November 2, 1999

MEMORANDUM TO: Richard L. Emch, Jr., Section Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

FROM: Peter S. Tam, Senior Project Manager, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: FORTHCOMING MEETING WITH DUKE ENERGY CORPORATION (DEC) -- CATAWBA AND MCGUIRE NUCLEAR STATIONS (TAC NOS. MA5989, MA5990, MA5994 AND MA5995)

DATE & TIME: November 16, 1999 (Tuesday)
1:00 p.m. - 4:00 p.m.

LOCATION: U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike, Room O-3 B6
Rockville, Maryland

PURPOSE: To discuss technical issues related to the proposed amendments to the Catawba and McGuire Technical Specifications. Reference: letter, M. S. Tuckman of Duke Energy Corporation to NRC, June 24, 1999. The attached Request for Additional Information (RAI) provides specifics and will serve as agenda for the meeting. Portions of the meeting may be closed to the public to discuss proprietary information.

PARTICIPANTS:*

NRC	UTILITY
Eric Weiss, NRR	P. T. Vu, DEC
Y. S. (Gene) Hsii, NRR	Greg Swindlehurst, DEC
Larry Kopp, NRR	Timothy Niggel, DEC
Anthony Attard, NRR	Scott Thomas
Peter Tam, NRR	Et al.
Frank Rinaldi, NRR	
Et al.	

Docket Nos. 50-413, 50-414, 50-369, 50-370

Original signed by P.Tam

Attachment: Request for Additional Information

cc: See next page

CONTACT: Peter Tam, NRR, 301-415-1451

*Meetings between NRC technical staff and applicants or licensees are open for interested members of the public, petitioners, intervenors, or other parties to attend as observers pursuant to "Commission Policy Statement on Staff Meetings Open to the Public" 59 Federal Register 48340, 9/20/94.

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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REQUEST FOR ADDITIONAL INFORMATION REGARDING MCGUIRE/CATAWBA NUCLEAR POWER STATIONS PROPOSED TECHNICAL SPECIFICATION AMENDMENTS TAC NOS. MA5994, MA5995, MA5989, AND MA5990

In a letter dated June 24, 1999, Duke Energy Corporation (the licensee) requested license amendments for the McGuire and Catawba Nuclear Stations Technical Specifications. In Attachment 3 to that letter, the licensee stated (in Item L, page 13) that the analysis of the uncontrolled rod cluster control assembly (RCCA) bank withdrawal at power event was performed in accordance with the analytical model and methodology described in Topical Reports DPC-NE-3000 and DPC-NE-3002; and that "since the minimum DNBR [departure from nucleate boiling ratio] calculated with a standard axial power shape is found to fall below the 1.50 design limit, MARP [maximum allowable radial peak] curves are generated in order to determine the number of fuel rods, if any, that experience DNB. The revised MARP curves allow greater radial peaking for all axial peaks and locations. Therefore, the conclusion that no fuel failures occur remains valid for the revised analysis."

Unless proper technical and regulatory bases are provided, this conclusion is not acceptable for the following reasons:

- General Design Criterion (GDC) 10, Appendix A to 10 CFR Part 50, specifies for the reactor design that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits (SAFDLs) are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences (AOOs). The Standard Review Plan (NUREG-0800) specifies that the minimum DNBR limit, as an SAFDL, be met for AOOs such as the uncontrolled RCCA bank withdrawal at power. The licensee's revised safety analysis for the uncontrolled RCCA bank withdrawal at power showed the minimum DNBR falls below the design limit.

- The licensee's conclusion of no fuel failure (or no fuel rod experiencing DNB) appears to disregard the safety analysis result showing the minimum DNBR falls below the design limit during the RCCA bank withdrawal transient, and relies on the generation of revised MARP curves which are said to allow greater radial peaking for all axial peaks and locations. No technical basis has been provided as to why the safety analysis results showing the minimum DNBR below the design limit would result in no fuel failure (or not exceeding the SAFDL) based on the revised MARP curves. No regulatory basis has been provided for violating the DNBR limit.

1. Regarding the revised analysis of the uncontrolled RCCA bank withdrawal at power:

   (A) Provide references where the "MARP curve" approach used to demonstrate SAFDL compliance for this event was described and accepted by the staff.

   (B) Provide technical basis for the acceptability of this "MARP curves" approach. The technical basis should clearly state (a) the acceptance criterion (or criteria) associated with the "revised MARP curves" that is equivalent to the minimum DNBR acceptance criterion that the DNBR limit is met during the entire transient of a moderate frequency event or AOO, and (b) how this acceptance criterion is met in the revised analysis for the RCCA withdrawal event.

(C) Clarify the statement that "the revised MARP curves allow greater radial peaking for all axial peaks and locations." What were these "revised MARP curves" compared to, e.g., the radial peaking factors used in this revised analysis, or the current existing MARP curves? If the "revised MARP curves" allow greater radial peaking than the current MARP curves, does that mean the current safety analysis also showed the minimum DNBR below the design limit as does the revised safety analysis? If not, explain the inconsistency.

(D) Explain how the hot fuel rod with a minimum DNBR below the design limit of 1.50 will not experience DNB. In particular, the licensee should clearly discuss what parameter and value were used in the analysis to compare with the "revised MARP curves" to conclude that the DNBR design limit is met, and why the conclusion from the safety analysis that "the minimum DNBR calculated with a standard axial power shape is found to fall below the 1.50 design limit" became acceptable via these "revised MARP curves."

2. Provide the results of the revised safety analysis of the uncontrolled RCCA bank withdrawal at power event for each power level (from low- to full-power) analyzed for the event. The information provided for each case should include the following parameters:

- Initial conditions including power level, axial peaking factor and location, radial peaking factor, RCS flow rate, pressure, inlet flow temperature.
- Control system reactivity insertion rates (minimum and maximum).
- Fuel and moderator feedback reactivity coefficients (minimum and Maximum).
- Results of analysis including reactor trip function and trip time, and the following parameters as a function of time during the transients: nuclear power, heat flux, pressurizer pressure, core average temperature, and minimum DNBR.

3. Are the radial peaking factors used in this revised safety analyses for various power levels consistent with the values of enthalpy rise hot channel factor, $F_{\Delta H}$ (X,Y), specified in Technical Specifications limiting conditions for operation (LCO) 3.2.2 as defined in the Core Operating Limits Report (COLR) Section 2.6 (including power-dependent allowance to increase the $F_{\Delta H}$ by 0.3 percent for every 1% thermal power reduction, i.e., $F_{\Delta H}$ ~ 2.03 for 10% initial power)? If not, the licensee needs to justify the acceptability of LCO 3.2.2 $F_{\Delta H}$ (X,Y) limit values.

4. Describe the differences between this revised safety analysis (the uncontrolled RCCA withdrawal at power related to the proposed TS change) and the safety analysis of the same event described in Section 15.4.2 of Catawba Updated Final Safety Analysis Report. The description should include the differences (with explanation) in inputs, methods used, and results of analyses. Particularly, an explanation should be given as to why the UFSAR analysis showed that the minimum DNBR did not fall below the statistical core design (SCD) limit of 1.55 (with the BWCMV correlation), whereas this revised safety analysis with higher RCS flow rate resulted in the minimum DNBR below the SCD design limit (with the BWUZ correlation) of 1.50.

5. Provide the "revised MARP curves" generated in this revised analysis of the uncontrolled RCCA bank withdrawal at power event. Also:

(A) Describe the difference between these "revised MARP curves" and the MARP curves provided in Table 7, Appendix A of the McGuire or Catawba COLR. You should also discuss the relationship between the "revised MARP curves" and the MARP curves in the COLR. Since the COLR MARP curves (with the increase of $F_{\Delta H}$ by 0.3 percent for every 1% thermal power reduction) are the limiting conditions for operation at various power levels to ensure the DNBR limit is met for all transients, should the COLR MARP curves be revised to the "revised MARP curves," if the latter are more restrictive? If not, why not?

(B) Define the "revised MARP curves." Are the "revised MARP curves" the loci of the radial peaking factors as a function of axial peak and location that result in the minimum DNBR at the design limit during the transient of the uncontrolled RCCA bank withdrawal at power event? How are the "revised MARP curves" used to demonstrate the DNBR limit is met for the analysis of the uncontrolled RCCA withdrawal at power event?

(C) Are the revised MARP curves dependent on the initial power level? Is the power dependency consistent with LCO 3.2.2 on the radial peaking factor, i.e., is the allowable radial peaking factor to be increased as the thermal power is reduced?

(D) If the revised MARP curves allow greater radial peaking, why does the revised safety analysis of the event result in the minimum DNBR below the design limit, whereas the analysis results of the event in the UFSAR met the design limit?

(E) Do the revised MARP curves bound the radial peaking factors with initial power level correction used in the safety analysis? In other words, do the revised MARP curves bound the $F_{\Delta H}$ limits of LCO 3.2.2, i.e., $F_{\Delta H} \sim 2.03$ for 10% initial power? If not, how will LCO 3.2.2 ensure that the DNBR limit is met for any transient conditions of AOOs, such as the uncontrolled RCCA withdrawal at power?

6. Describe how the "revised MARP curves" and the COLR MARP curves are generated. (Catawba TS BASES B.3.2.2 states that the MARP limits are developed in accordance with the methodology outlined in DPC-NE-2005P, which, however, does not provide the MARP development methodology.) In addition to referencing another topical report which describes the MARP limit methodology, if any, please provide:

- a step-by-step description (from initial conditions, analyses of plant responses of transients, and calculations of minimum DNBR during the transients) of how both "COLR" and "revised" MARP curves are generated, and

- how the resulting "revised MARP curves" are used in the safety analysis (i.e., what is the acceptance criteria or what input parameter is compared) to conclude that the DNBR limit is met during the entire transient.

The description should be detailed enough to provide an explanation and understanding on how they can be used to substitute for the safety analyses, especially when the resulting minimum DNBR is below the design limit (see question 1).

Meeting Notice dated November 2, 1999

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