Resolution of Oconee Flooding Issue

Regulatory Issue

Available information regarding postulated flood levels at the Standby Shutdown Facility (SSF) of the Oconee Nuclear Station suggests that the capability of the station to maintain needed residual heat removal functions would be compromised.

NRC issued a 50.54(f) letter to the Duke Power Company, licensee for the Oconee Station, on August 15, 2008, which stated that Duke is:

> "required to provide further information regarding the consequences of external flooding, including failure of the Jocassee Dam, to enable us to determine whether the Oconee Nuclear Station, Units 1, 2, and 3 (Oconee) licenses should be modified, suspended, or revoked."

Duke provided its response on September 26, 2008. In that letter, they described their probabilistic approach for assessing possible dam failures and indicated their intent to increase the height of the entrance wall of the SSF from 5 to 7.5 feet.[1] In short, the NRC staff has not found the response sufficient to demonstrate the necessary level of long-term protection from external flood hazards. The staff has communicated this to Duke verbally on several occasions, including meetings on November 5, 2008 and December 4, 2008. The NRC has determined that the units do not need to be immediately shut down, for reasons discussed below.

In its review of the Oconee issue, NRC staff identified an error in dam failure frequency estimates. It is likely that this error has been propagated into subsequent technical studies performed by other operating reactors and by the NRC staff. The implications of this error are not yet clear.

Desired Outcomes

To ensure that the NRC is able to conclude that reasonable assurance of adequate external flooding protection is provided for the Oconee Nuclear Station.

To ensure that the licensing basis of the Oconee Nuclear Station with respect to external flooding hazards is clear, documented, and consistent with agency regulations, and that the plant conforms to this licensing basis.

To inform licensees of the erroneous dam failure frequency information

To ensure that all other operating reactors that are potentially affected by dam failures are able to demonstrate adequate protection against external flooding and are assessed in a consistent manner, so that appropriate regulatory actions are taken.

To ensure that NRC studies that have used the erroneous dam failure frequency information are updated, so that appropriate regulatory actions are taken.

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[1] Duke has also discussed, but not committed to, the procurement of water-tight doors for these SSF entrances. The doors would increase protection to about 9 feet.

Resulting Regulatory Activities

- Resolve Oconee-specific issues identified in NRC's August 15, 2008, letter
- Communicate dam failure frequency estimate error to other licensees
- Assess adequacy of evaluations of external flooding for 6 other sites potentially affected by dams and ensure appropriate actions are taken
- Assess impact of dam failure frequency estimate error on other NRC studies and actions

Basis for NRC Allowing Continued Operation

Based on a review of the current condition of the Jocassee Dam, the NRC staff believes that it is unlikely to suffer a catastrophic failure during the next two years for the following reasons:

- The initiating event frequency, supported by ongoing FERC and Duke monitoring and inspection of the dam, is relatively low.
    - The initiating event frequency for a random failure is on the order of 1E-4/yr and for a large seismic event is 1E-5/yr.
    - The present level of the Jocassee Lake is about 23 feet below the lake's full pond level due to the drought conditions. This reduces the loading that is imposed on the dam.
    - Duke has a diverse program of constant surveillance of the performance of the dam by means of on-site cameras and also offsite monitoring of the observed data from its headquarters office.
    - Duke is performing biweekly inspection and monitoring of the condition of the dam, as required by FERC.
    - FERC personnel inspect the dam annually, and the 2007 inspection did not identify any adverse trends in the condition of the dam.
- Accident sequence progression timelines to containment breach and/or fuel pool boil off at Oconee are on the order of days, allowing time to implement onsite mitigating actions and offsite emergency response actions.
    - The staff assumes that recovery of flooded roadways after floodwater recession will allow for providing an alternate source of water for containment and spent fuel pool cooling.
    - Duke has committed to augmenting its Severe Accident Mitigation Guidance (SAMG) procedures in February 2009 to include potential loss of the SSF due to external flood.
    - The current drought level of the lake provides additional time within which any needed actions could be taken.

Staff Actions

1.	Document current basis for continued operation	
	a. Reconcile comments received	1/12/2009 (C)
	b. Provide to ET	1/13/2009 (C)
	c. Using appropriate NRR procedures, document this formally.	2/13/2009
2.	Identify regulatory path forward	
	a. Evaluate options: Provide a response letter Provide a Demand for Information Provide a confirmatory order Provide an Order	1/13/2009(C)
	b. Make recommendation to ET	1/14/2009(C)
	c. Draft response letter, obtain staff input	1/26/2009 (C)
	1. Initiate concurrence	2/5/2009
	2. Issue to licensee	3/20/2009
	d. Draft potential order	4/17/2009
	1. Define bases	
	2. Draft order	
	3. Decide on issuance	
	4. Issue, if necessary	
3.	Communicate activities with all stakeholders	Ongoing
	a. Internal:	
	1. Regular ET briefings	
	2. Periodic briefings with Commissioners	
	b. External:	
	1. Communicate with FERC	
	2. Communicate with DHS	
4.	Identify NRC expectations on dams	
	a. Summarize key guidance quotes	1/30/2009
	b. Assess ANSI N170/ANS/ANSI 2.8 and summarize	1/30/2009
5.	Assess adequacy of evaluations for other sites	
	a. Document NRC understanding of licensee external flooding evaluations on 6 other sites potentially affected by dam failures	1/30/2009
	1. Determine additional information needed	2/5/2009
	2. Determine method of obtaining information	2/27/2009
	b. Determine communication methods for dam failure frequency correction	1/13/2009
	1. Issue communication	
6.	Assess NRC studies and actions	1/30/2009
	a. Generic safety issues	
	1. Inform RES of error	2/5//2009
	2. RES follow-up actions	TBD
	b. Other studies using IPEEE information	TBD