Bryan J. Dolan
VP, Nuclear Plant Development

Duke Energy
EC09D/ 526 South Church Street
Charlotte, NC 28201-1006

Mailing Address:
P.O. Box 1006 – EC09D
Charlotte, NC 28201-1006

704-382-0605

bjdolan@duke-energy.com

September 26, 2008

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 # WLG2008.09-10

Reference: Letter from Tanya Simms (NRC) to Peter Hastings (Duke Energy), *Request for Additional Information Letter No. 005 Related to SRP Section 08.02 for the William States Lee III Units 1 and 2 Combined License Application*, dated August 27, 2008

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

Responses to the NRC information requests described in the reference letter are addressed in separate enclosures, which also identifies associated changes, when appropriate, that will be made in a future revision of the Final Safety Analysis Report for the Lee Nuclear Station.

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) Duke Energy Response to Request for Additional Information Letter 005, RAI 08.02-3
2) Duke Energy Response to Request for Additional Information Letter 005, RAI 08.02-4
3) Duke Energy Response to Request for Additional Information Letter 005, RAI 08.02-5
4) Duke Energy Response to Request for Additional Information Letter 005, RAI 08.02-6
5) Duke Energy Response to Request for Additional Information Letter 005, RAI 08.02-7

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 26, 2008

Phoebe P. Escott

Notary Public

My commission expires: June 26, 2011

SEAL

xc (w/o enclosures):

Michael Johnson, Director, Office of New Reactors
Gary Holahan, Deputy Director, Office of New Reactors
David Matthews, Director, Division of New Reactor Licensing
Scott Flanders, Director, Site and Environmental Reviews
Glenn Tracy, Director, Division of Construction Inspection and Operational Programs
Charles Ader, Director, Division of Safety Systems and Risk Assessment
Michael Mayfield, Director, Division of Engineering
Luis Reyes, Regional Administrator, Region II
Loren Plisco, Deputy Regional Administrator, Region II
Thomas Bergman, Deputy Division Director, DNRL
Stephanie Coffin, Branch Chief, DNRL

xc (w/enclosures):

Brian Hughes, Senior Project Manager, DNRL
Tanya Simms, Project Manager, DNRL

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

RAI Letter No. 005

NRC Technical Review Branch: Electrical Engineering Branch (EEB)

Reference NRC RAI Number(s): 08.02-003

NRC RAI:

RG 1.206, C.III.1, Position C.I.8.2.1 states that a COL applicant for passive design should provide a discussion in the FSAR of how the single designated offsite power circuit from the transmission network conforms with the requirements of GDCs 2, 4, 5, 17 and 18 (also see guidance in Standard Review Plan Section 8.2.II). Discuss how the FSAR addresses this consideration or justifies an alternative, as well as how Duke Energy intends to meet the requirements of 10 CFR 50.65 with respect to maintenance of onsite and offsite power system components.

Duke Energy Response:

There is no portion of the single required offsite circuit required to conform with GDCs 2, 4, 5, and 18. These GDCs are for structures, systems and components important to safety. For the AP1000, the single offsite circuit does not perform a safety-related function as stated in DCD Section 8.1.4. The required offsite circuit interface with the safety related batteries is through the Class 1E battery chargers (whose safety function is isolation.) These battery chargers are located within the Nuclear Island which is designed in accordance with GDCs 2 and 4.

Environmental effects are considered in the design of the offsite power circuit. For example, conductors are designed to withstand high temperatures (up to 120 degrees C, based on NERC guidance) before violating sag clearances, and transmission lines are designed for high winds, typically 90 mph, and for appropriate levels of snow and ice. Additionally, for lightning protection, transmission lines include overhead ground wires and, in area of high ground resistivity, additional grounding is installed.

The transmission lines and switchyards are designed so the full output of the plants can be carried out to the network, and the capacity is more than sufficient for any incoming power requirements.

Maintenance and testing of the offsite power circuits is discussed in the response to NRC RAI No. 08.02-007.

With regard to GDC 17, Regulatory Guide 1.206, Section C.III.1, Position C.I.8.2.1 states that for passive designs "the applicant should provide information on the single designated offsite power circuit provided from the transmission network with sufficient capacity and capability to power safety systems under normal, abnormal, and accident conditions. This power source should be the preferred source of power for passive plants."

The results of the grid stability analysis demonstrate the offsite source capacity and capability to power plant components during normal, shutdown, startup, and turbine trip conditions.

The results of the failure modes and effects analysis demonstrate the reliability of the offsite source which minimizes the likelihood of its failure under normal, abnormal and accident conditions.

FSAR Section 17.6 describes implementation of the requirements of 10 CFR 50.65. As indicated therein, implementation of the NEI 07-02 program description will determine the applicability of the maintenance requirements for the offsite power circuit.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

None

Attachments:

None

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

RAI Letter No. 005

NRC Technical Review Branch: Electrical Engineering Branch (EEB)

Reference NRC RAI Number(s): 08.02-004

NRC RAI:

In order for the staff to confirm that the single offsite power circuit provided from the transmission network satisfies the requirements of GDC 17, provide the voltage and frequency variations expected at the 525 kV and 230 kV switchyards. Confirm that these voltage and frequency limits are acceptable for auxiliary power system equipment operation during different operating conditions. The confirmation should include the following calculations: load flow analysis (bus and load terminal voltages of the station auxiliary system); short circuit analysis; equipment sizing studies; protective relay setting and coordination; motor starting with minimum and maximum grid voltage conditions. A separate set of calculations should be performed for each available connection to offsite power supply. In addition, discuss how the results of the calculations will be verified before fuel load.

Duke Energy Response to RAI:

It is recognized extensively throughout the FSER (NUREG-1793) that there is no requirement for functionality of offsite power to accomplish safe shutdown of the AP1000. Section 8.2.3.2 of the NRC FSER for the AP1000 addresses the AP1000 partial exemption from GDC 17 and states "The AP1000 design does not rely on power from the offsite system to accomplish safety functions, and therefore, the underlying purpose of the rule is met without the need for two independent offsite circuits." Additionally the Regulatory Guide 1.206 position describes the requested information for a single offsite source for passive plants and that information was addressed in the response to question 08.02-003.

For the Lee Nuclear Station grid voltage evaluation, the respective switchyard voltages were 523 kV (525 kV nominal) and 233 kV (230kV nominal). This is the anticipated voltage and is consistent with standard practice for grid studies at Duke Energy. As described in the DCD, for an AP1000 turbine trip event, adequate grid voltage is required for 3 seconds. The unit's electric generator will motor immediately following a turbine trip, providing MVARs to support this voltage, and therefore, the generator bus voltage remains relatively stable. The grid stability analyses are not particularly sensitive to the starting voltage; thus, if the voltage change is minimal at 523 kV and 233 kV it would also be minimal at a lower or higher voltage. When Duke Energy performs grid studies, if the voltage is close to violating a limit, then the grid would be stressed abnormally to see if there was a minimum or maximum voltage limit or a MVAR limit. Because the resulting voltage was not close to its limit, the study did not include these additional variations.

Confirmation that the switchyard voltage and frequency variations are acceptable for auxiliary power system equipment operation during different operating conditions is also addressed by the response to NRC RAI No. 08.02-006.

The above grid voltage evaluation results are verified during the preoperational testing identified in DCD Subsection 14.2.10 which includes the following tests:

- 100 Percent Load Rejection (DCD Subsection 14.2.10.4.21),
- Plant Trip from 100% Power (DCD Subsection 14.2.10.4.24), and
- Loss of Offsite Power (DCD Subsection 14.2.10.4.26).

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

None

Attachments:

None

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

RAI Letter No. 005

NRC Technical Review Branch: Electrical Engineering Branch (EEB)

Reference NRC RAI Number(s): 08.02-005

NRC RAI:

The final paragraph of GDC 17 requires, in part, provisions to minimize the probability of the loss of power from the transmission network given a loss of the power generated by the nuclear power unit(s). Describe any limits on the main generator MVAR output such that loss of the main generator will not result in an unacceptable voltage in the switchyards. Describe any auxiliary transmission system equipment, such as capacitor banks, static VAR compensators that may be necessary to offset loss of MVAR support on loss of the main generator.

Duke Energy Response:

The grid stability analysis did not identify a need to limit the generator MVAR output due to impacts on the switchyard voltage. A range of unit/plant MVAR output levels (within the vendor supplied capabilities) resulted from the various grid configurations. In each instance, the switchyard voltage remained acceptable for the simulated loss of a unit. The Lee Nuclear Station switchyard model simulation considered a transmission network with 2 generation resources (dynamic VAR sources) interconnected within 1-2 buses of the Lee 525 kV switchyard, and 4 generation resources interconnected within 1-2 buses of the Lee 230 kV switchyard. No capacitor banks or static VAR compensators are currently planned for the 525 kV or the 230 kV switchyard.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

None

Attachments:

None

Lee Nuclear Station Response to Request for Additional Information (RAI)
RAI Letter No. 005
NRC Technical Review Branch: Electrical Engineering Branch (EEB)
Reference NRC RAI Number(s): 08.02-006

NRC RAI:

Section 8.2.2 of the FSAR states that "the grid stability analysis has confirmed that the interface requirements for steady state load, nominal voltage, allowable voltage regulation, nominal frequency, allowable frequency fluctuation, and maximum frequency decay rate have been met." Provide the summary of the grid stability analysis results, the assumptions made, and the acceptance criteria used for the each case analyzed. In addition, provide the nominal frequency, allowable frequency fluctuation, maximum frequency decay rate and limiting under frequency values used for the RCPs in the analysis, or justify an alternative approach.

Duke Energy Response:

The Lee Nuclear Station grid stability analysis and criteria are summarized below:

- The steady-state load is 78.2 kW;
- The nominal voltage is 1.00 pu for both the 525 kV and 230 kV switchyards;
- The allowable voltage regulation is 0.95 – 1.05 pu (steady state);
- The nominal frequency is 60 Hz;
- The allowable frequency fluctuation is ± ½ Hz (steady state);
- The maximum frequency decay rate is 5 Hz/sec; and,
- The limiting under frequency value is greater than 57.7 Hz.

The grid study analysis confirms that the frequency oscillations were very small (<1%) and quickly stabilized within an acceptable range for Duke Energy Carolinas system. A past Southeastern Electric Reliability Council (SERC) regional study and the Duke Energy study both indicate that the frequency decay rate is significantly smaller than the stated 5 Hz/sec criteria. The Eastern Interconnection and the Duke Energy Carolinas systems are highly interconnected, and no frequency concerns are expected.

For the Turbine Trip Event simulation, the voltages remained within the allowable range of 0.95 – 1.05 pu.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

None

Attachments:

None

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

RAI Letter No. 005

NRC Technical Review Branch: Electrical Engineering Branch (EEB)

Reference NRC RAI Number(s): 08.02-007

NRC RAI:

Section 8.2.1.4 of the FSAR discusses maintenance, testing, and calibration practices that Duke Energy's Power Delivery (PD) department follows. It states that PD follows its own field test manuals, vendor manuals, industry's maintenance practices, and observes Federal Energy Regulatory Commission requirements (FERC) and NERC reliability standards. Explain what is meant by 'observes'? Explain whether this statement is intended to indicate that Duke will follow the FERC and NERC standards for switchyard maintenance and testing.

Duke Energy Response:

The statement was intended to indicate that Duke Energy follows the applicable NERC Reliability Standards associated with switchyard maintenance and testing. The paragraph will be revised for clarity as identified in the Attachment.

Associated Revision to the Lee Nuclear Station Final Safety Analysis Report:

FSAR Subsection 8.2.1.4

Attachment:

Revised Subsection 8.2.1.4

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

Attachment 1 to RAI 08.02-007

Mark-up of FSAR Section 8.2.1.4

COLA Part 2, FSAR, Chapter 8, Subsection 8.2.1.4:

Revise COLA Part 2, FSAR Chapter 8, Section 8.2.1.4, by modifying the 2nd paragraph to read as follows:

For performance of maintenance, testing, calibration and inspection, PD follows its own field test manuals, vendor manuals and drawings, industry's maintenance practices ~~and observes Federal Energy Regulatory Commission (FERC) requirements and the following~~ to comply with applicable NERC Reliability Standards.~~:~~

- ~~PRC-005-1 Transmission and Generation Protection System Maintenance and Testing.~~
- ~~PRC-008-0 Under Frequency Load Shedding Equipment Maintenance Program.~~
- ~~PRC-011-0 Under Voltage Load Shedding System Maintenance and Testing, and Field Test Procedure.~~