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Duke Energy
Oconee Nuclear Station
HELB/Tornado Mitigation
Strategies Meeting

NRR Offices
Rockville, MD
July 26, 2006,
10:00 a.m. – 12:30 p.m.

Enclosure 2

Duke Attendees

- Larry Nicholson
- Rich Freudenberger
- Graham Davenport
- Jim Sumpter
- Jeff Robertson
- Allen Park
- Tim Brown
- Lee Kanipe
- Steve Newman
- Keith Graham

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Agenda

- Opening Remarks
- Duke Responses to NRC Items from the July 12, 2006 HELB / Tornado Strategies Letter.
  - Enclosure 1
  - Discussion
- Closing Remarks

Opening Remarks

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Item 1: Use of TORMIS

- Conditions outlined in the October 26, 1983 TORMIS methodology
- Atmospheric Dump Valves (ADVs) access
- Duke concurs that TORMIS must collectively assess probability of damage on a function basis
- Criteria for physical separation
- Applicability of TORMIS to ONS
- Planned modifications

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Physical Separation

In resolution of Systematic Evaluation Program (SEP) ISSUE 156.1.5, the NRC acknowledged that there was no guidance relative to missile protection prior to 1972.

Physical separation was approved by the NRC as part of the Oconee SER (Unit 1, Section 6.2, page 34, last paragraph).

Physical separation was outlined as an acceptable approach in NUREG-75/087 (Standard Review Plan) Section 3.5.2, "SSCs to be Protected from Externally Generated Missiles", Item III, next to last paragraph, dated 11-24-75.

Intended Use of TORMIS.

October 26, 1983 TORMIS Methodology SER indicates TORMIS to be used to offset large expenditures.

November 7, 1983 NRC memo from Denton to Stello tied use of PRA for tornado missile analysis to function (Oconee effort cited in first paragraph):

Based on the guidance in SRP Sections 3.5.1.4 and 2.2.3, we plan to permit applicants and licensees to use risk assessments for tornado and other high wind missiles and to judge their acceptability against a numerical criterion which is as follows: The probability of significant damage to SSCs required to prevent a release of radioactivity in excess of 10CFR Part 100 following a missile strike, assuming loss of offsite power, shall be less than or equal to a median value of E-7 per year or a mean value of E-6 per year. Significant damage is damage that would prevent meeting the design basis function....

Applied to ONS secondary heat removal function in post-TMI EFW ONS SER dated July 28, 1989.

Applicability of TORMIS Methodology to ONS.

SEP NRC GL 95-04, 4/28/95, ISSUE 156.1.5: TORNADO MISSILES:

This issue is one of the nineteen Category 3 issues identified by NRR in SECY-90-343. All plants licensed after 1972 were designed for protection against tornadoes. The concern existed, however, that plants constructed prior to 1972 may not be adequately protected, in particular, those reviewed before 1968 when criteria on tornado protection were first developed.....Thus, the staff believes that any vulnerability associated with tornado missiles will be evaluated and reported in the IPEEE submittals.

ONS was one of the 41 plants.

IPEEE dispositioned missiles using TORMIS. NRC issued SER for ONS IPEEE on March 15, 2000. There were no outstanding issues other than protection of emergency response personnel.

Also used to address post-TMI EFW tornado issue. NRC issued SER on July 28, 1989.

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Item 2: Cold Shutdown

- Protected Service Water (PSW) and SSF capability – maintain hot standby for up to 72 hours
- Initiate plant cooldown to ~250 degrees F
- Cold shutdown following damage repair
  - Systems
  - Vulnerabilities
- Human Factors Assessment
  - Time critical actions will be in EOPs
  - CSD is not time critical
  - Damage repair guidelines
  - Time to achieve CSD will be based on damage assessment and repair

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Item 3: Technical Specifications

- Incorporation of new PSW system LCOs and AOTs should and will be included in a controlled regulatory document
- PSW to be incorporated into SLC manual (a.k.a. TRM)
  - New PSW system does not meet the 10 CFR 50.36 criteria
  - New PSW system and functions not in NUREG 1430
  - Preliminary PRA results – medium risk system
  - LCO and AOT times to be determined using PRA analysis
- Maintenance Rule criteria will ensure that stringent controls for system availability for all tornado and HELB mitigating systems are met.

Item 5: Application of GL 87-11

- Duke will fully apply criteria for intermediate pipe ruptures per GL 87-11
- Duke will utilize the following MEB 3-1 criteria:
  - No Class 1 piping outside containment
  - Will apply to postulated pipe breaks and critical cracks in all seismically analyzed lines
  - For leakage cracks:
    - Auxiliary Building - will be postulated
    - Turbine Building - will not be postulated
  - Moderate energy cracks will not be postulated
  - Circumferential and longitudinal breaks and crack orientations will be adopted

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The power piping code of record at Oconee is the USAS B31.1 code.

Item 4: Reactor Coolant System Letdown Line

- For HELB: Evaluation approach
  - Probability of break is low
  - Relocation of pressure reducing orifice impractical
  - Validation of results of original HELB report
  - Critical cracks (will use MEB 3-1 criteria)
- For Tornado: Missile damage resulting in concurrent LOCA is not credible based on physical construction and configuration

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HELB

The Safety Evaluation Report (SER) for Units 2&3 (dated 7/6/73) approved the original HELB report and noted that protection was to be provided for fluid piping systems that exceeded 200 degrees F and 275 psig. The letdown line at the containment penetration is at 120 degrees F and 2160 psig and thus is not technically a high energy line. The SER acknowledged the following: "The reactor coolant letdown is cooled before leaving the reactor building so this system is essentially a high pressure system rather than a high pressure and high temperature system."

Credible Tornado Threshold for Later Plants Around 1E-7

Staff objective outlined in SRP Section 2.2.3, Rev. 2.

Endorsed in ANSI/ANS 51.1-1983: Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants

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Item 6: Protection of Electrical Penetrations

- Electrical penetration enclosures housing circuits necessary for safe shutdown (SSD) will be protected from jet impingement and spray:
  - East Penetration Room - jet impingement and spray
  - West Penetrations Room - jet impingement only
- Other enclosures housing circuits in the East Penetration Room, whose failure or inadvertent operation due to spray could impact SSD capability, will be protected from spray.

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Closing Remarks