

**NRC/Duke Meeting**  
**Resolution of Tornado Related Items**  
**2/8/02**

- **Opening Remarks**
  
- **Overview of Tornado Design Basis Initiative**
  - Plant Improvements
  - Licensing Basis Change
  
- **Discussion of Specific Issues**
  1. Ability of PZR code safety valves to pass liquid
  2. 4kV bus failure impacting Keowee auxiliary power
  3. 4kV bus failure impacting TDEFW cooling
  4. Access to Atmospheric Dump Valves
  5. Access to LP-28
  6. Run out and flow control of Station ASW
  7. Steam Generator compressive tube loads
  8. Unit 3 Control Room wall not hardened
  9. HPI suction from SFP
  
- **Closeout Discussion**

Note: There are no new regulatory commitments contained in this document.

Enclosure 2

## **Overview of Tornado Design Basis Initiative**

### **Plant Improvements**

#### Tornado-Protected Safe Shutdown Path

The Standby Shutdown Facility (SSF) structure is designed to withstand the wind, differential pressure, and missile loads from the 300 mph design basis tornado. However, piping and cabling from the SSF passes through the Cask Decontamination Room and West Penetration Room of each unit. The exterior walls of these rooms are not designed to withstand the forces of the design basis tornado. A modification is being designed to protect the exterior walls of the West Penetration Room and Cask Decontamination Room from the loads of the design basis tornado. The preliminary design proposes the installation of two inch thick steel panels on these walls.

#### Replacement of Unit 1 RCP Seals

The reactor coolant pump (RCP) seals on Oconee Unit 1 were replaced on an expedited schedule in the fall of 2000. This design change has significantly reduced seal LOCA risk at ONS. All three units now have RCP seals that have a much lower probability of failure during a loss of seal cooling than had been previously modeled in the PRA. ONS is also participating in the CEOG seal LOCA model that is currently under review by the staff.

#### Recovery of Keowee Auxiliary Power

A modification is being developed to simplify operator recovery actions if auxiliary power is lost at Keowee due to a loss of the overhead path and switchgear ITC. Oconee has accelerated the schedule for implementing this modification, and the associated

Keowee abnormal procedure changes, with a goal of implementation by the end of March.

### **Licensing Basis Change**

- Risk-informed submittal (RG 1.174) will justify changes and clarifications to the current licensing basis.
- A revised tornado PRA model is being developed and will be used to support the submittal. This is a major change to the current model documented in Revision 2 of the PRA. Key changes include:
  - Revised failure probabilities for the UST and BWST based on wind loading analyses currently underway
  - Multi-unit interactions are being characterized
  - Modeling the West Penetration Room and Cask Decontamination Rooms as protected
  - Modeling Keowee auxiliary power recovery actions
  - Modeling new RCP seals
- SSF will be credited as the assured safe shutdown path during a tornado
- Submittal will accurately characterize the risk significance of other tornado mitigation strategies (EFW, Station ASW, HPI from SFP). Items with low risk significance will not be credited in the licensing basis.
- Schedule for submittal is 6/15/02, based on impact of recent changes to the PRA model.

- Any regulatory commitments associated with the tornado design basis, such as hardening the cask decon and west penetration room walls, will be made through this submittal.

## **Issue: Ability of pressurizer code safety valves to pass liquid**

- Duke's tornado analysis models liquid relief through the code safeties.
- Liquid relief was credited in post-TMI tornado submittals.
- Hot water (>500F) not expected to cause significant degradation.
- EPRI test data supports performance of code safeties under these conditions.
- Design document changes have been made per PIP 01-3651.

## **Issue: Loss of Keowee auxiliary power due to a loss of overhead and 4kV switchgear 1TC**

- Issue identified by Oconee risk studies
- Operations and Engineering have worked together to identify best approach to allow recovery of auxiliary power
- Urgent minor modification will be implemented to install a switch in Keowee Control Room
- Operators would perform the following to recover auxiliary power (using new abnormal procedure):
  - Inspect Keowee main step-up transformer
  - Open main step-up transformer disconnects
  - Operate auxiliary power recovery switch in the Keowee control room
  - Position the Master Transfer to Local
  - Position the Master Selector to Manual
  - Position the ACB to Closed Position
- Status is documented in PIP 01-1225

**Issue: Loss of TDEFW pump cooling due to a loss of Unit 1 4kV Power**

- Issue identified by Oconee risk studies
- Engineering will develop a test to characterize performance of the TDEFW pump without bearing cooling.
- Potential plant improvements will be evaluated based on test results
- Status is documented in PIP 01-1225

Issue: Access to atmospheric dump valves

- Access likely following tornado
  - Located just outside control room
  - USTs will not fall or impede access
  - No other major equipment located near valves
  
- Uncertainty is being modeled in PRA
  
- Limitations of station ASW will be addressed in licensing submittal

## **Issue: Access to LP-28**

- BWST will not collapse due to wind/differential pressure loadings
- Several hours would be available to access and close LP-28
- Uncertainty in accessing LP-28 is being modeled in PRA
- Limitations on HPI from the SFP will be addressed in licensing submittal

## **Issue: Runout and flow control of station ASW**

- Runout is only a concern when station ASW is simultaneously feeding six completely depressurized steam generators
- Risk significance of needing to feed station ASW to three units is very low
- Limitations on station ASW will be addressed in licensing submittal

## **Issue: Steam generator compressive tube loads**

- Two vendors are independently analyzing compressive tube loads
- Results from first vendor obtained on January 31, 2002
- Duke SG experts are analyzing vendor results to determine acceptable crack sizes – results expected by end of March
- Existing URI addresses this issue
- Status is reflected in PIP 01-0940

## **Issue: Unit 3 control room wall not tornado-hardened**

- Decision made during original construction that wall did not need to be hardened
- Risk assessment concluded that safety significance is very low
- Calculation being developed to confirm engineering judgement that wall would not fail
- UFSAR to be corrected to reflect calculation results

## **Issue: HPI suction from the SFP**

- Calculations were revised to define SFP temperatures and levels necessary to assure suction to HPI pumps
- Tornado PRA model is being revised to reflect limitations of flow path
- Current PRA calculations conclude risk significance is low
- Licensing submittal will address limitations of flow path and justify no credit for flow path if supported by risk insights