202
WNW	362	585	2,308	6,376	2,721	12,352
NW	413	1,335	4,589	985	4,347	11,669
NNW	550	4,351	3,802	5,250	4,040	17,993
Total	7,504	46,176	47,032	64,817	171,102	336,631

a. Source: Reference 50.

Table 3-5. Appling County land use characterization.[a]

Landuse category	Acres	Percent of county
Agriculture	109,276	32.6
Forest/Mining	167,364	50.0
Residential	3,626	1.1
Commercial	373	0.1
Industrial	738	0.2
Public/Semi-Public	421	0.1
Recreation/Park/Open Space	202	0.1
Vacant/Undeveloped	52,862	15.8
Total	334,862	100

a. Source: Reference 46.

Table 3-6. Tax payment amounts for the Edwin I. Hatch Plant, Appling County, Georgia, 1994–1998.

	1994	1995	1996	1997	1998
Appling County Digest[b]	$10,025,813.94	$10,061,773.42	$11,470,528.89	$11,577,951.81	$12,421,866.50
Georgia Power	$4,228,927.15	$4,108,164.72	$4,515,508.42	$4,470,276.95	$4,616,865.29
Oglethorpe Power	$3,043,071.08	$3,048,859.27	$3,496,434.75	$3,468,656.36	$3,717,624.25
City of Dalton	$158,141.15	$157,236.19	$157,592.66	$142,766.76	$149,999.51
Total HNP tax payment	$7,430,139.38	$7,314,260.18	$8,169,535.83	$8,081,700.07	$8,484,489.05
HNP percent of County Digest	74 percent	73 percent	71 percent	70 percent	68 percent

a. Source: Reference 51.
b. The "Digest" is the total property tax revenue that the County collects, portions of which are reserved for use by local governing bodies (e.g., school board) and for use by the State within the County boundaries.

Table 3-7. Census tracts with minority populations.[a]

			Percent						
Census tract	County	Pop. 1990	White	Black	Indian	Asian	Other	Hispanic	Minority
13001950200	Appling	4,292	47.9	51.6	0.5	0.0	0.0	0.0	52.1
13031990800	Bulloch	1,644	57.2	39.9	0.7	0.9	0.4	1.0	42.9
13043950200	Candler	964	58.1	41.9	0.0	0.0	0.0	0.0	41.9
13069990800	Coffee	6,972	53.1	46.6	0.1	0.1	0.0	0.1	46.9
13107980400	Emanuel	4,338	59.0	40.7	0.0	0.1	0.0	0.2	41.0
13107980100	Emanuel	4,308	61.2	38.6	0.1	0.0	0.0	0.1	38.8
13109970300	Evans	3,466	55.2	44.7	0.0	0.1	0.0	0.0	44.8
13179010100	Liberty	16,340	49.5	39.1	0.9	2.4	0.3	7.7	50.4
13179010200	Liberty	16,878	54.1	37.4	0.1	2.3	0.2	6.0	46.0
13267990298	Tattnall	7,284	58.9	37.9	0.2	0.1	0.2	2.7	41.1
13271950400	Telfair	2,019	55.3	44.4	0.0	0.0	0.0	0.3	44.7
13271950300	Telfair	930	60.3	39.4	0.3	0.0	0.0	0.0	39.7
13279970200	Toombs	5,563	56.1	42.6	0.1	0.0	0.0	1.2	43.9
13299950400	Ware	3,147	10.3	87.9	0.3	1.1	0.0	0.4	89.7

a. Source: Reference 40.

Table 3-8. Census Tracts with Low-Income Populations[a]

Census tract (FIPS#)	County name	County (FIPS#)	1990 Population	Households	Households above poverty level	Households below poverty level	Percent: Households above poverty level	Percent: Households below poverty level
13001950200	Appling	001	4,292	1,527	1,082	445	70.9	29.1
13001950400	Appling	001	1,640	610	450	160	73.8	26.2
13005970200	Bacon	005	6,999	2,542	1,774	768	69.8	30.2
13043950200	Candler	043	964	338	250	88	74.0	26.0
13069990700	Coffee	069	4,433	1,503	1,117	386	74.3	25.7
13069990800	Coffee	069	6,972	2,447	1,792	655	73.2	26.8
13107980400	Emanuel	107	4,338	1,578	1,041	537	66.0	34.0
13107980700	Emanuel	107	784	301	199	102	66.1	33.9
13109970300	Evans	109	3,466	1,234	855	379	69.3	30.7
13161960200	Jeff Davis	161	5,122	1,946	1,443	503	74.2	25.8
13209950200	Montgomery	209	4,028	1,366	994	372	72.8	27.2
13229960200	Pierce	229	1,366	436	321	115	73.6	26.4
13229960300	Pierce	229	4,911	1,870	1,333	537	71.3	28.7
13267990100	Tattnall	267	2,736	1,148	836	312	72.8	27.2
13267990300	Tattnall	267	3,624	1,341	947	394	70.6	29.4
13271950100	Telfair	271	6,443	2,379	1,718	661	72.2	27.8
13271950200	Telfair	271	1,608	600	421	179	70.2	29.8
13271950400	Telfair	271	2,019	708	478	230	67.5	32.5
13271950300	Telfair	271	930	335	233	102	69.6	30.4
13279970200	Toombs	279	5,563	1,795	1,208	587	67.3	32.7
13279970100	Toombs	279	4,153	1,414	959	455	67.8	32.2
13283960298	Treutlen	283	5,182	1930	1,354	576	70.2	29.8
13299950100	Ware	299	1,354	459	329	130	71.7	28.3
13299950400	Ware	299	3,147	1,284	612	672	47.7	52.3
13305970300	Wayne	305	5,130	1,867	1,323	544	70.9	29.1
13305970400	Wayne	305	2,598	921	641	280	69.6	30.4
13309980100	Wheeler	309	2,414	904	603	301	66.7	33.3
13309980200	Wheeler	309	2,489	916	658	258	71.8	28.2

a. Source: Reference 40.

Table 3-9. County population data.[a]

County	Total Population	Percent							
		White	Black	American Indian, Eskimo, or Aleut	Asian	Other	Hispanic Origin	Households below the Poverty Level	Minority
Appling	15,744	78.56	20.76	0.35	0.00	0.00	0.33	22.35	21.44
Bacon	9,566	83.46	15.42	0.11	0.05	0.00	0.95	27.12	16.54
Bulloch	5,890	74.97	24.21	0.20	0.24	0.10	0.27	18.39	25.03
Candler	7,744	67.12	30.94	0.00	0.23	0.00	1.70	23.59	32.88
Coffee	26,739	72.39	25.51	0.11	0.43	0.03	1.53	23.69	27.61
Dodge	2,006	73.18	26.72	0.00	0.00	0.00	0.10	21.19	26.82
Emanuel	15,566	68.25	30.68	0.20	0.60	0.00	0.27	26.42	31.75
Evans	8,724	65.02	33.73	0.02	0.08	0.00	1.15	26.33	34.98
Jeff Davis	12,032	83.85	15.36	0.05	0.00	0.00	0.74	21.05	16.15
Johnson	1,418	84.49	15.44	0.00	0.00	0.00	0.07	18.38	15.51
Laurens	10,800	78.67	21.26	0.07	0.00	0.00	0.00	20.92	21.33
Liberty	33,218	51.84	38.23	0.52	2.38	0.23	6.81	13.57	48.16
Long	3,104	76.19	18.65	0.45	0.55	0.00	4.16	20.44	23.81
Montgomery	7,163	69.55	28.17	0.08	0.20	0.00	2.00	25.01	30.45
Pierce	13,328	87.52	11.69	0.12	0.00	0.00	0.67	23.88	12.48
Tattnall	17,722	68.15	28.94	0.13	0.12	0.08	2.58	23.55	31.85
Telfair	11,000	65.41	34.44	0.03	0.00	0.00	0.13	29.14	34.59
Toombs	24,072	72.96	23.38	0.27	0.39	0.00	3.00	24.78	27.04
Treutlen	5,994	66.68	33.10	0.13	0.00	0.00	0.08	27.88	33.32
Ware	22,374	74.56	24.21	0.25	0.60	0.00	0.38	19.22	25.44
Wayne	19,750	77.38	21.49	0.07	0.14	0.00	0.93	22.44	22.62
Wheeler	4,903	68.73	30.06	0.00	0.00	0.00	1.20	30.71	31.27
GA Total	6,478,216	70.23	26.83	0.23	1.11	0.04	1.56	14.85	29.77

b. Source: Reference 40.

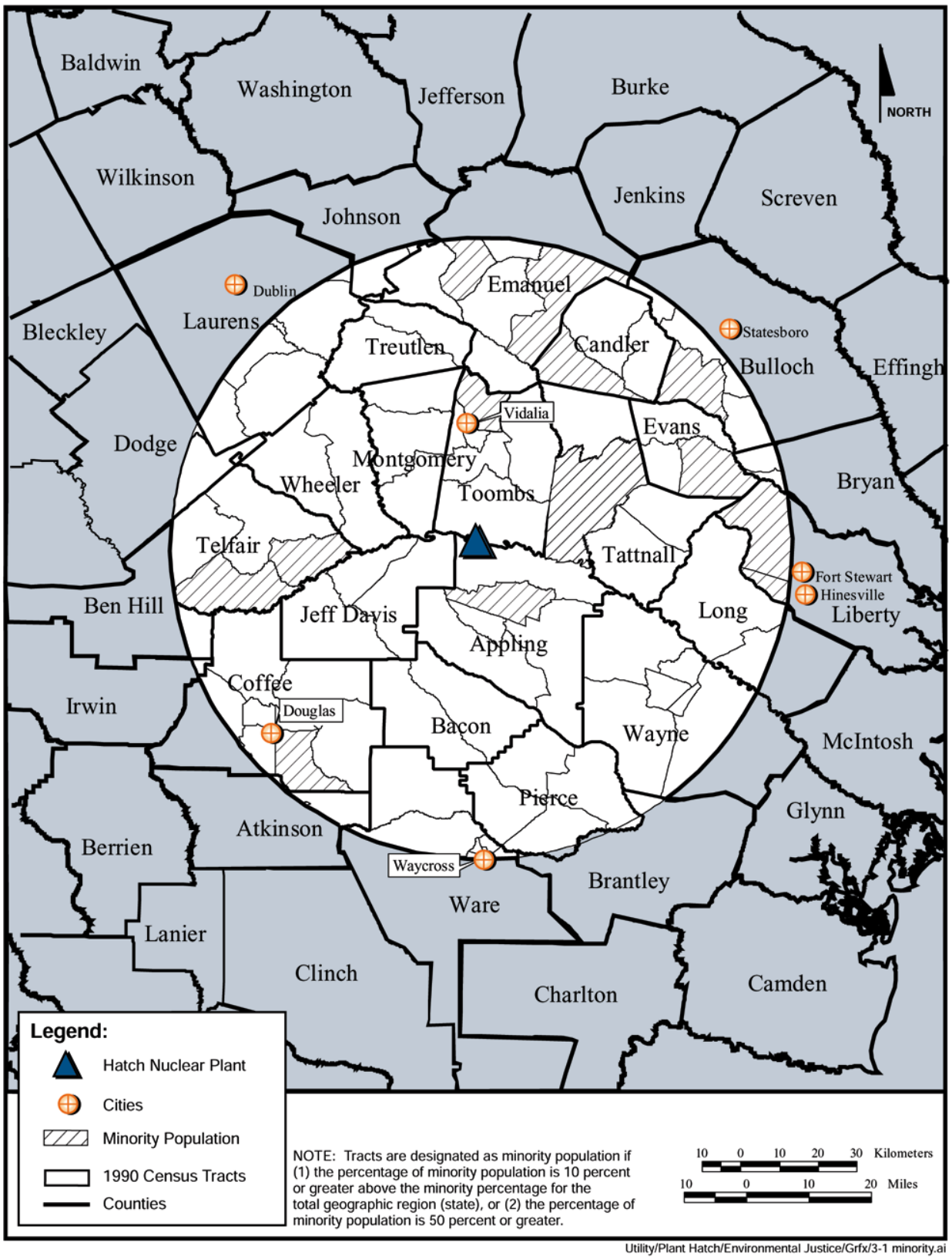

Figure 3-1. Minority population within 50 miles of Edwin I. Hatch Nuclear Plant Site

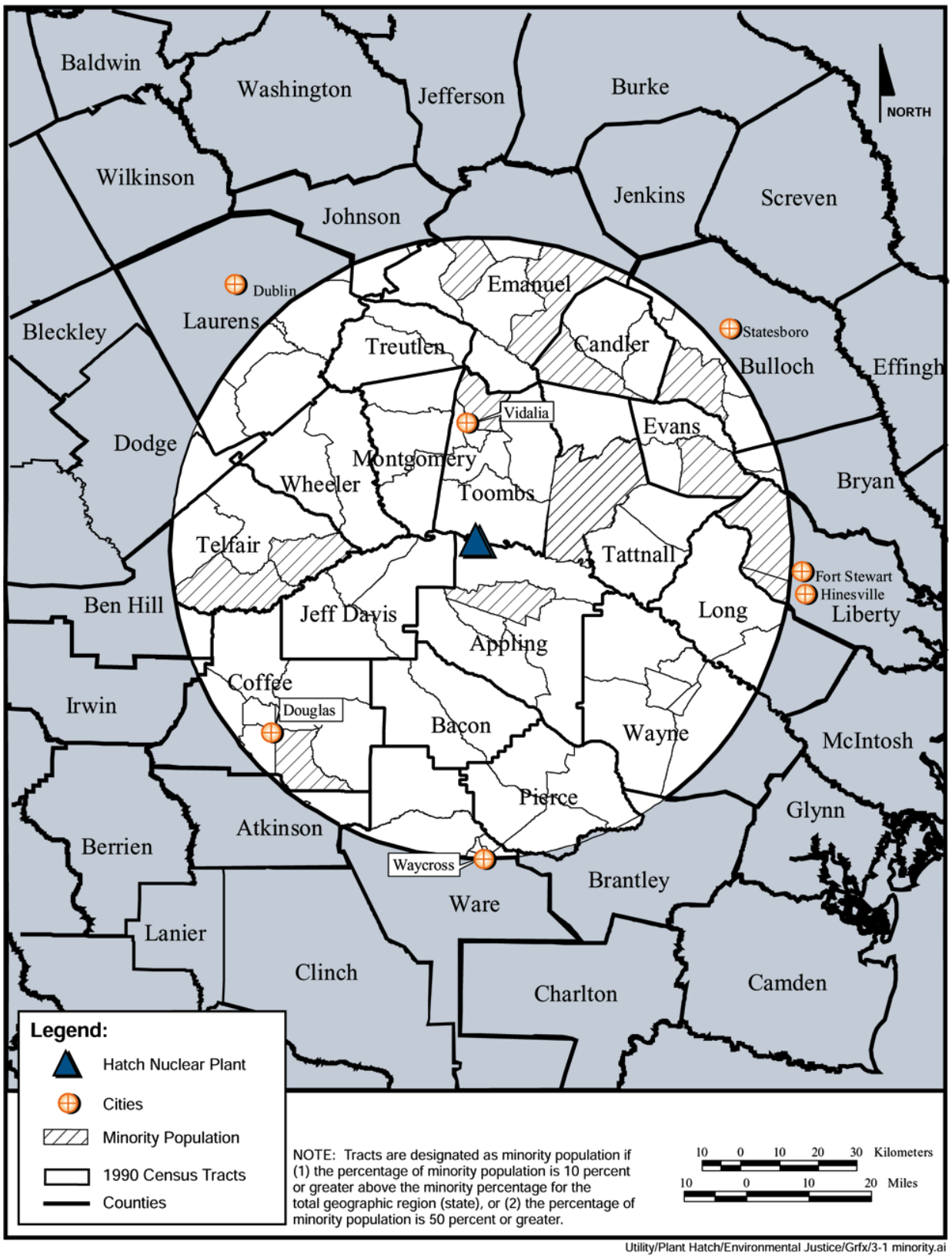

Figure 3-2. Black minority population within 50 miles of Edwin I. Hatch Nuclear Plant Site

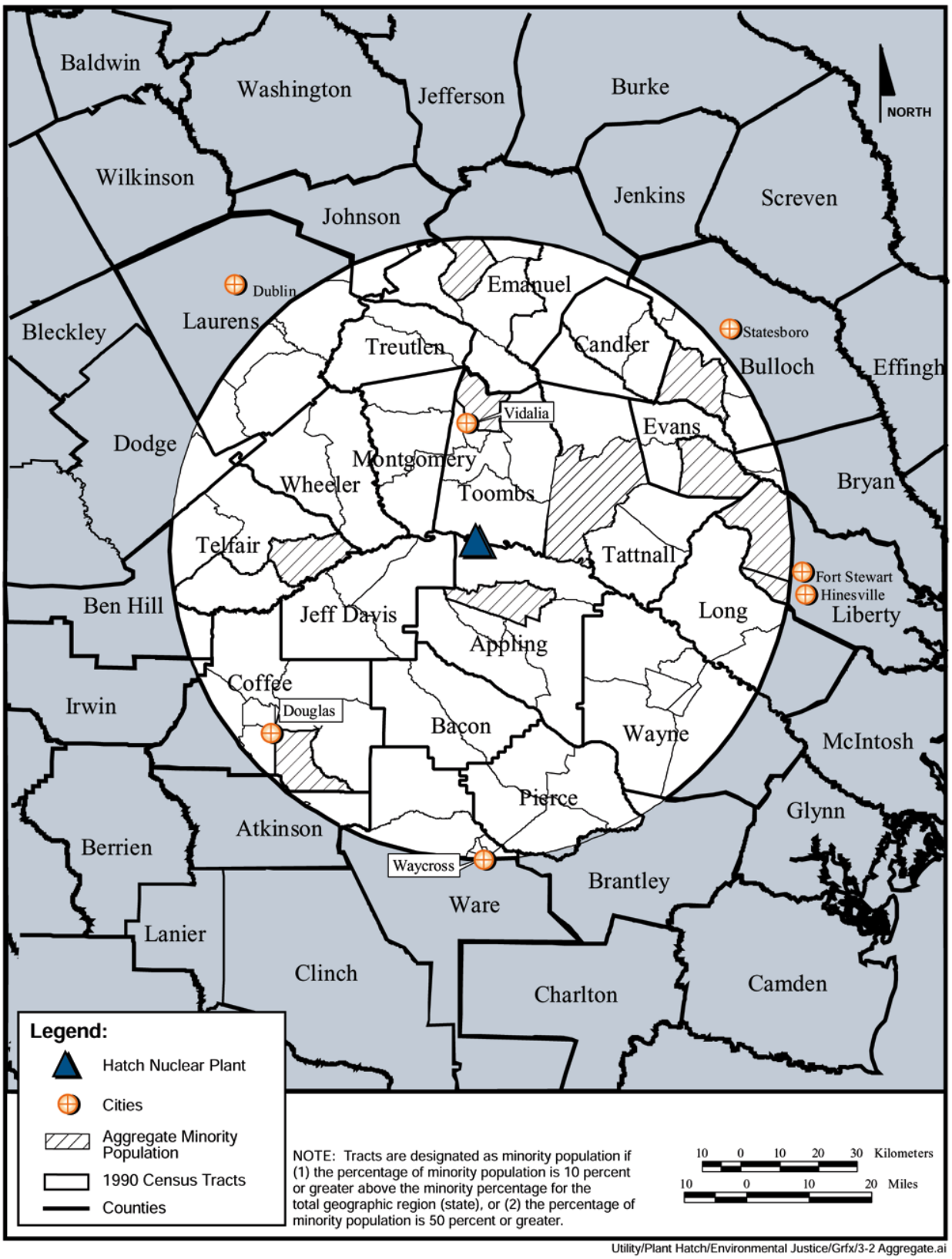

Figure 3-3. Aggregate minority population within 50 miles of Edwin I. Hatch Nuclear Plant Site

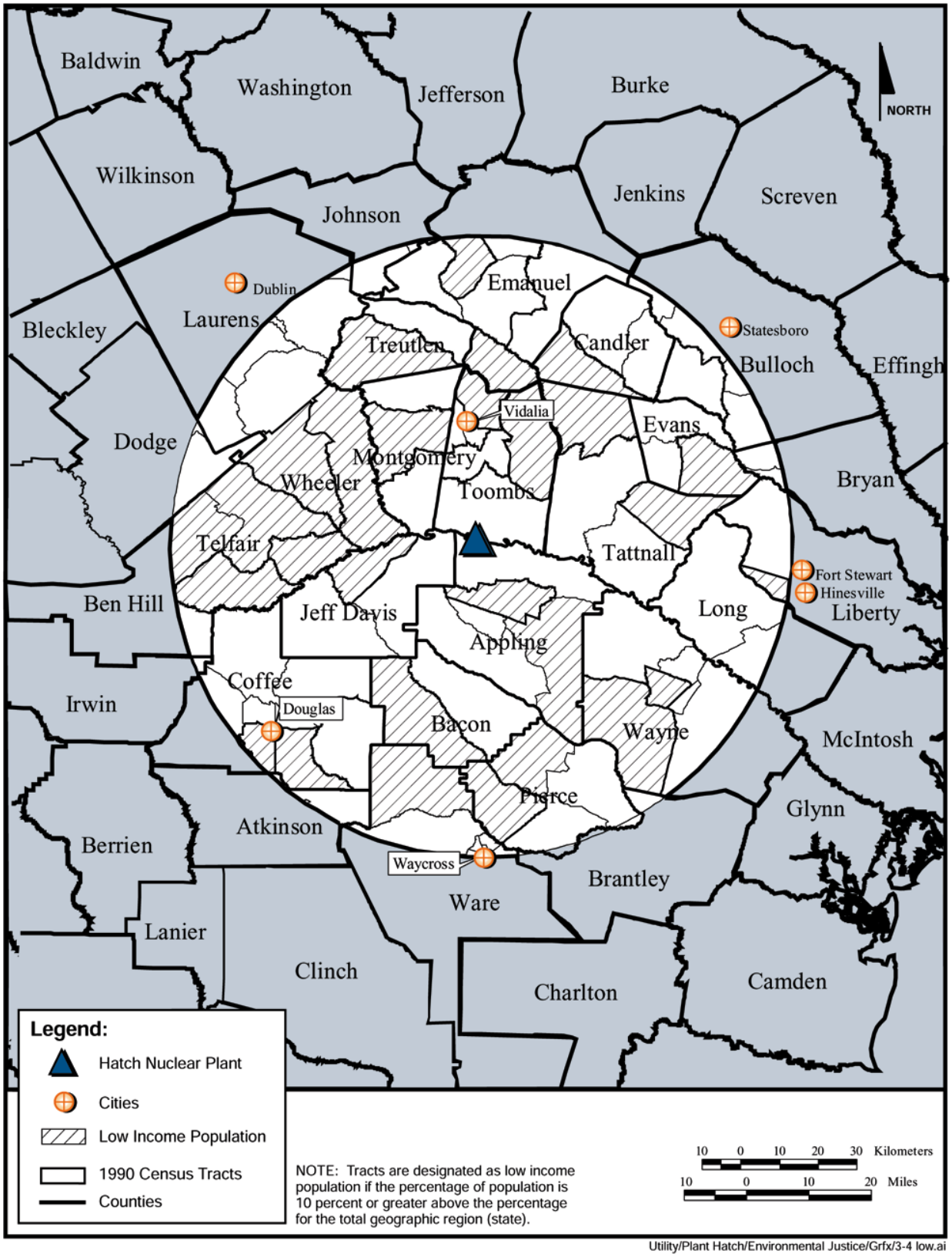

Figure 3-4. Low income population within 50 miles of Edwin I. Hatch Nuclear Plant Site

4.0 COMPLIANCE STATUS

4.1 PROPOSED ACTION

4.1.1 General

Environmental protection licenses and permits from Federal and State authorities for current HNP operations are listed in Table 4-1. HNP has no regionally or locally issued environmental permits or other environmental protection approvals or entitlements. Table 4-2 identifies environmental approvals and consultation associated with HNP license renewal. As indicated, SNC anticipates that relatively few such approvals are required.

SNC has initiated consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service in accordance with Section 7 of the Endangered Species Act (16 USC 1536). SNC has included as Attachment C correspondence related to these consultations.

SNC has initiated consultation with the Georgia State Historical Preservation Officer regarding potential effects of HNP License Renewal on cultural resources, in accordance with Section 106 of the Natural Historic Preservation Act (16 USC 470 et seq.). SNC has included as Attachment D correspondence related to these consultations.

No permits from, or consultations with, states other than Georgia are necessary because HNP is at least 75 miles from the nearest Georgia border and SNC expects that the quality of the water and air in neighboring states would not be affected by the proposed action of license renewal.

4.1.2 Water Quality Certification

E. I. Hatch Nuclear Plant currently holds a National Pollution Discharge Elimination System (NPDES) Permit issued in 1997 by the State of Georgia Department of Natural Resources - Environmental Protection Division. The permit (GA0004120), which was issued in accordance with Section 402 of the Federal Clean Water Act, authorizes water discharges from HNP into the Altamaha River. HNP also holds two permits issued by the U.S. Army Corps of Engineers, Savannah District under Clean Water Act Section 404. One permit (9400003873) authorizes maintenance dredging activities in the Altamaha River in front of the HNP intake structure. The other permit (970012880) authorizes a weir to be constructed in the Altamaha River in front of the Plant Hatch intake structure during low river flow periods, if necessary. Each of the above referenced permits will be maintained, as necessary, throughout operation of the HNP.

Federal Clean Water Act Section 401 requires that applicants for a Federal license to conduct an activity that might result in a discharge into navigable waters must provide the licensing agency a certification from the State that the discharge will comply with applicable Clean Water Act requirements (33 USC 1341). SNC is applying to NRC for a license (i.e., license renewal) to continue HNP operations and HNP operations result in discharges to the Altamaha River, a navigable water, within the State of Georgia. At present, HNP holds a Section 401 Water Quality Certification per letter dated November 10, 1972 from the State of Georgia, that issued its approval for HNP relative to water quality.

4.1.3 Coastal Zone Management

The Coastal Zone Management Act of 1972 (16 USC 1451 et seq.) requires applicants for a Federal license to conduct an activity that could affect a state's coastal zone to certify to the licensing agency that the proposed activity would be consistent with the state's Federally-approved coastal zone management

plan [16 USC 1456(c)(3)(A)]. The National Oceanic and Atmospheric Administration has promulgated implementing regulations that indicate the requirement is applicable to renewal of Federal licenses for activities not previously reviewed by the State [15 CFR 930.51(b)(1)]. The regulation requires license applicants to provide its certification to the Federal licensing agency and a copy to the applicable State agency [15 CFR 930.57(a)].

The Georgia Coastal Zone Management Act, enacted in 1997, defines the coastal zone as "all tidally influenced waters and submerged land seaward to the state's jurisdictional limits and all lands, submerged lands, waters, and other resources within the counties of Brantley, Bryan, Camden, Charlton, Chatham, Effingham, Glynn, Long, Liberty, McIntosh, and Wayne counties." The western boundary of Wayne County, which is the portion of the Georgia coastal zone nearest to HNP, is approximately 25 river miles downstream of Hatch Nuclear Plant. Ongoing HNP plant release and environmental monitoring have identified no significant impacts to the environment and no direct impacts on the coastal zone. License renewal would introduce no significant operational changes and SNC license renewal analysis has identified no significant changes to the current level of environmental impacts. Based on the distance to the coastal zone, past HNP performance with respect to discharges and releases, and the fact that no major changes in operations are expected during the license renewal term, SNC believes that direct impacts to the coastal zone from HNP operations during the license renewal term are unlikely. Because HNP is not located within the coastal zone and HNP operations are unlikely to directly affect the coastal zone, requirements for coastal zone management consistency certification are inapplicable to HNP license renewal.

4.2 ALTERNATIVES

NRC

The discussion of alternatives in the report shall include a discussion of whether the alternatives will comply with such applicable environmental quality standards and requirements. [10 CFR 51.45(d) as referenced by 10 CFR 51.53(c)(2)]

The coal-fired and gas-fired generation alternatives discussed in Sections 2.2.2.1 and 2.2.2.2, respectively, generally could be designed and constructed at the Plant Hatch location so as to comply with all applicable environmental quality standards and requirements.

Although construction and operation details for the imported power alternative, Section 2.2.2.3, are not known, it is reasonable to assume that any facility offering power for purchase would be in compliance or would be working to achieve compliance.

Table 4-1. Federal, state, local, and regional licenses, permits, consultations, and other approvals pertinent to current HNP Station operation (page 1 of 2).

Agency	Authority	Requirements	HNP Number	Issue Date	Expiration Date	Remarks
COE	Federal Clean Water Act (Section 404)	Maintenance Dredging Permit	940003870	03/19/95	09/31/04	The permit authorizes periodic dredging in the Altamaha river at the HNP intake structure.
COE	River and Harbor Act (Section 10) Clean Water Act (Section 404)	Permit for construction of a Weir	199101536	04/08/93	02/01/03	The permit authorizes construction of a temporary water retaining wall structure (weir) in the Altamaha River near the HNP intake structure. The weir would be placed in the river on in the event of an extreme low flow situation in the river, after supplemental flows from upstream reservoirs are near exhaustion.
GADNR	Georgia Groundwater Use Act, (Georgia Laws 1972 et seq., as amended by Georgia Laws 1973, et seq.)	State Groundwater Use Permit	001-0001	12/16/97	12/04/04	The permit authorizes withdrawal of groundwater from 4 wells for use at HNP sanitary facilities, process water, central water supply, and make-up water for a wildlife habitat pond
GADNR	Georgia Water Quality Control Act, (Georgia Law 1964, et seq.)	State Surface Water Withdrawal Permit	001-0690-01	12/16/97	01/01/10	Permit authorizes withdrawal of surface water from the Altamaha for cooling water at HNP.
EPA; GADNR	Federal Clean Water Act (33 USC 1251 et seq.); Georgia Water Quality Control Act, (Georgia Law 1964, et seq.)	Individual Discharge Permit	GA 0004120	09/15/97	08/31/02	Permit contains effluent limits for HNP combined plant waste steams, including sanitary wastewater, cooling water, and cooling tower blow down. SNP would have to submit a renewal application to GADNR no later than 180 days beyond the expiration date to receive authorization to discharge beyond the expiration date of August 31, 2002.
EPA; GADNR	Federal Clean Water Act (33 USC 1251 et seq.); Georgia Water Quality Control Act, (Georgia Law 1964, et seq.)	Stormwater Discharge Permit	GAR000000	06/01/98	05/31/03	The permit covers all discharges of storm water associated with industrial activities. SNC would have to notify GADNR before new storm water discharges from sites where industrial activity will occur.

Table 4-1. Federal, state, local, and regional licenses, permits, consultations, and other approvals pertinent to current HNP Station operation (page 2 of 2).

Agency	Authority	Requirements	HNP Number	Issue Date	Expiration Date	Remarks
EPA; GADNR	Federal Safe Drinking Water Act [42 USC 300(F) et seq., 40 CFR Parts 100-149]; Georgia Safe Drinking Water Act of 1997, Chapter 391-3-5	Public water system, production	PG0010005	03/21/91	03/21/01	The permit authorizes withdrawal of groundwater from 2 wells for use as drinking water at HNP.
EPA; GADNR	Federal Safe Drinking Water Act [42 USC 300(F) et seq., 40 CFR Parts 100-149]; Georgia Safe Drinking Water Act of 1997, Chapter 391-3-5	Public water system, recreation site	NG0010011	02/07/95	02/06/05	The permit authorizes withdrawal of groundwater from one well for use at the HNP recreation area.
EPA; GADNR	Resource Conservation and Recovery Act (Solid Waste Disposal Act) (42 USC 6901 et seq.); Georgia Solid Waste Management Act, Section 1486, Georgia Laws of 1972 as amended, Chapter 391-3-4	Solid waste landfill, phase II	001-004 D(L)(I)	09/12/80	Upon Closure	Imposes restrictions on activities at the HNP landfill
EPA; GADNR	Federal Clean Air Act, as amended, (42 USC 7401 et seq., (40 CFR 50-99); GA Air Quality Act, Section 12-9-1, et seq. and the Rules, Chapter 391-3-1	Air Quality	4911-001-0001-V-01-0	02/04/99	02/04/04	The permit applies to the following units: Auxiliary Start-up Boiler Number 2 Two diesel engine fire pumps Five for emergency diesel generators One Security power diesel generator
NRC	10 CFR Part 50	NRC license, HNP Unit 1	DPR-57	08/06/74	08/06/14	None
NRC	10 CFR Part 50	NRC license, HNP Unit 2	NPF-5	06/13/78	06/13/18	None

CFR = Code of Federal Regulations
COE = U.S. Corps of Engineers
EPA = Environmental Protection Agency
GADNR = Georgia Department of Natural Resources
HNP = Edwin I. Hatch Nuclear Plant
NRC = U.S. Nuclear Regulatory Commission
USC = United States Code

Table 4-2. Environmental approvals and consultations for HNP license renewal.a

Agency	Authority	Requirement	Remarks
Federal			
NRC	Atomic Energy Act (42 USC 2011 et seq.) 10 CFR 54.23 10 CFR Part 51	License renewal	Environmental Report submitted in support of license renewal application.
USFWS and NMFS	Endangered Species Act Section 7 (16 USC 1536)	Consultation	Requires Federal agency issuing a license to consult with FWS and NMFS. See Attachment C.
State			
GADNR	Clean Water Act Section 401 (33 USC 1341)	Certification	Requires applicant to provide certification from the State to Federal licensing agency.
GADNR Historic Preservation Division	National Historic Preservation Act Section 106 (16 USC 470f)	Consultation	Requires Federal agency issuing a license to consider cultural impacts and consult with State Historic Preservation Officer. See Attachment D.

EPA = U.S. Environmental Protection Agency
FWS = U.S. Fish and Wildlife Service
GADNR = Georgia Department of Natural Resources
NMFS = National Marine Fisheries Service
NRC = U.S. Nuclear Regulatory Commission
a. No renewal-related requirements identified for local or other agencies.

5.0 GENERAL REFERENCES

1. Nuclear Operating Agreement between SNC and GPC, 1997.

2. HNP Environmental Report Construction Stage, 1971.

3. HNP Environmental Report Operating License Stage. 1975.

4. Final Environmental Statement for the Edwin I. Hatch Nuclear Plant Unit 1 and Unit 2; Georgia Power Company; Docket Nos. 50-321 and 50-366, Atomic Energy Commission, October 1972.

5. NUREG-0147, Final Environmental Statement for the Edwin I. Hatch Nuclear Plant Unit 2; Georgia Power Company; Docket Nos. 50-366, Atomic Energy Commission, March 1978.

6. NPDES Discharge Monitoring Reports January 1997 – September 1998.

7. Sumner, H. L., Southern Nuclear Operating Company, Inc., letter to U.S. Nuclear Regulatory Commission Document Control Desk, dated August 8, 1997, "Edwin I, Hatch Nuclear Plant Request for License Amendment Extended Power Uprate Operation."

8. Not used.

9. National Electrical Safety Code®, published by the Institute of Electrical and Electronics Engineers, 1997 Edition.

10. NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," U.S. Nuclear Regulatory Commission, May 1996.

11. "Georgia Energy Data in Summary," Georgia Energy Facilities Authority, 1998.

12. Facts and Figures, Ga Power 1997.

13. Not used.

14. "Environmental Assessment for Cope Power Plant," South Carolina Electric and Gas Company, 1991.

15. "Electric Power Annual 1995, Volume II," DOE, Energy Information Administration, December 1996.

16. "Final Site Selection Study; 600 MW Coal-Fired Power Plant," Delmarva Power and Light Company, September 1992.

17. "Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources," EPA, AP-42, November 1996.

18. DOE/EIA-00191(97), "Cost and Quality of Fuels for Electric Utility Plants 1997 Tables," Energy Information Administration, DOE, May 1998.

19. HNP Monthly Operating Report, December 1997, January 1998.

20. EPA 904/9-94-002(a), "Final Environmental Impact Statement, Volume I: Tampa Electric Company - Polk Power Station," EPA, June 1994.

21. "The Beaver Combined Cycle Combustion Turbine Generating Plant," Portland General Electric, undated brochure.

22. DOE/EIA-0226(98/08), "Electric Power Monthly; August 1998 with Data for May 1998," Energy Information Administration, DOE, August 1998.

23. Local Climatological Data, NOAA 1996.

24. Not used.

25. Not used.

26. Not used.

27. Not used.

28. "Renewable Energy Annual; 1997" Energy Information Administration, DOE, February 1998.

29. Surface water use reports 1989-1997.

30. Groundwater use reports 1990-1997.

31. Not used.

32. Plant Edwin I. Hatch UFSAR Units 1 and 2.

33. "Edwin I. Hatch Nuclear Plant Environmental Field Survey Plan," Southern Nuclear Operating Company, August 1998.

34. Engineering Study on Induced Short Circuit Currents, Georgia Power Company, 1999 [SNC/GPC to provide citable reference for this evaluation of HNP 500kV lines].

35. Short Circuit Study on 230kV Lines From Plant Hatch, Georgia Power Company, 1999 [SNC/GPC to provide citable reference for this evaluation].

36. "TLWorkstation Code: Volume 7: ACDCLINE User's Manual Version 1.0," prepared for Electric Power Research Institute by the EPRI High Voltage Transmission Research Center, November 1991.

37. "Total Multipliers, by Industry Aggregation, for Output, Earnings, and Employment – Georgia," Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II), Revision 2, page 13, Bureau of Economic Analysis, U.S. Department of Commerce, Economics, and Statistics Administration, Washington, D.C., May 1992.

38. Joklik, W. K. and D. T. Smith (eds.), *Microbiology*, 15th edition, Appleton-Centry-Crofts, New York, New York, 1972.

39. Tyndall, R. L, K. S. Ironside, P. L. Metler, E. L. Tan, T. C. Hazen, and C. B. Fliermans, 1989. *"Effect of Thermal Additions on the Density and Distribution of a Thermophilic Amoebae and*

Pathogenic Naegleria Fowleri in a Newly Created Cooling Lake." Applied and Environmental Microbiology 55(3): 722-732.

40. 1990 U.S. Census Data.

41. Sellars, J., Appling County Board of Education, personal communication with J. B. Hovey, Tetra Tech, Inc, Aiken, South Carolina, "Student/Teacher data for Appling County, Georgia schools," October 30, 1998.

42. Alman, B., Toombs Central Elementary School, personal communication with J. B. Hovey, Tetra Tech, Inc, Aiken, South Carolina, "Student/Teacher data," November 2, 1998.

43. Burton, K., Toombs Middle School, personal communication with J. B. Hovey, Tetra Tech, Inc, Aiken, South Carolina, "Student/Teacher data," November 2, 1998.

44. Denmark, B., Lyons Elementary School, personal communication with J. B. Hovey, Tetra Tech, Inc, Aiken, South Carolina, "Student/Teacher data," October 30, 1998.

45. Culpepper, E., Toombs County High School, personal communication with J. B. Hovey, Tetra Tech, Inc, Aiken, South Carolina, "Student/Teacher data," October 30, 1998.

46. "Unity of Vision: Appling County, Baxley, Graham, and Surrency 2011, A Joint Comprehensive Plan for Appling County, the City of Baxley, the City of Graham, and the Town of Surrency, Georgia in accordance with the Georgia Planning Act of 1989", Appling County Joint Planning Board, Altamaha Georgia Southern Regional Development Center, January 1997.

47. State of Georgia Traffic count data.

48. Memorandum from J. C. Hoyle (NRC) to L. J. Callan (NRC), dated January 13, 1998, "Staff Requirements – SECY-97-279 – Generic and Cumulative Environmental Impacts of Transportation of High-Level Waste (HLW) in the Vicinity of an HLW Repository (SRM M970612)."

49. "EPA's Regional Emissions Plan Leaves Utilities Breathless," *Engineering New Record*, October 5, 1998.

50. NUREG/CR-6525, SECPOP90: Sector Population, Land Fraction, and Economic Estimation Program, Office of Nuclear Regulatory Research, U.S. Nuclear Commission, Washington, D.C., September 1997.

51. Ms. D. Carter, Appling County Tax Commissioner's Office personal communication with J. B. Hovey, Tetra Tech, Inc., "Tax payment amount for the Edwin I. Hatch Plant," November 1998.

52. "Together and Forward: Toombs County, Lyons, Santa Claus, and Vidalia 2012, A Joint Comprehensive Plan for Toombs County, the City of Lyon, the City of Santa Claus, and the City of Vidalia, Georgia in accordance with the Georgia Planning Act of 1989," Toombs County Comprehensive Plan Steering Committee, Altamaha Georgia Southern Regional Development Center, April 1992.

53. Fetter, C. W., *Applied Hydrogeology*, Second Edition, Macmillan Publishing Company, New York, New York, 1988.

54. "Significant Species Survey of Plant Hatch Appling County, Georgia," The Nature Conservancy of Georgia, 1995.

55. "Wildlife Habitat Council 1996 Recertification Application for Edwin I. Hatch Nuclear Plant," submitted by The Southern Company.

56. "Freshwater Mussel Survey, Altamaha River, Appling and Toombs Counties, Georgia," Law Engineering and Environmental Services, December 2, 1998.

57. Personal communication between J. A. Cudworth, Tetra Tech, Inc., and A. L. Clapp, Clapp Associates, February 26, 1999.

58. Wiltz, J. W., "Plant Edwin I. Hatch 316(b) Demonstration on the Altamaha River in Appling County Georgia," March 1981.

59. McMahon, R. R., "Mollusca: Bivalvia" in J. H. Thorp and A. P. Covich (editors), *Ecology and Classification of North American Freshwater Invertebrates*, Academic Press, Inc., San Diego, California, 1991.

60. Pennak, R. W., *Fresh-water Invertebrates of the United States*, John Wiley & Sons, New York, 1978.

61. DG-4005, "Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses," U.S. Nuclear Regulatory Commission, Draft Regulatory Guide, July 1998.

62. NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities," U.S. Nuclear Regulatory Commission, August 1998.

63. NUREG-1437, Addendum 1 "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report, Section 6.3 - Transportation, Table 9.1 Summary of Findings on NEPA issues for License Renewal of nuclear power plants," Draft Report for Comment, U.S. Nuclear Regulatory Commission, February 1999.

64. DOE/FEIS-0201, "Final Environmental Impact Statement Coyote Springs Cogeneration Project, Morrow County, Oregon, U.S. Department of Energy, July 1994.

65. "Threatened and Endangered Species Surveys: E.I. Hatch Nuclear Plant and Associated Transmission Line Corridors (1998-1999)," Southern Nuclear Operating Company, September 1999.

66. Georgia Natural Heritage Program (GNHP), 1997. Georgia Power Company location of rare species and natural communities within ¼ mile of Georgia Power transmission lines. Georgia Department of Natural Resources, Social Circle, Georgia.

67. Georgia Natural Heritage Program (GNHP), 1999b. Georgia element occurrence record database. Georgia Department of Natural Resources, Social Circle, Georgia, March 31.

68. Southern Company, "Wildlife Habitat Council 1999 Recertification Application for Edwin I. Hatch Nuclear Plant," July 1999.

69. Feimster, B., Georgia Power Company (HNP), personal communication with J. Bouknight, Tetra Tech, Inc., Aiken, South Carolina, October 12, 1999.

70. Memorandum from T.C. Moorer (Southern Nuclear Operating Company-Environmental Services) to C. R. Pierce (Southern Nuclear Operating Company-License Renewal Services) dated September 27, 1999, "Review of New and Significant Information Relative to License Renewal."

71. Council on Environmental Quality, "Environmental Justice: Guidance Under the National Environmental Policy Act," December 10, 1997.

72. Office of Nuclear Reactor Regulation (NRR), NRR Office Letter No. 906, Revision 2, "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues," September 21, 1999.

73. "Environmental Permits Manual," Southern Company, undated.