

Table 1 – Oconee Nuclear Station Flooding Issue

Date LIC-504 Initiated: 11/03/14 Date of Report: 12/02/14

☐ draft ☒ final

Summary Description of Issue:

The issues to be resolved by the LIC-504 process regarding flood protection are: 1) Should Interim Actions be provided by the Licensee? 2) Do the licensee's interim actions provide an appropriate short-term response to address the reevaluated hazard while the longer term integrated assessment is performed? 3) Is a Commitment to implement the interim actions the appropriate regulatory tool?

The issues will be resolved consistent with the ongoing regulatory processes associated with Near-Term Task Force Recommendation 2.1.

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ADAMS Accession No. ML14322A748

SUBJECT: STAFF DOCUMENTATION OF THE INTERIM ACTIONS REVIEW PROCESS (LIC-504) ASSOCIATED WITH THE FLOODING HAZARD REEVALUATIONS FOR RECOMMENDATION 2.1 OF THE NEAR-TERM TASK FORCE FOR OCONEE NUCLEAR STATION, UNITS 1, 2 AND 3.

EXECUTIVE SUMMARY

By letter dated March 12, 2012¹, the U.S. Nuclear Regulatory Commission (NRC) issued a request for information pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.54(f) (hereafter referred to as the 50.54(f) letter). The purpose of that request was to gather information concerning, in part, the external flooding hazards at operating reactor sites to enable the NRC staff to determine whether a license should be modified, suspended, or revoked.

By letter dated March 12, 2013,² Duke Energy Carolinas, LLC (Duke Energy) provided their Flood Hazard Reevaluation Report (FHRR) for the Oconee Nuclear Station (ONS), Units 1, 2 and 3, in response to Enclosure 2 of the 50.54(f) letter. By letter dated September 3, 2013³, Duke Energy provided a supplement to the FHRR, which provided updated information on the interim actions plans for ONS Units 1, 2 and 3 considered as part of the March 12, 2013 submittal. The licensee stated that no interim actions were necessary to be taken or planned beyond the pre-existing flood commitments (referred to compensatory measures in the FHRR) that are in place and are described in Confirmatory Action Letter⁴ (CAL) dated June 3, 2010. The NRC staff has reviewed the information provided by the licensee, previous NRC staff assessments of the compensatory measures and staff evaluations⁵, as well as information and insights provided by ONS NRC resident inspectors related to the interim actions.

The NRC staff has independently verified that the licensee's proposed interim actions (e.g existing interim compensatory measures) will perform their intended function of mitigating and/or protecting the plant from flood levels that are higher than the current licensing basis of the plant. This is based on the staff's previous review of compensatory measures described in the June 2010 CAL. As such, the staff concludes that the interim actions (compensatory measures) for ONS, Units 1, 2 and 3 provide an appropriate short-term response to address the reevaluated flood hazard defined in the licensee's FHRR until the licensee submits revisions to the Jocassee Dam failure analysis and performs and submits the longer term integrated assessment. No further information regarding the interim actions is needed at this time.

¹ The March 12, 2012, 50.54(f) letter can be found at Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340.

² The Flood Hazard Reevaluation Report is available under ADAMS Accession No. ML13079A227.

³ The supplemental letter is available under ADAMS Accession No. ML13254A149.

⁴ The ONS Confirmatory Action Letter is available under ADAMS Accession No. ML101610083.

⁵ NRC staff affirmed the licensee's compensatory measures as part of the CAL dated June 3, 2010. The staff accepted an inundation study in a safety evaluation issued in January 2011, available under ADAMS ML110280153. Documentation of staff decisions regarding implementation of permanent modifications for protection from external flooding is available under ADAMS ML13063A110.

REVIEW PROCESS

As identified in Table 1 above, the issues being resolved and documented regarding the ONS flooding hazard reevaluation are:

1. Should interim actions be provided by the licensee?
2. Do the licensee's interim actions provide an appropriate short-term response to address the reevaluated hazard while the longer term integrated assessment is performed?
3. Is a commitment to implement the interim actions the appropriate regulatory tool?

Office Instruction LIC-504 "Integrated Risk-Informed Decision Making Process for Emergent Issues", Revision 4, is being used to systematically document the NRC staff's review and decision making process in a uniform and consistent manner. The staff evaluated the appropriateness of the proposed interim action(s) (credited commitments from the flood confirmatory letter referenced above) in the context of whether the actions provide a reasonable, short-term means to address the reevaluated flooding hazard(s). The review considered the licensee's ability and capability to respond to the reevaluated flooding hazard(s) to ensure that these actions would maintain the plant in a safe condition. The review did not verify or evaluate the flood causing mechanisms described in the FHRR or evaluate the appropriateness of the interim actions for purposes beyond the short-term application for which they are intended.

EVALUATION

Should Interim Actions be provided by the licensee?

Background

The threshold for submittal of interim actions by a licensee is specified in Enclosure 2 of the 50.54(f) letter. The 50.54(f) letter stated that "[f]or the sites where the reevaluated flood exceeds the design basis, addressees are requested to submit an interim action plan that documents actions planned or taken to address the reevaluated hazard with the hazard evaluation." The interim actions are intended to address the higher flooding hazards while the licensee performs and submits the longer-term integrated assessment review.

Results of Flood Hazard Reevaluated Report

In the March 12, 2013 FHRR and September 3, 2013 supplemental letter, the licensee stated that two of the re-evaluated flood hazard mechanisms, the local intense precipitation (LIP) and the upstream dam failure, exceeded the current design basis (CDB) flooding hazards. The licensee also stated that issues with LIP and upstream dam failure events associated with the CLB were previously identified and compensatory measures are currently in place for mitigation of these CLB events. These measures are:

- A total of 15 compensatory measures were identified to address the upstream dam failure and these were put into place in response to the CAL issued to the licensee in June 2010.
- Regarding the LIP current licensing basis event, compensatory measures were taken in the form of adding flood barrier sandbags and gryffolyn coverings. These actions were identified in 2012 as part of a corrective action program (CAP) entry.

The licensee analyzed the potential vulnerabilities associated with the LIP and upstream dam failure mechanisms defined in the FHRR, in accordance with the process laid out in the 50.54(f) letter. The September 2013 supplemental later stated that “ONS ultimately determined that no interim actions were necessary to be taken or planned to address the higher flood level derived from the Local Intense Precipitation event.” For LIP, the licensee credits existing site Abnormal Procedures and Emergency Operating Procedures to mitigate the effects of flooding (e.g., loss of power caused by the flood). The licensee further concluded that “with respect to flood levels from postulated dam failures, it was also determined that no new interim actions [beyond those defined in the CAL] were necessary.”

The licensee also stated that it has installed two other interim actions to help protect against the hypothetical fair-weather failure of the Jocassee dam. These two features are the temporary ONS Intake Canal Dike Flood Barrier and the permanent swale wall located above the chemical treatment pond. ONS does not take credit for these two features in the CLB or as interim actions in the FHRR; however, they are referenced as additional actions taken at the site to reduce the potential effects of a Jocassee Dam failure. The NRC staff has previously evaluated these actions in a January 28, 2011 staff evaluation. After the submittal of the FHRR, the NRC staff identified areas of concern related to the Jocassee Dam failure analysis as a result of the methodology selected by the licensee to perform the review. Subsequently, the licensee indicated that they will provide a revised dam failure-related analysis, including a seismic dam failure analysis, by February 15, 2015. Therefore, the review performed by the NRC staff that is documented in this LIC-504 corresponds to the information presented in the original March 12, 2013 FHRR and will be revised, as necessary, once the results of the updated flood hazard evaluations are submitted by the licensee.

Conclusion

The NRC staff confirmed that Duke Energy submitted interim actions for ONS, Units 1, 2 and 3 in accordance with the established processes. Specifically, the licensee credited the 15 interim compensatory measures detailed in the June 22, 2010, CAL for the dam failure event. The licensee concluded that no interim actions were needed for LIP.

Do the licensee’s interim actions provide an appropriate short-term response to address the reevaluated hazard while the longer term integrated assessment is performed?

Background

The following table is a summary of the interim actions that have been referenced by Duke Energy in the March 12, 2013, FHRR and supplemental letters. This list is derived from the 15 CAL compensatory measures, and the actions taken by ONS in order to satisfy the June 2010 CAL.

Interim Action/ Compensatory Measure	Description
1	Perform flooding studies using HEC-RAS for comparison with previous

	DAMBRK models to more accurately represent anticipated flood heights in the west yard following a postulated failure of the Jocassee Dam.
2	Maintain plans, procedures and guidance documents implemented to address mitigation of postulated flood events which could render the SSF inoperable.
3	Create a guidance document to consolidate river management and storm management processes.
4	Maintain a dam safety inspection program.
5	Maintain a monitoring program that includes observation wells, seepage monitoring points and surveys of displacement monuments, among others.
6	Assign an Oconee engineer as Jocassee Dam contact
7	Install ammeters and voltmeters on Keowee spillway gates for equipment condition monitoring.
8	Ensure forebay and tailrace level alarms are provided for Jocassee to support timely detection of a developing dam failure.
9	Add a storage building adjacent to the Jocassee spillway to house the backup spillway gate operating equipment.
10	Obtain and stage a portable generator and electric drive motor near the Jocassee spillway gates to serve as a second set of backup spillway gate operating equipment.
11	Conduct Jocassee Dam failure Table Top Exercise with Oconee participation to exercise and improve response procedures.
12	Instrumentation and alarm of selected seepage monitoring locations for timely detection of degrading conditions.
13	Provide additional video monitoring of Jocassee Dam for timely assessment of degrading conditions.
14	Obtain and stage a second set of equipment (including a B.5.b-type pump) for implementation of the external flood mitigation guidance.
15	Conduct Jocassee Dam/Oconee Emergency Response Organization Drill to exercise and improve response procedures.

NRC Review

The NRC staff performed a two part review as follows:

1. The NRC headquarters staff performed a technical review to determine whether the proposed interim actions provide reasonable, short-term means to address the reevaluated hazard and whether the proposed interim actions can be reasonably expected to be within the capability of plant personnel. In the cases where the HQ staff identified additional information needs, these were communicated to the plant resident inspectors. The issues were included, as appropriate, in the region's review activities.
2. The resident staff performed Temporary Instruction (TI) 2515/190, "Inspection of the Licensee's Proposed Interim Actions as a Result of the Near-Term Task Force Recommendation 2.1-Flooding Reevaluation." The objective of the inspection was to independently verify that the licensee's proposed interim actions will perform their intended function for flood protection and mitigation and that any deficiencies identified during the inspection were entered in the licensee's CAP.

Specifically, the NRC staff reviewed the limited-scope information provided in the FHRR and supplemental letters, such as the current flood design-basis at the site, the reevaluated flood levels based in the FHRR, and the interim actions or compensatory measures that have been performed in the past and have been credited in this reevaluation. Previous evaluations which led to the identification of compensatory measures have been reviewed by staff under different regulatory programs and were not re-evaluated as part of this review. In addition, a March 19, 2013⁶, letter documents the NRC's staff decision regarding the implementation of permanent modifications for protection from external flooding and provides additional background. The resident inspectors verified that the licensee's proposed interim actions were acceptable by inspecting that:

- The procedures or activities can be executed as specified/written, and within available time, if time-dependent
- The water levels and associated effects, and severe weather conditions would not impair support functions and would not impede performing necessary interim actions.
- Equipment availability and/or staffing issues would not prevent implementation of the interim actions.
- Proposed interim actions do not result in adverse consequences to other activities at the site.
- Verified that issues identified were entered into the licensee's CAP.

The inspectors verified that issues identified were entered into the licensee's CAP. The resident inspectors documented the results of the TI 2515/190 inspection in inspection report (05000269/2013004, 05000270/2013004, 05000287/2013004) (ADAMS Accession No. ML13318A936). The interim compensatory measures for external flooding due to the dam failure (identified above) were previously inspected and the results documented in NRC inspection report 05000269, 270, 287/2012005.

Conclusion:

The NRC staff concludes that the interim actions for Oconee Nuclear Station, Units 1, 2 and 3 appear reasonable and provide an appropriate short-term response to address the reevaluated flood hazard defined in the licensee's FHRR while the licensee resubmits the Jocassee Dam failure analysis and submits the longer-term integrated assessment for staff review. No further information regarding the interim actions is needed at this time.

Is a Commitment to implement the interim actions the appropriate regulatory tool?

Based on the evaluation performed by the NRC staff, a commitment to implement the interim actions for ONS, Units 1, 2 and 3 is acceptable because the interim actions proposed by the licensee appear reasonable and within plant capabilities until the licensee resubmits the Jocassee Dam failure analysis and the total plant response to the reevaluated hazard is determined by the integrated assessment.

⁶ The staff decision letter regarding implementation is available under ADAMS Accession No. ML13063A110.

CONCLUSION

The NRC staff concludes that the interim actions submitted by Duke Energy for the Oconee Nuclear Station, Units 1, 2 and 3 and previously identified as part of past evaluations, appear reasonable and provide an appropriate short-term response to address the reevaluated flood hazard defined in the licensee's FHRR until the licensee resubmits the Jocassee Dam failure breach analysis and performs and submits the longer-term integrated assessment for staff review. No further information or staff actions regarding the interim actions are needed at this time.

CONCLUSION

The NRC staff concludes that the interim actions submitted by Duke Energy for the Oconee Nuclear Station, Units 1, 2 and 3 and previously identified as part of past evaluations, appear reasonable and provide an appropriate short-term response to address the reevaluated flood hazard defined in the licensee's FHRR until the licensee resubmits the Jocassee Dam failure breach analysis and performs and submits the longer-term integrated assessment for staff review. No further information or staff actions regarding the interim actions are needed at this time.

ADAMS Accession No: ML14322A748

*via email

OFFICE	NRR/JLD/JHMB/PM	NRR/JLD/JHMB/PM	NRO/DSEA/RHMB1*	NRO/DSEA/RHMB2/BC*
NAME	JUribe	FVega	MBensi	ARivera-Varona
DATE	12/01/14	12/01/14	11/25/14	11/25/14
OFFICE	NRR/DORL/LPLII-1*	RII/DRP/RPB1/SRI*	RII/DRP/RPB1/BC*	NRR/JLD/JHMB/BC
NAME	RHall	ECrowe	FEhrhardt	SWhaley
DATE	11/20/14	11/26/14	11/26/14	12/02/14

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