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May 20, 2008

Ms. Linda Tello
United States Nuclear Regulatory Commission
Office of New Reactors
T6-D32
Washington, DC 20555-0001

REFERENCE: William States Lee III Nuclear Station – Project 0742

Dear Ms. Tello:

South Carolina Department of Natural Resources (DNR) staff has reviewed the Environmental Report (ER) submitted by Duke Energy (Duke) in support of an application for a combined license to construct the proposed William States Lee III Nuclear Station (Lee Site), Project 0742. DNR staff has participated in several Lee Site inspections including those recently coordinated by the US Nuclear Regulatory Commission (NRC). This correspondence includes comments on the ER and project scoping as provided by the National Environmental Policy Act and the Fish and Wildlife Coordination Act.

The Lee Site is owned by Duke and is located in eastern Cherokee County, South Carolina (SC), on the Broad River, approximately 1000 feet upstream from the Ninety-Nine Islands Hydroelectric Development (also owned and operated by Duke). The Ninety-Nine Islands Reservoir is a run-of-the-river impoundment of the Broad River bounding the Lee Site north and east. Makeup water for the 2 proposed nuclear units (Units 1 & 2) is proposed to be withdrawn from the Ninety-Nine Islands Reservoir. The ER states that onsite reservoirs (Make-Up Ponds A and B, and Hold-Up Pond A) will be available to provide cooling water needs for the nuclear facility during periods of low instream flow of the Broad River. Make-Up Ponds A and B are proposed to be recharged as necessary using water pumped from the Ninety-Nine Islands

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Reservoir during normal Broad River instream flow conditions. Cooling tower blowdown from Units 1 & 2 will be discharged to the Broad River, just above Ninety-Nine Islands dam.

DNR has a number of concerns regarding natural resource impacts of the planned facility. These concerns are described as follows referenced to the corresponding section of the ER:

CHAPTER 2 ENVIRONMENTAL DESCRIPTION

2.2.1.2 The Vicinity, page 2.2-4
The proposed height of the reactor domes (185.5 ft above ground level) will be visible from Kings Mountain State Park, Croft State Park and Crowder's Mountain State Park, and from the downstream reach of the Broad River designated as a State Scenic River. Cooling towers are planned to be *shorter and compact*, but may still be tall (> 90 ft) relative to the local area. These construction features represent a visual impact to the view shed including important recreational, scenic and natural conservation areas.

2.2.2 Transmission Corridors and Onsite Areas, page 2.2-5
The ER states 2 transmission rights-of-way are proposed for the plant. On Dec 31, 2007 Duke advised DNR by letter and a 1-page 8.5 X 11.0 map at scale of 1 in = 2 mi the approximate location of the 2 transmission corridors measuring (widths respectively) 200 ft (525 kV) and 150 ft (230 kV) and 325 ft (concurrent 525 and 230 kV). As of this date, DNR has not been provided with finalized routes and projected wetland impacts or impact acreages for proposed transmission corridor routes. Wetland impacts including clearing and fill proposed in transmission corridors will be subject to permitting requirements under §§ 401 and 404 of the US Clean Water Act. The SC Navigational Waters Act also requires permitting of overhead transmission corridors if waters defined by this legislation are crossed.

2.3.1.5.4 Topography, page 2.3-16
Paragraph 3 indicates numerous springs (20) and seeps were identified during the 1973 investigation. These springs and seeps were cut or filled in order to level natural drainage and flatten the construction yard during the initial construction phase of the Cherokee facility. However, the ER does not include these impacts in the description of Environmental Impacts of Construction in Chapter 4. Impacts associated with the original construction that occurred in the 1970s supporting active operations of the proposed facility should be included in the description of environmental impacts in Chapter 4.

Geologic mapping by the South Carolina Geological Survey and others demonstrates a relationship between springs and younger brittle faults. Such faults have not been mapped extensively in the Piedmont, and the possibility of this style of faulting needs further investigation.

2.3.3.1.1 Basin-wide Water Quality, page 2.3-28
The ER references the South Carolina Department of Health and Environmental Control 2006 303(d) List of Impaired Waters. For future reference, the draft 2008 303(d) list is available and can be viewed at http://www.scdhec.net/environment/water/docs/08_303draft.pdf.

2.4.1 Terrestrial Ecology, page 2.4-2
The ER references the Cherokee Nuclear Station Environmental Report (Cherokee ER) issued by Duke Power Company on October 13, 1975. However, Duke has not provided the Cherokee ER as an Appendix for reference. Since Duke relied heavily on the results of the Cherokee ER in the development of the ER for the Lee Site, it will be necessary to review the Cherokee ER. Likewise, the ER references a 2006 *reconnaissance* study of terrestrial species and resources, but has not provided methods and study results in the form of an appended technical report. This information will be needed to appropriately evaluate the scope, intensity and effort of cited studies as conducted to support the license application.

2.4.1.1 Existing Cover Types, page 2.4-2
The ER indicates *previous terrestrial ecological conditions were extensively altered by grading and construction for the Cherokee Nuclear Station.* These impacts should be included in the discussion of terrestrial impacts of construction in Chapter 4.

2.4.1.1 Existing Cover Types, page 2.4-3
The ER states that Make-up Pond B was created by damming McKown's Creek, a perennial stream. Likewise, Hold-up Pond A was created by damming a small stream and backwater of the Broad River and Make-up Pond A by damming a backwater of the river. These impacts also should be included in the discussion of environmental impacts contained within Chapters 4 and 10.

2.4.1.1.1 Alluvial and Other Wetlands, page 2.4-6
Jurisdictional and non-jurisdictional wetlands have been identified onsite and Duke obtained an Approximate Jurisdictional Determination by the US Army Corps of Engineers on September 24, 2007. The ER indicates a § 404 permit will not be required for further construction because none is planned within identified jurisdictional wetlands. However, a finalized construction plan has not been provided. It should also be noted that alluvial wetlands along the fringe of the impoundments will be periodically impacted as pond levels are influenced by project operations.

2.4.1.3.1.1 Plants, page 2.4-16
A population of the southern adder's tongue fern (*Ophioglossum vulgatum*), a state species of concern, was identified onsite during the 2006 reconnaissance. A management plan for the southern adder's tongue fern population and any other protected plant species located within the project boundary should be provided for review by resource agencies.

2.4.1.3.4 Critical Species, page 2.4-20
The ER states *Because of the wide variety of ecological communities within the region, the abundance of individual species, especially plants, can vary significantly from location to location where different species serve similar ecological roles in the community. Accordingly, there is no evidence suggesting that any individual species is critical to structure or function at the ecosystem level.* It is not clear from this statement how it is concluded there are no onsite species critical to local or regional ecosystem structure or function.

2.4.1.3.5 Biological Indicators, page 2.4-20
The ER indicates *there are no species at the site that might function as true bioindicators.* Again, this conclusion seems to be drawn from the assertion that species onsite are common to southeastern forests, and to the lack of population information available for the less common species allowing biologists to track future status changes. The use of a species as a biological indicator is habitat-dependent. The ER does not indicate whether or not species were evaluated by habitat type (alluvial wetland, shoreline, upland, mixed hardwood forest, etc.). As with critical species, the regional commonness of a species does not necessarily correlate to its value as a biological indicator at the habitat level.

The lack of available population information on rare species does not preclude the applicant from the need to provide information on the presence of species essential to ecosystem function or of value as a biological indicator. Indeed, the lack of information points to the need for ongoing study and monitoring of species occurrence and use of resources by habitat type, both before and after construction.

2.4.2.1. Aquatic Habitats, page 2.4-24
DNR disagrees with the statement that *neither the river nor Ninety-Nine Islands Reservoir is a significant aquatic habitat in a regional context.* In 1988 the South Carolina Water Resources Commission (SCWRC) prepared a Rivers Assessment (RA) of the Broad River as a part of the South Carolina Rivers Assessment initiative. The RA provides an analysis of each river in SC, based on a number of categories, including (1) Historic and Cultural, (2) Industrial, (3) Inland Fisheries, (4) Recreational Fishing, (5) Timber Management, (6) Water Supply and (7) Wildlife Habitat. Criteria for designation of the Broad River included scenic value (lack of visual obstructions by structures); absence of wastewater dischargers; outstanding fishing quality and aquatic habitat; water quality; and wildlife habitat quality. The RA rated the Broad River as an outstanding river of regional significance in all of these categories. For more information on the Broad Scenic River Corridor, please contact Mary Crockett, DNR Scenic River Project Supervisor at crockettm@dnr.sc.gov or 803.734.9111.

2.4.2.4 Mussels, page 2.4-30
The paper pond shell mussel (*Utterbackia imbecellis*) a species of state concern, occurs in Make-up Pond A. This species may be impacted by siltation, dredging and fluctuations in pond elevations due to project operations representing an adverse impact for which mitigation should be provided.

2.4.2.5.5 Critical Species, page 2.4-33
The ER states *Because the habitats of the Lee Nuclear Site are widespread within the region, the abundance of on individual aquatic species can vary significantly from location to location where different species serve similar ecological roles in the aquatic community. Accordingly, there is no evidence suggesting that any individual species is critical to structure or function at the ecosystem level.* How does this lead to the conclusion that there are no species that are critical to ecosystem structure or function at the Lee site? What specific criteria were used to evaluate individual species function by habitat type?

2.4.2.5.6 Biological Indicators, page 2.4-34
DNR agrees the primary use of an indicator is to characterize current status and track, or predict significant change within a habitat or ecosystem. Therefore it is recommended there be periodic monitoring of macroinvertebrates and other sensitive aquatic species above and below the Ninety-Nine Islands dam and within onsite impoundments to track impacts of project operations to aquatic resources.

2.4.2.5.8 Other Aquatic Species of Special Interest
DNR recommends Duke conduct periodic fish surveys above and below the dam and within onsite impoundments to track impacts of project operations to aquatic resources.

NRC should be aware of a recently ratified cooperative diadromous fish passage agreement (Accord) between Duke, South Carolina Electric & Gas, DNR, North Carolina Wildlife Resources Commission and United States Fish and Wildlife Service. This agreement is intended to protect, restore and enhance diadromous fish in the Santee River Basin with particular emphasis to the Broad River sub-basin. DNR and other signatories of the Accord will require assurance construction and operation of the Lee Nuclear facility will not be an impediment to the Accord and its objectives including up and down stream migrations of diadromous fish. An electronic copy of this document is provided along with transmission of this correspondence.

2.4.2.5.9 Recreation Areas
DNR appreciates acknowledgement of the Broad Scenic River Corridor as an outstanding natural resource and recommends Duke utilize the Broad Scenic River Management Plan (2003) as a resource in planning project operations.

2.4.2.6 Waters of the United States
The ER identifies the section of the Broad River upstream of the Ninety-Nine Islands dam as not being an interstate navigable water (§ 10 US Navigable Water). However, it is a State navigable water, subject to permitting requirements pursuant to South Carolina R.19-450 under the State Navigable Waters Act.

The ER references Fig. 2.4-1 as a map of jurisdictional waters of the US and refers to 8 onsite stream channels as jurisdictional waters of the US, but these areas are not identified in Fig. 2.4-1.

It also is not clear whether onsite impoundments are jurisdictional waters of the US. Duke should submit for review a map with all waters of the US clearly identified.

2.5.1.1.2.4 Regional Paleozoic Tectonic Structures, page 2.5-23
The Kings Mountain shear zone and the Tinsley Bridge fault were described. The Kings Mountain shear zone was further subdivided into the Blacksburg and Kings Creek shear zones and this shear zone was implied to be a steeply northwest-dipping reverse fault.

Mapping by Horton and other geologists indicate ductile movement on the previously described structures has a component of right-lateral strike-slip movement. Interpretations of reverse movement further suggest oblique slip movement is possible. The ductile movement is localized along lithologic contacts. Recent mapping in the immediate vicinity by Horton shows brittle fault movement also is localized along lithologic contacts. It is possible that many or all of the lithologic contacts in the area have experienced some type of strike-slip movement and brittle movement has not been recognized in ductile shear zones. Such lateral movement needs to be further investigated because strike directions of the lithologic contacts are in the proper orientation to be reactivated by the prevailing northeast-southwest stress field.

DNR notes faults should not be implied to be dead or inactive. The destruction of Kobe, Japan, in the late 1990s on what was referred to as an inactive fault clearly shows zones of weakness, ductile shear zones, and brittle faults can be reactivated in modern times. Active or inactive faults can accumulate stress until a failure mode is reached. An earthquake does not necessarily have to occur on faults in the vicinity of the station. The 1913 Union earthquake is assigned a magnitude of 4.8, and the epicenter is approximately 25 miles to the southwest (possibly along strike). Assigned intensities for this earthquake are equivalent to average peak ground velocities of 5-8 cm/sec and average peak ground accelerations of 0.10-0.15 g. The Union fault, the second largest in the southeast, produced northeast-southwest isoseismal patterns suggestive of strike-slip movement. Isoseismal patterns also indicate this was a distinctly felt earth quake; and at the Lee Site, the earthquake's impact was felt as a VII or VI as numbered in the Rossi-Forel Scale. The recent earthquake at Columbus, North Carolina, further shows that active movement can occur throughout the piedmont region.

An investigation of strike-slip movement and related structural style is warranted. This investigation should include a detailed fracture analysis to investigate if the fracture and joint patterns also are related to possible strike-slip movement.

There are 2 other areas where some level of geologic understanding will be needed:

1) Slope stability: Topographic relief in the piedmont can be substantial, especially in major stream valleys. Location of facilities adjacent to steep slopes requires evaluation, particularly in relation to the structural fabric of the immediate area. Dip slopes have a propensity to fail and increasingly so due to weathering character of most piedmont rocks.

2) Foundation stability: In addition to earthquakes and ground motion, foundation stability is addressed by examining the material facilities will be built upon. The Lee Site is adjacent to the river valley. It is assumed that construction will build on bedrock, but what kind of bedrock? Because of rock composition and structure, some areas are better suited than others. A thorough description of the bedrock in the immediate vicinity of the construction site area is needed, rather than sweeping generalizations from regionally-scaled maps. As exemplified by remediation of the Saluda dam (Saluda Hydroelectric Development) near Columbia, SCE&G was required to excavate to pristine rock surface enabling the dam footing to be attached to bedrock.

CHAPTER 4 ENVIRONMENTAL IMPACTS OF CONSTRUCTION

4.1.1.2 The Vicinity, page 4.1-3
Potential impacts are considered only for National Scenic Rivers, of which there are none within the vicinity of the project. DNR submits impacts be considered not only for National Wild and Scenic Rivers, but also for the state-designated Broad Scenic River immediately downstream of the site.

4.2 Water Related Impacts, page 4.2-1
The ER states construction related impacts to wetland areas are expected to be *small* because the site requires few changes to aquatic habitats to accommodate the construction of a new plant, since *much of the potential water-related modifications of this site were made during original construction of the Cherokee plant.* It is not known whether a §404 permit was issued for the construction of the Cherokee plant and whether mitigation for these initial impacts was required or provided at that time. The existing impoundments and construction foundation for the 2 future nuclear units will be utilized for the active operation of the Lee Nuclear facility. These impacts are significant and should be included in environmental impacts due to construction to ensure that total impacts to waters of the US may be appropriately evaluated and mitigated. For example, a cursory review of USGS topographic maps indicates that ± 11,000 lf of perennial and intermittent stream were filled and flooded for the construction of the impoundments alone.

4.3 Ecological Impacts, page 4.3-1
The fact that many of the construction impacts occurred during the construction of the Cherokee plant before construction was halted does not obviate the need to provide appropriate mitigation and compensation for these impacts. These impacts should be included in total ecological impacts due to construction of the Lee Nuclear facility.

CHAPTER 5 ENVIRONMENTAL IMPACTS OF STATION OPERATION

5.2 Water-Related Impacts, page 5.2-1
In response to the statement *Evaluations specific to the Lee Nuclear Site are consistent with previous conclusions: water related impacts during plant operations are SMALL and mitigation is not warranted.* DNR will evaluate future applications for Federal and state permits associated

with the proposed Lee Site for impacts to aquatic resources. Avoidance and minimization of adverse impacts and mitigation and compensation for unavoidable impacts is required under §§ 401 and 404 of the US Clean Water Act.

5.2.3.1 Thermal Impacts, page 5.2-10
DNR requests the CORMIX model and associated data used to evaluate thermal impacts associated with blowdown discharge from the cooling towers be provided to staff for review. DNR has concern related to thermal impacts to all aquatic species as related to operation of the proposed Lee Nuclear facility at the thermal discharge site above the Ninety-Nine Islands dam as well as below in the Broad River .

5.3.1.1.3. Operations During Low Flow Conditions, page 5.3-3
The Broad River basin upstream of the Gaffney gauge incurs low to moderate regulation due to upstream hydropower operations. These hydropower projects are run-of-the-river projects at normal to high flows, but impacts from these facilities are very noticeable during low instream flow periods. Though the methodology employed by Duke is sometimes used by the United States Geological Survey (USGS) in computing 7Q10 values, the usefulness of this value is questionable due to the existing stream regulation throughout much of the upper Broad River basin, and it is not a value occurring under natural conditions. DNR hydrologists generally discourage using 7Q10 values for instream minimum flows and oppose the 479 cfs value computed by Duke because of impacts of stream regulation on low flows.

There are 2 published 7Q10 values on the Broad River at the Gaffney gauge, both of which only use measured data at the site. Steinert (1989) in the SCWRC Report No. 166 indicated a value 562 cfs, while a 1991 USGS Water Resources Investigations Report (91-4170) demonstrated a value of 540 cfs. Neither of these reports includes data from the 1998-2002 droughts, which may lower the 7Q10 value.

DNR hydrologists have computed synthetic hydrographs for the Broad River at the Gaffney gauge using alternative methods disregarding the Blacksburg gauge. This was done to show the impacts of using the Blacksburg gauge (downstream from the Gaston Shoals Hydroelectric Development). First, the area proration method was used for all the data gaps at the Gaffney gauge based solely on the Boiling Springs, NC gauge including the 1997-2006 period. A second hydrograph was developed using a correlation between the Boiling Springs gauge and the Gaffney gauge ($R^2 = 0.90$). These hydrographs produced 7Q10 values in the range of 530-540 cfs, over 50 cfs higher than the value computed by Duke. These computations were calculated to show use of the Blacksburg data tends to lower the 7Q10 value from what may occur naturally due to the impacts of regulation at the Gaston Shoals Hydroelectric Development during low flow periods.

Minimum flows in the Broad River at the Ninety-Nine Islands reservoir are regulated by Federal Energy Regulatory Commission (FERC) license: 966 cfs January through April; 725 cfs May, June, and December; and 483 cfs July through November. However, there are several places in

the ER where the 7Q10 value is quoted when discussing water availability during low flow conditions (see section 3.3.1.1 for example). If minimum flows are indeed designated by the existing FERC license then references to the 7Q10 value should be avoided when discussing water availability during low flow conditions.

In section 5.3.1.1.3 an analysis was done to determine when and how long the proposed nuclear plant would have had to shut down due to water shortages based on the 1926-2006 historic hydrograph. The threshold flow under which water would start to be withdrawn from Make-Up Pond B was 538 cfs (483 cfs +55 cfs). The 483 cfs value, the minimum FERC flow for July through November, was used for all 12 months. The same analysis should be repeated using seasonally based minimum flows stipulated from the FERC license. Though water shortages are most likely to occur during the dry season (July through November), designated seasonal minimum flows may serve to prolong water shortage periods and potentially increase the frequency of water shortages. A DNR analysis has been done to reconstruct the same synthetic hydrograph Duke computed using the area proration method. The 42 consecutive days of curtailed operation during 2002 listed in section 5.3.1.1.2 of the ER would be increased to 61 days when considering the seasonally based flows as required by the FERC license. DNR hydrologists also repeated this analysis using the synthetic hydrograph based on the regression relationship developed between the Gaffney gauge and the Boiling Springs gauge. The analysis also subtracted current net withdrawal from the river between the 2 gauges as determined from the Broad River Water Supply Study (approximately 27 cfs). This analysis improves water availability outlook under the minimum flow requirements from the FERC license by reducing the number of days the plant would have to shut down during 2002 to 25 days. These results also show minimum flows stipulated by the FERC license will have limited impacts on plant operations. However, DNR emphasizes the need to increase Lee Site off-stream water reserves to further ensure future operations and electric generation be uninterrupted due to limited but needed water availability.

Duke, as documented in the Broad River Water Supply Study and section 2.3.1.3.3 of the ER, is planning an expansion of their Cliffside Electric Generation Station. Duke currently withdraws 6.72 MGD (10.4 cfs) from the Broad River at Cliffside, and by 2015, the withdrawal is expected to be 20.68 MGD (32.1 cfs), giving a net increase of 14 MGD (23 cfs) in the total withdrawal. In addition, the North Carolina water demand is projected to increase by 23 cfs by 2020 (section 2.3.2.1.4) in the Broad River basin. The low flow analyses in section 5.3.1.1.3 based on the historic hydrograph do not appear to take into account these projected increases in water withdrawals (or any other projected withdrawals as described in the Broad River Water Supply Study). DNR encourages a more complete analysis of water availability issues and water shortages during low flow conditions, taking into account future water withdrawal projections.

Given the frequency and severity of droughts over the past 10 years and the projections of future water demand in the Upper Broad River basin, DNR is concerned with potential water shortages and plant shutdowns. How dependent will this region become on this plant and how could the loss of a substantial amount of power for weeks to months at a time affect this region now and in

the future? Will the plant become so vital to future power needs that future minimum flow requirements will be compromised? DNR recommends developing additional backup water reserves in addition to Make-Up Pond B to lessen the potential for plant shutdowns and to avoid water availability conflicts in the future. Back up water reserves should be sufficient to cover the longest consecutive projected plant shutdown based on the historic hydrograph record. DNR recommends the proposed Lee Site plant operations be consistent with the guidance and policies described within the SC State Water Plan, 2nd Edition which can be viewed at http://www.dnr.sc.gov/water/admin/pubs/pdfs/SCWaterPlan2.pdf.

CHAPTER 10 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

10.1.1 Unavoidable Adverse Environmental Impacts of Construction, page 10.1-1
The list of hydrological and water use impacts due to construction of the facility should include wetland areas within the footprint and adjacent to the initial construction site of the Cherokee plant and the linear footage of perennial and intermittent streams that were filled and flooded for the construction of the onsite impoundments.

10.1.2 Unavoidable Adverse Environmental Impacts of Operations, page 10.1-2
The list of hydrological and water use impacts due to operation of the Lee Nuclear facility should include those imposed upon aquatic life, wetland areas and shoreline adjacent to Make-up Ponds A and B as pond levels fluctuate.

The list of ecological impacts due to operation of the Lee Nuclear facility also should include those incurred through habitat fragmentation and degradation, obstruction of migration corridors and noise and human activity.

The ER does not indicate that in-kind alternatives have been identified to mitigate for direct wetland and other natural resource impacts. In order to adequately mitigate all identified and yet-to-be-identified impacts, including the likelihood of secondary impacts, a mitigation plan should be developed for the Lee Site and facility construction/operation. Such a mitigation plan may need to encompass more than simple wetland impact mitigation or compensation. DNR will request coordinated mitigation planning and identification of the need to address future negative secondary impacts to fish and wildlife resources as well as loss of public recreational opportunities related to the Lee Nuclear facility.

In conclusion, because use of nuclear energy creates almost no green-house gas emissions DNR generally supports opportunities to consult with utilities and regulators, review necessary documentation and participate in discussions involving additional reliance on nuclear power for generation of electricity. However, in view of the magnitude of the above-listed potential impacts, DNR urges diligence and additional documentation/consultation with respect to all potential project impacts.

Please contact DNR Project Manager Vivianne Vejdani at vejdaniv@dnr.sc.gov or 803.734.4199 or me if you have any questions regarding this correspondence or future natural resource issues related to development/operation of the proposed Lee Nuclear facility.

Sincerely,

Robert D. Perry

Robert D. Perry
Director, Office of Environmental Programs

c: Don Winslow
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