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U.S. Nuclear Regulatory Commission  
ATTENTION: Document Control Desk  
Washington, DC 20555-0001

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SUBJECT: Duke Energy Corporation  
Oconee Nuclear Station Units 1, 2, and 3  
Docket Numbers: 50-269, -270 and -287  
"Request for Staff Feedback in regards to Oconee  
Design Basis Tornado Proposal"

In 2005, several meetings with members of NRC management and technical staff were held (March 17, June 30, September 27, and November 14) to resolve ambiguities associated with the current Oconee Nuclear Station (ONS) tornado licensing basis. Duke understands that additional justification needs to be provided with regards to the proposed ONS design basis tornado outlined in these meetings.

In the attached enclosure, Duke describes the rationale for an ONS design basis tornado. This letter is being submitted to obtain the Staff's feedback in regards to this proposal in advance of Duke's pending license amendment request.

Duke was also asked by the Staff to submit commitments on tornado-related plant modifications by January 31, 2006. For this effort, it is Duke's goal to implement modifications that result in appreciable risk reduction. The Staff's feedback will assist Duke in determining how best to meet this goal. Consequently, Duke respectfully requests that this matter receive prompt review by the Staff.

If you have any questions or comments regarding these issues, please contact Graham Davenport of the Oconee Nuclear Site Regulatory Compliance Group at (864)885-3044.

Very truly yours,

R. A. Jones, Vice President  
Oconee Nuclear Site

Enclosure

AD001

cc: w/enclosure

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ENCLOSURE

TORNADO DESIGN BASIS WIND AND ATMOSPHERIC PRESSURE DROP  
(APD) PROPOSAL FOR THE OCONEE NUCLEAR STATION

The Oconee Nuclear Station received its operating licenses in the early 1970's. The station was designed and constructed prior to the issuance of the General Design Criteria and NUREG 0800 (Standard Review Plan) and as a result, the tornado mitigation strategy incorporated into its' design and construction is generally unique when compared to that of the rest of the industry.

As defined in the Oconee's original Final Safety Analysis Report (FSAR) as well as the current version of the Updated FSAR, Class 1 structures include the reactor buildings, CT-4 transformer and 4 kV switchgear enclosures, Standby Shutdown Facility, and the Auxiliary Building frame. The 300 mph winds, 3 pounds per square inch (psi) differential pressures, and missile design requirements associated with these structures are not affected by this proposal. This proposal seeks to clarify or in some cases update the design basis tornado requirements for other systems, structures, and components (SSCs) that are required for tornado mitigation.

For these structures, Duke proposes a tornado design basis wind of 230 mph and an atmospheric pressure drop (APD) of 1.15 psi differential (psid). Duke also proposes to evaluate missiles using the TORMIS code for these structures. The APD for this given wind speed is provided in ANSI/ANS-2.3-1983, "Standard for Estimating Tornado and Extreme Wind Characteristics at Nuclear Power Sites."

It is Duke's contention that these values satisfy both the Principal Design Criterion (PDC) 2<sup>1</sup>, as outlined in Oconee UFSAR Section 3.1.2, as well as established NRC Safety Goals. PDC 2 states in part:

*"The design bases so established shall reflect: a) appropriate consideration of the most severe of these natural phenomena that have been recorded for the site and the surrounding area and, b) an appropriate margin for withstanding forces greater than those recorded to reflect*

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<sup>1</sup>The principal design criteria for Oconee 1, 2 and 3 were developed in consideration of the seventy General Design Criteria for Nuclear Power Plant Construction Permits proposed by the Atomic Energy Commission in a proposed rule-making published for 10CFR Part 50 in the Federal Register of July 11, 1967.

*uncertainties about the historical data and their suitability as a basis for design."*

The "site and surrounding area" from PDC 2 is defined in UFSAR Section 2.3.1.2 as Oconee County, South Carolina (SC) and the 11 bordering counties in North Carolina, SC, and Georgia. National Weather Service records for the 54 year period from 1950 through 2004 indicate that no F4 or F5 tornadoes (tornadoes with wind speeds in excess of 206 mph) have been recorded in that area around Oconee (an area of 7854 square miles).

Tornado data for the eastern United States indicates that there is a significant decrease in the number and intensity of tornadoes along and near the Appalachian Mountain chain. Therefore, the absence of tornado wind speeds in excess of 206 mph in the Oconee area is not unexpected since the station lies at the eastern slope (foothills) of the southern Appalachian Mountains.

The application of a design basis wind speed of 230 mph both exceeds the maximum recorded wind speeds in the Oconee area and provides appropriate margin to address uncertainties in the historical data. Thus, the requirements of PDC 2 are satisfied.

Duke proposes to use the TORMIS methodology to evaluate tornado missiles. The TORMIS methodology is an industry standard and has been previously reviewed and approved by the NRC. The use of TORMIS to evaluate tornado missile damage to secondary heat removal systems at ONS has been previously used and subsequently approved by the NRC in the 1980s in response to Post-TMI reviews.

The proposed tornado design basis wind and APD also supports NRC safety goals. Current guidelines for implementing risk-informed licensing changes allow use of surrogate risk measures (Core Damage Frequency [CDF] and Large Early Release Frequency [LERF]) to evaluate whether proposed changes would meet the quantitative health objectives [RG 1.174]. This is accomplished by ensuring that any increase in risk from the change is small (as measured by CDF and LERF). It follows that the impact on public health consequences is also very small and the Commission's quantitative health objectives should be met.

Current guidelines [Section 2.2.4 of RG 1.174] stipulate that a CDF change of up to  $1E-05$ /rx-yr is permitted provided that a plant's overall CDF is less than  $1E-4$ /rx-yr. Similarly, a LERF change of  $1E-06$ /rx-yr is permitted provided that the overall plant LERF is less than  $1E-5$ /rx-yr.

The 230 mph design wind speed proposed by Duke for the selected SSCs has a frequency of occurrence of  $1E-6$ /rx-yr based on NUREG/CR-4461, Revision 1. It is important to note that the 230 mph wind speed is proposed only for certain accident mitigation SSCs. The reactor containment is designed to a 300 mph wind speed and thus is capable of meeting the stricter  $1E-07$  wind criterion. The robust containment design requirement therefore directly supports the more important LERF aspect of the NRC Safety Goal Policy.

If the Standard Review Plan (SRP) criterion of  $1E-7$ /rx-yr is used as a baseline, the 230 mph wind speed proposed for ONS, at most, results in a CDF change of  $9E-7$ /rx yr. For Oconee's large dry containment design, the LERF impact is expected to be 1 to 2 orders of magnitude less than the CDF impact.

Since Oconee's current plant CDF is estimated to be  $8.1E-05$ /rx-yr and LERF is estimated to be  $3.2E-06$ /rx-yr, it is concluded that risk impact of the LB change meets the  $1E-05$  delta-CDF and  $1E-06$  delta-LERF criteria. Meeting these criteria provides reasonable assurance that the NRC Safety Goals are met.

In addition, Duke concludes that the proposed design basis tornado wind and APD are conservative for the following reasons:

1. A  $1E-6$ /rx-yr tornado frequency is an order of magnitude less than that reviewed and approved by the NRC in a Yankee Nuclear Power Station safety evaluation report dated October 24, 1985.

Additionally, this frequency:

- a. Is consistent with the damage frequency adopted for tornado missiles as outlined in November 1983 NRC memorandum from NRR Director Harold R. Denton to NRC Deputy Director for Regional Operations and Generic Requirements, Victor Stello.
  - b. Is an order of magnitude less than the frequency of safe shutdown earthquakes (SSEs) outlined as acceptable to the NRC in RG 1.165. The guide specifies that new plants should perform a site-specific hazard analysis to define an SSE that has a median reference frequency of  $1E-5$  per year.
2. The 230 mph tornado design basis wind is significantly larger than the 95-mph wind outlined for the balance of auxiliary building as previously described in Duke's letter to the NRC dated November 19, 1982, for the ONS turbine and auxiliary buildings. This letter described analysis performed to determine the probability of damage to secondary heat removal equipment in the West Penetration Rooms in response to the NRC's Post-TMI recommendation, GL-4.
  3. The 230 mph wind exceeds the 200 mph wind capacity assumed in the Oconee IPEEE Section 5.1.2.2 for the evaluation of the auxiliary building.