

September 14, 2016

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

Before the Commission

In the Matter of	)	
	)	
DUKE ENERGY CAROLINAS, LLC	)	Docket Nos. 52-018 and 52-019
	)	
(William States Lee III Nuclear Station,	)	
Units 1 and 2)	)	

**DUKE ENERGY CAROLINAS’ RESPONSES TO PRE-HEARING QUESTIONS**

In accordance with the Notice of Hearing<sup>1</sup> and the Commission’s Order (Transmitting Pre-Hearing Questions) (Sep. 1, 2016), Duke Energy Carolinas, LLC (Duke Energy) submits the following responses to each of the questions posed to it by the Commission.

**Question 1:** The analysis and evaluation of downstream dam failure (Final Safety Evaluation Report (FSER) at 2-139) is focused on impacts to safety-related equipment. Please describe the impacts to other structures, systems, and components (SSCs) that are important to safety but not specifically safety-related. Would downstream dam failure impact other systems that could supplement safety-related equipment, such as regulatory treatment of non-safety systems (RTNSS) structures, systems and components? If so, how is the loss of availability of this equipment due to downstream dam failure accounted for in the application, analysis by DEC, and the Staff’s evaluation?

**Response:** The site and associated safety-related and non-safety-related SSCs are well protected from the effects of flooding by virtue of their elevation above the resulting flood levels.

As described in FSAR § 2.4.2.3, the Lee Nuclear Station site is defined by wide, flat areas that are graded to drain away from safety-related structures to Make-Up Pond A, Make-Up Pond B, or directly to the Broad River. The finished floor elevation of the safety-related and Seismic Category II structures for each unit is 593' MSL. The nearby areas range in elevation

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<sup>1</sup> Duke Energy Carolinas, LLC, William States Lee III Nuclear Station, Units 1 and 2, Combined license application; hearing, 81 Fed. Reg. 54,822 (Aug. 16, 2016).

from 592' immediately adjacent to the power block to 590' at the vehicle barrier system ditch surrounding the protected area. The maximum flood elevations on nearby water bodies, considering the effects of potential dam failures, is 585.36', 585.36', and 589.10' for the Broad River, Make-Up Pond A, and Make-Up Pond B, respectively. The site and all associated safety-related and non-safety-related SSCs are therefore well protected from the effects of flooding resulting from potential dam failures by virtue of their elevation above the flood elevations.

The failure of the downstream Ninety-Nine Islands dam was not evaluated since the effect would be to lower the water level at the site. The failure of the onsite (downstream) Make-Up Pond A dam was similarly not evaluated. The failure of the Make-Up Pond A dam would result in the loss of make-up water to the Circulating Water System (CWS) cooling towers, but would have no safety significance since safety-related passive cooling remains available.

The locally intense precipitation associated with the Probable Maximum Precipitation (PMP) event results in the maximum site surface water elevation of 592.56' on the west side of each power block, somewhat less on each east side, and 590.56' at the vehicle barrier system ditch. The Seismic Category I and Seismic Category II structures with finished floor elevations at 593' MSL and outdoor tanks located near those power block structures are therefore unaffected by the PMP.

Non-safety equipment required for between 72 hours and 7 days after a design basis event (DBE) is referred to as RTNSS-B. NRC documented its review and approval of the AP1000 RTNSS approach in Chapter 22 of its AP1000 FSER (NUREG-1793, ML112061231). As described in Section 6.2 of WCAP-15985 (ML032540843), the RTNSS-B SSCs that should be available are:

- Ancillary diesel generator and ancillary diesel generator fuel oil storage tank
- PCS recirculation pump and ancillary PCS water storage tank
- Main control room ancillary fan
- Instrumentation room ancillary fan

These RTNSS-B SSCs are located inside the Seismic Category I Auxiliary Building, inside the Seismic Category II Annex Building, or in the case of tanks, outside and close by those power block structures at ground level. As a result, the identified RTNSS-B SSCs are also unaffected by flooding resulting from potential dam failures, or by a locally intense precipitation event.

In summary, the site and associated safety-related and non-safety-related SSCs, including those SSCs identified as RTNSS-B, are well protected from the effects of potential flooding events.

**Question 2:** The staff concluded "that the quality and completeness of the AP1000 [probabilistic risk assessment (PRA)] are adequate and satisfy the regulatory requirements" (FSER at 19-24). Please describe what measures are in place to ensure that any changes in the as-built configuration of the William States Lee III Nuclear Station (WLS) Units 1 and 2 will be reflected in the final probabilistic risk assessments for events such as internal and external fires, floods and nearby facility accidents.

**Response:** The measures to ensure that changes in the William States Lee III Nuclear Station (WLS) Units 1 and 2 are reflected in the final probabilistic risk assessments for events such as internal and external fires, floods and nearby facility accidents are established by regulations, FSAR commitments, and license conditions. 10 C.F.R. § 50.71(h)(1) requires each COL holder to develop a level 1 and level 2 PRA no later than the scheduled date for fuel load, and 10 C.F.R. § 50.71(h)(2) requires the COL holder to maintain and upgrade this PRA, and provides that the PRA must cover those initiating events and modes for which NRC-endorsed consensus standards

exist one year prior to the scheduled date for initial loading of fuel. These requirements are addressed in Section 19.59.10.6 of the FSAR, which provides PRA configuration controls that include a process that maintains and updates the PRA to be reasonably consistent with the as-built, as operated plant.

In the case of risk from internal fire and flood, Section 19.59.10.5 of the DCD includes a COL item (identified as COL 19.59.10-3 in Lee FSAR Table 1.8-202, Pg. 19 of 19) to update internal fire and flood if needed based on walk downs performed after the plant is built. In the case of risk from external events such as fires, floods and nearby facility accidents, Section 19.59.10.5 of the DCD includes a COL item (identified as COL 19.59.10-2 in Lee FSAR Table 1.8-202, Pg. 19 of 19) to confirm that site-specific external event risks are bounded by the High Winds, Floods, and other External Events analysis documented in Section 19.58 of the DCD. These COL items in the DCD are addressed by programs described in Section 19.59.10.5 of the FSAR, which provides for (1) a review of the differences (determined by a verification walkdown) between the as-built plant and the design used as the basis for the AP1000 seismic margins analysis, (2) a review of the differences between the as-built plant and the design used as the basis for the AP1000 internal fire and internal flood analysis, and (3) a review of the differences between the as-built plant and the design used as the basis for the AP1000 PRA and PRA-based insights. Further, License Conditions 2.D.(12)(d)6 through 2.D.(12)(d)8 confirm each of these requirements.

AP1000 plant-specific design change process controls are relied upon to ensure any changes impacting the site characteristics presented in DCD Chapter 2 are reviewed for impact on the plant-specific PRA before being approved for implementation.

**Question 4:** DEC requested approval to have the WLS Emergency Operations Facility (EOF) located in the Charlotte General Office, where the current EOF for DEC’s McGuire, Catawba, and Oconee Nuclear Stations resides. NRC approval is required in accordance with 10 C.F.R. Part 50, Appendix E, IV.E.8.b, because the location of the Charlotte EOF is greater than 25 miles from the Lee site. DEC proposed what is now License Condition 13-7 to demonstrate the integrated capability and functionality of the EOF.

- a. Did the Staff consider the possibility that additional sites could be impacted by a common event?
- b. Please explain whether Emergency Response Organization (ERO) training would be required to address events at multiple facilities with possibly different reactor designs.
- c. What changes, if any, will be required to the EOF to meet any AP1000-specific requirements for the Lee Nuclear Station?

**Response:**

a. Duke’s Proposed License Condition 4, requires demonstration of the ability for the Duke EOF staff to handle two site events concurrently. Proposed License Condition 4 (Emergency Planning Actions)/License Condition 13-7 (from FSER) states, “Prior to fuel load, Duke Energy will demonstrate the integrated capability and functionality of the Emergency Operations Facility (EOF) for activation and operation of the facility to respond to emergency events at both the Lee Nuclear Station and one additional nuclear facility that is supported by the EOF. Integrated communication and data capability and functionality will include the Technical Support Centers for Lee Nuclear Station and one additional nuclear facility, and other Federal, State, and local coordination centers as appropriate.

As provided in Emergency Plan, section II.H.2, “Duke Energy maintains the capability for the EOF to simultaneously acquire, display and evaluate radiological, meteorological, and plant system data pertinent to offsite protective measures for each of the facilities that rely on the EOF for offsite emergency response support.”

b. Key positions of EOF staff that include the EOF Director, Assistant EOF Director, and Accident Assessment Manager are required to take training to cover multiple technologies. Current Duke Emergency Plan Implementing Procedures require technology specific training for plant systems, Severe Accident Management Guidelines (SAMG) and mitigation strategies for extensive damage. These requirements will be expanded to address AP1000 technology for the Lee site.

Duke also provides training for multi-site response to the ERO for the existing sites supported by the EOF. This training will be expanded to include the Lee site. As provided in section II.O.4 of the Emergency Plan, “Duke Energy implements a program to provide position-specific emergency response training for designated members of the emergency response organization. The content of the training program is appropriate for the duties and responsibilities of the assigned position.” Specific functions pertinent to EOF operations discussed in this section, include personnel responsible for accident assessment, radiological analyses, corporate office support personnel, and emergency communicators.

c. Appendix 9 of the Emergency Plan describes the functional requirements for the EOF to support the Lee AP1000 units. Duke Energy maintains the capability for the EOF to simultaneously acquire, display and evaluate radiological, meteorological, and plant system data pertinent to offsite protective measures for each of the facilities that rely on the EOF for offsite emergency response support. The only changes required to the existing EOF are to display site and plant parameters from the Lee AP1000 units.

EP ITAAC specify requirements for ensuring AP1000 technology and Lee site-specific data and information are provided in the EOF. The following EP ITAAC specifically address EOF and design-related considerations:

1.1 – Verifies displays for retrieving facility system information and effluent parameters and specifically requires, “An inspection of the control room, technical support center (TSC), and emergency operations facility (EOF) will be performed to verify that they have displays for retrieving facility system and effluent parameters that constitute the bases for the classification scheme in the emergency plan implementing procedure addressing “Emergency Classification.”

3.2 – Demonstrates performance of the Emergency Response Data System and specifies, “The means exist for communications from the control room, TSC, and EOF to the NRC headquarters and regional office EOCs (including establishment of the Emergency Response Data System (ERDS) between the onsite computer system and the NRC Operations Center.)

5.2 – EOF facility Design requires documentation of EOF inspection to confirm:

5.2.1 The EOF had at least 243 square meters (2,625 square feet).

5.2.2 Voice transmission and reception have been accomplished between the EOF and TSC.

5.2.3 A report exists that confirms voice transmission and reception have been accomplished via the Selective Signaling Telephone System between the EOF and the following:

- Cherokee County Warning Point
- York County Warning Point

- Cleveland County Warning Point
- South Carolina Warning Point
- North Carolina Emergency Operations Center Radiological Warning Point

**Question 5:** DEC filed a request to have the WLS EOF located in the DEC Charlotte General Office, which is greater than 25 miles from the affected reactor sites. The Staff notes in the FSER that DEC corporate staff provides management and technical support to the ERO and EOF. Currently the EOF is used for DEC’s McGuire Nuclear Station, Catawba Nuclear Station, and Oconee Nuclear Station, and DEC and Duke Energy Progress have submitted a license amendment request to the NRC seeking approval to integrate four additional reactors. The reactor technologies for the existing and proposed nuclear plants for the DEC EOF are well known and understood by a large number of DEC corporate and site staff because those reactor technologies have been in operation for many years.

- a. Will the WLS EOF be staffed by ERO members from both the corporate and site staff?
- b. Will the corporate EOF staff supporting WLS require additional technical knowledge or training on the AP1000-specific reactor design? If so, what, if any additional reactor technology training is required for corporate EOF support staff?

**Response:**

a. As discussed in Emergency Plan, section II.A.1.b, “The EOF assumes many of the functions of the TSC following turnover from the TSC. The EOF is staffed by corporate personnel or personnel from other Duke Energy Nuclear Stations, including the EOF Director, who directs the activities of this facility. The EOF Director is responsible for ensuring the EOF communicates emergency status to the States and counties, directing the efforts of the off-site monitoring teams, making radiological assessments, recommending off-site protective measures to the States and counties, and arranging for dispatch of any special assistance or services requested by the station. Specific information relating to the staffing and reporting structure of the EOF organization is provided in EPIPs.”

b. Duke provides training to the EOF staff necessary to support emergency response at each of the sites supported by the EOF. As described in the response to question 4b, key positions of EOF staff that include the EOF Director, Assistant EOF Director, and Accident Assessment Manager are required to take training to cover multiple technologies. Current Duke Emergency Plan Implementing Procedures require technology specific training for plant systems, Severe Accident Management Guidelines (SAMG) and mitigation strategies for extensive damage. This training will be expanded to include the Lee Station. As provided in section II.O.4 of the Emergency Plan, “Duke Energy implements a program to provide position-specific emergency response training for designated members of the emergency response organization. The content of the training program is appropriate for the duties and responsibilities of the assigned position.”

**Question 6:** Please explain the basis for the determination that the Unit Supervisor would be qualified and available during an accident to act as the Emergency Coordinator when the Shift Manager is unable to fill that role (FSER at 13-29). How would the role and duties of the Unit Supervisor in the control room be fulfilled during an accident if he/she is an Emergency Coordinator?

**Response:** Persons in the control room positions of Unit Supervisor and Shift Manager are both NRC licensed Senior Reactor Operators. As such, both receive training and are assessed on their knowledge and ability to perform the duties of the Emergency Coordinator.

Assuming another qualified Unit Supervisor is not available on-site, an NRC licensed Reactor Operator in the control room would perform some necessary functions of the Unit Supervisor during the time the Unit Supervisor is performing Emergency Coordinator activities. The Unit Supervisor would provide oversight on the implementation of event mitigation procedures performed by the control room operators as the Emergency Coordinator.

The transition of roles referred to in this question and described in the William States Lee III Nuclear Station (WLS) Combined License Application (COLA) Emergency Plan is not for an intended relief of the Emergency Coordinator position. As stated in WLS FSER Section 13.3.4.2 (page 13-29) and the WLS COLA Emergency Plan Section II.B.3 (page II-13), the Unit Supervisor assumes the duties of the Emergency Coordinator only if the Shift Manager is rendered unable to perform the Emergency Coordinator duties due to illness or injury. The incapacitation of the Shift Manager concurrent with an emergency would be a rare occurrence. In addition, the Unit Supervisor's assumption of these duties would only be until relieved as described in the WLS COLA Emergency Plan Section II.B.3 (page II-13).

**Question 7:** Based on DEC's response to RAI 25, Question 13.03-55(A), the FSER states that public information (coordination and dissemination) is handled by the EOF (FSER at 13-30). The Emergency Plan, Section G (Emergency Plan at II-36), however, indicates that this role is the responsibility of the Joint Information Center (JIC). Please clarify whether the EOF or the JIC would handle the coordination and dissemination of public information during an emergency.

**Response:** Release of public information during an emergency is provided through the JIC after its activation.

The EOF is staffed by corporate personnel or personnel from other Duke Energy Nuclear Stations, including the EOF Director, who directs the activities of this facility which includes the JIC. Coordination and dissemination of public information during an emergency requires participation by licensee and governmental agency staff in the EOF and JIC. Section II.B.7 of the Emergency Plan provides the following discussion related to coordination of public information between the EOF and JIC:

The EOF and JIC staff focuses on performing management, technical and administrative activities as needed to support the plant staff and to relieve the plant staff of external coordination responsibilities. This includes notification of and coordination with off-site authorities and release of information to the media.

The EOF Director has the ultimate responsibility for directing the corporate emergency response. Corporate support is coordinated between the Emergency Coordinator (TSC) and the EOF Director at the EOF. The EOF Director and his staff serve as the point of contact between Lee Nuclear Station personnel, the corporate emergency response staff (i.e. EOF and JIC), and governmental authorities.

**Question 8:** Based on the Emergency Plan and DEC's responses to RAI 25, Questions 13.3-55(M), (P), (P.2), and (Q), the Staff found that there will be "on-shift capability to perform dose assessment in the determination of emergency classification, onsite protective action, and offsite protective action recommendations" (FSER at 13-30), although it does not appear that there is a designated individual to perform dose assessment functions. Given that Section E.IV.A.4 of 10 C.F.R. Part 50, Appendix E requires "Identification, by position and function to be performed, of persons within the licensee organization who will be responsible for making offsite dose projections," please explain the basis for the Staff's finding.

**Response:** In Supplemental Response to RAI 13.03-55, dated January 8, 2015, Duke Energy discussed a change made to Table II-2 of the Emergency Plan that was committed to in a letter dated June 12, 2012 [ML12166A288] and incorporated in the Plan in WLS COLA Submittal 6. The change states that there will be an individual on-shift with the qualification to perform off-site dose projections until relieved by staff augmentation. This provides for the on-shift capability to perform dose assessment in the determination of emergency classification, on-site protective action, and offsite protective action recommendations. NUREG-0654 Table B.1 requires that dose assessment function be available within 30 minutes. This requirement is met by having a qualified individual on-shift to perform dose projections until the augmented dose assessment ERO member arrives. After staff augmentation, the offsite dose assessment function is performed by qualified dose assessors located in the Emergency Operations Facility.

Table II-2 of the Emergency Plan identifies "Major Functional Area – Protective Actions/Major Tasks – Radiation Protection" and indicates that two Radiation Protection Technicians are required on-shift. Note 3 associated with these positions indicates a Radiation Protection qualified individual assigned other duties is required to be on-shift with the

qualification to perform off-site dose projections until relieved by staff augmentation of the dose assessor position.

**NRC Question 9:** Please explain whether all relevant Emergency Action Levels (EALs) are in place to support the installed spent fuel pool instrumentation required under Commission Order EA-12-051 and discussed in FSER Chapter 20. Specifically, how will the Staff and DEC assure that EALS addressing the spent fuel pool (AA2.3, AS2, and AG2) specified in NEI 99-01, Revision 6, are implemented?

**Response:** DEC incorporated/validated the applicable requirements for spent fuel pool level instrumentation into the William States Lee III Nuclear Station (WLS) Combined License Application (COLA). The following items were referenced to define the applicable requirements:

- Commission Order EA-12-051, Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation, and the associated guidance in
- JLD-ISG-2012-03, Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation, which endorses
- NEI-12-01, Industry Guidance for Compliance with NRC Order EA-12-051, “To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation.”

Neither the Commission Order EA-12-051 nor the associated guidance address the addition or modification of EALs for spent fuel pool level. No action has been taken by DEC to establish a requirement in the WLS COLA to add/modify the spent fuel pool level EALs based on EALs in NEI 99-01, Development of Emergency Action Levels for Non-Passive Reactors, Revision 6.

NEI 99-01, Revision 6 is applicable to nuclear plants with active safety systems. NEI 07-01, Methodology for Development of Emergency Action Levels Advanced Passive Light Water

Reactors, was developed for passive safety system nuclear plants including the AP1000. The NRC's draft license for WLS includes a license condition requiring submittal 180 days before fuel load of a fully developed set of plant specific Emergency Action Levels (EALs) in accordance with NEI 07-01, Revision 0, with no deviations.

NEI 07-01, Revision 0 has an Initiating Condition based on low spent fuel pool level for an EAL at the Alert classification for AP1000. NEI 07-01, Revision 0 does not include EALs similar to AS2 and AG2 (Site Area Emergency and General Emergency EALs based on spent fuel pool level) in NEI 99-01, Revision 6.

**Question 10:** DEC describes the use of a satellite phone as a communication method during an emergency. Please discuss whether DEC will install a repeater system that would allow for satellite phone use inside a building.

**Response:** The specific portable satellite phones or satellite phone system that will be used on the William States Lee III Nuclear Station (WLS) site and in the emergency facilities associated with WLS are not known at this time. There are various capabilities available today and potentially more that will be available in the future. Satellite phones to be used by WLS to achieve the necessary communication capabilities described in NEI 12-01, Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities, will be evaluated at the appropriate time. License condition 13-11 on page 13-49 in the WLS FSER will require a communications capability assessment in accordance with NEI 12-01, Revision 0. The assessment must be completed at least 18 months before the latest date set forth in the schedule submitted in accordance with 10 CFR § 52.99(a) for completing the inspections, tests, and analyses in the ITAAC. This same license condition also requires implementation of corrective actions identified in the communications capability assessment, including any related emergency plan and implementing procedure changes and associated training be completed at

least one hundred eighty (180) days before the date scheduled for initial fuel load set forth in the notification submitted in accordance with 10 CFR § 52.103(a).

**Question 11:** In RAI 25, Question 13.03-62(D)(2), the Staff asked DEC to identify the person responsible for making source term estimates at various stages of the event. DEC responded that “Dose Assessors in the EOF, under the direction of the Radiological Assessment Manager, are responsible for evaluating source terms until the event is terminated” (FSER at 13-72). Who does this work before the EOF is activated (first 75 minutes of the event, assuming a radiological release is in progress)?

**Response:** Supplemental Response to Question 13.03-55, dated January 8, 2015, discussed a change made to Table II-2 of the Emergency Plan that was committed to by Duke Energy in a letter dated June 12, 2012 [ML12166A288] and incorporated in the Plan in WLS COLA Submittal 6. The change states that there will be an individual on-shift with the qualification to perform off-site dose projections until relieved by staff augmentation. Source term determination is an integral part of performing dose projections. The Plan change provides for the on-shift capability to perform dose assessment in the determination of emergency classification, on-site protective action, and offsite protective action recommendations. NUREG-0654 Table B.1 describes that a dose assessment function be available within 30 minutes. This requirement is met by having a qualified individual on shift to perform dose projections until the augmented dose assessment ERO member arrives. After staff augmentation, the offsite dose assessment function is performed by qualified dose assessors located in the Emergency Operations Facility.

In Emergency Plan, Table II-2, under “Major Functional Area – Protective Actions/Major Tasks – Radiation Protection,” the table indicates 2 RP Technicians on-shift. Note 3 associated with these positions indicates a Radiation Protection (RP) qualified individual assigned other duties is required to be on-shift with the qualification to perform off-site dose projections until relieved by staff augmentation of the dose assessor position.

In addition, EP ITAAC (6.1 and 6.2) provide for demonstration during a drill or exercise that Duke has the means to provide initial and continuing radiological assessment throughout the course of an accident and to determine the source term of releases of radioactive material within plant systems, and the magnitude of the release of radioactive materials based on plant system parameters and effluent monitors.

**Question 12:** With regard to the seismic design of the Lee Nuclear Station, WLS DEP 2.0-1 discusses a departure from the AP1000 certified design which is necessary because the WLS site-specific horizontal and vertical spectra exceed the Certified Seismic Design Response Spectra and the hard rock high frequency spectra for the AP1000. DEC used Appendix 3I of the AP1000 Design Control Document to identify WLS-specific equipment for which high frequency amplification was important. The Staff's review concluded that DEC adequately demonstrated that the test response spectra for representative high frequency sensitive equipment bound the site-specific required response spectra (RRS).

In SECY-16-0094, the Staff noted that DEC also committed to ensure that the future qualification testing for high frequency sensitive equipment identified in WLS Units 1 and 2 COLA Appendix 3I will envelope the WLS site-specific RRS. Where is this commitment discussed in the Staff's FSER or DEC's Final Safety Analysis Report (FSAR)? Did DEC or the Staff consider whether this activity should result in a license condition since the WLS site-specific conditions for higher frequencies exceed the AP1000 certified design?

**Response:** Duke Energy's commitment to ensure that future equipment qualification testing for high frequency sensitive equipment envelopes the WLS site-specific RRS, in addition to the CSDRS and HRHF RRS, is contained in WLS FSAR Subsection 3.7.2.15 (FSAR Revision 11, page 3.7-9). The last sentence of the second paragraph from the bottom of the page states the seismic qualification testing commitment:

"Duke Energy will ensure that all seismic qualification testing for safety-related equipment required per DCD Appendix 3I appropriately envelopes the Lee site-specific requirements, in addition to the CSDRS and HRHF RRS."

This commitment is presented as part of the overall discussion in FSAR Subsection 3.7.2.15, addressing the exceedance of the CSDRS described in Departure WLS DEP 2.0-1. FSAR Subsection 3.7.2.15 also describes the equipment qualification programs already

conducted as part of the standardized effort in support of the entire fleet of AP1000s. In a review of completed testing, it was found that the actual test response spectra (TRS) used in the equipment qualification exceeded the WLS site-specific demands by a significant margin. As such, Duke Energy believes that the stated FSAR commitment is the appropriate measure to ensure long-term attention to this aspect of equipment qualification for WLS Units 1 and 2.

**Question 13:** As discussed in the FSER Chapter 2, several legacy structures from the Cherokee project require removal. Draft License Condition 2.D.(12)(d)12 would require confirmation that a single legacy Cherokee project stormwater drain line and any associated bedding material representing a potential preferential groundwater pathway have been removed and that the excavation has been backfilled with compacted native soil.

- a. Please describe why addressing this stormwater drain line resulted in a license condition.
- b. Are other conditions or commitments required for additional legacy Cherokee project structures? If not, why not?

**Response:** A detailed review of the historical Cherokee earthwork and drainage construction plans identified one stormwater drain line corridor that could potentially create a preferential groundwater flow pathway from the power block area to Hold-Up Pond A. Such a preferential pathway could impact the results of the conservative analysis described in FSAR Section 2.4.13 of a postulated accidental liquid effluent release to the environment at the Lee Nuclear site. To avoid this potential impact, Duke Energy committed in FSAR Subsection 2.4.12.2.3 to removing the existing stormwater drain and associated bedding materials by over-excavation and backfilling with native soils or low permeability fill material. The fill material will be compacted to a density sufficient to ensure that no short circuiting or preferential pathway can occur. A license condition addressing this commitment was added to the Lee Nuclear Station COLA Part 10 at the request of the NRC staff.

Yes, commitments are required for removal or modification of additional legacy Cherokee project structures. FSAR Subsection 2.5.4.5.2.1 and FSAR Figures 2.5.4-244a through

2.5.4-244e and 2.5.4-266 describe excavation and foundation conditions for the Lee Unit 1 Nuclear Island and these commitments. These commitments are:

- the isolation joint material between the legacy Cherokee reactor and auxiliary building basemats within the Lee Unit 1 Nuclear Island foundation support zone will be removed,
- the legacy Cherokee groundwater drainage system will be sealed with fill concrete where exposed by excavation, and
- protective sheathing and waterproofing membranes associated with the legacy Cherokee pit/pump rooms will be removed.

**Question 16:** Please describe the site-selection process for Make-Up Pond C, including the consideration of possible alternate locations.

To what extent were environmental impacts a factor in the location selection process for Make-Up Pond C?

**Response:** As discussed in Section 9.4.2.2.5.5 of the Supplement to Revision 1 of the William States Lee Environmental Report, Duke evaluated a number of alternatives for selecting a supplemental water impoundment, including alternative impoundment locations on London Creek and on Kings Creek, and the alternative of raising the level of the Ninety-Nine Islands Reservoir. Environmental impacts were extensively evaluated in selection of the best location for a supplemental water pond. A detailed comparison of affected wetlands, affected streams, land cover, noteworthy soils, protected species, occupied buildings, existing land use, transportation corridors, recorded archeological sites and recorded historic sites was performed for the Kings Creek, London Creek and the raising of the Ninety-Nine Islands Reservoir options, as shown in Tables 9.4-7 and 9.4-8 of the ER Supplement. This comparison determined that the London Creek location for Make-Up Pond C was the least impactful of these three options.

The option of increasing the capacity of existing Make-Up Pond B by increasing the pond's depth via excavation was assessed and was eliminated from further consideration because this option would not provide sufficient make-up water during extended drought periods. Raising the full pond elevation of Make-Up Pond B would potentially result in site flooding concerns.

**Question 17:** Did the decision to add Make-Up Pond C affect the alternative site analysis?

For DEC:

- a. If so, please describe how that analysis changed.

For the Staff:

- b. If so, please describe how the change impacted the Staff's review of alternative sites.

**Response:** Yes, evaluation of the 2007 and 2008 drought affected the alternative site analysis, resulting in the determination that each of the candidate sites would require a supplemental water pond. The decision to add Make-Up Pond C prompted Duke to quantify the size of the supplemental water reservoirs that would be required at each of the alternative sites and provide more specific estimates of wetland and other related impacts, but did not alter the overall conclusion on alternative sites. Section 9.3.2 of Duke Energy's Supplement to Revision 1 of the Applicant's Environmental Report – Construction and Operation of Make-Up Pond C, provided this additional information on the impacts of construction of supplemental water reservoirs at the alternative sites, including land use, hydrology and water quality, terrestrial ecology, and aquatic ecology. This evaluation ultimately led to the NRC determination that none of the alternative sites are environmentally preferable nor obviously superior to the Lee Nuclear Station site. The US Army Corps of Engineers also concluded in the 404 Permitting Process that the Lee site was the Least Environmentally Damaging Practicable Alternative Site.

All alternative sites would require supplemental water ponds ranging in size from 1,300 acres to 3,700 acres in comparison to the 1,100 acres required for Make-Up Pond C at the Lee site. Supplemental reservoirs at the alternative sites would impact from 144,000 linear feet to 378,000 linear feet of streams compared to about 66,000 linear feet for Make-Up Pond C at the Lee Site.

**Question 22:** Please summarize the impacts the U.S. Forest Service found in the EIS for the Special Use Permit to complete compensatory mitigation work in the national forest. Were those impacts mostly beneficial or did they include some negative impacts too? If so, how were those negative impacts mitigated?

**Response:** As detailed in the U.S. Forest Service’s Chester County Stream and Riparian Restoration/Enhancement Project Final Environmental Impact Statement, the long-term impacts from the proposed compensatory mitigation in Sumter National Forest are overwhelmingly beneficial. The proposed mitigation will “restore and enhance the hydrologic and aquatic functions on approximately 18 miles of streams in four watersheds ... [and] restore riparian functions and help to re-establish stability of the stream systems and natural habitat-forming processes [including] restoring the hydrologic regime [by] reconnecting streams to their respective floodplains, reducing sedimentation and stabilizing banks, improving in-stream and riparian habitats, and improving water quality.”

However, activities associated with the stream restoration will result in short-term impacts to aquatic and terrestrial habitats during construction. Aquatic organisms with limited mobility and located within areas of disturbance may not survive. Short-term increases in sediment concentrations and disturbance in riparian areas will occur. Construction will also result in temporary disturbance to wildlife and to recreation as activities and traffic increase. Short-term impacts to scenery will result from cut trees, construction equipment, and soil disposal and borrow areas.

Adherence to Forest Plan standards, including Best Management Practices (BMPs) and site-specific mitigation measures will reduce and limit the effects on aquatic and terrestrial species, erosion and sediment transport, recreational activities, and general disturbance in riparian areas.

Specific mitigation measures include BMPs, specific to the U.S Forest Service (USFS), U.S. Army Corps of Engineers (USACE) and South Carolina Department of Health and Environmental Control (SCDHEC) Erosion and Sediment Control Standards to limit erosion and sedimentation and impacts to terrestrial and aquatic species. Forest Plan standards include use of rolling dips and various water diversions on temporary roads, soil ripping, grading, disking at log landings and equipment staging areas followed by re-vegetation with native and desirable non-native grasses and forbs. The project will likely be performed over a four year period; thereby, reducing or eliminating impacts to recreational users. Aesthetic impacts will be avoided, where practicable, by avoiding scenic vistas. The duration of the disturbed appearance and overall visual impact will be reduced by locating construction materials, soil borrow, and disposal areas out of the immediate viewshed.

**Question 23:** In its comments on the Draft Environmental Impact Statement (DEIS) (Letter from Jay B. Herrington, U.S. FWS, to NRC (March 5, 2012) (ML12083A064)), the U.S. Fish and Wildlife Service (FWS) stated that “additional information is required to provide a complete analysis of the effects of the proposed project on fish and wildlife resources” and provided three recommendations to complete the analysis:

1. A survey for snails should be conducted in London Creek and its tributaries, and downstream of the Ninety-Nine Island Dam in the Broad River.
2. A comprehensive survey for the yellow lance below the dam in the Broad River, and downstream areas affected by the discharge from the hydroelectric project, should be conducted because the mussel is currently under a 90-Day Petition Finding for listing under the Endangered Species Act.
3. The applicant should develop and implement a plan to collect the South Carolina State Conservation High and Moderate priority fish species in London Creek and relocate to nearby suitable streams prior to construction of Pond C.

For the Staff:

- a. Did the Staff implement either recommendation 1 or 2?
- b. What was the outcome of the 90-Day Petition Finding? Is the yellow lance still under review for potential listing?

For DEC:

- c. Did DEC implement recommendation 3?

**Response:** No, DEC has not implemented the U.S. Fish and Wildlife Service (USFWS) recommendation 3. Collection and relocation of these species is not deemed necessary based on their ranking.

At the time the USFWS submitted its comments on the Draft Environmental Impact Statement (DEIS), four fish species collected in London Creek were considered by South Carolina Department of Natural Resources (SCDNR) to be state conservation high or moderate priority species. These species were the greenhead shiner, greenfin shiner, highback chub, and flat bullhead. The greenhead shiner, which was the only species of the four classified as “high priority” in the 2005 SC Comprehensive Wildlife Conservation Strategy, has now been totally removed from the list of SC Priority Species in the 2015 SC State Wildlife Action Plan. The name of the 2005 SCDNR document changed from the SC Comprehensive Wildlife Conservation Strategy to the SC State Wildlife Action Plan in 2015. The ranking of the other three species, classified as moderate (the lowest) priority in 2005, remain unchanged in the 2015 plan.

In the 2005 South Carolina Comprehensive Wildlife Conservation Strategy and 2015 SC State Wildlife Action Plan, priority species are identified using the following criteria:

- State and federal protection status: endangered, threatened, rare or special concern
- South Carolina Natural Heritage Program state rank: S1 through S5
- Degree of exploitation/harvest: high, medium or low

- Availability of past or current funding to address species challenges
- Feasibility measure: the likelihood that conservation activities in South Carolina can make a difference for this species
- Knowledge of the species' population status: status mostly known, slightly known or unknown
- Knowledge of species' distribution in the state: distribution mostly known, slightly known or unknown
- Population status (trend): population decreasing, stable or increasing

None of the priority fish species found in London Creek meet the first two criteria above, indicating known rarity. None have been ranked as critically imperiled, imperiled or vulnerable.

**Question 24:** DEC has removed approximately 86 privately owned housing units from the Make-Up Pond C site since it acquired the land. The Staff concluded that the potential environmental justice impacts of the construction and preconstruction activities would be SMALL.

- Did DEC determine whether the residents of the housing units were members of a minority group or of low income?
- Did the Staff assess the environmental justice impacts, if any, on the owners and tenants of the 86 housing units removed from the site? If so, what were those impacts specifically?

**Response:** The Make-Up Pond C area is adjacent to the Lee site. DEC evaluated the presence of minority and low income populations in the region and the vicinity of the Lee site at the census block level consistent with NRC guidance. The regional aggregate minority population was 25.2% and the low income population was 10.4%. No minority populations were identified adjacent to the Lee site. The nearest low-income population to the site is over 15 miles away. Therefore, no disproportionate impacts to minorities or low income populations are anticipated from construction of Make-Up Pond C. Offers to purchase the properties in the Make-Up Pond C area were tendered and all sales of properties were voluntary. Specific demographics of property owners accepting the offers were not collected.

**Question 32:** How do the impacts of an accident with a radionuclide release during transportation compare to the impacts of a severe accident for the facility (FEIS at 6-36)?

**Response:** The impacts of accidental releases are best compared on a risk basis. The estimated public radiological risk associated with a transportation accident from the Lee site is  $7.1\text{E-}05$  person-rem/yr ( $7.1\text{E-}07$  person-sv/year) and the estimated public radiological risk due to a severe accident is  $5.3\text{E-}02$  person rem/yr ( $5.3\text{E-}04$  person-sv/year). Based on these estimates, the impact of an accident with a radionuclide release, in terms of risk, is approximately 750 times greater for a severe accident compared to a transportation accident.

**Question 33:** North Carolina requires an Integrated Resource Plan that will yield a “least cost mix of generation and demand reduction activities,” while South Carolina requires a program that is “economic and reliable” (FEIS at 8-7). Are the North Carolina and South Carolina regulations governing the development of an Integrated Resource Plan consistent with each other? If there are tensions between the two sets of requirements, how did DEC and the Staff address them for a project like Lee that services both states? Does Table 8-1 reflect the North Carolina process, the South Carolina process, or both processes?

**Response:** The Integrated Resource Plans filed in North Carolina and South Carolina are nearly identical with limited differences being administrative and not substantive in nature. While there are slight differences in the regulatory language governing the development of an Integrated Resource Plan in North Carolina and South Carolina, the substantive requirements are generally consistent. Both address the same primary tenets of reliability and economics. As a result, the analysis and discussion of the Lee Nuclear Project is the same in both the North Carolina and South Carolina Integrated Resource Plans with no tensions between the two.

FEIS Table 8-1 reflects the process in both states. All of the elements listed in Table 8-1 are included in DEC’s planning process in both North Carolina and South Carolina as the Integrated Resource Plans developed and filed in both States are substantially the same.

**Question 34:** For the Combination Alternative, the text suggests that “Make-Up Pond C may not be required” but Table 9-3 indicates, “Land would be required for even a smaller version of Make-Up Pond C” (FEIS at 9-35). Would this alternative require Make-Up Pond C? If not, would the impacts on historic and archeological resources still be SMALL?

**Response:** The NRC review team evaluated the Combination of Alternatives scenario assuming natural gas combined cycle generation, renewables and energy efficiency programs. Whether this alternative would require a smaller version of Make-Up Pond C or not would depend on final cooling design for the gas generation plant (three 510 MW(e) combined cycle units assumed in the Staff’s analysis). Regardless, the impacts to historic and cultural resources would remain MODERATE (not SMALL) as noted in FEIS Table 9-3 since siting, construction, and operation of the assumed renewable generation (453 MW(e) of wind, solar and biomass generation) and associated transmission would likely not be co-located on the same site and would likely increase ground-disturbance effects

**Question 35:** The Environmental Justice analysis for each alternate site notes, “The review team did not identify any Native American communities or other minority communities with the potential for a disproportionately high and adverse impact due to their unique characteristics or practices” (FEIS at 9-84; see also FEIS at 9-140, and 9-191). Does this determination include a consideration of subsistence hunting, fishing, or gathering?

**Response:** DEC’s Environmental Justice analysis for the Lee site did include consideration of subsistence activities. However, the DEC analysis of each alternative site was limited to identifying the presence of low income and minority populations in the vicinity of each site and did not specifically include identification of subsistence activities.

Since none of these alternative sites were carried forward as the preferred site and the preferred Lee site involved no identified impact on subsistence activities, consideration of subsistence activities at those alternative sites was not considered necessary to determine whether any of the alternatives were environmentally preferable.

**Question 36:** Please explain why the “[i]mpacts on aquatic resources from the transmission lines and rail-road spur installation [for the Keowee site] would be similar to those described for the proposed Lee Nuclear Station site in Section 4.3.2” (FEIS at 9-130) when the WLS site would require 31 miles of additional transmission lines (FEIS at 4-73) while the Keowee site would require just 1.3 miles of transmission lines (FEIS at 9-106).

**Response:** The 31 miles of transmission lines for the WLS site would include line structures that are located within upland areas. Streams and open waters would be spanned by the transmission lines so that no direct impacts to streams or open waters would occur and impacts to aquatic resources from the transmission lines would be negligible. Similarly, impacts to aquatic resources for the 1.3 miles of transmission lines for the Keowee site would also be negligible.

**Question 37:** Please account for the variation in size of the proposed cooling reservoirs for the WLS site (1100 acres (FEIS at 7-12)) and the alternative sites at Middleton Shoals (3700 acres (FEIS at 9-162)), Keowee (1300 acres (FEIS at 9-106)), and Perkins (1500 acres (FEIS at 9-54)).

**Response:** The size of the supplemental make-up water reservoirs at each of the sites varies because site specific data and topography were used in determining the reservoir sizes. The methodology for calculating the needed volume for all sites included 1) determining the historical worst case droughts; 2) calculating the volume of make-up water needed to support the station operations during extended drought conditions; 3) determining the volume of water associated with maintaining the top 20 feet of water to comply with CWA § 316(b) regulations regarding cooling water intake structures located on reservoirs; 4) determining the volume of water associated with the bottom 10 feet of each reservoir to keep the elevation of the intake structure floor off the bottom. The topography in the vicinity of each site was used to identify the likely location for supplemental make-up reservoirs. That topography coupled with the required volume of water was used to calculate the estimated acreage of the area needed at each site and is why each site varies in size.

**Question 38:** For water supply alternatives, was an expansion of Make-Up Pond A considered (in addition to the discussed expansion of Make-Up Pond B (FEIS at 9-215))? If so, what were the results of that consideration; if not, why was that alternative not explored further?

**Response:** Expansion of Make-Up Pond A was informally evaluated but the expansion was not considered a feasible alternative due to Pond A's small size and proximity to interferences, and therefore was not explored further as an option.

Expansion of the larger Make-Up Pond B was formally evaluated as an option, but was determined to be infeasible and was eliminated from detailed analysis, as it would not provide sufficient make-up water during extended drought conditions. The usable storage volume of Make-Up Pond A is approximately 60% less than the usable storage volume of Make-Up Pond B. Since Make-Up Pond B expansion was not feasible, Make-Up Pond A would also not be feasible for expansion.

In addition, expansion of Make-Up Pond A is limited due to its proximity to planned plant structures, McKowns Mountain Road and Ninety-Nine Islands Reservoir.

Respectfully submitted,

/Signed electronically by David R. Lewis/

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Counsel for Duke Energy Carolinas, LLC

Dated: September 14, 2016

CERTIFICATION

I, Robert H. Kitchen, am responsible for the responses to the above questions. I certify that these answers were prepared by me or under my direction, and I adopt the answers as part of my sworn testimony in this proceeding. I hereby certify under penalty of perjury that the forgoing is true and complete to the best of my knowledge, information, and belief.

/Executed in Accord with 10 C.F.R. § 2.304(d)/

Robert H. Kitchen  
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Dated at Charlotte, NC,  
this 14th day of September, 2016

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

Before the Commission

In the Matter of	)	
	)	
DUKE ENERGY CAROLINAS, LLC	)	Docket Nos. 52-018 and 52-019
	)	
(William States Lee III Nuclear Station,	)	
Units 1 and 2)	)	

**CERTIFICATE OF SERVICE**

I hereby certify that the foregoing Duke Energy Carolinas' Responses to Pre-Hearing Questions, and accompanying Certification, have served through the E-Filing system on the participants in the above-captioned proceeding, this 14<sup>th</sup> day of September, 2016.

/Signed electronically by David R. Lewis/

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David R. Lewis