

**COMMUNICATION PLAN FOR OCONEE NUCLEAR STATION (ONS)
REGARDING EXTERNAL FLOOD PROTECTION**

SEPTEMBER 2012

GOAL

The goal of this plan is to facilitate communication and coordination within the NRC, as well as facilitate consistency and quality of internal and external communications regarding interest in external flood protection at the Oconee Nuclear Station.

BACKGROUND

Due to its configuration on Lake Keowee, the Oconee three-unit site relies on accident mitigation from the Standby Shutdown Facility (SSF) to provide RCP seal cooling, inventory control, and secondary side heat removal under several conditions including a site flood from rupture of the Jocassee Pumped Storage Dam, which is located 11 miles upstream. In 2006, the staff identified a White finding for a performance deficiency associated with an unanalyzed opening in the SSF, rendering it vulnerable to external flood. The licensee appealed the finding twice. During a re-evaluation on the second appeal, the staff discovered that the licensee had erroneously computed a random Jocassee Dam rupture frequency that was significantly lower than which was supported by the actual data on dam failures.

In the 1980s, the licensee performed a flooding analysis which predicted a resultant on-site flood height of 4.71 feet assuming the failure of the Jocassee Dam. The licensee incorporated the results of this study in the Oconee Updated Final Safety Analysis Report (UFSAR) and used it to justify the construction of a seismically qualified 5-foot flood protection wall around the entrance to the SSF. In the early 1990s, the Federal Energy Regulatory Commission (FERC) performed a flood analysis to determine population evacuation zones. The results of the FERC analysis included a predicted on-site flood height due to the failure of the Jocassee Dam of between 12 and 16 feet. FERC's analysis clearly demonstrated that the 5-foot flood wall did not provide adequate flood protection for the SSF. In 1992, the licensee removed the 5-foot wall and Jocassee rupture flood protection references from Oconee's UFSAR.

In November 2006, the NRC staff issued the initial final significance determination for a WHITE finding that involved a breach in the SSF Flood Barrier. Following the resolution of several licensee appeals, the staff issued the final significance determination for the White finding, and also informed Duke Energy that the Jocassee Dam failure frequency used in its risk assessment was in error.

Subsequent NRC staff review of Oconee's emergency plans and strategy for responding to external hazards revealed that the licensee had not adequately addressed the flooding concerns associated with the potential failure of the Jocassee Dam. As a result, 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 ONS, including a postulated failure of the Jocassee Dam.

Duke responded to the NRC letter on September 26, 2008. The NRC staff reviewed the letter and found that the licensee had not provided sufficient information to demonstrate that ONS would be adequately protected from external flooding events. On April 30, 2009, the NRC issued a letter to Duke requesting additional information to demonstrate that Oconee would be adequately protected from external flooding events. Duke replied by letter on November 30, 2009, with a revision to the flooding analysis. On January 15, 2010, Duke provided the details of new and additional compensatory measures to be implemented at both the ONS and the Jocassee Dam. The January 15, 2010, letter also contained a schedule for the implementation of the compensatory measures. On June 3, 2010, Duke submitted a list of compensatory measures which updated and superseded the commitments made in the January 15, 2010, letter. On June 7 – 11, 2010, the NRC inspected these interim compensatory measures (ICMs) and determined they were adequate pending completion of permanent plant modifications. The ICMs were determined to provide a significant improvement in the licensee's ability to mitigate an external flooding event. The ICMs included actions to improve monitoring Jocassee Dam physical conditions including additional monitoring and alarms capabilities, staging additional equipment to provide diverse means to operate the Jocassee spill ways, developing a mitigation strategy and procedures for external flood, and obtaining and staging a second set of equipment.

On June 22, 2010, the NRC issued a Confirmatory Action Letter (CAL) to ONS which required the ONS to maintain the compensatory measures listed in the June 3, 2010, letter until final resolution of the inundation of the Oconee site from the failure of the Jocassee Dam and all modifications are made to mitigate the inundation. In addition the CAL required the following actions of Duke Energy: (i) submit to the NRC by August 2, 2010, all documentation necessary to demonstrate to the NRC that the inundation of the Oconee site resulting from the failure of the Jocassee Dam has been bounded; (ii) submit by November 30, 2010, a list of all modifications necessary to adequately mitigate the inundation; and (iii) make all necessary modifications by November 30, 2011. The first two CAL items are complete. The action to complete the modifications was revised by the licensee, in a letter dated October 17, 2011, to 30 months plus the regulatory review period once the flooding requests for additional information were resolved. However, this completion date was revised to approximately June 2016 by the staff in a letter dated September 20, 2012. This was based on allowing the licensee to complete their flooding re-evaluation required by the NRC's Fukushima 50.54(f) letter (see Recommendation 2.3 on flooding).

On March 9, 2012, the NRC released to the public a redacted GI-204 screening analysis report following the issuance of IN 2012-02. The same redacted version that was made public August 17, 2012, in response to an FOIA request on January 4, 2012. The review for public release of both documents was conducted by RES. The redactions were made in accordance with Commission paper SECY-04-0191, "Withholding Sensitive Unclassified Information Concerning Nuclear Power Reactors From Public Disclosure," dated October 19, 2004, and the associated staff requirements memorandum dated November 9, 2004, which said to withhold information

that could reasonably be expected to be useful to potential adversaries. In addition the staff used the guidance of Management Directive 12.6, "NRC Sensitive Unclassified Information Security Program;" and the NRC internal web site on SUNSI. Also see SECY-05-0091, "Task Force Report on Public Disclosure of Security-Related Information," dated May 18, 2005, and the associated staff requirements memorandum dated June 30, 2005."

Prior to the redacted version being made publicly available, the NRC staff (RES) also interacted with other stakeholders (Department of Homeland Security, Army Corps of Engineers, Federal Energy Regulatory Commission, and Duke Energy Carolinas) regarding the use and release of data and the redaction of information. These stakeholders suggesting withholding dam and nuclear power plant proximity information, flood levels following dam failure, anything from a non-public source and any cause of an event at Oconee (see ML12053A016), and failure probability of FERC structures.

KEY MESSAGES

1. During the initial licensing of Oconee, the Atomic Energy Commission had accepted the licensee's position that the failure of the Jocassee Dam was not credible, and did not require flood protection for such a failure.
2. In 2007, the NRC staff identified that the failure frequency associated with the failure of the Jocassee Dam was higher than previously believed, and decided that action was needed to improve the associated risk evaluation.
3. The NRC has been and is continuing to work to resolve the external flood issue at ONS using the appropriate regulatory tools:
 - Using the Reactor Oversight Process, NRC inspectors issued an inspection finding of moderate significance (known as a "White" finding) when they discovered the licensee had left a penetration in the SSF wall open during maintenance, which compromised flood protection
 - The NRC inspected the licensee's compensatory measures on June 7 – 11, 2010, to verify protective strategy and ability of plant operators to implement that strategy. Continuing inspections by NRC resident inspectors to verify compensatory measures are maintained.
 - The NRC issued a Confirmatory Action letter on June 22, 2010, which required Oconee to maintain the interim compensatory measures in place until modifications are made to mitigate the onsite inundation from a postulated failure of the Jocassee Dam.
4. The licensee is making physical modifications at the Oconee site to mitigate the consequences of the potential Jocassee Dam failure, including a temporary wall on the intake dike and a permanent wall north of the plant. Inspections of the Jocassee Dam have been increased, and continuous monitoring implemented, to provide early indications of problems at the dam. Other options being reviewed include hardening the Keowee dam and building additional walls.
5. The NRC has pursued improvements in the mitigation of external flooding at all commercial nuclear plants, first through Generic Issue 204 on the failure of upstream dams, and then through the response to the Fukushima event and the issuance of the 10 CFR 50.54(f) letter requesting further information from all licensees on flood hazards.
6. During the process to issue GI-204, the staff determined that redactions needed to be made to remove information that was sensitive and could reasonably be expected to be useful to potential adversaries. The redactions were based on guidance provided in SECY-04-0191 and interactions with the Department of Homeland Security, the Army Corps of Engineers, Duke Energy, and the Federal Energy Regulatory Commission.

STAKEHOLDERS

Internal

- Office of Public Affairs
- Office of Congressional Affairs
- Office of the General Counsel
- NRC Region II: DRP, DRS, ORA, State Liaison Office
- Office of Nuclear Reactor Regulation
- Office of Nuclear Security and Incident Response
- Office of Enforcement
- Office of the Executive Director for Operations
- The Commission

External

- DHS/FEMA Headquarters; Region II
- FERC
- Congress (via OCA)
- State Liaison Officer (South Carolina)
- Public Citizen Groups
- Media Representatives
- Members of the Public
- FEMA
- Department of Homeland Security

Point of Contact

Jonathan Bartley, Chief
Reactor Projects Branch 1
Division of Reactor Projects, Region II
404-997-4607

jonathan.bartley@nrc.gov

COMMUNICATION TEAM

Team Member	Organization	Phone
Rick Croteau/William Jones	RII/DRP/Div. Director	404-997-4500
Jonathan Bartley	RII/DRP/Branch Chief	404-997-4607
John Boska	NRR/DORL/LPL2-1/Project Manager	301-415-2901

ACTION PLAN

The focus of the activities in this communication plan is to deliver key messages consistently to internal and external stakeholders

Sequence of Events

Time Sequence Goal	ACTION	Responsible Organization
9/19/2012	Complete communication plan with Questions and Answers	Region II/DRP
9/20/2012	Brief Region II Management (ORA/DRP) on communication plan	Region II/DRP
9/20/2012	Brief Region II PAO/State Liaison Officer on communication plan	Region II/DRP
9/20/2012	Provide communication plan to NRR	Region II/DRP
9/20/2012	Brief State of South Carolina EP office	Region II/State Liaison Officer
END	Respond to inquiries	Region II

External Communications

No external communication efforts are planned except for response to congressional inquiries. Inquiries from the public about external flood at ONS will be responded to using the “External Use” questions and answers provided in this communication plan.

COMMUNICATION TOOLS

This Communication Plan and associated information will be provided to NRC management for use during internal communications. Some of the questions and answers may be used for interactions with other stakeholders. The questions are split into lists for internal and external use. Information that will be prepared and maintained by the Communication Team includes key messages, talking points, and a bank of Questions and Answers for use in communicating with stakeholders. The decision was made that there would be no press release or public notifications.

EVALUATION AND MONITORING

The following activities are planned:

- Monitor internal communications to ensure consistency with key messages or to determine if further information is needed, assess the degree of success that key messages and talking points had upon the target stakeholder audience
- Gather feedback on this plan and its implementation and assess the feedback to determine lessons learned that will be forwarded to NRC senior management, as appropriate.

UPDATES AND REVISIONS

If major revisions are necessary to the plan or its key messages a formal revision will be made and the revision will be placed into ADAMS.

QUESTIONS AND ANSWERS

Internal use:

Q1. What is currently being done about the possibility that the Jocassee dam can fail which may create a problem for safely shutting down Oconee?

A1. Duke implemented compensatory measures to deal with the potential for a Jocassee dam failure including:

- Staging of backup equipment to operate the Jocassee spillway gates, which prevent overtopping of the dam during heavy, prolonged rainfall
- Installing condition monitoring equipment for the Keowee spillway gates
- Increasing awareness of dam status
- Increasing frequency of inspection and monitoring of Jocassee dam
- Construction of some flood barriers has been completed and additional construction is planned

The NRC has inspected the licensee's mitigating strategy for external flood and the compensatory measures (actions and procedures to implement the strategy). The NRC determined that the mitigation strategy and compensatory measures provided an adequate level of protection pending completion of modifications to mitigate the on-site inundation due to a failure of the Jocassee Dam.

Q2. Why is the NRC requiring additional mitigating action to be taken only now considering the fact that Oconee has been operating for over 30 years with the Jocassee dam in its current condition?

A2. During the Significance Determination Process following identification of a breached flood barrier to the Oconee standby shutdown facility, the NRC discovered that the licensee had been erroneously using a significantly lower Jocassee Dam rupture frequency. In other words, the potential risk of the Jocassee Dam was initially underestimated. The probability of the event is still very low, but it is now high enough that the NRC determined that additional mitigative action was needed.

Q3. How long has the NRC known about the flooding issue at Oconee due to a failure of the Jocassee Dam?

A3. The NRC has known about the 1992 FERC study, which predicted high water levels at the site in the event of a failure of the Jocassee Dam, since 1994. However, it wasn't until June 2007 that the NRC determined that the Dam Failure Frequency used in the risk analysis was higher than previously used. The NRC staff determined that the licensee did not include two earthen dam failures in their calculation and NRC staff thought they should be included. The licensee's position was that Jocassee was a rock filled dam so failures of earthen dams were not applicable. The increase in the failure frequency put the risk into a range which required Regulatory action.

Attachment 1

Q4. Why is the NRC permitting operation of the three Oconee units when it has concerns about the facility's ability to withstand external floods?

A4. The NRC required the licensee to perform additional corrective measures to increase the assurance that the reactors can be safely shut down following the very remote possibility of the Jocassee Dam failure. The current operating risk is considered to be very small, but based on the new analysis the NRC determined it was prudent to take additional actions which were required by the NRC's Confirmatory Action Letter.

Q5. Why is the information and correspondence related to the failure of the Jocassee Dam not available to the public?

A5. The NRC determined that certain parts of this information should not be publicly available because it identified a plant vulnerability prior to the licensee implementing compensatory measures or was considered critical energy infrastructure information. Recent information is not publicly available because it discusses the licensee's mitigation strategies and equipment. For further information on the NRC's focus on mitigating external flooding, refer to the public version of the NRC's screening analysis report for Generic Issue 204 on dam failures, ML113500495.

Q6. How does the flooding due to a Jocassee a dam breach compare with the event in Japan?

A6. The ability to supply electrical power to the Oconee site would be similarly affected; however, the licensee has implemented compensatory measures to provide other means of cooling to the reactors and the spent fuel pools. These measures have been inspected by NRC and are routinely reviewed by the on-site resident inspectors.

Q7. Will the NRC include dam failures in their recommendations to the Japanese event?

A7. The recommendations from the Japanese event are separate from this issue.

Q8. The GI-204 Screening Analysis Report says that Regulatory actions have been taken for the flooding issue at Oconee. What are those actions?

A8. In April 2006, the NRC identified that a performance deficiency associated with a breach of the SSF flood barrier. In September 2007, after resolving multiple appeals by the licensee, a White finding was issued for the performance deficiency.

On June 22, 2010, the NRC issued a Confirmatory Action Letter which required Duke:

- maintain the compensatory measures listed in the June 3, 2010, letter until final resolution of the inundation of the Oconee site from the failure of the Jocassee Dam and all modifications are made to mitigate the inundation
- submit to the NRC by August 2, 2010, all documentation necessary to demonstrate to the NRC that the inundation of the Oconee site resulting from the failure of the Jocassee Dam has been bounded
- submit by November 30, 2010, a list of all modifications necessary to adequately mitigate the inundation; and shall make all necessary modifications by November 30, 2011.

External Use:

EQ1. Why is the NRC permitting operation of the three Oconee units when it has concerns about the facility's ability to withstand external floods?

EA1. The NRC required the licensee to perform additional corrective measures to increase the assurance that the reactors can be safely shut down following an external flooding event. The current operating risk is considered to be very small, but based on the new analysis the NRC determined it was prudent to take additional actions.

EQ2. Why is some information and correspondence related to external flooding at Oconee not available to the public?

EA2. The NRC determined that this information should not be publicly available because it identified a plant vulnerability prior to the licensee taking permanent measures to mitigate the event or was considered critical energy infrastructure information. Recent information is not publicly available because it discusses the licensee's mitigation strategies and equipment.

EQ3. Why is it taking so long for NRC to make the changes to the Oconee site?

EA3. The NRC does not make changes at Nuclear Power Plants. The licensee develops the changes and NRC reviews them to verify they will address this issue. The NRC is currently reviewing the licensee's proposed mitigation strategy to determine if it is acceptable. Once that is done the licensee has to develop and make the appropriate modifications to implement the approved strategy. Some changes have already been made, but further changes are needed. It has taken longer than expected due to the complexities of developing permanent modifications that will perform the required functions, and the complexities of having multiple Federal agencies involved. FERC licenses the Jocassee and Keowee Dams, and reviews and approves water-control structures.

EQ4. When will the Oconee site be safe from flooding?

EA4. The NRC determined that Oconee is currently able to safely mitigate a flooding event using the compensatory measures that have been determined by the NRC to be adequate. Permanent modifications will take several years to complete.

EQ5. Why was some of the information redacted from the GI-204 Screening Analysis Report?

EA5. The NRC redacts information that would be useful to individuals with a malicious intent. For the NRC's policy on redaction, see Regulatory Issue Summary 2005-26, "Control of Sensitive Unclassified Nonsafeguards Information Related to Nuclear Power Reactors," which is available from the NRC's web site.

EQ6. The GI-204 Screening Analysis Report says that Regulatory actions have been taken for the flooding issue at Oconee. What are those actions?

EA6. In April 2006, the NRC identified that a performance deficiency associated with a breach of the SSF flood barrier. In September 2007, after resolving multiple appeals by the licensee, a White finding was issued for the performance deficiency.

On June 22, 2010, the NRC issued a Confirmatory Action Letter which required Duke to take actions to mitigate external flooding including interim actions pending completion of plant modifications. These interim actions were inspected by Region II staff.

**Timeline of Interactions with Oconee Nuclear Station
on the External Flooding Issue**

- **February 1982** – Oconee calculation OSC-631 contains a simplified licensee flood study which predicts that a Jocassee failure would overtop the Keowee Dam by 4 feet for 2.4 hours, resulting in 32.5 feet of flood water on site.
- **May 1982** – draft Oconee PRA assigned Jocassee Dam failure frequency of $2.5\text{E-}5/\text{yr}$ with conditional probability of site flooding and core melt to be 1.0. In **December 1995**, the licensee issued the IPEEE. Random dam failure frequency was computed to be 1.3×10^{-5} per year. In addition, split fractions for flood heights that exceeded the 5-ft level were included. Subsequent supplements issued in December 1996 and December 1997 also carried over these split fractions. In response to January 1999 RAI, the licensee reconfirms that a flooding event (resulting from the seismically-induced failure of the Jocassee Dam) which exceeds the 5 foot SSF flood wall is the dominant cutset. Subsequently in March 2000, the NRC closes the IPEEE generic letter.
- **January 1983** - Licensee memo to file, documents that a Jocassee Dam failure would overtop the Keowee Dam by 2.45 feet resulting in 4.71 feet of water on site. The flood study was completed as part of the Oconee PRA study, NSAC-60, by Duke Power and the EPRI Nuclear Safety Analysis Center.
- **December 1992** - Jocassee Dam Failure Inundation Study (FERC Project No. 2503) was completed and predicted a flood depth of 12.5 ft to 16.8 ft above site grade level.
- **December 1992** - Licensee implemented an UFSAR update which added the Jocassee Dam failure, SSF flood wall, and watertight door references to the UFSAR.
- **December 1993** – In an internal memo, licensee attempted to reconcile differences between the FERC study and their internal one due to updated software and analysis conservatism. Licensee admits that they can not recreate the 4.71-ft flood height. Proposed corrective action to re-analyze as part of the Individual Plant Examination of External Events (IPEEE) for December 1995.
- **February 1994** - NRC issued a Notice of Violation and Notice of Deviation (Report number 50-269,270,287 / 93-25) which included the identification of the inability of the SSF to mitigate the worst case Jocassee Dam failure per the recently completed FERC study; and the inaccurate IPE submittal, which stated that the SSF flood walls were 8 feet in height (they were 5 feet in height).
- **April 2006** – NRC inspectors, in documenting a breach of the SSF wall as a performance deficiency, also note the 1992 Jocassee Dam Inundation Study. Inspectors also identified a new flood flow path via the building's sanitary system. Both issues are documented as URIs in Oconee report 2006002 (ML061180451).
- **November 2006** - Final significance determination of WHITE was issued for breached SSF Flood Barrier (Oconee report 2006017, ML063260282).
- **June 2007** - Team assembled to evaluate seismic analysis. Flooding expert reviewed the random failure frequency for Jocassee Dam. NRC staff determined that the failure probability of Jocassee Dam was on the order of 2×10^{-4} events/yr for a sunny day failure.

Attachment 2

This was a factor of 10 greater than the licensee's probability of dam failure (1.5×10^{-5}). The NRC calculation included the failure of two earthen dams. The licensee's calculation did not include the earthen dam failures calculation because they determined they were not applicable because Jocassee was a rock filled dam. With the NRC's frequency of 2×10^{-4} and a CDP of 1, the CDF of 2×10^{-4} was above the threshold for an adequate protection issue. Follow up telecom with licensee after seismic fragility analysis was evaluated. Discrepancy in dam failure frequency was communicated to the licensee.

- **November 2007** – November 20 letter to licensee regarding the Final Significance Determination of the SSF barrier white finding and communication of the NRC's analysis of the Jocassee Dam failure frequency. (ML073241045)
- **August 12, 2009** and **March 5, 2010** – NRC memos justifying continued operation to November 2010 (ML090570117) and November 2011 (ML103410042) for completion of flood modifications
- **March 15, 2010** – NRR memo calculates failure frequency for Jocassee Dam as $2.8\text{E-}4$ per year (ML100780084)
- **June 10, 2010** – Region II completed inspection of interim compensatory measures (ICMs)
- **June 22, 2010** – Region II issued CAL on Oconee external flood. (ML101730329) CAL directed licensee to:
 - Implement ICMs as documented in the June 3, 2010 letter
 - Submit to the NRC by August 2, 2010, all documentation necessary to demonstrate to the NRC that the inundation of the Oconee site resulting from the failure of the Jocassee Dam has been bounded
 - Submit by November 30, 2010, a list of all modifications necessary to adequately mitigate the inundation
 - Make all necessary modifications by November 30, 2011
- **January 28, 2011** – Staff issues safety evaluation of inundation study. Safety evaluation determined that Case 2 provided adequate bounding parameters to model the dam failure and subsequent flooding (Reservoir 1110 full pond, bottom breach el 800 ft, width 425 ft, time-to-failure 2.8 hours) (ML110280153)
- **April 29, 2011** – Oconee provided list of modifications being considered to mitigate external flooding (intake dike diversion wall, dedicated flood protected offsite power, power block diversion wall, turbine building and yard drain isolation, SFP makeup via re-routed SSF ASW miniflow line). Completion times determined by FERC and NRC (LAR) approvals plus 30 months. (ML111460063)
- **April 29, 2011 to present** – NRC transmitted and Duke responded to multiple rounds of communications to resolve/establish: 1) construction/quality standards to be applied to flood protection features, 2) the timeline for completing modifications, and 3) a better understanding of the planned modifications, including implications of the results of the flooding hazard re-evaluations required by the Fukushima 50.54(f) letter recommendation 2.3 on flooding.
- **March 12, 2012** – NRC Fukushima 50.54(f) letter (ML12053A340)
- **September 20, 2012** – Staff issues letter answering Duke's June 14, 2012, letter, accepts FERC standards for flood walls, and establishes start date and end date for modification timeline (ML12219A163).