

From: Peter Tam
To: Craig_D_Sly@Dom.com
Date: 10/11/2006 12:28:20 PM
Subject: Kewaunee: Draft RAI on Amendment re. Tornado Design Basis (TAC MD1194)

Craig:

Please discard the previous e-mail. I received a few more draft questions (No.5 thru 7 below) on your 4/6/06 application for amendment:

1. The application reported that the Kewaunee subregion had a total land area of 186,847 square miles and was comprised "essentially all of Wisconsin, Michigan, and Minnesota. It also includes northern Illinois, and a small portion of Indiana and Ohio." Please provide the center coordinates and a box domain (length x width) in degrees for this reported subregion.

2. The tornado data set examined was comprised of 54 years total. A review of the data reported in Table 1, "Number of Reported Tornadoes - Kewaunee SubRegion (1950-2003)," reveals that the total tornado occurrence for this 54-year period was 3,135. By NRC staff calculations, this would equate to 58.01 tornado occurrences per year for the noted subregion. This would ultimately equate to 3.17 E-04 tornadoes per square mile per year, as reported in paragraph 1 on page 2 of the license amendment submittal. Thus, this process is clearly understood. However, in Table 2, the methodology implemented to derive the occurrence rates for each Fuji Scale (F0-F5) category has apparently changed. It is generally stated that "The F-scale distribution was adjusted for local tornado occurrence rates and the path length, width, and directional data from the Kewaunee subregion was statistically analyzed." The NRC staff assumes that the equation provided on page 2.7-3 of Attachment 3 in the LAR, $P=(z)(t)/A$, is used for this analysis. However, in order to verify the data presented in Table 2, the values of mean tornado path area, mean number of tornadoes per year, and the local subregion (in square miles) must also be provided for each F-scale category in the 2005 tornado evaluation (1950-2003). Please define the steps used in determining the "local tornado occurrence rates" as listed in Table 2. Also, please provide a detailed calculation for at least one of the F-scale occurrence rates, including all parameters and their values.

3. Please justify the application of SRP Section 2.2.3 siting criteria as the acceptance criteria for a tornado-generated missile impact evaluation in lieu of SRP Section 3.5.1.4

4. Please provide the following additional information:

- a. The layout of the Turbine Building with respect to the other buildings
- b. Direction of the tornados considered
- c. Identification of missiles from SRP Section 3.5.1.4 that are included in Table 3 of the request

5. The amendment request to approve the EPRI methodology states: "The proposed amendment would allow the use of a different methodology for determining the design requirements necessary for protecting safety-related equipment from damage by tornado generated missiles. Currently, Kewaunee uses a deterministic methodology to establish these design requirements. The proposed amendment would allow the use of a probabilistic methodology in place of the current deterministic methodology for specifically identified plant equipment."

However, in its safety evaluation (SE) approving the use of the EPRI tornado missile probabilistic methodology (October 26, 1983), the NRC staff determined that the use of this methodology should be limited to the evaluation of specific plant features where additional costly tornado missile protective barriers or alternative systems are under consideration. Further, the staff determined in SEs to Waterford in September 7, 2000 and September 28, 2006 (ADAMS Accession No. ML062480114) that the TORMIS methodology is not recognized

by the NRC as an approved method for justifying the elimination of existing tornado protected structures, systems and components (SSC) or tornado barriers, nor for justifying the elimination or relaxation of technical specification (TS) (or other) requirements that have been established for those SSC and barriers.

Clarify the extent of the proposed amendment request. Specifically, clarify if it is intended as a one-time application to address tornado missile protection for the EDG exhaust ducts and EDG fuel oil tank vent lines.

6. The amendment request states that the missile origin zones extend approximately 1,600 feet from the targets of concern. However, the TORMIS Code user's manual suggests that missile origin zones do not need to extend more than 2,000 ft. In addition, the NRC staff noted that the estimated number of missiles identified in the amendment request varies significantly with those used in the EPRI methodology and previous license amendment requests (Waterford, September 7, 2000).

Consistent with the EPRI TORMIS methodology, confirm that the missile origin zone will extend at least 2,000 feet from the affected structures. Also, explain why the number of missiles is much less for Kewaunee than for most other plants that have used the TORMIS methodology. Describe how many missiles of each type exist, where they are located, and measures that are proposed to assure that the assumed number of missiles will not be exceeded.

7. Clarify which tornado region, within the NRC or the EPRI classification scheme, was chosen in the TORMIS analysis; provide a justification to demonstrate that this selection provides the most conservative results.

8. Provide a basis for area reduction methods that were used in the TORMIS methodology analysis.

9. The amendment request states that for windspeed exceedance calculations, six speeds were analyzed in the simulations. Clarify what these six velocities represent and how do they fit into your analysis.

10. In your resolution to point three of the TORMIS safety evaluation, you stated that the tornado windfield parameters in the Kewaunee TORMIS analysis were adjusted to increase the windfield profile in the lowest 10 meters over the original profile in TORMIS, and that this adjustment applied the ratio of V_0/V_{33} in a conservative manner, in accordance with the TORMIS SER. However, the TORMIS SE does not provide a specific threshold for the ratio, only that it should be higher than in the EPRI study. Provide actual ratios used in the analysis performed at Kewaunee.

11. The amendment request provides a description of the methodology used to evaluate target damage due to tornado missile impact. This methodology is used to calculate damage probability to the EDG exhaust vents and fuel oil tank vent lines by assuming that structural damage is the result of crushing the components to a critical closure. However, this is not consistent with the EPRI methodology in that the TORMIS' structural damage probability model is limited to reinforced concrete structures with steel rebars. In addition, the staff notes that the amendment request relies on the results of the crush probabilities per year to meet the acceptance criteria of NUREG 0800, Section 2.2.3, and by extension the requirements of 10 CFR Part 100. The staff also noted that the licensee did not consider cumulative probabilities for all possible failure cutsets (i.e. all possible combinations in Table 4 of the request). Further, the proposed amendment is not consistent with the guidelines in RG 1.117 because it does not consider non-safety related nor important to safety components which could adversely impact safe shut down and long term cooling.

The licensee's approach is not consistent with other applications of the TORMIS methodology that have been approved by the NRC and does not provide the level of

conservatism that is typical of other applications. Revise the analysis to provide conservative results consistent with the other applications that have been approved by the NRC or provide appropriate justification for the deviation from the precedents that have been established in this regard.

Please e-mail or call me to set up a conference call to discuss the above questions with reviewers (Sujit Samaddar, Tasha Greene/Leta Brown, Jorge Hernandez).

The sole purpose of this e-mail is to prepare you and others for the proposed conference call. It does not formally request for information, and it does not convey a formal NRC staff position.

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