U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF FEDERAL AND STATE MATERIALS AND ENVIRONMENTAL MANAGEMENT PROGRAMS

DIVISION OF WASTE MANAGEMENT AND ENVIRONMENTAL PROTECTION

ENVIRONMENTAL ASSESSMENT FOR THE RENEWAL OF U.S. NUCLEAR REGULATORY COMMISSION LICENSE NO. SNM–2503 FOR OCONEE NUCLEAR STATION INDEPENDENT SPENT FUEL STORAGE INSTALLATION

DOCKET NO. 72-04
DUKE POWER COMPANY LLC d/b/a DUKE ENERGY CAROLINAS, LLC

May 15, 2009

1.0 INTRODUCTION 1
1.1 Background 1
1.2 Need for the Proposed Action 1
1.3 Previous Environmental Assessments and Supporting Documents 2
1.4 The Proposed Action 2
1.4.1 Description of Site and Activities 2
1.4.2 Current ISFSI and Dry cask Storage System Description 4
1.4.3 Waste Generated 5
1.4.4 Waste Management 5
1.4.5 Monitoring Programs 5
1.4.6 Decommissioning 6
2.0 Alternatives to the Proposed Action 6
2.1 No Action 6
2.2 Increase the Storage Capacity of the Existing Spent Fuel Pools or Construct Additional Pool Storage Space 6
2.3 Shipment of Spent Fuel to an Offsite Facility 7
2.4 Construct a new ISFSI at the ONS Site 7
2.5 Renewal for the Initial 20-year Term 8
3.0 AFFECTED ENVIRONMENT 8
3.1 Land Use 8
3.2 Transportation 9
3.3 Demography and Socioeconomic 10
3.4 Climatology, Meteorology, and Air Quality 12
3.5 Geology, Hydrology and Seismology 13
3.5.1 Geology and Soils 13
3.5.2 Seismology 13
3.5.3 Hydrology 14
3.5.3.1 Groundwater 15
3.5.3.2 Surface Water 16
3.6 Ecology 16
Terrestrial Resources 17
3.7 Noise 19
3.8 Historical and cultural resources 20
3.9 Visual/scenic Resources 21
3.10 Public and Occupational Health 22
4.0 ENVIRONMENTAL IMPACTS 22
4.1 Non Radiological Impacts 23
4.1.1 Land Use and Tax Impact 24
4.1.2 Air Quality 25
4.1.3 Noise 25
4.1.4 Water Use/Quality 26
4.1.5 Socioeconomics 27
4.1.6 Historical and Archaeological Resources 27
4.1.7 Endangered and Threatnened Species 28
4.1.8 Geology and Soil 29
4.1.9 Transportation 30
4.1.10 Scenic and Visual 30
4.1.11 Waste Management 31
4.2 Radiological Impacts 31
4.2.1 Normal Operations 31
4.2.2 Accidents 32

4.3 Impacts from Decommissioning 33
4.4 Cumulative Impacts 34
5.0 AGENCIES AND PERSONS CONSULTED 34
5.1 South Carolina State Department of Archaeology and Historic Preservation 34
5.2 U.S. Fish and Wildlife Service 34
5.3 Economic Development Commission 34
5.4 Oconee County Planning 35
5.5 School District of Oconee County 35
5.6 Oconee Soil and Water Conservation District 35
5.7 Oconee County Park, Recreation and Tourism office 35
6.0 FINDING OF NO SIGNIFICANT IMPACT 36
7.0 LIST OF PREPARERS 36
8.0 REFERENCES 37

1.0 INTRODUCTION

1.1 Background

By letter dated January 30, 2008, as supplemented January 30, 2009, Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC (Duke) submitted an application to the U.S. Nuclear Regulatory Commission (NRC), to renew license SNM-2503 for the site-specific Independent Spent Fuel Storage Installation (ISFSI) located at Oconee Nuclear Station (ONS). The ONS site is located in Oconee County, South Carolina. The current site-specific license will expire on January 31, 2010.

The license application includes a request for an exemption from 10 CFR 72.42(a), which specifies the term of an ISFSI license of 20 years. Pursuant to 10 CFR 72.7, Duke requests exemption from this requirement and proposes a license renewal period of 40 years to continue to store spent fuel until January 31, 2050. A 40 year ISFSI license renewal will also allow ONS to operate its site-specific ISFSI for 16 years beyond expiration of the station's power reactor facility operating licenses (FOLs).

This environmental assessment was prepared in accordance with the NRC regulations listed in 10 CFR Part 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions and the NRC guidance document, NUREG–1748, Environmental Review Guidance for Licensing Actions Associated with Nuclear Material Safety and Safeguards Programs (NRC, 2003).

This environment assessment will not address either the decommissioning of the ONS site following transfer of the spent fuel to the ISFSI, or the transportation of the spent fuel offsite to a permanent federal repository.

1.2 Need for the Proposed Action

ONS consists of three nuclear generating units. Units 1, 2, and 3 began commercial operation on July 15, 1973, September 9, 1974, and December 16, 1974 respectively. The current FOLs for Oconee Units 1, 2, and 3, will expire on February 6, 2033; October 6, 2033; and July 19, 2034, respectively.

The ONS ISFSI is needed to provide continued spent fuel storage capacity so that the ONS can continue to generate electricity. SNM-2503, if renewed for only the twenty year term provided by the applicable regulation, 10 CFR 72.42, will expire on January 31, 2030, which is approximately four years before the FOLs expire. As described in its renewal application, Duke anticipates that the ISFSI will continue to be required for spent fuel storage well beyond a January 31, 2030 expiration date. In accordance with the Part 72 exemption provision, 10 CFR 72.7, Duke is requesting a renewal period of 40 years, which would allow the ONS Site-Specific ISFSI to continue to store spent fuel until January 31, 2050.

1.3 Previous Environmental Assessments and Supporting Documents

Listed below are some of the documents that were reviewed to help prepare this EA:

- ONS site-specific Independent Spent Fuel Storage Installation License Renewal Application (the applicant's environmental report is attached at Enclosure 3, Appendix E) (ONS, January 2008).

- ONS site-specific Independent Spent Fuel Storage Installation Updated Final Safety Analysis Report, (ONS, December 2007).

- Environmental Assessment Related to The Construction and Operation of The Oconee Nuclear Station Independent Spent Fuel Installation (NRC, Oct 1988).

- Environmental Study "Federally-listed Endangered, Threatened, Candidate, and Special Concern Species Potentially-Occurring at the Proposed Expansion Site of the Oconee Nuclear Station Independent Spent Fuel Storage Installation" (ONS, January 2009).

Additional references may be found in the Reference section of this EA.

1.4 The Proposed Action

Duke has submitted a license renewal application requesting a renewal period of 40 years that, if approved, would allow the ONS site-specific ISFSI to continue to store spent fuel until January 31, 2050. The current license authorizes ONS to receive, acquire and possess the power reactor spent fuel and other radioactive materials associated with spent fuel storage at the ISFSI in accordance with the requirements of 10 CFR Part 72. With the exception of minor changes in the Updated Final Safety Analysis Report (UFSAR) regarding the license approval period and the addition of an aging management section, ONS indicates that renewal of material license SNM-2503 has no impact on the technical specifications set forth in the site-specific ISFSI license.

1.4.1 Description of Site and Activities

Duke owns and operates three nuclear units on the ONS site. ONS is located in eastern Oconee County, South Carolina, approximately 13 km (8 miles) northeast of Seneca, South Carolina.

The ONS facility is located on 210 ha (510 acres) in the Inner Piedmont Belt in eastern Oconee County, South Carolina, approximately 13 km (8 mi) northeast of Seneca and 42 km (26 mi) west of Greenville, South Carolina (see figure 1 below). The area around the site is primarily covered by forests, with pasture, cropland, and residential development each contributing significant portions of total land use. However, the land within 8 km (5 mi) of the plant is primarily wooded and rural.

ONS lies within the drainage area of the Little and Keowee Rivers, which flow southerly into the Seneca River, and subsequently discharge into the main drainage course of the Savannah River. Lake Keowee occupies the area north and west of the site. Lake Jocassee, which provides pump storage capacity for the Jocassee Hydroelectric Station, lies approximately 11 miles to the north, while the Corps of Engineer's Hartwell Reservoir is south and downstream from the site.

Besides being the main source of water for municipal and industrial raw water users, Lake Keowee also is one of the primary providers of cooling water for the three Oconee units and serves as a source of hydroelectric power for the Keowee Hydroelectric Station. Water from the Seneca water treatment plant provides potable water for the plant.

Duke owns all the property within the 1 mile radius exclusion area except for the small vacant rural church plot belonging to Old Pickens Church.. A visitor center, Keowee Hydroelectric Station, the Mosquito Control Facility, the Crescent Resource office complex, and the Clemson Operations Center are all located within one mile exclusion area but outside the protected area. All these facilities are owned and operated by Duke.

ONS site-specific ISFSI is located within the protected area approximately 1000 ft southwest of the Unit 2 reactor building (at the center point of the one mile exclusion zone around the ONS site) and approximately 100 ft west of the condenser cooling water intake structure (ONS, January 2008) (See Figure 2).

Figure 1: 50-mile Vicinity Map of Oconee Nuclear Station (ONS, January 2008)

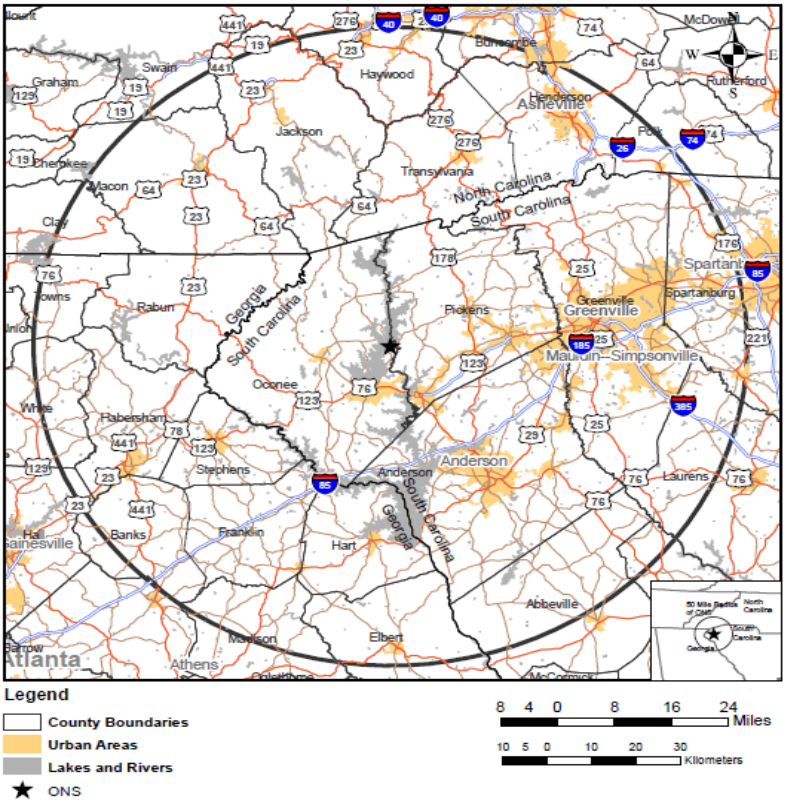
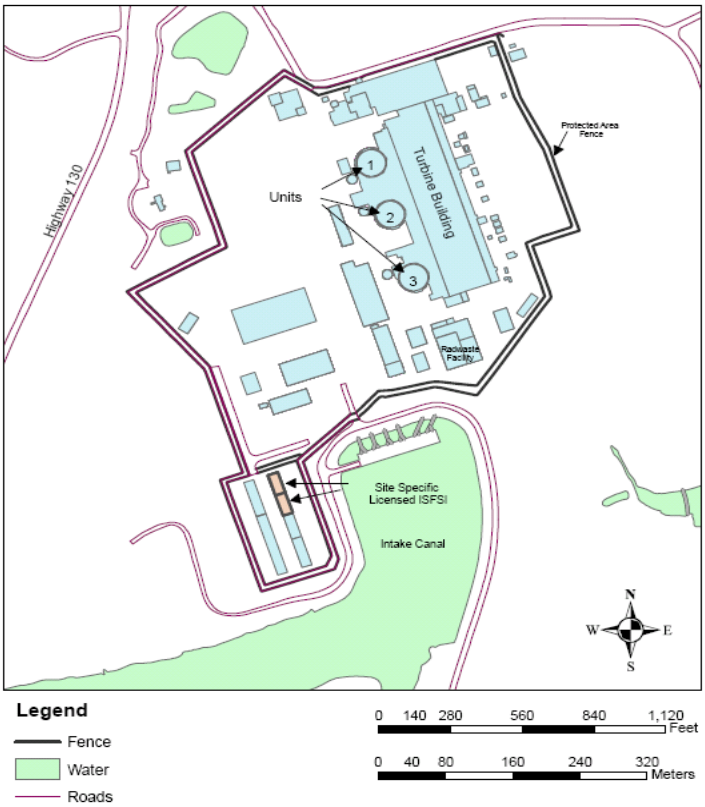


Figure 2. Oconee Nuclear Station Layout (ONS, January 2008)



1.4.2 Current ISFSI and Dry cask Storage System Description

The ONS site-specific ISFSI uses the NUHOMS®-24P dry cast system to provide for the horizontal, dry storage of irradiated fuel assemblies (IFAs) in a reinforced concrete module. The principal components of the system include a Horizontal Storage Module (HSM), made of concrete and structural steel, and a steel Dry Storage Canister (DSC) with an internal basket which holds the IFAs. The exterior walls and roof of the HSM are 3 feet thick, and the interior walls are two feet thick. Each HSM contains one DSC and each DSC contains 24 fuel assemblies. The DSC is equipped with two shielded end plugs so that when the DSC is inside the transfer cask or HSM, the dose exposure will be limited. To ensure the integrity of the DSC is not compromised under any kind of accidents, the bottom cover is redundantly seal welded during fabrication while the top cover is welded after fuel loading. All connections such as drain and vent ports on the DSC are also redundantly sealed to prevent any kind of breaches to the main body of DSC. To protect against fuel or cladding oxidation during storage, helium gas is added to each DSC prior to storage. Once the DSC is ready to be transferred, equipment such as the transfer cask, hydraulic ram, trailer and cask skid are used to transfer the DSC from the spent fuel pool to the HSM, which is the final on-site storage location (ONS, January 2008). Decay heat emanating from the IFAs is removed from the DSC by natural convection through air inlet and outlet ports provided at the top and bottom of the HSM. .

Layout

The HSMs were constructed in two phases - 20 HSMs in Phase I which were installed in 1990 and 20 HSMs in Phase II which were installed in 1992. Each HSM is approximately 20 ft long by 15 ft high and 8 ft 8 in wide. Phase I of the site-specific ISFSI consists of 20 integrally constructed HSMs on one foundation with ten modules facing opposing sides. Phase II consists of an additional 20 HSMs which were constructed in an identical configuration on an adjacent foundation for a total of 40 site-specific HSMs. There are 960 irradiated fuel assemblies stored in the site-specific ISFSI. The DSC access at the front of each HSM is covered by a steel door with a neutron shield (ONS, January 2008).

Since the site-specific ISFSI has no moving parts, it requires no maintenance other than periodic inspection of the HSM air inlets and outlets and removal of debris.

1.4.3 Waste Generated

All radioactive waste generation is from cask decontamination consists of 1) liquid waste, which is input into the cask decontamination pit drain and thus, into the existing plant liquid radwaste system; and 2) solid waste, which is collected for disposal via the existing plant radwaste facility (ONS, January 2008). Since the site-specific ISFSI has no moving parts, no waste is generated during normal storage operations.

.

1.4.4 Waste Management

Radioactive wastes generated during spent fuel loading operations are treated using existing station facilities and in accordance with ONS radwaste procedures. Any waste released from the site must meet NRC's radiological safety requirements found in 10 CFR 20 and 10 CFR 61. Contaminated pool water removed from loaded DSCs is normally drained back into the spent fuel pool with no additional processing. The small amount (<15 Cubic Feet/DSC) of liquid waste and detergent/demineralized water mixtures that is collected during transfer cask and decontamination operations are collected in the Cask Decontamination Pit. All liquid waste from this pit is transferred to the Station Liquid Waste Management System (LWM) for processing.

Potentially contaminated air and helium purged from the DSC following DSC loading and seal welding operations are directed to the Auxiliary Building Ventilation Air System (VA) at a point upstream of the Fuel Building HVAC filter units and radioactive effluent monitor. Purged gases processed with the Fuel Building HVAC filter units are released from the unit vent and will meet station release requirements.

In addition, a small quantity (<5 Cubic Feet/DSC) of low level solid waste, such as Anti-C garment, tape, blotter paper and rags, generated as a result of DSC loading operations and transfer cask decontamination are processed by compaction using the Volume Reduction (VR) System or incineration using appropriate facilities (ONS, January 2008).

1.4.5 Monitoring Programs

At a minimum of once per year, a System Health Report is generated which includes an indicator of ISFSI performance reliability and material condition. Monthly, a surveillance test with pre-established limits is performed to monitor radiation and contamination levels. Once

every 24 hours site personnel visually inspect all air inlets and outlets of each loaded HSM for both obstructions and screen damage. If present, cracks in the shielding and/or a loss of containment function could be identified through one of the above stated monitoring functions.

Environmental Monitoring Program

No liquid or airborne effluents are anticipated from the HSM. Therefore, the dose to any offsite point will only be from direct and scattered gamma radiation. Several environmental sampling locations are presently located at the Oconee site boundary surrounding the ISFSI. The closest of these is less than 0.3 miles from the ISFSI, well within the 1-mile exclusion area boundary. In addition, the dose rates at the ISFSI are monitored periodically with fence-mounted dosimetry as part of the Oconee routine radiological monitoring program (ONS, January 2008).

1.4.6 Decommissioning

When the material license for ONS site-specific ISFSI is terminated, ONS will have to decontaminate and decommission the ISFSI structure with the decommissioning technology available at the time of decommissioning. The actual detailed decommission plan will have to be designed consistent with the applicable regulation at the time of decommissioning and submitted for NRC review and approval.

2.0 Alternatives to the Proposed Action

2.1 No Action

The no action alternative will result in expiration of ONS site-specific ISFSI material license as of January 31, 2010. If this alternative is not implemented, Duke will not be able to store spent fuel at the site-specific ISFSI after January 31, 2010, and would have to remove all spent fuel that is currently stored on site. This alternative does not provide higher environmental advantage than the proposed action because there is no current federal repository for spent fuel. As such, no action would result in the lack of an appropriate storage or disposal pathway for the spent fuel.

2.2 Increase the Storage Capacity of the Existing Spent Fuel Pools or Construct Additional Pool Storage Space.

As an alternative to the proposed action, Duke could increase the storage capacity of the existing spent fuel pools or construct a new spent fuel storage pool. As stated by Duke, increasing the size of the existing spent fuel pools at ONS is not possible due too a lack of room for such expansion, as well as the impracticality of maintaining an existing inventory of spent fuel during expansion activities. Duke further states that since the ONS spent fuel storage racks have already been replaced with a high-density design; capacity increases through re-racking is not possible.

Expansion of the existing ONS spent fuel pool through the use of spent fuel rod consolidation was previously evaluated in the original site-specific ISFSI Environmental Report from April 1988. As determined by the previous evaluation, this option was deemed to be impractical since it could result in greater potential for radioactive releases, and higher radiation exposures

for operating personnel. Furthermore, construction of new spent fuel storage pool will require the same support facilities, maintenances and surveillance as for the current spent fuel pool.

Additionally, a new storage pool would require new fuel handling equipment, large capacity cask crane, building ventilation, and a water quality system. Furthermore, ONS will have to transfer fuel assemblies from existing ONS site-specific ISFSI storage modules into the pool. These alternatives will result in higher occupational exposure for the additional maintenance and surveillance activities required in support of operation of the storage pool.

Therefore, capacity increases for the ONS spent fuel pools are not a reasonable alternative to renewing the ONS site-specific ISFSI license. Moreover, as a result of increased dose exposure and high construction cost associated with new construction, this option is also not considered a viable option.

2.3 Shipment of Spent Fuel to an Offsite Facility

As an alternative to the proposed action, ONS could ship the spent fuel at the ISFSI to an offsite facility. Implementation of this alternative will minimize the environmental impacts associated with operation of the ISFSI for additional 40 years. However, radiological and non-radiological impacts resulting from activities such as packaging and transferring of the spent fuel to an offsite facility would need to be assessed.

The alternatives of shipping ONS' s spent fuel to a commercial reprocessing facility, federal interim storage facility or other privately owned spent fuel storage facility are not reasonable given that no such facilities are currently available in the United States. Therefore, these alternatives are not a reasonable option.

Duke could ship the ONS spent fuel to another nuclear power plant with sufficient storage capacity. In order for this option to be viable, the receiving plant would have to be licensed to accept the ONS spent fuel and would have to be willing to accept the fuel. Since most nuclear power plants are expected to face shortage of spent fuel storage capacity in the near future, this alternative is deemed to be not reasonable. Duke could attempt to ship the ONS spent fuel to its other nuclear power plants; however, this option will only exasperate the spent fuel storage capacity issues for Duke Company. Thus is not seen as a viable option.

2.4 Construct a new ISFSI at the ONS Site

ONS has constructed and operates an additional ISFSI under the 10 CFR Part 72 general license provision, 10 CFR 72.210, to meet its current needs for additional dry spent fuel storage. Duke could repackage ONS site-specific ISFSI spent fuel into other NRC-certified casks and store the spent fuel in the ONS general license ISFSI. Repackaging the spent fuel would preclude the need to renew the original site-specific ISFSI license. However, this alternative would add significant cost and personnel exposure associated with repackaging. Therefore, implementing this alternative does not offer an environmental benefit and as such, is not a reasonable option.

2.5 Renewal for the Initial 20-year Term

A 20 year renewal of the existing ONS ISFSI license would expire on January 31, 2030, which is approximately four years before the ONS Renewed FOLs expire. Based on the expected limits on the annual amount of fuel that can be shipped to a potential high-level waste repository and the anticipated delayed schedule for opening of such facility, Duke estimates it would not be able to ship all the stored fuel before a 20 year ISFSI license term expires. According to Duke's most recent decommissioning analyses, which assume DOE accepts ONS spent fuel beginning in 2015, operation of the ONS ISFSI is projected to continue through 2044.

3.0 AFFECTED ENVIRONMENT

3.1 Land Use

The majority of the land use and localized population lie in Pickens and Oconee counties. Portions of both Pickens and Oconee Counties are within the 10 miles Emergency Planning Zone of the ONS with the largest portion being in Oconee County. According to Oconee County planning commission comprehensive plan from 2004, the county covers approximately 670 square miles of land. The county planning commission further characterizes approximately 25% of the county land area as being in the Blue Ridge Mountains with the remainder of the county in the Piedmont region.

Land Use	Total Acres	Approximate % of total Acres
Agricultural	219,420	51.2
National Forest	79,414.68	18.5
Water Areas	48,573.08	11.3
Residential	25,000.00	6.0
Corps of Engineers	24,242.42	5.7
Commercial Farm	17,122.63	4.0
Utility	7,948.64	2.0
Clemson University	3,756.05	0.9
Commercial	1,588.06	0.4
Industrial	1,734.44	0.4

Table 1: Oconee County Land use from the County Comprehensive Plan of 2004.

As can be seen from the table above, a relatively large percentage of the total land in the county still remains in agricultural uses and national forest. Agricultural uses of land located near ONS include farming of soybeans, cotton, hay, wheat, small grain, corn, apples, forestry, poultry, beef or dairying. Utilities, such as Duke, only occupy 2% of the total land available in the county.

The original town of Pickens was located on what is now the ONS site location. The only standing structure remaining is the Old Pickens Church and Cemetery. This small, historic property, which is currently not in use, lies within the exclusion area approximately 3600 ft east of the site.

There are two schools located within a 5 mile radius of the site: Six Mile Elementary School and Keowee Elementary School. There are also two special care institutions located within a 5 mile radius: Harvey's Love and Care Home and Six Mile Retirement Center, both of which are nursing home facilities.

In addition to the schools, located approximately 5 miles north of the site on the western shore of Lake Keowee, are two condominium communities. Keowee Keys and Keowee Harbors collectively house some 2,000 people, with a large portion being permanent residents. Keowee Keys, the residential area closest to the plant, is a retirement community that features private homes and condos, a marina, tennis courts, a country club, and a golf course.

3.2 Transportation

Oconee County is served by I-85 at its southeast corner, plus U.S. highways 76 and 123 and State highways 28 and Scenic 11. ONS is on a two-lane highway with service to the site being convenient from four main directions.

Pickens County is not served by the Interstate Highway system, but has ready access to the I-85 corridor via U.S. 76, 123, and 178. State Highways 8, 96, 135, 137, 124, and Scenic 11 complete the major road net. Highway 123 runs the length of Pickens County from east to west with four-lane service to Greenville.

South Carolina state highways 130 and 183 pass to the west and south of the ONS respectively, through the 1 mile radius exclusion area. Both serve as commuting highways for local traffic and infrequent trucking of hazardous chemicals and explosives. Highway 183 is the access road that leads directly into the plant. Traffic count data collected by South Carolina Department of Transportation and Oconee County Development Commission indicated that in 2007, the number of cars traveled on these two highways was estimated to be between 100 and 10,000 cars per day. Below are additional traffic count data for roads in Oconee County.

Traffic counts (Locations with an average daily traffic volume of at lest 5,000 vehicles per day, Oconee County, 1996)			
Rank	Road	Location	Average Daily Traffic Volume
	SC 183	Between SC 188 to SC 130	5,000
	SC 183	Between 130/S-15 and Pickens Co.	5,100
	SC 130	Between US 76 and 123 to S-1	11,300
	SC 130	Between S-520 and US 76/123	8,200
	I-85	Between SC 11 and SC 59	40,800
	I-85	Between SC 59 and SC 23	39,500
	SC 28	Between US 76/123 Bus. To SC 188/S-135	22,600
	US 123	Between SC 11 and Westminster town limit	12,000
	SC 28	Between SC 11 and S-3	14,300
	SC 76	Between S-13 to US 76/123 bus and SC 28	16,400
	SC 76	Between S-21 to US 76/123 bus/ SC 130	26,500
	SC 11	Between SC 130 to Pickens Co.	3,100

Table 2 Traffic Count Data from South Carolina Department of Transportation (2008).

Air traffic into and out of Oconee County is primarily through the Clemson-Oconee Airport, which is located approximately 9 miles south of the site. Pickens County Airport is situated approximately 10 miles to the east, and Anderson County Airport is nearly 23 miles south-southeast of the plant. The nearest railroad is located in Newry, SC which is outside the 5 mile radius from the plant (ONS, January 2008).

3.3 Demography and Socioeconomic Factors

The population distribution and projections for areas around the site location are based on information from the 2000 Census. Anderson, Pickens and Oconee Counties surrounding the plant site are relatively rural, with a majority of citizens residing in the cities of Walhalla, Seneca, Clemson, Central, and Anderson, SC.

According to the 2000 Census Bureau information, Oconee County has an approximate population of 70,753, which has increased 23.1% since 1990. Oconee County has five incorporated cities and towns ranging in size from approximately 150 to 8,100 persons. The remaining county residents reside in unincorporated communities. The land occupied by the station is located in an unincorporated portion of Oconee County.

As derived from the 2000 Census, approximately 187,679 people lived within 20 miles of ONS. This represents a population density of 149 persons per square mile within 20 miles. An approximate 1,219,121 people lived within 50 miles of the site, which equates to a population density of 155 persons per square mile within 50 miles.

As estimated from the 2000 Census, expected population growth for Oconee and Pickens County, South Carolina can be found in Table 3. Based on the estimates obtained from this table, Oconee County is expected to grow by 40% by the year 2030 (as compared to 33.8% increase for SC, and 34.8% increase for the region).

Table 3 Population Growth Data (U.S Census 2000)

County	Pop 2000	Pop 2005	Pop 2010	Pop 2015	Pop 2020	Pop 2025	Pop 2030
Oconee	66,215	70,390	74,920	79,450	83,980	88,510	92,920
Pickens	110,757	116,090	123,960	131,840	139,710	147,580	154,610
Region	1,028,656	1,084,360	1,145,170	1,206,020	1,266,830	1,327,650	1,386,770
South Carolina	4,012,012	4,229,990	4,458,930	4,687,920	4,916,870	5,145,850	5,371,150

Based on census 2000 estimate for 2006, the Minority (non-white) population of Oconee County was 9.6% while the comparable percentage for the state of South Carolina was 32%. Moreover, as depicted in Table 4, approximately 17.5% of residents in Oconee County is 65 years or older as compared to 12.8 % for the entire South Carolina.

Table 4 Population Estimate by Age, Group, 2006 (Census 2000, 10-3-08)

County	Under age 14	Age 15 to 19	Age 20 to 34	Age 35 to 44	Age 45 to 54	Age 55 to 64	Age 65 +	Total
Oconee	12,607 (17.8%)	4,235 (6%)	13,087 (18.5%)	9,352 (13.3%)	9,893 (14%)	9,048 (12.8%)	12,345 (17.5%)	70,567

Although Oconee County Park and Recreation Center does not track number of visitors in the County, the county generates $28 Million dollars per year revenue from tourism. Additionally, visitors of the county spent $5.5 Million dollars per year in taxes. The influx of visitors to the county's popular shoreline on Lake Keowee is heaviest during the summer season.

In Oconee county, there are 12 elementary, 3 middle and 4 high schools serving approximately 10,500 students. In accordance with the School District of Oconee County Assistant Superintendent, increases in birthrate may result in increasing the student population to reach over 11,000 by 2018.

Based on census 2000 data, the number of households in Oconee County was 27,283 as compared to 1,533,854 for the entire South Carolina. The projected 2004 median household income for Oconee County, South Carolina was $39,415 as compared to $39,454 for the entire South Carolina. Furthermore, 12.7 % of residents in Oconee County live below the poverty line as compared to 15% for the entire South Carolina. As comparison, the median household for the entire United States was $44,334 and 12.5% of individuals were living below poverty level (Based on census 2000.)

According to the South Carolina Employment Security Commission, Oconee County labor force amounted to 30,350 with a 7.3% unemployment rate, as of 2007. As of August 2008, 30,539 residents were employed while 2,538 were unemployed resulting in unemployment rate of 7.7%. As comparison, SC unemployment rate for August 2008 was 7.6%. Duke is one of the major employers of the county next to the School District of Oconee County. Other manufacturing companies that operate their business in the Oconee County include Itron, Schneider Electric, Kendall Healthcare products and Timken U.S. Corporation.

According to Economic Development Commission (EDC) office, Oconee County future plans are to implement industrial development activities to take advantage of the ~ 4 mile stretch of I-85 highway that passes through the county. Examples of industries proposed are distribution center, warehouse, and assembly plants. Currently, some residents of Oconee county travel to Anderson and Pickens County to work; the EDC's plan is to develop the industrial park to attract employers to Oconee County.

3.4 Climatology, Meteorology, and Air Quality

ONS is located on the eastern slope of the Appalachian Mountains at an elevation of about 800 ft mean sea level. The climate of the region is generally mild. Climatological records for Greenville-Spartanburg, South Carolina (NOAA 2008), which should be representative of the site, show normal daily maximum temperatures ranging from about 50 ^{o}F in January to about 89 ^{o}F in July; normal daily minimum temperatures range from about 31 ^{o}F in January to about 69 ^{o}F in July. Average annual rainfall at the site area is approximately 53 inches (ONS, January 2008). Monthly average wind speeds range from 6.2 mph to 8.3 mph, with the highest speeds during the winter and lowest speeds during the summer (www.sercc.com). The influence of the Appalachian Mountains is seen in the prevailing wind directions, which are west-southwest and northeast. Section 2.3 of the ONS updated final safety analysis report (UFSAR) (ONS, December 2007) contains a more detailed description of the climate of the region and site.

Climatological records also show that the area is subject to occasional storms, including destructive winds. In most years, one or more tropical storms affect the site; however, ONS is sufficiently far inland that the winds associated with these storms are below hurricane force. Tornadoes are infrequent in this region and are generally small when they occur.

For about two-thirds of the year, the region is under the influence of the Bermuda high pressure system. High pressure systems are typically associated with low winds and increased potential for air pollution problems.

The National Ambient Air Quality Standards (NAAQS) specify the acceptable air concentration thresholds for six common non-radiological pollutants: nitrogen oxides, ozone, sulfur oxides, carbon monoxide, lead, and particulate matter. Compliance is determined individually for each pollutant, and the area is classified as in attainment when concentration levels comply with NAAQS standards. As indicated in 40 CFR 81.341 and the 2005 South Carolina Air Quality Annual Report (SCDHEC 2005), most counties in South Carolina including Oconee and Pickens counties are in attainment of the NAAQS. As of 2008, the EPA has changed the air quality standards for ozone. With this new standard, some counties in South Carolina may not meet the new criterion. As a result, South Carolina's Bureau of Air Quality is developing a comprehensive plan (SC Early Action Compact) to minimize the factors that are contributing to this challenge. South Carolina continues to meet all the remaining 5 pollutants standards easily, being well below the threshold.

The Oconee site is within 100 km (62 mi) of the Great Smoky Mountains National Park and Shining Rock Wilderness Area. These areas are designated in 40 CFR, Part 81, Subpart D, as mandatory Class I Federal areas in which visibility is an important value. As a result of the proximity of the Oconee Site to these Class I areas, future industrial development at the site will be subject to strict Federal standards for pollution control (NUREG 1437, Supplement 2).

3.5 Geology, Hydrology and Seismology

3.5.1 Geology and Soils

The regional geology of the affected area is typical of the Southern Piedmont and Blue Ridge. The regional geology can be further categorized as typical of southwestern Piedmont –with narrow belts of metamorphic rocks trending northwest, with the foliation dipping generally to the southeast. The Brevard zone, an ancient shear zone, passes 11 miles northwest of the site. There is no major capable fault in the immediate vicinity of the site. Major faults of the region are ancient and have been dormant for many years.

The Oconee Nuclear Site is located within the Inner Piedmont Belt, the westernmost component of the Piedmont Physiographic Province. The regional geology is typical of the southeastern Piedmont, having narrow metamorphic belts trending northeast and dipping generally to the southeast. Overlying the foundation bed are saprolite soils, a weathering product of the underlying parent rock. These soils, ranging in thickness from a few feet to over 100 feet (30 m), show decreasing degrees of weathering and decomposition with increasing depth. A light to medium gray granite gneiss is dominant among the three rock types found at the site. Second most abundant is the biotite hornblende gneiss. Most likely due to the higher percentage of biotite mica, this rock is generally weathered (i.e., softer) to a greater depth than the granite gneiss. The third rock type, a hard quartz pegmatite with local concentrations of mica, is present in layers generally less than three feet. Test borings at the ISFSI site indicate that liquefaction of soils is not a concern because all foundation materials are non-liquefiable. The ISFSI's concrete foundation will rest on either soil or partially weathered rock (ONS, January 2008).

3.5.2 Seismology

According to South Carolina's Earthquake Education and Preparedness program (SCEEP), South Carolina's earthquake region is divided into three regions: Region 1 is the low country, Region 2 is the midlands and Region 3 is the Piedmont/Blue Ridge (Figure 3). Oconee County is located in the Piedmont/Blue Ridge region.

The Piedmont and Blue Ridge region of South Carolina are not susceptible to major earthquakes with a magnitude of 6 or greater. The last major quakes, measuring 5.5 on the Richter scale, experienced in this region was in 1913 in Union County South Carolina. However, this region is susceptible to smaller magnitude of earthquakes ranging from 2 to 4, especially near dams owing to additional hydrostatic pressure exerted by the accumulated water. The University of South Carolina (USC) seismic stations have recorded numerous small

earthquakes associated with dams in the Piedmont/Blue Ridge area and some smaller earthquakes distributed around the area. These small earthquakes not associated with dams may be associated with the uplift of the Appalachian Mountains as is seen in other areas near the mountains.

Although small earthquakes may be experienced in the Piedmont/Blue ridge region, according to USC, the quakes will cause less damage than earthquakes in other regions of South Carolina (i.e., low country) since most buildings in the Piedmont region are built on solid rock and solid rock does not increase the amplitude of earthquake waves, whereas unconsolidated sediment can increase the shaking by increasing the amplitude of the waves.

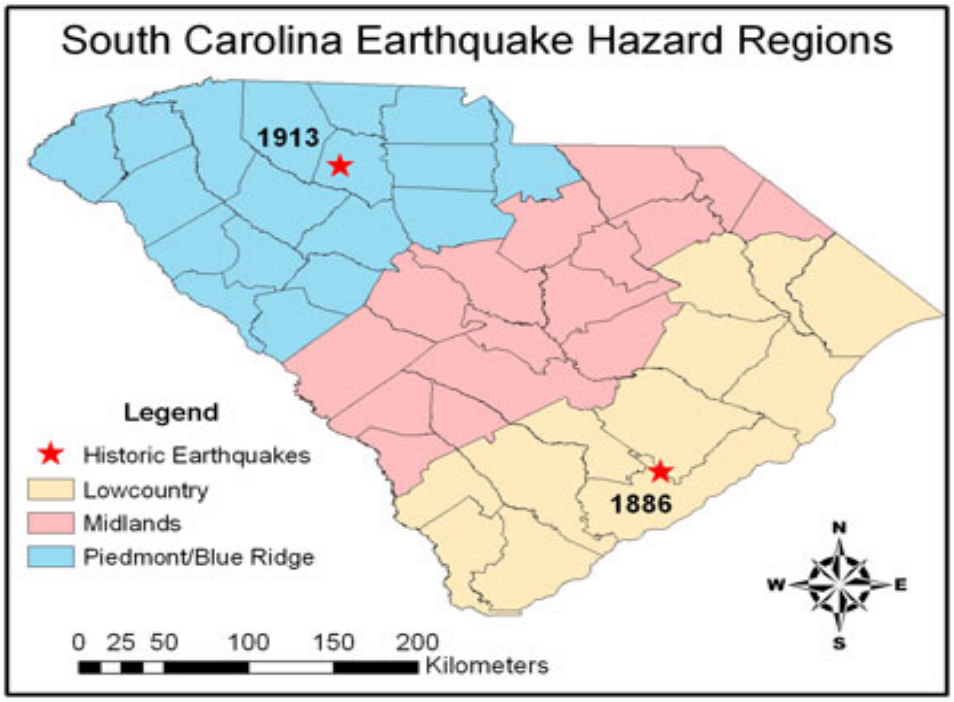


Figure 3: South Carolina Earthquake Hazard Regions (SCEEP, 2008)

3.5.3 Hydrology

South Carolina has three major physiographic regions: the Blue Ridge, the Piedmont and the Coastal Plain (**Figure 4**). "The physiographic regions exhibit variations in topography, geology, hydrology and vegetation that directly affect the quantity, quality and availability of water resources in South Carolina" (SC water usage report from 2006).

According to South Carolina water usage report from 2006, Counties in the Piedmont and Blue Ridge physiographic provinces depend primarily on the abundant regional rainfall that recharges lakes, reservoirs and major river systems. These surface water bodies constitute the primary source of water for public supply, industry, agriculture, and power production in the Piedmont Region.

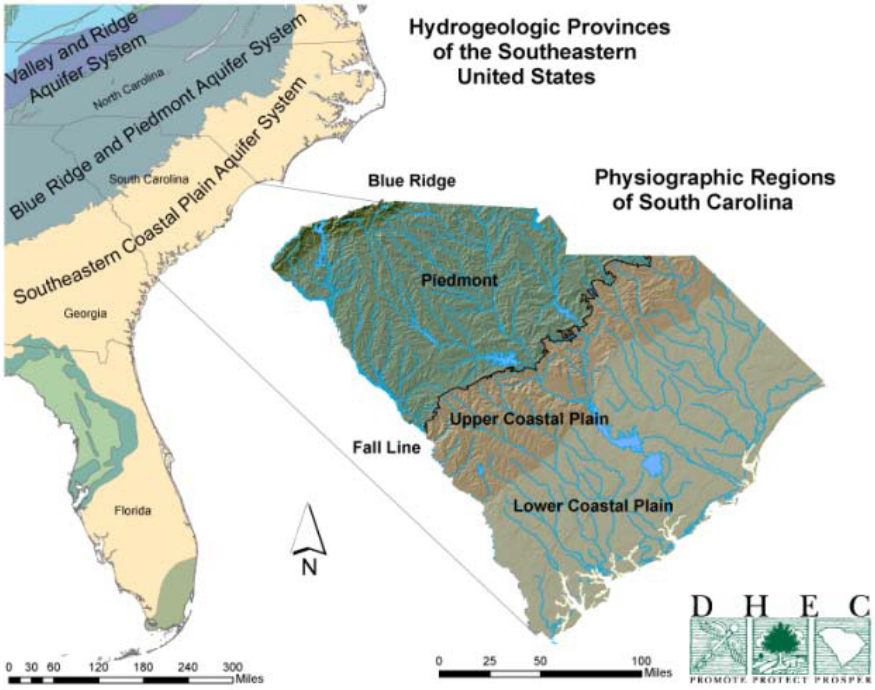


Figure 4: Hydrogeologic and Physiographic Setting for Water Use in South Carolina (SC water use report 2006 annual summary)

3.5.3.1 Groundwater

Groundwater in the Blue Ridge/Piedmont region occurs in the fractures of the bedrock and overlying soil and saprolite, and is also of good quality. In general, wells in the Blue Ridge and Piedmont regions yield little water when compared to wells drilled in the Coastal Plain owing to the inherently low porosity and permeability of the crystalline rock present in the upstate. Refer to figure below for graphical representation of major aquifer in South Carolina.

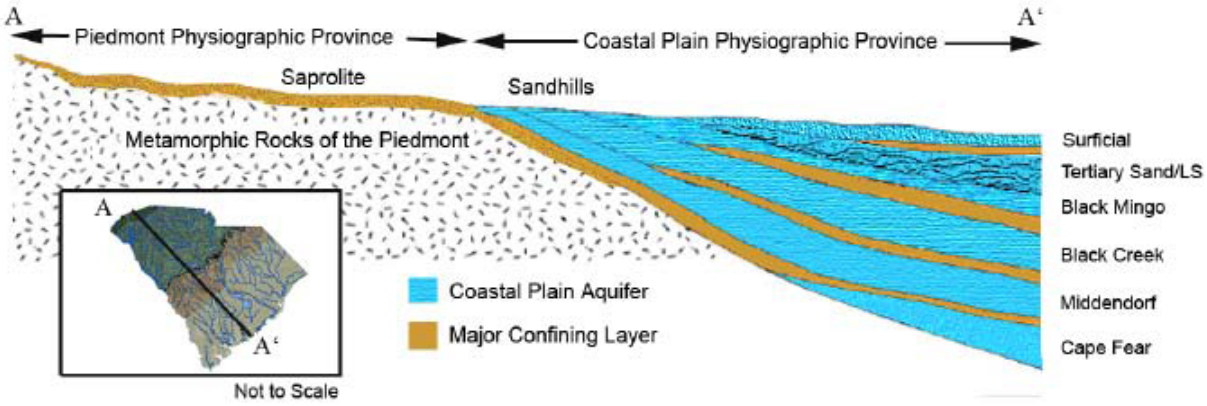


Figure 5: Generalized Hydrogeologic Cross-Section from the Blue Ridge through the Lower Coastal Plain in South Carolina (SC water use report 2006 annual summary)

The Oconee Station lies with the drainage area of the Little and Keowee Rivers, which flow southerly into the Seneca River and subsequently discharge into the main drainage course of the Savannah River. Throughout the area, groundwater occurs at shallow depths within the saprolite (weathered rock/soil) regolith that overlies the metamorphic and igneous rock basement complex (ONS UFSAR, December 2007).

A field survey conducted within 4 miles of the plant in the late 1960's determine that ground water derived from the permeable zones within the saprolite with only minor amounts obtained from the underling fractured bedrock. The wells were generally low yielding, less than 5 gpm. Most of the groundwater comes from shallow wells, 40-60 ft deep, and is used domestically for homes, irrigation of lawns and gardens, and for livestock in limited amounts. Presently, there is little industrial demand for groundwater with in the area. The surface and groundwater of the area is generally of good quality. Of the wells surveyed in the late 1960's, none were noted to require water treatment due to poor quality. (ONS UFSAR, December 2007).

3.5.3.2 Surface Water

The primary surface water body in the affected area is Lake Keowee. Lake Keowee was created in 1971 with the construction of the Keowee Dam on the Keowee River and the Little River Dam on the Little River. Lake Jocassee was created in 1973 with the construction of the Jocassee Dam on the Keowee River. At full pond, Lake Jocassee has an elevation of 1,110 ft msl and a shore line of approximately 75 miles. ONS lies within the drainage area of the two above mentioned rivers, which flow southerly into the Seneca River (ONS, January 2008).

Lake Keowee, positioned north and west of the site, serves as a major use of land and water. Its 300 miles shoreline is developed with vacation residences, along with campgrounds, marinas, golf courses, and small retail establishments. The lake is also used for fishing, boating, and swimming by the public via various public and private recreational areas. The lakes are attributes that enhance recreational land use in Oconee County.

The primary purpose of Lake Keowee is to provide cooling water for the three Oconee units and to serve as a source of hydroelectric power for the Keowee Hydroelectric Station. Water from the Seneca water treatment plant is used as potable water for the plant.

In addition to serving the needs of the nuclear and hydroelectric power plants, the lake provides water for municipal and industrial raw water users. The city of Greenville and the town of Seneca take their raw water supplies from Lake Keowee. Intake sources lie 2 miles north of the site and 7 miles south of the site respectively. Additionally, the towns of Anderson, Clemson, and Pendleton, as well as Clemson University draw their raw water from Hartwell Reservoir which is downstream from Lake Keowee (ONS, January 2008).

3.6 Ecology

The topography consists of rolling hills, with surface elevations ranging from about 700 ft to 900 ft within the region. The ecological features in the area are characterized by highly disturbed, second growth mixed pine and hardwoods. The neighboring counties surrounding the site provide a wide array of habitats for plants and animals.

Aquatic Resources

Lake Keowee serves the needs of the local nuclear and hydroelectric power plants and is also used as a source of municipal drinking water by the cities of Greenville and Seneca, South Carolina. It is used extensively by fishermen, boaters, skiers, and swimmers, and its banks are developed with vacation and permanent residences, campgrounds, boat launch areas, marinas, golf courses, and small retail establishments.

Algae have never been present in nuisance concentrations, and, because of the low nutrient content of the water, Lake Keowee has a relatively low standing crop of fish. A creel census conducted in 1973 indicated that largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), and crappie (*Pomoxis*, spp.) were the most important recreational species in Lake Keowee (Edwards et al. 1976). Data on angler effort and harvest rates collected over a period from 1974 to 1993 (Barwick et al. 1995) confirmed that largemouth bass remained the most important sportfish in the reservoir and that sunfish (*Lepomis* spp., including bluegill) and crappie were the only other species that contributed in a significant way to the reservoir's sport fishery (NUREG 1437)

The U.S. Fish and Wildlife Service (FWS), in a letter dated June, 2008, provided a list of the Federally endangered and threatened species that potentially occur in Oconee County, South Carolina. No Federally listed aquatic species were identified for Oconee County. However, the bog turtle *(Clemmys muhlenbergii)* occurs in neighboring Pickens County and was listed as a threatened species due to similarity of appearance to the northern population of the same species. A survey conducted during June 1998 by Dr. L.L. Gaddy (ONS, January 2008) found no Federal-listed threatened or endangered species present within a 1.6-km (1-mi) radius of Unit 2's reactor building at ONS. This includes the owner-controlled areas as well as additional lands along the Keowee River and along Lake Keowee. No State-ranked aquatic species listed as occurring in Oconee or Pickens Counties have been identified as occurring on or in the immediate vicinity of ONS.

Terrestrial Resources

As described in NUREG 1437, Supplement 2, the vegetation in the vicinity of ONS has been variously described as part of the oak-pine-hickory biome (forest type) of the eastern deciduous forest (Greller 1988) or as part of the southern mixed forest province (Bailey 1976, 1980). Much of the Piedmont region near ONS was cleared and converted to cotton production during the late 1800s and then abandoned in the 1930s. Most of the existing forested areas in the vicinity of ONS consequently represent second growth forests. According to a survey conducted by ONS in December 2008, the various dominant species found near the site are as follows: Eupatorium Capillifolium (Dog fennel), Lespedeza Cuneata (sericea, Chinese Lespedeza), Lonicera Japonica (Japanese Honeysuckle), Pinus Taeda (Loblolly Pine), Rubus Sp. (Blackberry) and Symphyotrichum Pilosum (Frost Aster, Oldfield Wite Aster). A more comprehensive list of the species found during this survey can be found in Reference “Environmental Study, January 2009”.

White-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), raccoon (*Procyon lotor*), rabbits (*Sylvilagus floridanus*), squirrels (*Sciurus carolinensis* and *Tamiasciurus hudsonicus*), beavers (*Castor canadensis*), muskrats (*Ondatra zibethica*), foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), opossums (*Didelphis marsupialis*), skunks (*Mephitus mephitus* and *Spilogale putorius*), river otters (*Lutra canadensis*), mink (*Mustela vison*), and various mice, voles, and shrews are wildlife species found in the project area. The white-tailed deer is the most popular game species, and black bear are hunted in the areas to the west of ONS.

The turkey (*Meleagris gallopavo*), bobwhite quail (*Colinus virginianus*), and mourning dove (*Zenaida macroura*), are the most common game birds. Many species of songbirds inhabit the area, including the eastern bluebird (*Sialia sialis*), red-eyed vireo (*Vireo olivaceus*), cardinal (*Cardinalis cardinalis*), tufted titmouse (*Parus bicolor*), woodthrush (*Hylocichla mustelina*), summer tanager (*Piranga rubra*), blue-gray gnatcatcher (*Polioptila caerulea*), hooded warbler (*Wilsonia citrina*), and Carolina wren (*Thryothorus ludovicianus*). The box turtle (*Terrapene carolina*), common garter snake (*Thamnophis sirtalis*), timber rattlesnake (*Crotalus horridus*), and assorted frogs, toads, and salamanders comprise the herpetofauna.

Extensive areas of ONS are protected or managed as upland natural areas, wetlands, or wildlife areas. A Duke funded survey conducted in May and June of 1998 identified several areas within 1 mile radius of the plate site that retain characteristics of mature upland forests that the applicant has designated as protected natural areas. Wetlands were also identified during this survey, and these are managed as sensitive environmental areas.

Threatened and Endangered Species

In October 2006, in a letter addressed to ONS, US Fish and Wildlife Service (FWS) provided a list of endangered and threatened species in Oconee County. In this letter, US FWS concurred with ONS's conclusion that the "proposed actions is not likely to have reasonably foreseeable adverse effects on resources under the jurisdiction of the Service that are currently protected by the act" (ONS, January 2008).

In March 2008, NRC staff sent a consultation letter to FWS. In response to this consultation, FWS identified several species that are known to occur or that may occur within Oconee and Pickens County of South Carolina. Of the many species identified in Oconee, only the three following species are classified as either federally endangered or threatened species.

Common Name	**Scientific name**	**Status**	**Occurrence**
Smooth coneflower	Echinacea laevigata	endangered	Known
Persistent trillium	Trillium persistens	endangered	Known
Small whorled pogonia	Istoria medeoloides	threatened	Known

Table 5 : List of Federally Endangered and/or threatened species provided by FWS in 2008.

In Pickens County, FWS identified the following four species as being endangered or threatened.

Common Name	Scientific name	Status	Occurrence
Bog turtle	Clemmys muhlenbergii	Threatened/ (Federally protected due to similarity of appearance to listed species)	Known
Smooth coneflower	Echinacea laevigata	endangered	Known
Dwarf-flowered	Hexastylis naniflora	threatened	Possible
Mountain sweet pitcher-plant	Sarracenia rubra ssp. Jonesii	endangered	Known

Table 6 : List of Federally Endangered and/or threatened species provided by FWS in 2008.

FWS indicated that there are no critical habitats for threatened and endangered species found in either Oconee or Pickens County in a letter sent to NRC in June 2008.

As documented in ONS's environmental report (attached to the ONS application as Enclosure 3, Appendix E), the FWS concurred with the result of ONS's 1998 field survey. The 1998 survey in concluded that there were no federally endangered and threatened species within 1 mile radius of ONS. In a letter dated June 23, 2008, the FWS identified threatened and endangered species in Oconee and Pickens County. The NRC staff requested ONS to review these new species, listed in tables 5 and 6 above, and determine if they are found near the ISFSI structure. ONS conducted a survey in December 2008 and concluded that none of the threatened and/or endangered species, listed in tables 5 and 6 above, exist in the vicinity of the ISFSI structure. A comprehensive list of the ONS's findings can be found in reference "Environmental Study, January 2009".

3.7 Noise

Noise resonates from a variety of sources such as transportation, construction, industrial and recreation. Noise exposure in excess of 85 decibels for 8 hrs can harm an individual's health and cause unwanted stress. Noise annoyance can impact an individual's quality of life as well as disrupt individual's concentration that might reduce efficiency of completing assigned task thoroughly/effectively.

Noise/sound can be described utilizing the following three concepts: amplitude (measure of loudness expressed in decibels -dBA), frequency (measure of pitch expressed in hertz-Hz), and time pattern (measure of exposure duration expressed in hours and minutes). Refer to figure 4 for typical ranges of common sounds. The amount of noise and the length of time of exposure determine the extent to which it can impact one's health.

In accordance with the Environmental Designation for noise abatement (EDNA) classification (Control of Unnecessary Noise, 2008), there are set noise level limits set forth for each land use (i.e., Class A for residential, Class B for commercial and Class C for Industrial). The maximum permissible environment noise level between industrial neighbors is 70 dBA, between industrial

and residential neighbors, 60 dBA and, between industrial and commercial neighbors, 65 dBA. As a result of Oconee's ISFSI license renewal, the noise sources generated come from all the resources (such as tracks, cranes, and personnel coordinating the activities) utilized to transport spent fuel from the reactor building to the spent fuel storage area. All the noises generated from transporting the spent fuel are noises expected of normal industrial sites; therefore, applying EDNA's classification, the noise levels are predicated to be less than 70 dBA, a value lower than the OSHA exposure limits of 85 decibels.

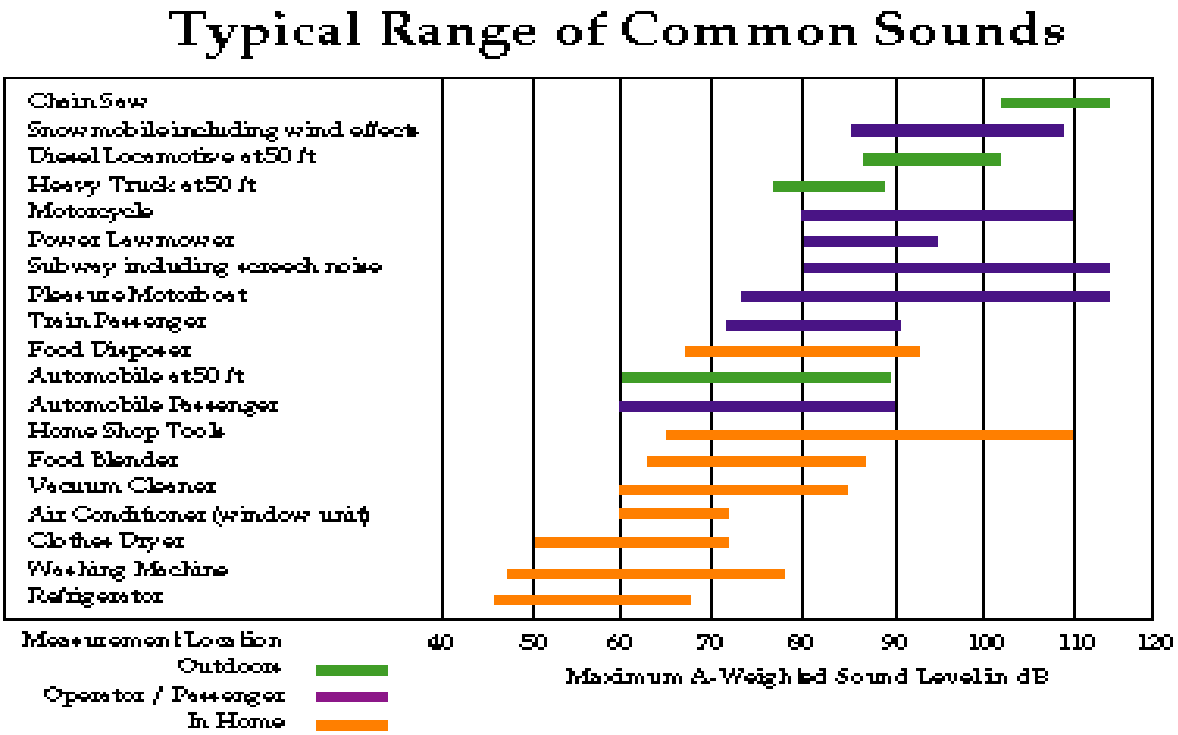


Figure. 6 - Typical Range of Common Sounds (Protective noise level, 2008)

3.8 Historical and cultural resources

As required by the National Historic Preservation Act, the NRC is evaluating the impact of this renewal on historic, archaeological and traditional cultural resources. As stated by the applicant, significant archaeological investigations were conducted throughout the Keowee-Tozaway project area including the Keowee Dam and ONS site prior to inundation. During this investigation, South Carolina State Department of Archaeology personnel recorded 39 archaeological sites. In addition to the investigation, Duke also conducted archaeological site file searches at the South Carolina Department of Archives & History and the Institute of Archaeology & Anthropology at the University of South Carolina. This search resulted in identifying four Native American Sites within 1 mile radius of ONS. However, none of these Native American sites were located within the fenced area of the site-specific ISFSI.

In addition, the NRC staff independently searched the National Registry Information System for Oconee County South Carolina and discovered several listings of historical places, including the three historic sites identified by Duke that are near the nuclear station. The Duke identified sites are as follows:

- Oconee Nuclear Station is built on the former site of the original town of Pickens. The only standing structure remaining from the original town is the "old Pickens Presbyterian Church", surrounded by 200 marked graves, built between 1849 and 1851. This Presbyterian Church was added into the National Register of Historic Places in 1996.

- The Alexander-Cannon-Hill House is located at High Falls County Park within 6 miles of Oconee Nuclear Station. This house was relocated in 1972 from the old Pickens town.

- The Newry Historic District, a textile mill village consisting of various building and properties on approximately 250 acres, is located approximately five miles from Oconee Nuclear station.

Duke also identified a small fenced cemetery near the current access road into the plant from highway 183. However, this cemetery is not listed in Oconee County Historic Cemeteries database.

The NRC staff contacted the SHPO office to validate none of the sites identified by ONS are affected by the proposed action. In an e-mail dated October 13, 2008, the SHPO office indicated that the continued operation of the ONS ISFSI will have no effect on properties listed in or eligible for listing in the National Register of Historic Places.

3.9 Visual/Scenic Resources

The Oconee Nuclear site is within 62 miles of the Great Smoky Mountains National Park and Shining Rock Wilderness Area. The major landscape feature near the affected area of ONS are Lake Keowee, which is formed by the Keowee Dam, located adjacent to ONS to the north and east of the site; the Army Corps of Engineers Lake Hartwell, located to the south of the site-specific ISFSI, and Lake Jocassee located approximately 11 miles to the north of ONS. Oconee Nuclear Station ISFSI is located inside the plant site protected area boundary approximately 1000 ft southwest of the Unit 2 reactor building. There are no residence, industrial, and commercial, institutional, or recreational structures not owned by Duke within the one mile exclusion zone.

Scenic resource near Lake Keowee has changed as a result of population growth and resultant development since the plant's construction. However, the view near the plant along side of SC highway 183 and 130, shows mainly wooded countryside, occasional agricultural lands, and fields, and thus does not reveal ONS until the traveler is within hundred yards of the plant gate.

From the air, the principal visual features of the ONS region are Lakes Keowee, Jocasee, and Hartwell and the countryside, which is generally wooded or in small farms. The position of the plant relative to Lake Keowee is such that the ONS is only visible from the water within the first

1.6 km (1 mi) to the north. Farther north, islands and the topography of the shoreline render the plant invisible. From the lake, the shoreline appears mostly wooded with upscale housing developments and boat launches (NUREG 1437, December 1999).

3.10 Public and Occupational Health

Risks to occupational health and safety include exposure to industrial hazards, hazardous materials, and radioactive materials. Industrial hazards for ONS are typical for similar industrial facilities and include exposure to chemicals and accidents ranging from minor cuts to industrial machinery accidents.

For a U.S. resident, the average annual estimated total effective dose equivalent (TEDE) from natural background and anthropogenic radiation sources is about 3.6 mSv [360 mrem] but varies by location and elevation (DOE, 2008). The source of this dose includes cosmic radiation, radionuclides generated by interactions between the atmosphere and cosmic radiations (cosmogenic radionuclides), radiation sources in the earth (terrestrial sources), naturally occurring radionuclides in the air (inhaled), and naturally occurring radionuclides that exist in the body.

The site-specific ISFSI is a passive system and requires no or little maintenance. If maintenance is required, maintenance operation on the transfer cask, transfer trailer and other ancillary equipment are performed in a low dose environment and is done when fuel movement is not occurring (ONS, January 2008). Work such as construction of additional HSM that can expose personnel to radiation are supposed to be planned and executed such that ALARA is achieved.

The expected collective dose received by site personnel from fuel handling activities such as loading, constructing and maintenance of HSM is 7.5 rem per year. The dose estimates assumes design bases source terms for all fuel, construction of additional modules at a rate of 5 HSMs per year and general area doses from a full 88 HSM array of site-specific HSMs for the entire period of HSM construction (ONS, January 2008). Although 88 HSM are used to calculate dose exposure, only 40 HSM are currently at the ISFSI site. Additional 48 HSM may be constructed as the need arise in the future.

The ONS site-specific ISFSI is situated approximately 1 mile from the exclusion area boundary. The estimated maximum dose rate in any direction at 5,000 ft for up to an 88 module array of HSMs is less than 1.0×10^{-6} mrem/hr. The estimated annual dose to the public is conservatively calculated as 7 person-millirem per year. The maximum dose to the nearest potential future resident from the site-specific ISFSI is 7.5×10^{-2} mrem/yr (ONS, January 2008).

4.0 ENVIRONMENTAL IMPACTS

The staff reviewed the applicant's environmental report, collected information from local, regional, and state government agencies and evaluated the environmental impacts for the various resources on the affected environment. The staff applied the guidelines outlined in NUREG-1748 in their evaluation. In accordance with this guidance, the staff evaluated the direct and indirect effects, and cumulative impacts that each resource may encounter from the

proposed action. The staff qualified the effects in terms of small, moderate, or large. NRC applies the same qualitative measurements in its environmental impact assessments for nuclear power plants (10 CFR 51). The definitions are 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.

- MODERATE – environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.

- LARGE – environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

In addition to applying the qualitative measures listed above, the NRC staff further characterized the effect of the proposed actions into radiological and non radiological impacts. The next section will address each category in detail.

4.1 Non Radiological Impacts

Potential non radiological impacts are created from activities that might directly and indirectly impact resource areas such as:

- Land use and Tax impact as a result of clearing, and excavating undisturbed land, as well as secondary developments like retail shops, recreation, and restaurants

- Noise from construction, transportation, and other activities associated with operation and construction of ISFSI

- Socioeconomics from the additional resource that will require housing, use of public resources such as hospitals, schools, and libraries

- Air quality from emissions (transport trucks, ISFSI components)

- Transportation

- Ecological

- Water quality from liquid discharge of the ISFSI as well as use for new secondary developments

- Waste storage from additional spent fuel

- Historical and Archeological Resources

- Scenic and Visual

- Public and Occupational Health

As discussed in detail below, the non-radiological environmental impacts for ONS are expected to be minimal since the proposed action is a renewal of the site-specific license for an existing ISFSI facility. Approval of the proposed action will not result in any construction or expansion of the existing ISFSI footprint. Any ground-disturbing activities will occur upon ground that has been previously disturbed. Nor is the proposed action likely to result in either an increase or decrease in employment.

4.1.1 Land Use and Tax Impact

Duke's ISFSI license renewal request does not include any new construction that will disturb previously undisturbed land. During the renewal term, ONS will continue to store spent fuel at the ISFSI structure located within the owner controlled area until a permanent federal repository or other disposition is available to accept commercial power plant's spent fuel. Since no new construction is required for the proposed action, existing land use (as described in Section 3) is not anticipated to be altered. Thus, there will not be any direct or indirect effect on land use or on property taxes.

Long term operation of the ISFSI structure is not anticipated to require new and/or additional maintenance activity that impacts the current land use since the ISFSI structure is passive and requires little or no maintenance. ONS is licensed to store 88 HSM on site, however, only 40 HSM are currently on the premises. If additional spent fuel storage is required in the future, ONS may have to expand the existing ISFSI pad to accommodate the additional 48 HSM that it is allowed by the current site-specific ISFSI license. The environmental impact of expansion has already been addressed in the original EA and deemed to be minimal since construction activities will take place on already disturbed land.

Land use can also change over time if the population-driven changes and tax-driven changes in offsite land use are experienced as a result of project implementation. Under the terms of this application, population-driven changes in land use are not expected since no new construction is planned and increase in employment is not expected.

As stated in NUREG 1437 supplement 2, Oconee County is the only jurisdiction that taxes ONS directly, and it is the principal jurisdiction that receives direct tax revenue as a result of ONS's presence. Since the scope of the ISFSI license renewal does not include any new construction or major refurbishment activities, no new sources of plant-related tax payments are expected that could significantly influence land use in Oconee County.

Based on the review of information documented above, the NRC staff concludes that the proposed action will not result in any significant impact on land use.

The No Action Alternative could impact land use. In the short-term, land use would support the decommissioning activities. Long-term use of the land will depend on the outcome of the decommissioning activity and will have to be assessed as part of the decommissioning plans.

4.1.2 Air Quality

Potential impacts on air quality for the affected environment can result from gaseous effluents releases from the ONS ISFSI structure. The effluents may contain radiological and non-radiological chemical constituents. The proposed action is to renew the ISFSI license and does not include any construction or ground-disturbance. Moreover, by design, the dry spent fuel storage casks used at the ISFSI emit no gaseous or liquid effluents into the environment. As such, the continued operation of the ISFSI is predicted to be small under the NUREG-1437 criteria and thus, will have no significant impact to the NAAQS criteria.

The NRC requires licensees to monitor and report the principal radionuclides released to the environment in liquid and gaseous effluents, primarily through the radioactive waste treatment system, during operation of an ISFSI in accordance with 10 CFR 72.44(d)(3). The staff reviewed ONS's annual effluent release reports and determined that ONS has not had any releases of radioactive material from the ISFSI operation. ONS based is analyses on dose rate measurement at the perimeter of the ISFSI, and the robust design of the dry storage canisters that are able to maintain effluents in the confinement barriers for all normal, off normal and accident conditions during storage, as well as during severe environmental events (e.g. tornado, earthquake). Based on these findings and the procedures in place at the ISFSI, NRC staff considers this a small, and thus not a significant, environmental impact.

Indirect and cumulative environmental impacts may result from the emissions (e.g., process stack, vehicular) released by ONS and other industrial companies located near the affected area. As stated before, the ISFSI structure does not release any gaseous effluents by design; therefore, there will not be any incremental gaseous effluent increase as a result of the proposed action. Hence, the NRC staff concludes that the proposed action will not result in any significant cumulative impact. Moreover, as discussed in transportation section of this report, vehicle emission impact as a result of the proposed action is insignificant. From this assessment, NRC staff considers the indirect and cumulative environmental impacts are small and thus, will have no significant impact upon the human environment.

The No Action Alternative may degrade the air quality over the short-term and cause direct impact to the affected area based on the high levels of demolition dust and exhaust from vehicles caused by the ISFSI decommissioning process.

4.1.3 Noise

Aside from noise generated by the trucks transporting the ISFSI from the spent fuel pool to the ISFSI pad, the ONS Site Specific ISFSI generates no noise, per design; the structure has no moving parts. As discussed in Section 3, noise generated by the transport vehicle is no

different than noise that is expected at an industrial site. Therefore, NRC staff considers the impact from noise generated as a result of the proposed action to be small, and thus, will have no significant environmental impact.

Cumulative impacts include noise associated with the surrounding facilities. There are no large industrial or military facilities or activities within 5 miles of Oconee. The approximate distance to the nearest non-industrial neighbors is: residential - 1 mile; school – 5 miles; and hospital (retirement Center) – 5 miles. Given the low noise levels at the site and its dissipation with distance, the staff determines that any cumulative impact of noise from continued operation of ONS ISFSI would be small.

The No-Action Alternative may cause short-term noise impacts. Increased noise from the decommissioning activities, such as building demolition, and relocating the spent fuel cask to an alternate location would occur. Long-term noise impacts are expected to be transient and within the range of a typical construction site.

4.1.4 Water Use/Quality

The primary surface water body in the affected area is Lake Keowee. During normal operation, the plant cooling water is provided from Lake Keowee. The Seneca water treatment plant is also used for potable water for the plant. Water consumption at the ONS site as a result of the proposed action is not anticipated to change since existing operational and maintenance procedures will be used during the renewal term. Consequently, there are no direct environmental impacts to surface water as a result of ISFSI license renewal of ONS.

There are no liquid effluents generated by the dry storage casks located at the ISFSI by design, thus, the proposed action should cause no significant environmental impact to water quality or upon local water use. Another indirect impact to the quality of water can result from storm-water runoff. ONS currently does not contain storm-water runoff from the ISFSI site prior to its release into the intake canal. However, once the water passes through the plant, discharge from the plant is monitored to ensure acceptable NPDES discharge limits are met prior to the discharge water enters Lake Keowee. As the dry storage casks at the ISFSI are designed not to generate any liquid effluents and based upon the ONS effluent monitoring program, the NRC concludes that the quality of surface water will not be altered significantly by the proposed action. Based on information obtained from NUREG-1437, supplement 2, “Plants using less than 100 gpm are not expected to cause any groundwater use conflicts." Per design, ONS ISFSI does not consume any water during normal operation. During any spent fuel loading operation, water used for decontamination comes from demineralized water, as such; groundwater used as the result of the proposed action is less than 100 gpm. Based on the above information, the NRC staff classifies the impact on water consumption/quality as small thus not significant.

The Oconee County anticipates increased industrial and residential activity in the county. Further industrial/residential activity could potentially increase the amount of effluent and runoff discharged to Lake Keowee as well as increase water consumption. As documented in the Oconee County Comprehensive plan 2004, this development has been acknowledged by the Oconee County planning commission, and has been captured as one of the “natural resource objectives for the future” of county development. Since neither the Economic Development commission nor the County Planning commission have specific details of future

industrial/residential development, the impact of effluents runoff and/or water consumption can not be reasonably determined. However, as part of the objectives, the county plans to preserve, protect and enhance the quality and quantity of Oconee County's ground water and surface water through the implementation of strategies such as adoption of infrastructure master plan and adaption of erosion and sediment control going forward. Furthermore, since there is no incremental increase of water consumption as a result of the proposed action, the NRC staff concludes that the proposed action will not result in any significant cumulative impact.

The No-Action Alternative could impact water quality. In the short-term, decommissioning activities could increase sediment runoff. In the long-term, the impact would depend on the decontamination level achieved.

4.1.5 Socioeconomics

NRC staff considered each of the following socioeconomic factors for this analysis: Economy; employment levels; population growth; recreational resources; available educational services; and health care. In the renewal application, Duke indicated that the proposed action will not require any additional employees to maintain and/or monitor the site specific ISFSI. Thus, there are no direct or indirect effects, and no cumulative impacts, upon socioeconomic factors resulting from the proposed action.

The no action alternative will result in expiration of ONS site-specific ISFSI license as of January 31, 2010. However, since ONS FOLs will continue in effect until 2034, the impact of the ISFSI decommissioning upon the socioeconomics of Oconee County will not be significant.

4.1.6 Historical and Archaeological Resources

As stated in ONS's application, the proposed action will not involve any new construction or disturbance of previously undisturbed land. As a result, there would be no identifiable adverse effects to known historical and archaeological resources as a result of renewal of the ISFSI license. Moreover, consultation between ONS and the South Carolina State Historic Preservation Office resulted in a determination by the State office that no known historical properties included in or eligible for inclusion in the National Register of Historic Places would be affected by the proposed action.

Potential historical and cultural impacts may occur during future construction if ONS expands ISFSI structure and discovers historical and cultural artifacts during the expansion. However, as stated by applicant, ONS's ISFSI structure is located on previously disturbed land thus discovery of new historic or cultural resources is unlikely. In an event historical and cultural artifacts are discovered during any expansion, standard industry practice is to stop construction activities and inform the SHPO office so that they can analyze the newly discovered artifacts for historical and cultural significance.

Based on this assessment, NRC staff considers the direct and indirect effects, and cumulative impacts, of the proposed action upon any historic or archaeological resources as being small, and thus, there will be no significant impact to such resources.

4.1.7 Endangered and Threatened Species

NRC staff consulted with the applicant and the fish and wildlife services to determine the effects the proposed action may have on the ecology, particularly the endangered and threatened species. The U.S. Fish and Wildlife Service (FWS), in a letter dated June 23, 2008, provided a list of the federally endangered and threatened species that potentially occur in Oconee County, South Carolina. The FWS acknowledged that ONS's site area does not provide critical habitats for threatened and endangered species found in either Oconee or Pickens County. No Federally listed aquatic species were identified for Oconee County. However, the bog turtle *(Clemmys muhlenbergii)* occurs in neighboring Pickens County and was listed as a threatened species due to similarity of appearance to the northern population of the same species. A survey conducted during June 1998 by Dr. L.L. Gaddy (ONS, January 2008) found no Federal- or State-listed threatened or endangered species present within a 1.6-km (1-mi) radius Unit 2's reactor building at ONS. This includes the owner-controlled areas as well as additional lands along the Keowee River and along Lake Keowee. No State-ranked aquatic species listed as occurring in Oconee or Pickens Counties have been identified as occurring on or in the immediate vicinity of ONS. In December 2008, an additional survey was conducted by ONS to confirm the existence of federally endangered and threatened species near the site. Results of the survey concluded that none of the threatened and/or endangered species, listed in the FWS letter, exists in the vicinity of the ISFSI structure. A comprehensive list of the ONS's findings can be found in Reference "Environmental Study, January 2009".

NRC staff considered other direct and indirect effects, and cumulative impacts, that might result from the proposed action. Renewal of ONS's ISFSI license would not result in any additional terrestrial impacts. The ISFSI structure is currently in operation on a previously disturbed land. While plans may exist for expansion of the pad to accommodate the 48 additional HSM that ONS is licensed to maintain, according to ONS, there are no planned expansions outside of the current footprints of existing site-specific ISFSI. Furthermore, ONS has made a commitment, as part of this ISFSI license renewal process, to survey the affected area for any federally listed threatened and endangered species if the site-specific ISFSI is expanded in the future. With this action, construction may produce soil erosion concerns or alter/restrict animal movement (i.e. fencing), noise from the construction may affect animal behavior. However, as observed by NRC staff during the site visit as well as information obtained from ONS application, the surrounding area near the ISFSI structure has been graveled over and is routinely maintained by ONS to prevent vegetation growth and minimize erosion. Moreover, the ISFSI structure is fenced to deter animals and other species from coming in close proximity with the ISFSI. Therefore, future expansions will not significantly alter the ecology of the area near the ISFSI. Some of the outcome of the expansion are short-term (i.e. construction noise) and may have little effect on the terrestrial ecology. Based on consultations with the Federal, State, and City officials and consideration of the characteristics of the affected area, NRC staff does not find any significant direct or indirect effects, or cumulative impacts upon endangered and threatened species.

The No-Action Alternative would result in the expiration of ONS's ISFSI license which will force ONS to decommission the ISFSI and relocate the spent fuel currently stored at the ISFSI. This action may result in short-term environmental impacts such as increases in the noise levels due to the demolition activities, increased occupational dose exposure or changes in air quality. In the long-term, the land would eventually become available for another use or could remain

unoccupied. Therefore, the ecological impact would depend on the final determination of the land.

4.1.8 Geology and Soil

Environmental impacts considered for this resource include, but are not limited to, land stability (the occurrence of earthquakes) and soil erosion. As stated in ONS's UFSAR section 2.5.1, extensive research has been done to understand the soil which makes up the foundation of the ISFSI structure such that proper foundation design, which can withstand possible earthquake activities, can be done for the structure. The result of the study found that the original plant structures are founded on typical piedmont granite gneisses. The study also allowed ONS to characterize the rock underlying the site as hard and structurally sound and contains no defect which would influence the design of the heavy structure and that the residual soil overlying the rocks that form the foundation for the ISFSI present no problem in design or construction.

Seismic activity appears low overall, but occurrences of earthquake swarms (small magnitudes) exist within the affected area. As stated in Section 3, Oconee County is located in the Piedmont/Blue Ridge region. Although small earthquakes may be experienced in the Piedmont/Blue Ridge region, according to USC, the quakes will cause less damage than earthquakes in other regions of South Carolina (i.e., low Country) since most buildings in the Piedmont region are built on solid rock and solid rock does not increase the amplitude of earthquake waves, whereas loose sediment can increase the shaking by increasing the amplitude of the waves. A major quake has not been seen in this region for over 100 years. The largest earthquake occurred in Charleston, approximately 200 miles away from ONS, in August 1886. Since the plant start operating, two moderate earthquakes have been experiences near the site in 1971 in Seneca, SC and in 1979 in Lake Jocassee respectively (UFSAR 2.5.2.1). To minimize soil erosion, the area near ISFSI structure has been graveled. Based on the results of the study and events that are likely to occur near the ONS site, ONS's ISFSI structure is designed to withhold credible site hazards such as seismic events, wind, tornado and flooding events (UFSAR 1.3.1.2). From these statements, NRC staff believes there is little direct environmental impact on the geology and soils as a result of the proposed action, therefore considers the direct impact as small and not significant.

An indirect impact on the soils may result from spills, leaks, and inadvertent discharges that flow uncontained into the ground. The impact is closely related to the extent of the release, sediment transport, and groundwater movement. As stated by ONS, ISFSI structure (dry cask) is designed for no leakage and analysis of normal and accidental conditions have shown that no credible conditions could breach the canisters body or fail the double seal welds at the end of the DSC. Therefore the potential for spills and leaks to be discharged into the ground is minimal. Additionally, routine inspection of the ISFSI structure is done by maintenance and security person who can identify spills and or leaks right away. Therefore, NRC staff considers that the resultant releases to the soils would produce a small environmental impact.

Cumulative impacts can result from accidental releases of contaminated water into the soils. This may cause degradation of the groundwater, diminish land fertility, and produce toxic sediment contamination. Although the chance of leakage from the ISFSI structure is minimal, ONS surveys groundwater quality frequently to monitor for tritium and other contaminants in the subsurface. This monitoring program will ensure proper identification and resolution will occur in an event inadvertent leakage or spills happen at ONS. Based on adequate monitoring

program and design of the ISFSI assures the NRC staff that cumulative geology and soil impacts to be small.

The No-Action Alternative may produce short-term impacts. Decommissioning activities may affect surficial geology from erosion. The main geological impacts experienced during decommissioning would result from the clean-up of contaminated soils and sediments. However, soils at the site must meet applicable radiological soil concentration limits before release for restricted or unrestricted use. The long-term geological impact would depend on the land use after license termination.

4.1.9 Transportation

The transportation system in the vicinity of ONS is adequate to support the level of traffic it receives. Although several of the residential communities on both sides of Lake Keowee have long, narrow access roads, none of these roads has been identified as seriously congested. According to Oconee County Development Commission traffic on SC highway 183 and 130 is under capacity thus will be able to accommodate future traffic pattern increases. However, as population continues to grow, upgrading of most arterial links and main highways is likely to be required to accommodate the growth.

Duke owns all the property within the 1 mile radius exclusion area except for the small vacant rural church plot belonging to Old Pickens Church, rights-of-way for existing highways and approximately 9.8 acres of U. S. Government property involved with Hartwell Reservoir (ONS UFSAR, December 2007). As stated by ONS, arrangements have been made with the South Carolina State Highway Department to control and limit traffic on public highways in the Exclusion Area should it become necessary in the interest of public health and safety. According to Economic Development Commission, road closure of either highway (due to accident and/or heavy equipment transport) does not significantly impact the traffic pattern as there are other smaller routes residents of Oconee County could take to reach their final destination. Based on this information, the NRC staff concluded that the impact to transportation as a result of the proposed action is small.

4.1.10 Scenic and Visual

This section evaluates the visual and scenic quality impact as a result of the proposed action. Scenic quality is impacted by surface disturbance, which creates a contrast with the natural environment. The ISFSI structure is located with in the ONS site boundary and is surrounded by mature trees along the side of SC highways 183 and 130. Due to the topography of the area near the ISFSI structure, travelers on either highway are mostly able to see the natural growth and farmland surrounding ONS much more than the ISFSI structure. Moreover, the staff does not anticipate any changes in the region's scenic quality as the scope of the proposed action does not include any new construction. Therefore, the staff classifies the impact of the proposed action on scenic and visual resources as small and not significant.

In the future, if federal repositories are still not accepting spent fuel from commercial nuclear power plants and existing spent fuel storages are at capacity, the applicant may need to expand the existing ISFSI. If expansion of the ISFSI is warranted, according to ONS, construction will occur on the current footprint of the existing Site Specific ISFSI within the ONS site boundary.

Therefore, the staff believes there will be little or no impact on scenic quality of the area. With these considerations, NRC staff does not find any significant direct or indirect effects, or cumulative impacts upon scenic resources.

4.1.11 Waste Management

NRC staff evaluated the waste management environmental impacts associated with continued storage of ISFSI for additional 40 years until federal repository is available to accept the spent fuel or another type of disposition is utlized. Waste generated as a result of loading operation, and transfer cask decontamination (ISFSI campaign) may be in the form of liquid (from decontamination of transfer cask), air (from loading and seal welding DSC) and/or solid (from protective clothing utilized and all tools and material used during the campaign).

Contaminated pool water removed from loading DSC is normally drained back into the spent fuel pool with no additional processing. Liquid generated during decontamination process is collected in Cask Decontamination Pit. This liquid waste is directed to the Station Liquid Waste Management System for processing. As documented in ONS's Technical Specification Section 5.5, Radioactive Effluent Controls Program ensures concentrations of both liquid and gaseous effluents conforms to 10 CFR 50.36a requirements to keep doses to the public as low as reasonably achievable.

Potentially contaminated air and helium purged from the DSC following DSC loading and seal welding operation are directed to the Auxiliary Building Ventilation Air System (VA) at a point upstream of the Fuel Building HVAC HEPA and carbon filter unit and radioactive effluent monitors. Purged gases processed with the Fuel Building HVAC filters units are released from the unit vent and meet station release requirements.

Small quantities of low level sold waste generated during the ISFSI campaign is processed by compaction using the Volume Reduction (VR) System or incineration using appropriate facilities. This low level waste consists of disposable Anti-C garments, taps, blotter paper, rags, etc.

Based on all the existing programs and/or systems in place to manage waste generated from ISFSI operation, the NRC staff determined there to be no significant direct or indirect effects, or cumulative impacts, related to the waste management area.

4.2 Radiological Impacts

4.2.1 Normal Operations

Dose to the Workers:

Radiation exposure from normal ONS ISFSI operations is primarily a result of direct and scattered radiation from the spent fuel in the storage modules. Duke maintains a radiation protection program for the ONS in accordance with 10 CFR Part 20 to ensure that radiation doses are maintained as low as is reasonably achievable. This radiation protection program is applicable to ONS ISFSI operations. During the storage phase, radiological impacts to workers will result from routine activities, such as performing radiation surveys, surveillance activities of

the inlet and outlet vent of the HSM, and routine security patrols. Such activities will be conducted by the existing workforce at the ONS and dose exposure from these activities is negligible. Furthermore, since the ONS ISFSI structure is a passive system; it requires minimal maintenance during normal operation except the routine surveillances. Additionally, according to ONS, maintenance operations on the transfer cask, transfer trailer and other ancillary equipment are performed in a very low dose environment when fuel movement is not occurring.

Dose to the Worker During Additional Construction:

Occupational dose from construction activities is less than 50 mrem per year (ONS, January 2008) which is well within the occupational dose limits set forth in 10 CFR 20.1201(a).

Dose to the Public:

Since no gaseous and liquid effluents are discharged from the ONS ISFSI structure, potential dose exposure to the public as a result the proposed actions are a result of direct and scatter gamma radiation from the storage module (ONS, January 2008). As documented in ONS environmental review, estimated annual dose to the public is calculated as 7 person-mrem per yer and the maximum dose to the nearest potential future resident from the ONS ISFSI is 7.5×10^{-2} mrem per year which is minimal compared to the 10 CFR 20.1301 dose limit of 100 mrem. The cumulative offsite dose to the public from all activities at ONS, including ISFSI operation, is well below the regulatory limits.

Based on the findings above, the staff concluded that the environmental impacts as a result of the proposed action to be small.

4.2.2 Accidents

As defined in ANSI/ANS-57.9-1984, “Design Criteria for an Independent Spent Fuel Storage Installation (Dry Storage Type),” ONS addressed four categories of design events in its environmental review. These events are classified as normal, off normal and accident events. Category I events are associated with normal operation, dose impacts of these events are similar to impacts discussed above for normal operations at the ISFSI.

Category II events are associated with off-normal operation, ONS has determined that the limiting off-normal event to be jammed dry storage cask (DSC) during loading or unloading operation at extreme ranges of ambient temp (-44 ^{o}F and +125 ^{o}F). Based on analysis performed by ONS for this limiting off-normal event, no additional radiological impact exists beyond what is presented in section 7 of the ONS ISFSI UFSAR (Radiation Protection).

Category III events are associated with infrequent events that could be reasonably expected to occur over the lifetime of the ISFSI and Category IV events are associated with extremely unlikely events that is postulated to occur (conservative design bases for ISFSI). Category III and IV events include, Loss of Air Outlet Shielding, Tornado/Tornado Missile, Earthquake, Transfer Cask Drop, Transfer Cask Loss of Neutron Shield, Lightning, Blockage of Air Inlets and Outlets, DSC Leakage, Accidental Pressurization of DSC, Load Combinations, Floods, and Explosions. Due to the robust design features of the ONS ISFSI structure, the impact of these accidents to station workers as well as the nearest residents is small. Of all the accidents mentioned above, loss of air outlet shielding and Dry Storage Canister leakage are the two

postulated accidents that can have offsite radiological consequences. Loss of air outlet shielding accident analysis postulates the loss of both air outlet shielding blocks from the top of the HSM. As discussed in UFSAR section 8.2.1.3, dose rates to person 100 meters from the ISFSI during a seven day recovery period is 0.533 mrem/hr as compared to 0.0587 mrem/hr under normal case dose rate with shielding blocks intact. The increased dose to an offsite person located 2000 meters away from the ISFSI during the seven day recovery time is 9.62E-7 as compared to 3.77E-8 under normal case (ONS UFSAR, December 2007). These values are significantly lower than the 10 CFR 72.106 limit of 5 rem. For Dry Storage Canister Leakage accident scenario, ONS assumed a total and complete instantaneous leak of one DCS concurrent with all fuel rods failure in the damaged DCS that instantaneously released 30% of all the fission gasses in the irradiated fuel assembly to the atmosphere. This accident scenario, although not creditable due to the robust design features, was analyzed to show the safety features of the ONS site specific ISFSI structures. As calculated by ONS, the maximum offsite whole body and thyroid doses as a result of this accident were determined to be 7 and 200 mrem respectively. These dose exposure values are well within the 10 CFR 72.106 limits of 5 Rem (5000 mrem). Based on the information contained above as well as the results of analysis done by ONS, the NRC staff considers the environmental impact from the proposed action to be small.

4.3 Impacts from Decommissioning

If the proposed action is approved, decommissioning will not occur, at the earliest, until 2050. If the no-action alternative is selected, decommissioning may occur much sooner. Nevertheless, decommissioning will occur, eventually, regardless of whether the proposed action or no-action is selected. As such, only the timing aspect of decommissioning is considered in relation to the no-action alternative in this environmental assessment.

Decommissioning of the ISFSI structure will start after the ONS spent fuel has been transported to a federal repository (if available) or other off-site facility for permanent storage. Prior to commencing decommission activity, a detailed decommissioning plan will have to be submitted and approved by NRC (an additional NEPA analysis for the decommissioning plan is conducted at that time). Activities included in the decommission plan are the removal of the spent fuel from the site for transfer to an offsite faculty, the decontamination and dismantling of the concrete Horizontal Storage Module (if necessary), and surveying the area to determine the levels, if any, of residual radioactive material.

Small occupational exposures to workers could occur during decontamination activities, but these exposures would be much less than those associated with cask loading and transfer operations. Minor impacts from noise and dust could also result from dismantling the pad and structures, but they would be much less than similar construction impacts. A final radiological survey would be conducted. If the results of the final decommissioning survey indicate there is no residual radioactive material, then the site may be released for unrestricted use. The outcome of this review will not alter plans developed by the applicant (and approved by NRC) for decommissioning activities.

4.4 Cumulative Impacts

The NRC has evaluated whether cumulative environmental impacts could result from the incremental impact of the proposed action when added to the past, present, or reasonably foreseeable future actions in the area. As documented under each of the resource area in section 4.1 and 4.2, the impact of the proposed ONS ISFSI license renewal, when combined with previously evaluated effects from the ONS Power Plant, is not anticipated to result in any significant cumulative impacts to human health or the environment.

5.0 AGENCIES AND PERSONS CONSULTED

The NRC staff consulted with other agencies regarding the proposed action in accordance with NUREG–1748. These consultations are intended to (i) ensure that the requirements of the Endangered Species Act Section 7 and the National Historic Preservation Act Section 106 are met and (ii) provide the designated state liaison agency the opportunity to comment on the proposed action.

5.1 South Carolina State Department of Archaeology and Historic Preservation

By letter dated May 27, 2008, the NRC staff requested the views of the State Historic Preservation Officer regarding identification of historic properties that may be affected by the proposed action. On October 13, 2008, a representative of the State Historic Preservation Office transmitted a response via an email detailing the State Historic Preservation Office's conclusion that the continued operation of the Oconee Nuclear Spent Fuel Installation will have no effect on properties listed in or eligible for listing in the National Register of Historic Places (ML091271071).

5.2 U.S. Fish and Wildlife Service

By letter dated May 27, 2008, the NRC staff requested that the U.S. Fish and Wildlife Service to provide an official species list for the project area. On June 23, 2008, the U.S. Fish and Wildlife Service transmitted the official species list (ML081850455). The NRC staff confirmed that ONS considered in its Site Specific ISFSI license renewal request (ONS, January 2008) those threatened and endangered species identified by the U.S. Fish and Wildlife Service in the species list, and concluded that the proposed action would not impact those species.

5.3 Economic Development Commission

On October 24, 2008, NRC staff, met with Mr. Jim Alexander, the director of Economic Development Commission (EDC), to inform his office of Oconee Nuclear Station's intention of renewing its Site Specific ISFSI license for another 40 years and solicit any questions. While at EDC, the staff also collected information on future economic development plans, current development status, population growth and major employers in the county. In addition to the above information, the staff was able to get a copy of a report for 2006-2007 which included a comprehensive overview of Demographic, Economic and Quality of life trends for Oconee County, South Carolina.

5.4 Oconee County Planning

On October 24, 2008, NRC staff met with Ms. Amanda Schell to inform her office of Oconee Nuclear Station's intention of renewing its Site Specific ISFSI license for another 40 years and solicit any questions. While at County Planning Office, the staff collected information on future residential development plans, current development status, and population growth.

5.5 School District of Oconee County

On October 24, 2008, NRC staff met with Mr. Michael Thorsland, assistant superintendent to gather information on the capacity of schools to accommodate the current and future population of the county. While at the School District office, Mr. Thorsland, provided information on current student population data, school operating budget, current school expansion/renovation plan to keep up with population growth, and industrial partnership program to host students and educate them on the various technology that are being utilized.

5.6 Oconee Soil and Water Conservation District

On October 24, 2008, NRC staff, met with Ms. Heather Stevens at the Oconee County Agricultural building to discuss water and soil classifications. Ms. Stevens indicated that her office works with residents of Oconee County, including farms, to manage their land and water use such that various conservation methods are effectively utilized. Ms. Stevens indicated that implementing conservation methods are strictly voluntary by the residents of the county. Below are additional information gathered during our visit:

- As forest lands are being converted into developments, runoff from various developments might increase soil erosion; this issue is one of the conservation office concerns going forward;

- Since the conservation office is not a regulating body, they do not monitor water quality nor do they enforce any kind of conservation practices onto residents as well as businesses in Oconee County. They implement conservation practices through cost sharing program with private land owner. On example of cost sharing program is when the cost of building fences around livestock water use to prevent runoff from entering drinking water is shared between the private land owner and the conservation office;

- Lake Keowee is part of the Savannah River Basin. According to Watershed Water Quality Assessment done in 2003, Lake Keowee is classified as not being impaired.

5.7 Oconee County Park, Recreation and Tourism office

On October 24, 2008, NRC staff, met with Mr. Phillip Shirley, director of Parks, Recreation and Tourism, to gather information on number of visitors to Oconee County. Mr. Shirley indicated that the county does not have a way to monitor the number visitors per year, just amount spent in the county; $28 Million dollars per year is spent in Oconee County; $5.5 Million dollar per year is spent on taxes by tourist. Mr. Shirley believes that once resources such as sewer system are developed in southern county, tourism is expected to grow. Oconee County is developing a

Recreation Master Plan to tackle the increasing demand for recreational use of shoreline in Oconee County, and expected growth.

6.0 FINDING OF NO SIGNIFICANT IMPACT

The NRC staff concludes that the proposed action will not result in any significant impacts to human health or the environment. The proposed action is simply the renewal of a license for an existing ISFSI facility. Approval of the proposed action will not result in any construction or expansion of the existing ISFSI footprint. Any ground-disturbing activities will occur upon ground that has been previously disturbed. The ISFSI is a passive facility that produces no liquid or gaseous effluents and requires no power or regular maintenance. No significant radiological or non-radiological impacts from continued normal operations are expected. Occupational dose estimates from routine monitoring activities and transfer of spent fuel for disposal must be maintained ALARA and must be within the limits of 10 CFR 20.1201 per the ONS radiation protection program. The annual dose to the nearest potential member of the public from ISFSI activities is estimated to be 7.5×10^{-2} mrem/year, which is significantly less than limits specified in 10 CFR 72.104 and 10 CFR 20.1301(a). The cumulative dose to an individual offsite from all site activities will not exceed 0.05 mSv/yr [5 mrem/yr], a value within the limits specified in 10 CFR 20.1301.

The environmental impacts of the proposed action have been reviewed in accordance with the requirements of 10 CFR Part 51. The NRC staff has determined that the proposed action will not significantly affect the quality of the human environment. Therefore, an environmental impact statement is not warranted for the proposed action, and a finding of no significant impact (FONSI) is appropriate.

The documents related to this proposed action are available for public inspection and copying at the NRC Public Document Room, One White Flint North, 11555 Rockville Pike, Rockville, Maryland, 20852. Additionally, most of these documents are available for public review through the NRC electronic reading room at http://www.nrc.gov/reading-rm.html.

7.0 LIST OF PREPARERS

H. Yilma, Project Manager, All Sections

K. Jamerson, Project Manager, Part of Section 3

A. Fetter, Senior Project Manager, Reviewer

8.0 REFERENCES

ONS Independent Spent Fuel Storage Installation Application for Renewed ISFSI site-specific License (ONS, January 2008).

ONS site-specific Independent Spent Fuel Storage Installation Updated Final Safety Analysis Report (ONS, December 2007).

Environmental Assessment Related to the Construction and Operation of the Oconee Nuclear Station Independent Spent Fuel Installation (NRC, October 1988).

Environmental Study "Federally-listed Endangered, Threatened, Candidate, and Special Concern Species Potentially-Occurring at the Proposed Expansion Site of the Oconee Nuclear Station Independent Spent Fuel Storage Installation" (ONS, January 2009).

Duke Power Company, "Independent Spent Fuel Storage Installation Environmental Report", April 1988.

Oconee County 2004 Comprehensive Plan, 2008, http://www.oconeesc.com/planning/comprehensiveplan.htm

South Carolina Department of Transportation, 2008, http://www.dot.state.sc.us/getting/pdfs/Traffic_Count_Files/Oconee.pdf

U.S. Census Bureau, 2008, http://www.census.gov.

South Carolina Department of Health and Environmental Control, "South Carolina Air Program: A Decade and Beyond- 1990 to 2005", December 2008.

NRC, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: supplement 2 regarding the Oconee Nuclear Station. Final Report", Washington, DC: NRC, December 1999.

NRC. NUREG 1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS programs. Final Report." Washington, DC: NRC. August 2003.

South Carolina's Earthquake Education and Preparedness Program (SCEEP), 2008, http://scearthquakes.cofc.edu/SCEQ/SCEQRegions.html

South Carolina Water Use Report 2006 Annual Summary, 2008, http://www.scdhec.net/environment/water/docs/wtruse2006.pdf?bcsi_scan_A3171404B2C9D30E=0&bcsi_scan_filename=wtruse2006.pdf

U.S. Fish and Wild Life Service letter, "Oconee Independent Spent Fuel Storage Installation License Renewal, Oconee Nuclear Station, Oconee County, SC, FWS Log No.42410-2008-SL-0475", June 2008.

Protective Noise Levels, 2008, http://www.avlelec.com/epa_noise.html.

DOE, Office of Civilian Radioactive Waste Management, 2008, "Americans' Average Radiation Exposure" http://www.ocrwm.doe.gov/factsheets/doeymp0337.shtml.

Oconee County Economic Development Commission (EDC), "2006 – 2007 Oconee County Profile: comprehensive Overview of Demographic trends, Economic Trends, and Quality of life", 2007.

Oconee County, "A Recreation Master Plan for Oconee County, SC", 2004

Oconee Medical Center Official Website, 2009,
http://www.oconeemed.org/index.cfm?PageID=26&ParentPageID=3

Forest Encyclopedia Network, 2008, http://www.forestencyclopedia.net/p/p1537

Health Guidance Series, 2008, "Construction Industry Council
CDM Guidance for Designers: http://www.safetyindesign.org/NOISE.pdf

Control of Unnecessary Noise, 2008, http://www.ci.kennewick.wa.us/City_Clerk/KMC/09-52.pdf

Average Wind Speed (mph) for Selected Cities in the Southeast, 2008,
http://www.sercc.com/climateinfo/historical/avgwind.html

Oconee County Economic Development Commission, 2008, "Demographics"
http://www.oconeesc.com/econdev/demographics.htm

South Carolina Employment Security Commission, 2008, http://www.sces.org/index.htm

Duke Energy Corp. "Operating License Nos. DPR-38, 47, 55: Technical Specifications for the Oconee Nuclear Station Units 1, 2, 3"; May 23, 2000.

Duke Energy corp. Response to Requests for Additional Information License Amendment Request No. 2007-06: attachment 2 "Environmental Study", January 30, 2009.