

August 10, 2006

LICENSEE: DUKE POWER COMPANY LLC (DUKE)

FACILITY: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 (OCONEE)

SUBJECT: SUMMARY OF JULY 26, 2006, MEETING TO DISCUSS TORNADO AND HIGH-ENERGY LINE BREAK (HELB) MITIGATION STRATEGIES

On July 26, 2006, the Nuclear Regulatory Commission (NRC) met with Duke (the licensee) to discuss the Oconee tornado and HELB mitigation strategies (the strategies). Enclosure 1 is a list of the attendees. Enclosure 2 is the handout provided by the licensee at the meeting.

By letter dated July 12, 2006, (ML061780639) the NRC staff provided key issues related to proposals made by the licensee in previous letters on the strategies. The purpose of the July 26, 2006, meeting was to discuss the issues in the July 12, 2006, letter. Following is the discussion of the items in Enclosure 1 to that letter.

#### Use of TORMIS

The licensee stated that it would use TORMIS to show that the probability of a missile strike disabling the steam generator makeup function would be less than  $1.0E-6$  and that the probability of a missile strike disabling the primary makeup function would also be less than  $1.0E-6$ . The NRC staff stated that this approach is not consistent with the approach found acceptable for other plants. The approach that has been found acceptable by the NRC staff entails using TORMIS for all structures, systems, and components (SSCs) not protected from tornado-generated missiles and demonstrating that the probability of exceeding the off-site dose requirements of 10 CFR Part 100 is less than  $1E-06$ . The NRC staff recommended that the licensee read the NRC staff safety evaluations (SEs) for the use of TORMIS at other facilities. The NRC staff also recommended that the licensee review the TORMIS request that was submitted by the First Energy Nuclear Operating Company on January 11, 2005, for the Davis-Besse plant and the request for additional information that was issued by the NRC staff on May 25, 2006. The NRC staff stated that it also could provide other examples if the licensee needed them. The licensee stated that it would review the examples provided by the NRC staff and decide the feasibility and schedule impact of using this approach for the Oconee TORMIS evaluation. The NRC staff stated that if the licensee's TORMIS request is similar to those that have been recently submitted by other licensees, it is likely that it would receive NRC approval.

The licensee stated that it would use the conditions outlined in the October 26, 1983, TORMIS SE and would use a ground wind velocity that is 82 percent of the 33-foot tornado wind velocity. The licensee intends to include the atmospheric dump valves (ADVs) in the TORMIS evaluation, and is assuming that the ADVs will be accessible following a tornado and can be used to limit the number of cycles of the main steam safety valves; the licensee stated that the ADVs would not be expected to be needed until at least 4 hours after a tornado. Additionally, the licensee stated that it would include justification that the main steam safety valves could withstand the number of relief cycles that would occur during this period. The NRC staff stated that the licensee should address in the license amendment requests (LARs) the human-factor elements relative to ADV operation.

The licensee stated that if redundant components are physically separated by the presence of the containment, it will not apply TORMIS to determine the likelihood of missile damage. In addition, the licensee will assume that a tornado will not cause concurrent damage to the station and to the Keowee Hydro Units, which is consistent with the current licensing basis.

The NRC staff indicated that, in general, all unprotected SSCs that are credited for mitigation tornado events and other SSCs (safety-related and non-safety related) that could affect the outcome of the tornado event should also be included in the TORMIS analysis. In particular, the TORMIS analysis should not be limited to only those features that are crediting TORMIS for demonstrating adequate tornado-generated missile protection.

### Cold Shutdown

The licensee stated that proposed protected service water (PSW) system will be the primary shutdown path in the strategies and would provide cooling water to the associated high-pressure injection pump. Both the PSW and the standby shutdown facility (SSF) have the capability to maintain hot standby (average reactor coolant temperature (Tavg) equal to or greater than 250 F) for 72 hours. The strategies would then establish a plant cooldown to 250 F at which point repairs may have to be implemented to bring the plant to cold shutdown (Tavg equal to or less than 200 F). The licensee considers Tavg at 250 F to be a safe condition for plant. The licensee stated that since it could not predict the repairs that may be required after a tornado, the licensee is unable to establish the time it would take to achieve cold shutdown. The NRC staff requested that the licensee provide details associated with these repairs for the purposes of a human-factors assessment.

The NRC staff stated that tornado damage may impair the ability of the SSF to maintain hot standby for 72 hours or could affect the capability to access the ADVs. For example, the time it takes to gain access to the ADVs will require additional cycling of the main steam safety valves (MSSVs). If one or more MSSV sticks open, the SSF would not be able to keep up with the resulting cooldown, and the licensee will have to explain why this will not be a problem for the proposed mitigation strategy. The NRC staff stated the LAR for the tornado mitigation strategy should provide the basis for concluding that the SSF can maintain the plant in hot standby for 72 hours following a tornado, the basis for why the MSSVs are not expected to stick open, and the justification for why 72 hours is considered to be sufficient for affecting necessary repairs and/or restoring power (i.e., Keowee or offsite power) so that the PSW system can be used beyond the 72-hour capability that is afforded by the SSF.

### Application of Generic Letter 87-11

The licensee stated that it will apply all of Generic Letter (GL) 87-11, "Relaxation of Arbitrary Intermediate Pipe Rupture Requirements," and Branch Technical Position MEB-1, except that the licensee is not intending to postulate leakage cracks in seismically-analyzed moderate-energy piping. The licensee stated that there is no Class 1 piping outside containment. The NRC staff stated that it expects a detailed discussion in the HELB LARs of the application of GL 87-11 and MEB 3-1. The NRC staff asked the licensee to provide confirmation for the licensee's statement that there are no seam welds in the main steam and feedwater piping.

The licensee acknowledged that it would identify in the LARs those piping inspections that are being, and will be, performed to justify not implementing HELB-related modifications that are not feasible. The licensee stated that it will also address in the LARs exceptions to the inspection requirements of GL 87-11 and MEB 3-1 because of the inaccessibility of the main steam line

terminal ends in the east penetration rooms.

#### Reactor Coolant System (RCS) Letdown Line

The licensee stated that this line was not considered a high-energy line in the original licensing basis of the plant. However, with the exception of the single-failure requirement, the licensee intends to treat this line as a high-energy line. To mitigate a break in this line, automatic isolation is achieved by two valves in parallel, located upstream of the line, that close on an ESF signal. Therefore, a postulated single failure in one of these two valves would preclude immediate isolation of the line. However, the licensee noted that the line could then be isolated by the control room operator by closing a valve that is in series with the automatic isolation valve that did not close because of the postulated single failure. The NRC staff asked if the licensee had evaluated the effects of a break in this line and the subsequent single failure, and the licensee stated that it had not performed this analysis. However, the licensee stated that the probability of a break in the RCS letdown line is low. The licensee also stated that relocation of the flow-limiting orifice is impractical.

The licensee stated that damage to this line from tornado-generated missiles resulting in a loss-of-coolant accident is not credible due to the physical construction and configuration of the line. The licensee will include this line in its TORMIS evaluation.

The licensee agreed to provide in the LARs related to the strategies an analysis of the safety significance of the RCS letdown line, including an assessment of the impact of the single failure.

#### Protection of Electrical Penetrations

The licensee stated that it would protect from HELB-induced jet impingement and spray all electrical penetration enclosures in the east penetration room that house circuits that are necessary to achieve safe shutdown or whose function could prevent achieving safe shutdown. The licensee indicated that it would provide the details of the methodology that it would use to evaluate all remaining circuits for any adverse effects caused by jet impingement or spray that could indirectly affect any circuit required to achieve and maintain safe shutdown.

Protection from jet impingement will be provided in the west penetration room, but the licensee stated the effects of spray in the west penetration would not be considered since spray would not impact the ability to achieve safe shutdown. The NRC staff requested that the licensee provide appropriate protection for the electrical penetrations or provide an analysis of the collective effects of all potential failures, including inadvertent actuations, multiple grounds, and power supply failures, resulting from jet impingement and spray. The licensee stated that it will describe the scope of its review and analysis in a future letter.

#### Technical Specifications

The licensee stated that the proposed PSW system does not meet the criteria of 10 CFR 50.36 for inclusion in the Technical Specifications (TS), and therefore the licensee proposed to incorporate the limiting conditions of operation and the allowed outage times for the PSW system in the Selected Licensee Commitments manual, rather than in the Oconee TS. The licensee stated that the PSW is not needed to mitigate a design-basis accident or transient, and therefore does not meet Criterion 3 of 10 CFR 50.36. In addition, the licensee stated that the PSW system is a medium-risk system; therefore, it does not meet Criterion 4 of 10 CFR 50.36 that states that a system which operating history or probabilistic risk assessment has shown to

be a significant risk to public health and safety must be included in the TS. The NRC staff stated that it will consider the licensee's position and let the licensee know if the NRC staff determines that the PSW system has to be included in the TS. The licensee stated that if the NRC staff determined that the PSW system has to be included in the TS, the licensee would consider doing so in the LARs that are to be submitted for the strategies.

The NRC staff stated that original TS Bases for the SSF stated that the SSF would be used following a fire, sabotage, or turbine-building flooding. The NRC staff stated that the SSF now is being used to mitigate additional events, including tornados and HELBs. Based on the additional uses of the SSF, the NRC staff questioned the adequacy of the existing TS requirements for the SSF. For example, TS 3.10.1.F allows the SSF to be out of service for 45 days if the SSF systems or instrumentation are inoperable due to maintenance. The licensee stated that it has reviewed this TS and has concluded that it is still adequate, based partially on the fact that the PSW system can also be used to mitigate tornados and HELBs. The NRC staff stated that the licensee should review the justification that was provided in the LAR for the current SSF TS and propose new SSF TS that recognize all of the events; in addition to fire, sabotage, and turbine-building flooding; that rely on the SSF for mitigation.

The licensee and the NRC staff then discussed several of the issues in Enclosure 2 to the July 12, 2006, letter. The licensee stated that the intent of the strategies is to keep the RCS sub-cooled with a pressurizer steam bubble (Issue 2 of Enclosure 2). The licensee stated that the piping and valves associated with the borated water storage tank (BWST) will be protected from tornado-generated missiles and that the BWST itself can withstand these missiles; therefore, foreign material that could have resulted from tornado damage to the BWST need not be considered (Issue 11 of Enclosure 2). The licensee stated that its strategies would include the use of submersible pumps in Lake Keowee that would be able to replenish the condenser circulating water supply to the PSW system and the SSF.

The licensee and the NRC staff agreed to discuss all the items in Enclosure 2 to the July 12, 2006, letter, in a conference call tentatively scheduled for the week of July 31, 2006.

Sincerely

/RA/

Leonard N. Olshan, Project Manager  
Plant Licensing Branch II-1  
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Office of Nuclear Reactor Regulation

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

Enclosures: 1. List of Attendees  
2. Licensee's Handout

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

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2. Licensee's Handout

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### MEETING TO DISCUSS TORNADO AND HIGH-ENERGY LINE BREAK MITIGATION STRATEGIES

JULY 26, 2006

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