CHAPTER 1
INTRODUCTION TO THE ENVIRONMENTAL REPORT

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1.0 INTRODUCTION

The regulations in 10 *Code of Federal Regulations* (CFR) 51.20(b) require preparation of an environmental impact statement (EIS) pursuant to the National Environmental Policy Act (NEPA) when the proposed "major federal action" is issuance of a permit to construct a nuclear power reactor. In this case, the proposed action is the U.S Nuclear Regulatory Commission (NRC) issuance of a combined construction and operating license (combined license) to Duke Energy Carolinas LLC (Duke Energy), for the William States Lee III Nuclear Station, Units 1 and 2, hereinafter referred to as the Lee Nuclear Station, in Cherokee County, South Carolina. The purpose of the Lee Nuclear Station is to provide base load generation capacity to accommodate both projected demand increases and replacement capacity for anticipated retirement of older generating units. The requested license would authorize the construction and operation of the Lee Nuclear Station and its associated support facilities.

In accordance with the provisions of 10 CFR 52, Duke Energy is submitting to the NRC an application for a combined license for the Lee Nuclear Station. The regulations in 10 CFR 51 and 52 require a complete Environmental Report (ER). This ER is submitted to aid the NRC in fulfilling its obligations under NEPA. The general format and contents of this ER are based on the guidance in NRC Regulatory Guide 4.2, Revision 2, “Preparation of Environmental Reports for Nuclear Power Stations” and NUREG-1555, “Standard Review Plans for Environmental Reviews for Nuclear Power Plants.” This ER also conforms to the regulatory guides cited in these two documents unless noted otherwise.

This ER is organized into the following chapters:

- Chapter 1, Introduction to the Environmental Report.
- Chapter 2, Environmental Description.
- Chapter 3, Plant Description.
- Chapter 4, Environmental Impacts of Construction.
- Chapter 5, Environmental Impacts of Station Operation.
- Chapter 6, Environmental Measurements and Monitoring Programs.
- Chapter 7, Environmental Impacts of Postulated Accidents Involving Radioactive Materials.
- Chapter 8, Need for Power.
- Chapter 9, Alternatives to the Proposed Action.
- Chapter 10, Environmental Consequences of the Proposed Action.

This ER discusses the purpose of and need for the proposed action. In addition, it describes the existing environment at the Lee Nuclear Site and in the vicinity, describes the proposed AP1000 reactors, summarizes potential environmental impacts of construction and operation of the proposed facility, and considers appropriate mitigation measures. It includes discussions of alternative sites and alternative technologies for the production of electrical power. The ER also includes an evaluation of the costs and benefits associated with construction and operation of the specific reactor.

1.1 THE PROPOSED PROJECT

The proposed project will be constructed on the site of the former Duke Power Cherokee Nuclear Station. The property is wholly owned by Duke Energy. Likewise, the Lee Nuclear Station will be wholly owned by Duke Energy, which also will be the operator of the facility. Transmission corridors associated with the Lee Nuclear Station will be owned by Duke Energy.

The proposed project utilizes the Westinghouse AP1000 reactor design. The NRC issued the proposed AP1000 design certification rule in April 2005, inviting the public to submit comments on the AP1000 design control document, the proposed rule, and the environmental assessment. The rule certifying the AP1000 reactor design became effective February 27, 2006.

Duke Energy, through its integrated resource planning process, identified a need for additional base load generation starting in 2010 and continuing beyond 2015 that is planned to be satisfied through a number of means, including the proposed Lee Nuclear Station. Duke Energy is submitting this combined license application to preserve the option of nuclear generation to meet this need. The need for power is further discussed in Chapter 8 of this ER.

The current site was selected on the basis of an in-depth review of alternative sites. Criteria such as seismic characteristics, demographics, emergency planning, exclusion area, transmission access, and water availability were used in the site-selection analysis. The Lee Nuclear Site meets the desired characteristics necessary to support the construction of a new nuclear power plant. This ER summarizes the process that led to selection of the Lee Nuclear Site for the proposed facility.

The Lee Nuclear Site is located in the eastern portion of Cherokee County in north-central South Carolina (Figures 1.1-1 and 1.1-2). It is on the west side of the Broad River at a point about 1000 feet (ft.) upstream from the Ninety-Nine Islands Hydroelectric Plant. Within Cherokee County, the site is 8.2 miles (mi.) southeast of Gaffney, 7.5 mi. southeast of East Gaffney, 5.8 mi. south of Blacksburg, and 2.6 mi. southeast of the unincorporated village of Cherokee Falls (Reference 2). The three largest population centers (defined as having more than 25,000 residents) in the region are Charlotte, North Carolina; Spartanburg, South Carolina; and Greenville, South Carolina (Reference 4). The site is 40.1 mi. southwest of Charlotte, 24.6 mi. northeast of Spartanburg, and 51.6 mi. northeast of Greenville. The nearest population center is Gastonia, North Carolina, located 24.0 miles northeast of the site (Reference 3). Gaffney is the largest city within a 10-mi. radius of the site (Reference 4).

Ninety-Nine Islands Reservoir is the nearest major body of surface water to the Lee Nuclear Site. This reservoir is an impoundment of the Broad River. The Lee Nuclear Site is located adjacent to the reservoir, which bounds it to the north and east. Land along the south boundary of the site is private property (Reference 1).

Universal Transverse Mercator grid coordinates (NAD 83) for the proposed reactor location at Unit 1 of the new nuclear power plant are 453194 meters (m) east and 3877231 m north. The reactor coordinates at Unit 2 are 453447 m east and 3877285 m north. At the center of the Lee Nuclear Site (the midline between the two proposed reactors), the coordinates are 453321 m east and 3877258 m north.

The Lee Nuclear Site encompasses approximately 1900 acres (ac.) of property (Figures 1.1-2 and 1.1-3). In the early 1970s, the site was evaluated for construction of three nuclear units. In 1975, the NRC granted a construction permit (NUREG-75/089) to Duke Power Company. Approximately 750 ac. of ground on the site were disturbed by the subsequent construction, which began in 1977 and was halted in 1982 (Reference 1). The terrestrial environs of the site prior to this construction consisted primarily of deciduous hardwood forest and farms. However, the construction resulted in extensive alteration of the site, which involved vegetation clearing; establishment of on-site construction roads; establishment of a railroad spur to the site; extensive excavation and grading with heavy equipment; building of on-site warehouses, shops, and construction support facilities; and construction of portions of one nuclear unit, including about half of its associated reactor containment/shield building. These construction activities occurred in the large open area that is visible on the Lee Nuclear Site today. As a result, the site consists of open, partially developed industrial land with low groundcover vegetation and scattered areas of sparse tree growth. The environmental impacts associated with the development of the Cherokee Nuclear Site are evaluated in References 1 and 6 and are incorporated into this Environmental Report by reference to those documents. The aquatic environs are dominated by the Ninety-Nine Islands Reservoir, which has a pool elevation of 511 ft. above mean sea level (msl) (Reference 2). The Unit 1 basemat and warehouse facilities are the only portions of the original plant construction to be retained. The warehouse facilities will be used during Lee Nuclear Station construction. The basemat will be used as fill since the AP1000 basemat is located at a higher elevation. Many of the original support buildings fell into disrepair. The original support buildings that cannot be utilized due to their location or state of disrepair were demolished in 2007-2008, during demolition of the previously constructed portions of the Cherokee Unit 1 power block.

The proposed plant would be constructed within the large, open, contiguous area of land that was cleared for previous construction activities on the site. The topography in this area ranges from a low elevation of 512 ft. above msl along the river bank to a high elevation of 659 ft. above msl northwest of the existing excavation. The elevation of McKowns Mountain is 816 ft. above msl, the highest point on the Lee Nuclear Site (Figure 1.1-4).

Additional on-site areas are expected to be cleared for the cooling water intake structure, the cooling water discharge structure, a new meteorological tower, and the rerouting of the overlook road. The proposed plant is estimated to require approximately 415 ac. of land within the cleared area around the star on Figure 1.1-3.

The proposed plant uses two AP1000 reactors. Each reactor has a rated core thermal power of 3400 Megawatts thermal (MWt) and a nuclear steam supply system (NSSS) thermal output of 3415 MWt. The rated gross electrical power is 1,199.5 Megawatts electric (MWe). The rated net electrical power is at least 1000 MWe (Reference 5). Waste heat is dissipated by mechanical draft cooling towers. Makeup water for the cooling towers is withdrawn from the Ninety-Nine Islands Reservoir (Broad River) through the river water intake structure. For additional cooling water, onsite reservoirs are available to provide cooling water needs to ensure that the existing limits for downstream flow are maintained. Based on a review of historical data, use of these

reservoirs is expected to be infrequent. Cooling tower blowdown is discharged to the Broad River, just above the Ninety-Nine Islands Dam. These facilities and the other facilities at the proposed plant are shown in Figure 2.1-1 and are described in more detail in Chapter 3.

Two proposed transmission line rights-of-way are planned for the Lee Nuclear Station. The plant is connected to the transmission system through two switchyards on the Lee Nuclear Site. Power from the units is routed to a 230 kilovolt (kV) and a 525 kV switchyard for system reliability. Two 325-foot-wide corridors, each containing a 230 kV line and a 525 kV line, extend southward from the site for approximately 8 mi. to an existing 230 kV transmission line. From these points, each 200-foot-wide 525 kV corridor extends an additional 8 mi. to an existing 525 kV transmission line. At the time of this application, Duke Energy identified several alternative corridors for these two transmission lines, and they are discussed in Subsection 9.4.3. Final selection of the routes was completed in December 2007 and is subject to review and approval by the Public Service Commission of South Carolina. Modification of the existing transmission lines to carry the additional power load from the plant may be required.

During construction of the Cherokee Nuclear Station, a railroad spur was laid between East Gaffney and the site. When this earlier construction ended, the railroad spur was abandoned, and the rails were removed. Duke Energy plans to reconstruct this railroad spur to support construction and operations at the Lee Nuclear Site. With the exception of a short detour at an existing industrial facility (Reddy Ice Plant), current plans are to reconstruct the spur on the existing rail bed.

The overall schedule for site preparation and construction of the two AP1000 reactors at the Lee Nuclear Site is shown in Table 1.1-1. The schedule presented in Table 1.1-1 is influenced by the following factors:

1. Duke Energy economic evaluations.

2. The state schedule for issuance of the Certificate of Environmental Compatibility and Public Convenience and Necessity and various environmental permits.

3. The federal schedule for issuing U.S. Army Corps of Engineers and Federal Energy Regulatory Commission (FERC) construction permits.

4. The federal licensing and adjudicatory process schedule.

As discussed later in the Environmental Report, Duke Energy's 2008 annual plan reflects a commercial operation date of 2018 for the first unit of the Lee Nuclear Station. The annual plan is sensitive to assumptions made for various factors such as market conditions, commodity costs, environmental compliance costs, customer growth, and customer usage patterns. The precision with which these factors can be predicted diminishes as the forecast period increases. Although the current optimal timeframe for commercial operations is 2018, this plan will be updated annually, increasing the precision of this forecast as the licensing process progresses. The construction schedule in Table 1.1-1 provides for completion of the plant in a timeframe that would support commercial operation beginning in 2018, and provides for an adequate planning window to accommodate changes due to uncertainties in the federal and state regulatory processes, construction schedule, availability of critical components, and market forces. The construction of Unit 2 is nominally planned to follow Unit 1 by one year. The actual schedule will be influenced by many of the same factors discussed above.

Some population-sensitive impacts projected in Environmental Report Revision 0 were based on a projected operation date of 2016. Duke Energy performed a sensitivity study to evaluate the sensitivity of population to a change in commercial operation from 2016 to 2018. The results of this sensitivity study indicated that the population change at the end of license (2056 – 2058) was less than 2 percent. Consequently, Duke Energy concluded that the change in operation date from 2016 to 2018 does not affect the validity of the data or impact conclusions in the Environmental Report.

1.1.1 REFERENCES

1. Duke Power Company (DPC), *Duke Power Company Project 81, Cherokee Nuclear Station, Environmental Report*, Docket No. 50-491 – 493, Volume I, as amended through Amendment No. 4, October 13, 1975.

2. U.S. Geological Survey, 1971, *Blacksburg South Quadrangle, South Carolina, 7.5 Minute Series Topographic Map*, 1971.

3. Environmental Systems Research Institute, Census 2000 TIGER/Line Data, Shapefiles for North and South Carolina, ArcData, Website, http://arcdata.esri.com/data/tiger2000/tiger_county.cfm?sfips=36, accessed June 2006.

4. U.S. Census Bureau, State and County Quickfacts: 2003 Population Estimates, Website, http://quickfacts.census.gov/qfd/, accessed June 2006.

5. Westinghouse Electric Company (WEC), *AP1000 Design Control Document*, Document Number APP-GW-GL-700, Tier II, Revision 17, 2008.

6. U.S. Nuclear Regulatory Commission, *Final Environmental Statement Related to Construction of Cherokee Nuclear Station, Units 1, 2, and 3*, Docket Nos. STN 50-491, STN 50-492, and STN 50-493, NUREG-75/089, Washington, DC, 1975.

TABLE 1.1-1
ANTICIPATED SCHEDULE FOR CONSTRUCTION AND OPERATION OF TWO AP1000 REACTORS AT THE LEE NUCLEAR SITE

Activity	Start	Finish	Duration
Unit 1			
Site Preparations	1st Q 2012	1st Q 2014	24 mo.
First Safety-Related Backfill Concrete Below the Nuclear Island	4th Q 2012		
First Nuclear Island Concrete	1st Q 2014		
Site Construction to Fuel Load	1st Q 2014	1st Q 2018	48 mo.
Fuel Load – Start Up	1st Q 2018	3rd Q 2018	6 mo.
Commercial Operation	3rd Q 2018	2058	40 yrs.
Unit 2			
First Concrete	1st Q 2015		
Site Construction to Fuel Load	1st Q 2015	1st Q 2019	48 mo.
Fuel Load – Start Up	1st Q 2019	3rd Q 2019	6 mo.
Commercial Operation	3rd Q 2019	2059	40 yrs.

Q - Quarter.

1.2 STATUS OF REVIEWS, APPROVALS, AND CONSULTATIONS

Construction and operation of the proposed plant would require compliance with a number of environmental regulations, obtaining a number of associated permits, and performing consultations with governmental agencies. A search for applicable regulations, permits, and consultations required by federal, state, regional, local, and affected Native American tribal agencies was conducted, and the results are presented in Table 1.2-1. Some permits have not been applied for at this time; therefore, the columns for “License/Permit No.” and “Expiration Date” contain blank spaces.

TABLE 1.2-1 (Sheet 1 of 4)
FEDERAL, STATE, AND LOCAL AUTHORIZATIONS

Agency	Authority	Requirement	Date Filed	Date Received	License/Permit No.	Expiration Date	Activity Covered	Status
AIR								
South Carolina Department of Health and Environmental Control (SCDHEC)	SC R. 61-62	Construction permit (emissions)	04/09/2008	07/29/2008			Permanent air-emitting equipment to be installed for station operations. Air emissions from diesel- and gas-powered generators that exceed 400 horsepower (construction) and all contractor construction sources.	Preparation of application not initiated.
SCDHEC	SC R. 61-62	Title V air operating permit or conditional major source permit	10/07/2014	1/05/2015			Air emissions operating permit for the purposes of Title V of the federal Clean Air Act. However, Lee Nuclear Station may be classifiable as a non-Title V conditional/synthetic minor facility. Under the new SC NSR rules, a regulatory analysis with appropriate calculations will be performed to determine whether NSR/PSD is applicable.	Preparation of application not initiated.
SCDHEC	SC R. 61-62	Concrete batch plant permit (Form IIF) (emissions)	06/09/2008	09/26/2008			Operation of a concrete batch plant on the site. This permit may be part of a SCDHEC Bureau of Air Quality construction permit (emissions)	Preparation of application not initiated.
Cherokee County	Fire Marshall	Approval	07/01/2007A	07/01/2007A	None	None	Open burning for vegetation/right-of-way clearing.	Permit has been received.
GROUNDWATER								
SCDHEC	SC R. 61-71	Well permits	02/17/2006A 06/27/2006A	02/21/2006A 07/03/2006A	2597 2736	None None	Installation and abandonment of wells.	Permits have been received.
HISTORIC PROPERTIES								
South Carolina Department of Archives and History	36 CFR 800	Consultation	04/03/2006A				Identification and evaluation of historic properties.	The Phase I evaluation is complete for the on-site cooling water intake structure, road to the overlook, and meteorological tower.

TABLE 1.2-1 (Sheet 2 of 4)
FEDERAL, STATE, AND LOCAL AUTHORIZATIONS

Agency	Authority	Requirement	Date Filed	Date Received	License/Permit No.	Expiration Date	Activity Covered	Status
RADIOACTIVE MATERIALS								
SCDHEC	SC R. 61-63	South Carolina radioactive material license	TBD	TBD			Bringing any radioactive source on the Lee Nuclear Site.	This license will be received by the contractors owning the radioactive material.
SURFACE WATER								
U.S. Army Corps of Engineers (USACE)	33 CFR 322, 323, 328, and 330	Section 404 dredge and fill permit	2008	2009			Construction of cooling water intake structure, dredging in pond/river, and construction in wetlands. A USACE negative declaration on jurisdictional wetlands on the Lee Nuclear Site.	Preparation of application not initiated.
SCDHEC	SC R. 19-450	Permit	2008	2009			Construction in navigable waters for water intake and discharge structures. Filed for in conjunction with USACE Section 404 permit.	Preparation of application not initiated.
Federal Energy Regulatory Commission (Duke Energy Lake Management)		Water use permit	07/24/2008	09/17/2008			Water withdrawal from Ninety-Nine Islands Reservoir (Broad River).	Preparation of application not initiated.
SCDHEC	SC Code, Title 49, Chapter 4, Section 49-4-40	Water withdrawal registration	07/24/2008	09/17/2008			Water withdrawal from Ninety-Nine Islands Reservoir (Broad River).	Preparation of application not initiated.
SCDHEC	SC R. 61-9	NPDES discharge permit	05/29/2008	07/30/2008			Discharge of wastewater to surface waters (contractor concrete batch plant, cooling water blowdown, and process waste discharge).	Preparation of application not initiated.
SCDHEC	SC R. 61-9	NPDES storm water permit	05/29/2008	09/29/2008			Storm water to surface water discharges associated with land disturbance and industrial activity. Requires notice of intent, grading permit, erosion control plan prior to excavation, and SWPPP.	Preparation of application not initiated.
SCDHEC	SC R. 61-9	NPDES permit to construct	05/29/2008	07/30/2008			Construction of a wastewater treatment plant.	Preparation of application not initiated.

TABLE 1.2-1 (Sheet 3 of 4)
FEDERAL, STATE, AND LOCAL AUTHORIZATIONS

Agency	Authority	Requirement	Date Filed	Date Received	License/Permit No.	Expiration Date	Activity Covered	Status
SCDHEC	Clean Water Act, Section 401, SC R. 61-101	Water quality certification	2008	2009			Federally licensed activities with discharges to navigable waters; state certifies water quality standards will not be violated.	Preparation of application not initiated.
SCDHEC	SC R. 61-58	Permit	06/27/2008	08/28/2008			Construction and operation of a public water distribution system.	Preparation of application not initiated.
SCDHEC	SC R. 72-1 to 72-9	Dam repair permit	11/21/2006A	01/15/2007A			Required before making repairs to an existing dam.	Permit has been approved.
THREATENED AND ENDANGERED SPECIES								
U.S. Fish and Wildlife Service	Endangered Species Act/Migratory Bird Treaty Act (50 CFR 13, 17, 222,226, 227, 402, 424, 450-453)	Consultation	04/03/2006A				Consultation concerning potential impacts to federal threatened and endangered species and migratory birds.	Consultation process in progress. Consultations for the Lee Nuclear Site have been completed. Consultations will continue for the railroad spur, transmission corridors, and any necessary road work.
South Carolina Department of Natural Resources	Endangered Species Act (50 CFR 13, 17, 222,226, 227, 402, 424, 450-453)	Consultation	04/03/2006A				Consultation concerning potential impacts to state threatened and endangered species.	Consultation process in progress. Consultations for the Lee Nuclear Site have been completed. Consultations will continue for the railroad spur, transmission corridors, and any necessary road work.
TRANSPORTATION								
Federal Aviation Administration	Federal Aviation Act, 14 CFR 77	§ 77.15 Permit	04/14/2008	07/23/2008			Permit for structures over 200 ft. in height (construction cranes, reactor buildings).	Preparation of application not initiated.
South Carolina Department of Transportation	SC Code Annotated § 57-5-1080	Highway encroachment permit	2008	2008			Building an alternate construction entrance to the Lee Nuclear Site.	Preparation of application not initiated.

TABLE 1.2-1 (Sheet 4 of 4)
FEDERAL, STATE, AND LOCAL AUTHORIZATIONS

Agency	Authority	Requirement	Date Filed	Date Received	License/Permit No.	Expiration Date	Activity Covered	Status
WASTE MANAGEMENT								
SCDHEC	SC R. 61-79 and 61-104	RCRA ID number	07/02/2008	09/23/2008			90-day accumulation of hazardous waste.	Preparation of application not initiated.
MISCELLANEOUS								
South Carolina Public Service Commission	SC Code Annotated § 58-33-110	Certificate of Environmental Compatibility and Public Convenience and Necessity	2008	2009			Construction and operation of a generating station of more than 75 megawatts.	Draft application preparation in progress.
South Carolina Public Service Commission	SC Code Annotated § 58-33-110	Certificate of Environmental Compatibility and Public Convenience and Necessity	2008	2009			Construction and operation of any transmission line with a designed voltage of 125 kV or more.	Draft application preparation in progress.
South Carolina Fire Marshall Office	Chapter 71, 1976 Code Section 23-36-80, as amended	Blasting permit	01/21/2008	02/01/2008			Magazine storage and use of high explosives on the Lee Nuclear Site.	Preparation of application not initiated.
SCDHEC	SC R. 61-107.11, Part III	Temporary C & D debris permit	07/03/2007A	07/03/2007A	None	None	Storing of engineered fill. Part III permit-by-rule through notification of SCDHEC.	Permit received as a result of notification to SCDHEC in Spartanburg, SC.
Cherokee County	Building Safety	Building permit	01/23/2008	02/01/2008			Construction of offices and warehouses only. Buildings subjected to inspection.	Preparation of application not initiated.

All dates are projected unless listed as actual (A).

TBD - To be determined.