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Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Duke Energy Carolinas, LLC
William States Lee III Nuclear Station - Docket Nos. 52-018 and 52-019
AP1000 Combined License Application for the
William States Lee III Nuclear Station Units 1 and 2
Response to Request for Additional Information
Ltr# WLG2010.09-10

References:

(1) Letter from Sarah Lopas (NRC) to Bryan Dolan (Duke Energy), Request for Additional Information Regarding the Supplement to the Environmental Report for the William States Lee III Nuclear Station, Units 1 and 2 Combined License Application, dated June 22, 2010 (ML101370398)

(2) Letter from Sarah Lopas (NRC) to Bryan Dolan (Duke Energy), Follow-Up Requests for Additional Information Regarding the Supplement to the Environmental Report for the William States Lee III Nuclear Station, Units 1 and 2 Combined License Application, dated September 14, 2010 (ML102371173)

This letter provides the Duke Energy response to the Nuclear Regulatory Commission's requests for additional information (RAIs) included in Reference 1.

RAI 127, Alternatives
RAI 131, Alternatives
RAI 133, Alternatives

The responses to the NRC information request described in Reference 1 are addressed in separate enclosures, which also identify associated changes to the Combined License Application for the Lee Nuclear Station, when appropriate.

In Reference 2, Duke Energy received an additional NRC information request, RAI 216, which requests specific information to be included in the Duke Energy response to RAI 128 (issued in Reference 1). Accordingly, Duke Energy will provide a combined response to RAI 128 and RAI 216 by October 29, 2010.

If you have any questions or need any additional information, please contact Peter S. Hastings, Nuclear Plant Development Licensing Manager, at 980-373-7820.

Bryan J. Dolan
Vice President
Nuclear Plant Development

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NRO

Enclosures:

1) RAI 127 and 131, Alternatives
2) RAI 133, Alternatives

AFFIDAVIT OF BRYAN J. DOLAN

Bryan J. Dolan, being duly sworn, states that he is Vice President, Nuclear Plant Development, Duke Energy Carolinas, LLC, that he is authorized on the part of said Company to sign and file with the U. S. Nuclear Regulatory Commission this supplement to the combined license application for the William States Lee III Nuclear Station and that all the matter and facts set forth herein are true and correct to the best of his knowledge.

Bryan J. Dolan

Subscribed and sworn to me on September 30, 2010

Vickie M Prenatt
Notary Public

My commission expires: May 11, 2011

SEAL

VICKIE M PRENATT
NOTARY PUBLIC
Mecklenburg County
North Carolina
My Commission Expires May 11, 2011

xc (w/o enclosures):

Loren Plisco, Deputy Regional Administrator, Region II
Robert Schaaf, Branch Chief, DSER

xc (w/ enclosures):

Sarah Lopas, Project Manager, DSER
Brian Hughes, Senior Project Manager, DNRL
Mickie Chamness, PNNL

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter Dated: June 22, 2010

Reference NRC RAI Numbers: ER RAI 127 and 131 - Alternatives

NRC RAI 127:

Provide ecological analyses for construction of the storage reservoirs at Lee Nuclear Station and the alternative sites that are similar to the analyses in section 9.3.2.3 regarding the location of construction of the reactor facilities. Include associated construction that would attend the filling and use of such reservoirs (pipelines, transmission lines, dams, borrow and spoil areas, etc.).

NRC RAI 131:

The USACE defines the "single and complete project" to include the site of the nuclear facility as well as all other associated facilities, including Pond C and any transmission lines to be constructed as part of the proposed work. Provide a summary of stream length and wetland areas present in all these areas combined, including estimated impacts for the proposed site and each alternative site evaluated.

Duke Energy Response:

For clarification regarding RAI 127, activities associated with storage reservoirs for the Lee site and alternative sites do not constitute "construction" under 10 CFR 51. Ecological analyses for the alternative sites in Chapter 9 of the Supplement to the Lee Nuclear Station Environmental Report (ER-S) (Reference 1), including comparison of the Lee Nuclear Site, are based upon reconnaissance level data, while the impacts of the Lee Nuclear Station discussed in Chapters 4 and 5 of the ER-S are based on site specific studies.

For purposes of the alternatives analysis in Chapter 9 of the ER-S, ecological analyses were conducted for the primary site and supplemental reservoir(s) for the Lee Nuclear Site and the alternative sites in the response to RAIs 125 and 126 (References 2 and 3). The ecological analyses provided in this RAI response (combined response for RAIs 127 and 131) include the ancillary features for the alternative sites, and updates the analyses provided in RAI 125. Ecological analyses were performed for the development of the Lee, Keowee, Perkins, and Middleton Shoals sites, associated supplemental cooling water reservoirs, and associated ancillary facilities. Ancillary facilities consist of pipelines, railroad lines, transmission lines, and roadway realignments (occurring at Middleton Shoals). The transmission lines were assumed to have a 270-foot corridor; the railroad lines a 100-foot corridor; the pipelines a 50-foot corridor; and the road realignments a 100-foot corridor. Road realignments would be required for the Middleton Shoals site due to the closure of roads traversing the site. Borrow and spoil areas for all four sites were assumed to be located in upland areas, or within the footprint of supplemental reservoirs, and were not included in the analysis. The locations of ancillary features included in the analyses were based on the level of detail available for the conceptual design of the alternative sites. For instance, the ancillary features for the Lee Nuclear Station used for the alternatives analysis were developed before detailed design was available. Therefore, the

location of the ancillary features for the Lee Nuclear Station used for this alternatives analysis differs slightly than what was presented in Chapters 3, 4, and 5 of the Environmental Report (ER) and ER-S. Additionally, the lengths of the railroads have been updated from what was presented in the ER as the alternatives analysis has evolved over time. The analyses considered: (1) rare, threatened or endangered (RTE) species, (2) streams, (3) wetlands, and (4) habitat.

The approaches used to evaluate terrestrial and aquatic ecology resources for the ancillary features are the same approaches used for the alternative sites and supplemental reservoirs as described in the responses to RAIs 125 and 126.

Revisions to the ER-S to include the ecological analyses for the ancillary features of the alternative sites are provided in Attachments 127-01, 127-02, 127-03, and 127-04. These revisions build upon the revisions made in RAI 125 (i.e., revisions made in RAI 125 are already incorporated; only new changes for this RAI are shown).

A request was made by NRC during the August 2010 audit to provide a reference for the following statement contained in the response to RAI 125: *Onsite streams likely have typical Piedmont stream geomorphology and contain alternating riffles and pools, providing habitat for aquatic invertebrates and fish. Such habitat would likely include riffles with cobbles, pools, root masses, leaf packs, woody debris, and sand and silt substrate. Fish communities likely include cyprinids (minnows), centrarchids (sunfish and bass), and ictalaurids (catfish).*

As described in the response to RAI 125, 2009 National Agriculture Imagery Program (NAIP) aerial imagery were used to provide general characterizations of streams located within the reservoir sites, as well as adjoining landuse. Based on review of aerial imagery and the assumption streams located on the sites were typical of Piedmont streams, cyprinids (minnows), centrarchids (sunfish and bass), and ictalaurids (catfish) were determined to be common fish species. This determination was made from the review of reconnaissance level data and species distribution and habitat information provided in *Freshwater Fishes of the Carolinas, Virginia, Maryland, & Delaware* (Reference 4). No rare aquatic species have been documented within the vicinity of the Lee Site, Perkins Site, or Middleton Shoals Site. Two state rare insects with aquatic life stages have been documented within the footprint of the Keowee supplemental water reservoir.

Associated Revisions to the Lee Nuclear Station Combined License Application:

COLA, ER Supplement, Chapter 9.3.2.1

COLA, ER Supplement, Chapter 9.3.2.3

COLA, ER Supplement, Chapter 9, Table 9.3-4 (Sheet 2 of 2)

COLA, ER Supplement, Chapter 9.3.2.4

Attachments:

Attachment 127-01 Revisions to COLA, ER Supplement, Chapter 9.3.2.1

Attachment 127-02 Revisions to COLA, ER Supplement, Chapter 9.3.2.3

Attachment 127-03 Revisions to COLA, ER Supplement, Chapter 9, Table 9.3-4 (Sheet 2 of 2)

Attachment 127-04 Revisions to COLA, ER Supplement, Chapter 9.3.2.4

References:

1) Letter from Bryan J. Dolan (Duke Energy) to Document Control Desk, U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, Ltr# WLG2009.09-05, dated September 24, 2009 (ML092810255).

2) Letter from Bryan J. Dolan (Duke Energy) to Document Control Desk, U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, Ltr# WLG2010.07-08, dated July 22, 2010 (ML102070357).

3) Letter from Bryan J. Dolan (Duke Energy) to Document Control Desk, U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, Ltr# WLG2010.07-07, dated July 16, 2010 (ML102020479).

4) Rohde, F. C., R. G. Arndt, D. G. Lindquist, and J. F.Parnell. 1994. Freshwater fishes of the Carolinas, Virginia, Maryland and Delaware. The University of North Carolina Press, Chapel Hill, North Carolina.

Attachment 127-01

Revisions to COLA, ER Supplement, Chapter 9.3.2.1

Subsection 9.3.2.1, Land Use Impacts, page 9-1, 1st through 5th paragraphs, REVISED TEXT:

The objective of this criterion was to evaluate the suitability of the four candidate sites with respect to potential conflicts in existing land uses at each site. Impacts include the amount of clearing and grading necessary to place the proposed AP1000 standard plant on the site, including any supporting infrastructure. Impacts also considered the amount of land required to support supplemental water ponds as discussed in Subsection 9.3.2.2, and ancillary facilities such as railroads, transmission lines, cooling water pipelines, and any required road realignments. Information sources include USGS topographic maps and first-hand observations from helicopter over-flights.

Lee Site

The Lee Site was previously owned by Duke Energy and was available for purchase at the time of the site selection study. Duke Energy has subsequently purchased the site. The site was developed as an industrial site (the former Cherokee Nuclear Site) and extensive rough grading, including the construction of two reservoirs, was completed in the 1970's. The surrounding land is rural and sparsely populated. The Lee Site will require a 620-ac. supplemental water pond (Subsection 9.3.2.2). An existing 8-mi. rail spur to the site will need a small re-route (approximately 1800 ft.) and the rail bed will need vegetation cleared, new ballast, rail ties and rails added to become operational for transporting materials and equipment to the site. Two transmission lines, 6.1 mi. and 6.3 mi., and 2.8 mi. of cooling water pipeline would also have vegetation and land use impacts. Land use impacts would be MODERATE.

Keowee Site

The Keowee Site is owned by Duke Energy and is located adjacent to the Oconee Nuclear Station. The site is a wooded greenfield site, requiring extensive rough grading that would include the construction of a 1300 ac. supplemental water reservoir (Subsection 9.3.2.2). Residential development is absent on the site, but the surrounding area has a low level of development. There is a high level of residential development at the area where a water intake structure would be constructed. An 8.8~~5.4~~-mi. rail spur would be constructed to the site to transport materials and equipment to the site. A 1.3-mi. transmission line and 4.0 mi. of cooling water pipeline would also be constructed. Land use impacts would be LARGE.

Perkins Site

Duke Energy currently owns the Perkins Site that was originally characterized for the Perkins Nuclear Station in the 1970's. The site remains a wooded greenfield site and is managed as a wildlife management area by the North Carolina Fish and Wildlife Service under an agreement with Duke Energy. The site would require extensive rough grading. There is no residential development on the site but the surrounding area is undergoing a moderate amount of residential development particularly in the area proposed for three supplemental water reservoirs totaling ~~approximately~~ 1500 ac. (Subsection 9.3.2.2). A 6.3~~5.6~~-mi. rail spur would be constructed to the site to transport materials and equipment to the site. Two transmission lines, 2.4 mi. and 2.8 mi., and 7.7 mi. of cooling water pipeline would also be constructed. Land use impacts would be LARGE.

Middleton Shoals Site

At the time of the evaluation, this ~~This~~ site ~~is~~ was ~~currently~~ owned by Duke Energy. The site ~~is~~was a wooded greenfield site requiring extensive rough grading that would include the construction of an approximately 3700 ac. supplemental water reservoir (Subsection 9.3.2.2). There was~~is~~ no residential development on the site and sparse residential development in the vicinity of the site. A 15.3~~14~~-mi. rail spur would be constructed to the site to transport materials and equipment to the site. A 12.6-mi. transmission line and 1.0 mi. of cooling water pipeline would be constructed. Additionally, 7.0 mi. of road realignment would be required due to plant and reservoir construction. Land use impacts would be LARGE.

Attachment 127-02

Revisions to COLA, ER Supplement, Chapter 9.3.2.3

Subsection 9.3.2.3, Terrestrial Ecology Resources, page 9-5, 1st Paragraph, REVISED TEXT:

Lee Nuclear Site

The South Carolina Natural Heritage Program database documents a record of *Menispermum canadense* (Canada moonseed), a state species of concern, in the vicinity of the Lee Nuclear Site and supplemental cooling reservoir. NWI maps, USGS hydrologic data, soils data, and aerial photographs identified about 18 ac. of wetlands and 28 ac. of open water on the site and approximately 3 ac. of wetlands and approximately 5 ac. of open water on the associated reservoir area (Table 9.3-4). Approximately 7 ac. of wetlands and 15 ac. of open water were identified within the ancillary facilities, including pipelines, transmission lines, and railroads for the Lee Nuclear Site. The Lee Nuclear Site is already partially cleared. Using 450 ac. in the core area of the site for the plant facilities would require removal of 65 ac. of high quality wooded habitat (Table 9.3-4). The 620 ac. supplemental cooling reservoir would impact approximately 430 ac. of high quality wooded habitat. Ancillary facilities for the Lee Nuclear Site would impact approximately 230 acres of high quality habitat. It was determined that impacting ~~21~~ 28 ac. of wetlands (for comparison purposes, a conservative assumption that all acres of wetlands would be impacted was made) and ~~62,000~~ 76,000 linear feet (LF) of streams (Table 9.3-4) for plant facilities, reservoir, and ancillary facilities would have MODERATE impacts on terrestrial ecosystems. Information presented in this section reflects desktop analysis conducted for all alternative sites; and may differ from information presented in other sections of this Environmental Report that reflect more detailed surveys of the preferred alternative.

Subsection 9.3.2.3, Terrestrial Ecology Resources, page 9-5, 4th Paragraph, REVISED TEXT:

Keowee Site

There are no documented RTE species on the Keowee Site; however, four state species of concern have been documented within the footprint of the supplemental cooling reservoir: *Eupatorium fistulosum* (hollow joe-pye weed), *Nestronia umbellula* (Indian olive), Margaret's river cruiser (*Macromia margarita*), and Carlson's polycentropus caddisfly (*Polycentropus carlsoni*). The federally listed endangered peregrine falcon (*Falco peregrinus*) has been occasionally sighted near the Oconee Nuclear Station (which is located next to the Keowee Site). There are five state-listed plant species (species of concern) and one state-listed bird species (species of concern) in the vicinity of Lake Keowee: *Nestronia umbellula* (Indian Olive), *Viola tripartita* (three-parted violet), *Carex laxiflora* (loose-flowered sedge), *Carex prasina* (drooping sedge), *Pachysandra procumbens* (Allegheny-spurge), and barn owl (*Tyto alba*). Two other state-listed plant species (species of concern) were documented in the vicinity of the railroad spur for the Keowee Site: *Agrimonia pubescens* (soft groovebur) and *Allium cernuum* (nodding onion). The NWI maps, USGS hydrologic data, soils data, and aerial photograph interpretation revealed 3.5 ac. of wetlands and 10 ac. of open water on the Keowee Site, ~~and~~ 19 ac. of wetlands and approximately 2 ac. of open water associated with the supplemental water reservoir, and 2.8 ac. of open water and 3.0 ac. of wetlands associated with the ancillary facilities. Construction at the Keowee Site, ~~and~~ reservoir, and ancillary facilities would affect ~~144,000~~ 149,000 LF of streams. The site is mostly wooded. Using 450 ac. in the core area of the site for the plant facilities would require removal of 297 ac. of high quality wooded habitat (Table 9.3-4). The 1,300 ac. supplemental cooling reservoir would impact approximately 1000 ac. of high quality wooded habitat, while the ancillary facilities would impact 60 ac. of high quality habitat.

Subsection 9.3.2.3, Terrestrial Ecology Resources, page 9-6, 1st Paragraph, REVISED TEXT:

Perkins Site

Corallorhiza wisteriana (spring coral-root), a state species of concern, has been documented within the Perkins Site. There are no documented RTE species at the Perkins supplemental cooling reservoir sites. *Dicanthelium annulum* (a witch grass), a state species of concern, has been documented within the vicinity of the Perkins Site and supplemental water reservoirs. *Corallorhiza wisteriana* has been documented in the vicinity of the cooling water pipeline. NWI maps, USGS hydrologic data, soils data, and aerial photo interpretation revealed 0.5 ac. of wetlands and 0.0 ac. of open water on the Perkins Site, ~~and~~ 92 ac. of wetlands and approximately 2 ac. of open water associated with supplemental water reservoirs, and 24 ac. of wetlands and 0.2 ac. of open water within the ancillary facilities. Construction at the Perkins Site, ~~and~~ reservoirs, and ancillary facilities would affect ~~207,000~~ 222,000 LF of streams. The site is mostly wooded. Using 450 ac. for the plant facilities in the core area of the site would require removal of 288 ac. of high quality wooded habitat (Table 9.3-4). The 1500 ac. of supplemental cooling reservoirs would impact approximately 1000 ac. of high quality wooded habitat, while the ancillary facilities would impact approximately 140 ac. of high quality wooded habitat.

Subsection 9.3.2.3, Terrestrial Ecology Resources, page 9-6, 4th Paragraph, REVISED TEXT:

Middleton Shoals Site

There are no documented RTE species on the Middleton Shoals Site or its supplemental cooling reservoir. There are no documented occurrences of RTE species in the vicinity of the site or supplemental cooling reservoir. Two state species of concern have been documented within the vicinity of the railroad spur: *Trillium discolor* (pale yellow trillium) and *Ophioglossum vulgatum* (southern adder's tongue). NWI maps, USGS hydrologic maps, soil maps, and aerial photograph interpretation revealed 1.2 ac. of wetlands and 7 ac. of open water on the Middleton Shoals Site, ~~and~~ 174 ac. of wetlands and 30 ac. of open water associated with the supplemental reservoir, and 4 ac. of wetlands and 19 ac. of open water associated with the ancillary facilities. Construction at the Middleton Shoals Site, ~~and~~ reservoir, and ancillary facilities would affect ~~378,000~~ 402,000 LF of streams. The site is mostly wooded. Using 450 ac. in the core area of the site for the plant facilities would require removal of 265 ac. of high quality wooded habitat (Table 9.3-4). The 3700 ac. supplemental cooling reservoir would impact approximately 1800 ac. of high quality wooded habitat, while the ancillary facilities would impact approximately 170 ac. of high quality wooded habitat.

Attachment 127-03

Revisions to COLA, ER Supplement, Chapter 9
Table 9.3-4 (Sheet 2 of 2)

TABLE 9.3-4 (Sheet 2 of 2)
COVER (HABITAT) TYPES PRESENT ON THE PERKINS, KEOWEE, MIDDLETON SHOALS, AND LEE NUCLEAR CANDIDATE SITES

	Name of Candidate Site											
	Perkins			Keowee			Middleton Shoals			Lee Nuclear Site		
	Site	Reservoirs[b]	Ancillary Facilities[c]	Site	Reservoirs[b]	Ancillary Facilities[c]	Site	Reservoirs[b]	Ancillary Facilities[c]	Site	Reservoirs[b]	Ancillary Facilties[c]
Wetlands (ac)	0.5	92	24	3.5	19	3.0	1.2	174	4.2	18	3.1	7.1
Stream Length (LF)	20,000	187,000	15,000	17,000	127,000	5000	16,000	362,000	24,000	3000	59,000	14,000
Open Water (ac)	0	2.4	0.2	10	2.3	2.8	7.0	30	19	28	5.3	15
Land (ac)	450	1500	250	450	1300	130	450	3700	560	450	620	450

(b) Acreage and location of proposed reservoirs were estimated based on supplemental water needs and USGS topographic maps.

(c) Ancillary facilities include 270-ft. wide transmission corridors, 100-ft. wide railroad corridors, and 50-ft. wide cooling water pipelines. 100-ft. wide road realignment corridors were also included for the Middleton Shoals alternative.

Attachment 127-04

Revisions to COLA, ER Supplement, Chapter 9.3.2.4

Subsection 9.3.2.4, Aquatic Ecology Resources, page 9-7 1st Full Paragraph, REVISED TEXT:

Lee Nuclear Site

There are no documented occurrences of aquatic RTE species in the vicinity of the Lee Nuclear Site, ~~or~~ its supplemental cooling reservoir, or ancillary facilities. The construction of the plant, ~~and~~ supplemental cooling reservoir, and ancillary facilities will impact up to ~~62,000~~ 76,000 LF of stream (for comparison purposes, a conservative assumption was made that all linear feet of streams would be impacted). This includes conversion of 59,000 LF of stream from a lotic to lentic ecosystem from the supplemental cooling reservoir. Lotic organisms will be replaced by lentic organisms. The Lee Nuclear Site is located on a river which would likely provide sufficient heat rejection capacity for the proposed plant, using a closed cooling water system, without having significant thermal impacts to aquatic ecology. No information was discovered during the evaluation which revealed any concerns with significant thermal impacts at the site.

Subsection 9.3.2.4, Aquatic Ecology Resources, page 9-7, 4th Full Paragraph, REVISED TEXT:

Keowee Site

There are no documented occurrences of aquatic RTE species within the Keowee Site or ancillary facilities; however, two state-listed insect species (species of concern) with aquatic life stages have been documented within the footprint of the supplemental cooling reservoir: Margaret's river cruiser and Carlson's polycentropus caddisfly. The construction of the plant, ~~and~~ supplemental cooling reservoir, and ancillary facilities will impact up to ~~144,000~~ 149,000 LF of stream, which includes conversion of 127,000 LF of stream from a lotic to lentic ecosystem from the supplemental cooling reservoir. Lotic organisms will be replaced by lentic organisms. The Keowee Site is located on a reservoir which would likely provide sufficient heat rejection capacity for the proposed plant, using a closed cooling water system, without having significant thermal impacts to aquatic ecology. No information was discovered during the evaluation which revealed any concerns with significant thermal impacts at the site.

Subsection 9.3.2.4, Aquatic Ecology Resources, page 9-8, 2nd Full Paragraph, REVISED TEXT:

Perkins Site

There are no documented occurrences of aquatic RTE species in the vicinity of the Perkins Site, ~~or~~ its supplemental cooling reservoirs, or ancillary facilities. The construction of the plant, ~~and~~ supplemental cooling reservoir, and ancillary facilities will impact up to ~~207,000~~ 222,000 LF of stream, which includes conversion of 187,000 LF of stream from a lotic to lentic ecosystem from the supplemental cooling reservoir. Lotic organisms will vanish and be replaced by lentic organisms. The Perkins Site is located on a river which would likely provide sufficient heat rejection capacity for the proposed plant, using a closed cooling water system, without having

significant thermal impacts to aquatic ecology. No information was discovered during the evaluation which revealed any concerns with significant thermal impacts at the site.

Subsection 9.3.2.4, Aquatic Ecology Resources, page 9-8, 5th Full Paragraph, REVISED TEXT:

Middleton Shoals Site

There are no documented occurrences of aquatic RTE species in the vicinity of the Middleton Shoals Site, ~~or~~ its supplemental cooling reservoir, or ancillary facilities. The construction of the plant, ~~and~~ supplemental cooling reservoir, and ancillary facilities will impact up to ~~378,000~~ 402,000 LF of stream, which includes conversion of 362,000 LF of stream from a lotic to lentic ecosystem from the supplemental cooling reservoir. Lotic organisms will be replaced by lentic organisms. The Middleton Shoals Site is located on a reservoir which would likely provide sufficient heat rejection capacity for the proposed plant, using a closed cooling water system, without having significant thermal impacts to aquatic ecology. No information was discovered during the evaluation which revealed any concerns with significant thermal impacts at the site.

Lee Nuclear Station Response to Request for Additional Information (RAI)

RAI Letter Dated: June 22, 2010

Reference NRC RAI Number: ER RAI 133, Alternatives

NRC RAI:

Expand the impacts discussion of the proposed project and all viable alternatives to include secondary and cumulative impacts that might be expected or reasonably foreseeable.

Duke Energy Response:

This response specifically addresses secondary and cumulative impacts as defined by the 404(b)(1) guidelines described in 40 CFR 230.10. These definitions are applicable to the U.S. Army Corps of Engineers (USACE) review under section 404 of the Clean Water Act and focus on the aquatic ecosystem under these definitions. Certain impacts considered as direct impacts by the U.S. Nuclear Regulatory Commission, such as impacts from plant operation, would likely be considered as secondary impacts by the USACE, and are treated as such in this discussion. Therefore, the response to this RAI does not evaluate secondary (or indirect) and cumulative impacts as those terms would be used by the NRC.

Secondary Impacts

Secondary impacts are defined as those impacts "on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material" (Reference 1). Secondary impacts to wetlands and other waters of the U.S. may be associated with the construction and continued operation of the Lee Nuclear Station. A discussion of the potential for such impacts from the Lee Nuclear Station and the three alternative sites follows.

Lee Nuclear Station

During the construction of the Lee Nuclear Station, including development of Make-Up Pond C, the railroad, and the transmission lines, sedimentation into adjacent and downstream waters could potentially occur. Such impacts are discussed in Subsections 4.2.4.1 and 4.2.4.2 of the Lee Nuclear Station Environmental Report (ER) and the Supplement to the Environmental Report (ER-S) provided in Reference 2. Secondary effects could occur due to increases in turbidity downstream of the construction areas. However, erosion control measures will be permitted and installed prior to construction activities as required by South Carolina State Regulation 72-300. The approved erosion control measures will minimize sedimentation run-off.

In addition to potential secondary impacts related to sedimentation during the general construction of the Lee Nuclear Station, secondary impacts may occur within the Broad River during intake structure construction. The effects of the intake structure construction and associated cofferdam on the Broad River are discussed in Subsection 4.2.2.1 of the ER and the response to RAI 192 (Reference 3). The presence of the cofferdam will narrow the width of the Broad River, temporarily increasing velocity. This may temporarily increase energy, resulting in short-term increased river bed scour and bank erosion locally. After construction is complete and

the cofferdam is removed, the velocity of the Broad River should return to preconstruction levels allowing the bed and bank to stabilize. As stated in Subsection 5.3.1.1.2 of the ER, the bank is expected to be restored after intake construction to stabilize the banks of the Broad River to minimize erosion by river currents. Additionally, the presence of the intake structure along the bank of the Broad River could increase the potential for local bank erosion during station operation. However, as described in Subsection 5.2.1.6 of the ER, the design of the intake structure on the bank of the Broad River, combined with the low intake velocity, should have little effect on the general flow path or flow velocity of the river. As described in Subsection 4.3.2.1.2 of the ER, possible secondary impacts resulting from the construction of the intake and discharge structures within Make-Up Ponds A and B include possible turbidity due to sheet pile cofferdam installations and proposed dredging.

As described in Subsection 5.2.2.1.1 of the ER, the operation of the river intake structure may lead to minimal secondary impacts to the Broad River. Under normal plant operation and mean annual Broad River flow, withdrawals from the Broad River only account for approximately 3 percent of the flow at this point in the river (based on a period of record from 1926 to 2008). Under the same conditions, approximately 1 percent of the flow is returned to the river via the blowdown discharge structure. Therefore, the Lee Nuclear Site consumptive water use during normal operation only accounts for approximately 2 percent of the mean annual flow and would have minimal impact on downstream water supply. Draw downs of Make-Up Pond B and the proposed Make-Up Pond C during low flow in the Broad River may lead to temporary increases in temperature, decreases in dissolved oxygen levels, and impacts to aquatic habitat within the impoundments. Desiccation of benthic organisms may occur within the dewatered areas. These operational draw downs may also temporarily affect the hydrology of wetlands adjacent to the impoundment.

The intake structures themselves can result in secondary impacts to aquatic life. Impingement and entrainment of fish and mussel larvae can occur from the intake. Subsections 5.3.1.1.1 and 5.3.1.2 of the ER discuss impingement and entrainment impacts, as well as how the intake screens and approach velocity were designed to minimize impacts to aquatic life. Is the intent of Duke Energy to design intake screens to satisfy the requirements of Section 316(b) of the Clean Water Act. Intakes for the river and Make-Up ponds are described in Subsection 5.3.1.2 of the ER and in the response to RAI 148 (Reference 4), respectively. The intakes at the river and Make-Up Pond A will also be equipped with fish return systems. Therefore, impacts to aquatic life from the intakes will be minimal.

The discharge structure may also lead to minor secondary impacts to the Broad River. Such secondary impacts include thermal and chemical impacts from the discharge. Subsection 3.4.2.2 of the ER describes the blowdown discharge system under normal operation. As described in the response to RAI 63 (Reference 5) the thermal plume associated with the discharge dissipates quickly. Impacts from the thermal plume are discussed in Subsections 5.3.2.1 and 5.3.2.2 of the ER. With such a small thermal plume and negligible temperature increase, impacts are not expected to occur. Particularly, the small temperature change associated with the discharge structure is not anticipated to affect smallmouth bass or other fish populations.

As described in Subsection 5.3.2.2 of the ER, there are minerals from the blowdown, and trace chemicals from plant water and wastewater treatment. The chemicals used in the wastewater system for Lee Nuclear Station are designed to be consumed into non-detectable levels prior to discharge. Chemicals to be used within Lee Nuclear Station for water treatment are expected to

be similar to those used at Catawba Nuclear Station. NPDES monitoring data for Catawba reveals no chemical levels in the discharge above observable effects concentrations. Therefore, no significant secondary impacts are anticipated. Such secondary impacts will be addressed in detail in the NPDES permit required for the discharge.

In addition to impacts associated with erosion and sedimentation during construction of Make-Up Pond C, dam construction will alter the flow regime of London Creek. Flows downstream of the Make-Up Pond C dam will likely be decreased because of the structure, particularly during extended drought. Decreased flows may affect aquatic biota and natural stream channel processes. However, approximately only a half mile of London Creek will remain after the construction of the impoundment, limiting the effect of the secondary impacts to a short segment of remaining stream. Also, stream reaches within the 50-foot cleared buffer around the impoundment may experience minor increases in temperature due to the loss of shading from trees, as well as associated decreases in dissolved oxygen. Similar impacts will occur to the main stem of London Creek and other tributaries within the footprint of the impoundment during construction, prior to inundation.

The reconstruction of the railroad spur will have minimal secondary impacts since the fill for the railroad spur was placed during Cherokee Nuclear Station construction. The proposed culvert enlargement associated with London Creek will expand the hydraulic capacity of the crossing and can be considered a secondary positive benefit for London Creek by allowing larger discharges to pass and reducing downstream velocity during storm events.

Secondary impacts associated with the offsite transmission lines will also be minor since construction will adhere to the Duke Energy Best Management Practices for Stormwater Management and Erosion Control (BMP). These BMPs include maintaining vegetated riparian buffers based on slope and clearing canopy trees as necessary to provide for appropriate transmission line clearance (Reference 6). Other than impacts associated with erosion and sedimentation during construction, the hand clearing of canopy trees within riparian buffers will result in a minor loss of habitat structure. The presence of understory trees and shrubs should continue to provide shade to these aquatic systems. This should minimize any increases in temperature and associated decreases in dissolved oxygen.

Keowee, Perkins, and Middleton Shoals Alternatives

Secondary impacts associated with the three alternative sites are expected to generally be similar in nature to those anticipated for Lee Nuclear Station. All three alternatives would be subject to impacts from erosion and sedimentation, which would be mitigated through the implementation of BMP as determined within each site specific Storm Water Pollution Prevention Plan. Additionally, although conceptual design details are not available for intake and discharge structures, secondary impacts from these structures would be similar in nature to what could occur at Lee Nuclear Station, as the screens would be designed in accordance with 316(b) requirements that would apply to these sites as well. Similarly, construction of supplemental cooling water reservoirs at any of the three alternative sites would alter hydrologic regimes downstream of the reservoir dam. Since each of the alternative sites would require the construction of a railroad spur within a new corridor, there is the potential for additional secondary impacts that would not occur at Lee Nuclear Station. The placement of fill material for railroad construction could alter the hydrology of any wetlands adjacent to the railroad. Additionally, the installation of culverts at stream crossings creates the possibility for increased

downstream velocity if storm events exceed the design capacity of the culvert. Increased stream velocity could lead to bed and bank scour, degrading the aquatic habitat. Finally, secondary impacts associated with the construction of the transmission lines for the alternative sites are expected to be similar to impacts associated with Lee Nuclear Station, and would be in proportion to the length of transmission lines and aquatic habitat types present.

Cumulative Impacts

Cumulative impacts are defined in 40 CFR 230.11(g)(1) as "changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material" (Reference 7). Cumulative impacts are typically addressed qualitatively, based on the best available information and/or reasonable assumptions concerning the site and surrounding areas. Cumulative impacts from construction of Lee Nuclear Station are discussed in Subsection 4.7 of the ER. Cumulative impacts to the aquatic environment from the operation of the intake system at Lee Nuclear Station are described in Subsection 5.3.1.2.1 of the ER. Cumulative impacts to the aquatic environment from the operation of the Lee Nuclear Station discharge system are discussed in Subsection 5.3.2.2.1 of the ER.

Additional information regarding cumulative effects is provided in this response for the three alternative sites. For the purpose of this cumulative impacts evaluation, the geographic areas evaluated were the eight digit Hydrologic Unit Code (HUC) watersheds for each site defined in the alternative analysis, since the direct wetland and tributary impacts occur in these watersheds. These watersheds include:

- Lee Nuclear Station (Cherokee): Upper Broad River (03050105)
- Keowee: Seneca (03060101)
- Perkins: Upper Yadkin (03040101)
- Middleton Shoals: Upper Savannah (03060103)

Past Actions

Past Actions are defined by the NRC as actions that occurred prior to the submittal of a Combined Operating License (COL) application. Agencies then look for present effects of past actions that are, in the judgment of the agency, relevant and useful because they have a significant cause-and-effect relationship with the direct and secondary effects of the proposal for agency action and its alternatives.

Lee Nuclear Station and the three alternatives are located within the Piedmont region. This region was once forested with oak-hickory and pine communities, but has been extensively clearcut and farmed over the last 300 years. This history of land use has had a profound effect on ecosystems within the region. One noteworthy example is increased runoff due to loss of riparian buffer habitat, which has led to stream erosion and channel instability in many streams throughout the region (References 8 and 9). These impacts have affected the general habitat quality in many streams within the region.

Large reservoirs and many other smaller impoundments have also been created throughout the watersheds of the four sites. These reservoirs have been created for multiple purposes, including:

drinking water supply, recreation, cooling water supply, hydroelectric generation, and flood control. These large reservoirs and other impoundments have contributed to various impacts to the aquatic environment including: inundation of lentic and wetland habitat, alteration of normal hydrology, interruption of sediment transport, and introduction of aquatic species passage barriers. Attachment 133-1 provides a table listing of impoundments larger than 100 acres within the watershed for each alternative.

Residential, commercial, and industrial developments, as well as transportation projects, have also impacted aquatic resources within each alternative site region. Quantitative information on these impacts is not available.

In addition to the reservoirs listed in Attachment 133-1, the regions for the alternative sites have experienced the following major past actions that may contribute to cumulative impacts:

- Lee Nuclear Station
    - The partial construction of Cherokee Nuclear Station in the late 1970s and early 1980s previously impacted Waters of the U.S. within the Lee Nuclear Station site due to site grading and the construction of three impoundments for cooling water and stormwater.
- Keowee
    - Oconee Nuclear Station was built in the early 1970s as part of the larger Keowee-Toxaway Complex Federal Energy Regulatory Commission (FERC) project. This project also included the construction of Lake Keowee, Lake Jocassee, and associated hydroelectric stations. Bad Creek Reservoir and associated hydroelectric station were built in early 1990s. The construction of the reservoirs and site grading for the nuclear station previously impacted Waters of the U.S. (Reference 10).
- Perkins – No other major past actions identified.
- Middleton Shoals – No other major past actions identified.

Present and Future Actions

Present Actions are defined by the NRC as actions that occur from the submission of the COL application to the start of the NRC authorized construction of the new units. Future Actions are defined as reasonably foreseeable actions occurring after the start of the NRC authorized construction. The response to RAI 129 (Reference 11) discusses present actions and reasonably foreseeable future actions within a 50-mile radius of each alternative site. However, as discussed in the response to RAI 129, there is insufficient information on these actions to evaluate potential impacts. An additional project within the region of the Lee Nuclear Station is discussed in the ER. Subsection 9.4.2.2.5.4 of the ER discusses a reservoir proposed for the First Broad River in Cleveland County, North Carolina. According to the Public Notice for the U.S. Army Corps of Engineers permit application, the 1,300 acre impoundment would impact approximately 24 miles

of river and stream and less than one acre of wetland (References 12 and 13). This project is roughly 25 miles from Lee Nuclear Station. The Cleveland County water reservoir has not received the U.S. Corps of Engineers Section 404 permit required to move forward.

References:

1. 40 CFR 230.11(h)(1), "Determination of secondary effects on the aquatic ecosystem".

2. Letter from Bryan J. Dolan (Duke Energy) to Document Control Desk, U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, Ltr# WLG2009.09-05, dated September 24, 2009 (ML092810255).

3. Letter from Bryan J. Dolan (Duke Energy) to Document Control Desk, U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, Ltr# WLG2010.07-03, dated July 9, 2010 (ML101950207).

4. Letter from Bryan J. Dolan (Duke Energy) to Document Control Desk, U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, Ltr# WLG2010.07-08, dated July 22, 2010.

5. Letter from Bryan J. Dolan (Duke Energy) to Document Control Desk, U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, Ltr# WLG2009.09-10, dated September 24, 2009 (ML092730480).

6. Duke Energy, 1999, Best Management Practices for Stormwater Management and Erosion Control - Policy and Procedures Manual. February 1999.

7. 40 CFR 230.11(g)(1), "Determination of cumulative effects on the aquatic ecosystem".

8. Rosgen, D. 1996. Applied Fluvial Morphology. Wildland Hydrology: Pagosa Springs, CO.

9. Rosgen, D. 2006. Watershed Assessment of River Stability and Sediment Supply. Wildland Hydrology: Fort Collins, CO.

10. U.S. Nuclear Regulatory Commission, 1999, Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Oconee Nuclear Station, Units 1, 2 & 3 – Final Report (NUREG-1437, Supplement 2).

11. Letter from Bryan J. Dolan (Duke Energy) to Document Control Desk, U.S. Nuclear Regulatory Commission, Response to Request for Additional Information, Ltr# WLG2010.07-06, dated July 16, 2010 (ML102100214).

12. U.S. Army Corps of Engineers, Wilmington District. 2005. Public Notice. Corps Action ID#: 200330194. June 28, 2005.

13. U.S. Army Corps of Engineers, Wilmington District. 2008. Public Notice for Scoping Meeting: Corps seeks comments on proposed First Broad River Reservoir. Corps Action ID# SAW-2003-30194-1. April 7, 2008.

Associated Revisions to the Lee Nuclear Station Combined License Application:

None

Attachment:

Attachment 133-01 Table 133-01. List of Large Lakes and Reservoirs within Alternative Site Watersheds

Attachment 133-01

Table 133-01

Table 133-01: List of Large Lakes and Reservoirs within Alternative Site Watersheds[1]

Cherokee (Lee Nuclear Station)	Keowee	Perkins	Middleton Shoals
• Ninety-Nine Islands Reservoir • Thickety Creek WCD • Lake No. 26 • Lake Lure • Lake Whelchel • Kings Mountain Reservoir • Lake Summit • Lake Adger • Lake William C. Bowen • Pacolet River Reservoir No. 1 • Lake Blalock	• Lake Hartwell • Lake Jocassee • Lake Keowee • Lake Toxaway • Bad Creek Reservoir • Lake Cherokee[2]	• Salem Lake • Kerr Scott Reservoir • High Rock Lake [3] • Badin Lake[3] • Lake Tillery[3]	• Secession Lake • Tate Lake • Anderson Reservoir • Broadway Lake • Hartwell Lake • J. Strom Thurmond Reservoir

Source: USGS National Hydrography Dataset, Geodatabases for Four Digit HUCs 0304, 0305, and 0306

1. Waterbodies larger than 100 acres were included in this list. For waterbodies without names listed in the geodatabase, the USGS quad was referenced to determine the Lake or Reservoir name.
2. Not to be confused with Lake Cherokee adjacent to Make-Up Pond C, which is less than 100 acres.
3. High Rock Lake, Badin Lake, and Lake Tillery are actually located on the Yadkin River within the watershed downstream of the Perkins site. The Perkins site is located near the downstream limit of the Upper Yadkin watershed, so these large lakes were included in the list due to their proximity.