

April 30, 2009

Mr. Dave Baxter
Vice President, Oconee Site
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: EVALUATION OF DUKE ENERGY CAROLINAS, LLC (DUKE),
SEPTEMBER 26, 2008, RESPONSE TO NUCLEAR REGULATORY
COMMISSION (NRC) LETTER DATED AUGUST 15, 2008, RELATED TO
EXTERNAL FLOODING AT OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3
(OCONEE) (TAC NOS. MD8224, MD8225, AND MD8226)

Dear Mr. Baxter:

On August 15, 2008, the NRC issued a request for information pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.54(f) regarding the protection against external flooding at Oconee including a postulated failure of the Jocassee Dam. Duke responded to the NRC letter on September 26, 2008. Based on the NRC staff's review of the information provided by Duke to date, the NRC staff remains concerned that Duke has not demonstrated that Oconee will be adequately protected in the long term from external flooding events. Specifically, Duke did not (1) provide an adequate inundation study, (2) provide a deterministic resolution of this matter, and (3) provide a schedule to resolve the external flooding issue in a timely manner. To resolve the issues identified in the August letter, Duke must provide appropriate technically-supported inundation studies with a sensitivity analysis. We have clarified these issues below.

At the time that the NRC issued the 50.54(f) letter, there were several factors that generated the NRC staff's concern regarding external flooding protection at Oconee:

- The plant equipment designed to provide the primary means to achieve and maintain a hot shutdown condition is not demonstrated to be protected from external flooding. Thus, the standby shutdown facility (SSF) was designed as the alternate means to provide safe shutdown during flooding scenarios. Should the SSF also become unavailable in a significant external flood, the ability to achieve and maintain safe shutdown would be compromised for all three units.
- The SSF was protected against external flooding to a height of approximately 5 feet. Duke has been unable to retrieve the calculations performed in the early 1980's supporting the adequacy of that flood height protection.
- In 1992, Duke conducted a flood inundation study that predicted onsite flood heights ranging from approximately 12 to 17 feet.

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- Duke did not perform further studies to rectify the disparity between the 1992 and early 1980's inundation studies.
- In late 2007, the NRC staff identified that the dam failure frequency utilized by Duke in the individual plant examination of external events was approximately an order of magnitude non-conservative.

Because of the potential significance of this issue, the concern that resolution is needed in a timely manner, and the need to ensure that Oconee was adequately protected from external flooding, the NRC issued a request for information pursuant to 10 CFR 50.54(f) to formally resolve this issue.

The NRC staff and Duke met on August 28, 2008, to discuss the basis for the letter and scope of the requested information. Duke responded to the request on September 26, 2008. The NRC staff and Duke met again on November 5, 2008, to discuss the response. Further technical interactions were conducted over the following several months, including teleconferences and a meeting on December 4, 2008, to understand the details of Duke's response.

The NRC staff has concluded that at this time there is not a need to modify, suspend or revoke the Oconee licenses as stated by the NRC staff in the November 5, 2008, management meeting. Nonetheless, the NRC staff remains concerned that Duke has not demonstrated that the Oconee units will be adequately protected. Duke has not provided a technically defensible inundation study supporting the protection of Oconee from offsite flooding. Duke's response indicates that the 1992 inundation study performed for the Federal Energy Regulatory Commission (FERC) predicts a bounding onsite flood height of 12 to 17 feet due to a rapid failure of the Jocassee Dam, and Duke states that the study results are not applicable to Oconee since the purpose of the study was to determine the scope of evacuation plans and not for determining credible flood heights at Oconee. However, the 1992 study is the only available external flooding analysis for the Oconee site.

The NRC staff's position is that a Jocassee Dam failure is a credible event and needs to be addressed deterministically. The NRC staff has assessed the potential failure likelihood of dams of similar construction and concluded that the failure probability is significantly greater than the present screening criteria for concluding that an event is not credible. While the NRC staff recognizes that risk insights gained from probabilistic approaches could be of value to Duke in focusing and prioritizing modifications and testing and maintenance activities regarding the dam, the NRC staff believes that this approach will not demonstrate that the probability of a failure of the Jocassee Dam is so low that it does not need to be considered in Oconee's external flooding analyses.

In its response to the 50.54(f) letter, Duke stated that it would perform inundation studies and sensitivity analyses using the HEC-RAS model. The NRC staff agrees that a study with the more advanced model and sensitivity analyses would be beneficial because of the uncertainty involved in predicting dam failure and resultant flood levels at Oconee. Dam design operating

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parameters, including reservoir level, should be used as input to the inundation study to support the safety of the Oconee facility. The sensitivity analyses should include varying key parameters that can affect the on-site flood height (e.g., breach size, reservoir levels, and time to dam failure) individually and in combination over a sufficient range to provide an understanding of how changes impact the flood height estimates. As appropriate, the sensitivity analyses should also consider FERC guidelines or other applicable industry standards as potential methods for representing appropriate ranges for the sensitivity analyses. Regarding the inundation study, Duke must provide adequate technical justification for the various input parameters used in the study. Regarding the sensitivity analyses, Duke must provide adequate technical justification for the selection of parameters to be varied and the range of variability for those parameters.

The NRC staff understands that Duke has now completed benchmarking the HEC-RAS model for the Oconee site and has performed preliminary inundation and sensitivity studies. The NRC plans to meet with Duke in May 2009 to discuss how the inundation study models were developed and the basis for parameters chosen for the study and sensitivity analyses. When the inundation study and sensitivity analyses are completed, the NRC staff will evaluate the results to determine whether further regulatory actions are necessary to ensure there is adequate protection against external flooding at Oconee.

Should the results of the HEC-RAS flooding studies indicate that the flood height is greater than current flood protection levels provided at Oconee, Duke is required, pursuant to 10 CFR Part 50, Appendix B, Criterion XVI, to take corrective actions for this significant condition adverse to quality. As discussed in the NRC's August 15, 2008, letter, the NRC staff reviewed the Oconee Updated Final Safety Analysis Report (UFSAR) and noted that it does not include the effects of a Jocassee Dam failure, nor does it include the flood protection features to mitigate the consequences of such an event. Once the NRC staff has accepted the adequacy of additional information in response to the August 15, 2008, 10 CFR 50.54(f) letter, the UFSAR is required to be updated to reflect that information in accordance with 10 CFR 50.71(e)(2)(i).

Recently, Duke has informed the NRC staff that it has completed the short-term actions to create interim guidance to address mitigation of postulated flood events that render the SSF inoperable and has extended the height of the existing SSF flood walls by 2.5 feet to enhance flood protection at the SSF. The NRC staff will evaluate these actions in future inspections and reviews.

We request that Duke provide its plans and schedules for completing the final inundation study and sensitivity analyses within 30 days following the May 11, 2009, meeting regarding your preliminary inundation study and sensitivity analyses.

The NRC staff and Duke will begin holding monthly meetings in June 2009 to discuss the technical basis for the proposed closure. As discussed in our November 5, 2008, meeting, the NRC staff expects that the analyses discussed above which would establish an adequate licensing basis for external flooding and the technical basis for proposed closure, to be

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completed by November 2009. Should Duke find that additional modifications are necessary, that schedule should also be provided by November 2009.

In responding to the above-mentioned requests, please take appropriate measures in the development and handling of information regarding this issue, including consideration of the provisions of 10 CFR 2.390(d)(1). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

If you have any questions on this matter, please contact Senior Project Manager, John F. Stang, of my staff at 301-415-1345.

Sincerely,

/RA/

Joseph G. Giitter, Director
Division of Operating Reactor Licensing

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