



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 16, 2015

Mr. Preston Gillespie
Site Vice President
Oconee Nuclear Station
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672-0752

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3, REQUEST FOR
ADDITIONAL INFORMATION RELATED TO LICENSE AMENDMENT REQUEST
TO ADD KHU STEADY STATE FREQUENCY REQUIREMENTS
(TAC NOS. MF1741, MF1742, AND MF1743)

Dear Mr. Gillespie:

By letter dated April 26, 2013, Duke Energy Carolinas, LLC submitted a license amendment request proposing to incorporate steady state operating limits for the onsite emergency power sources, the Keowee Hydro Units (KHU), into the Technical Specification Surveillance Requirements for Oconee Nuclear Station, Units 1, 2, and 3 to the U.S. Nuclear Regulatory Commission (NRC) staff for review.

The NRC staff is reviewing the submittal and has determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). Please provide a response to these RAIs within 30 days of the date of this letter.

If you have any questions, please call me at 301-415-4032.

Sincerely,

A handwritten signature in cursive script that reads "James R. Hall".

James R. Hall, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosure:
Request for Additional Information

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST TO AUGMENT ONSITE POWER
SYSTEM SURVEILLANCE REQUIREMENTS
DUKE ENERGY CAROLINAS, LLC
OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3
DOCKET NOS. 50-269, 50-270 AND 50-287

By letter dated April 26, 2013,¹ Duke Energy Carolinas, LLC, doing business as Duke Energy requested amendments to the Oconee Nuclear Station (ONS) Units 1, 2, & 3 Operating Licenses DPR-38, DPR-47 and DPR-55. The license amendment request (LAR) proposes to incorporate steady state operating limits for the onsite power sources, Keowee Hydro Units (KHU) at ONS into the Technical Specification (TS) Surveillance Requirements (SR). The changes would amend the SR to improve operation and testing of the KHU units by maintaining a more restrictive frequency band for operation when not connected in parallel with the offsite sources.

The Electrical Engineering Branch has reviewed the LAR and developed the following questions regarding the proposed changes to TS 3.8.1.9, "AC Sources – Operating," SR related to KHU steady state frequency testing.

The LAR states, in part, that the KHU frequency is allowed to vary as follows:

On an actual or simulated emergency actuation signal, each KHU auto starts and:

- a) Achieves frequency ≥ 57 Hz and ≤ 63 Hz and voltage ≥ 13.5 kV and ≤ 14.49 kV in ≤ 23 seconds;
- b) Achieves steady state frequency ≥ 59.4 Hz and ≤ 61.8 Hz; and
- c) Supplies the equivalent of one Unit's Loss of Coolant Accident (LOCA) loads plus two Unit's Loss of Offsite Power (LOOP) loads when synchronized to system grid and loaded at maximum practical rate.

The LAR also states that small perturbations outside of the steady state criteria due to expected load additions or removals are permitted. However, the transient peak values shall be within $\pm 5\%$ frequency limits and of short time duration being no more than 10 seconds.

The NRC staff notes that changes in KHU frequency will affect the performance of the components, pumps and motor operated valves (MOV). For induction motors, motor speed is directly proportional to power supply frequency. As power supply frequency varies pump speed varies causing variations in pump flow and discharge pressure. MOV stroke time may be negatively affected by lower emergency diesel generator frequency, causing the MOV to operate more slowly. The NRC staff also notes that the frequency and voltage recovery time for most onsite power systems is less than 5 seconds during load sequencing in accordance with guidance

¹ Agencywide Documents Access and Management System Accession No. ML13121A460.

provided in Regulatory Guide 1.9 (Revisions 1-4). The KHU frequency is expected to recover within 10 seconds.

Based on the above observations please provide the following information:

- a. Emergency Safety Features (ESF) Pump Performance: For induction motors, motor speed is directly proportional to power supply frequency. Please provide a summary of the evaluations or analyses performed to validate that flow rates and systems pressures for ESF pumps are within the parameters assumed in accident analyses and plant design. Please provide a summary of the minimum margin of motor torque allowed over the pump load torque during the motor accelerating period.
- b. MOV Performance: Operation of the KHU at the high end of the frequency range may cause a higher differential pressure across MOVs as compared to nominal conditions. Operation of MOVs at lower end of the allowable frequency may negatively affect the MOV stroke time.
 - i. Please provide a listing of critical valves, the required stroke time as considered in accident analyses and the measured stroke time during the last surveillance.
 - ii. Please provide a summary of the analyses performed to demonstrate that sufficient margin exists between actual stroke times and maximum allowed stroke times to account for the minimum expected KHU frequency.
 - iii. Please provide a summary of the analyses performed to demonstrate that MOVs will operate satisfactorily with maximum differential pressures.
 - iv. Please explain if the frequency recovery time of 10 seconds was factored into the above evaluations and impact of voltage variations in available torque was considered.
- c. The KHU frequency and voltage, immediately after connecting to the plant safety busses, can be ≥ 57 Hz and ≤ 63 Hz and voltage ≥ 13.5 kV and ≤ 14.49 kV. The accident signal is actuated at time zero and typically present in the control logic of ESF pumps and MOVs when the onsite power systems is connected to the safety busses. Please confirm if the wider range of allowable frequency and voltage coupled with a 10 second delay in voltage and frequency was considered in the performance capabilities of pumps and MOVs.
- d. Please provide a summary of the changes in KHU loading as a consequence of operation at the extremes of the proposed frequency and voltage range.

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/RA/

James R. Hall, Senior Project Manager
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