

April 6, 2001

Mr. G. R. Peterson  
Site Vice President  
Catawba Nuclear Station  
Duke Energy Corporation  
4800 Concord Road  
York, South Carolina 29745-9635

SUBJECT: CATAWBA NUCLEAR STATION, UNITS 1 AND 2 RE: REVISION 4 TO THE  
DUKE ENERGY CORPORATION TOPICAL REPORT DPC-NE-3002-A, "UFSAR  
CHAPTER 15 TRANSIENT ANALYSIS METHODOLOGY" (TAC NOS. MA8928  
AND MA8929)

Dear Mr. Peterson:

The accepted version of Duke Energy Corporation topical report DPC-NE-3002-A, Revision 3, was submitted to the NRC on May 13, 1999. By letter dated April 19, 2000, as supplemented by letters dated August 24 and September 22, 2000, and March 21, 2001, you submitted Revision 4 of the topical report for NRC review. You proposed three changes to the previously approved revision of the topical report. The first change corrects the description of the primary coolant volume that is used in the Updated Final Safety Analysis Report, Section 15.4.6, for boron dilution accident analysis in Mode 4 for Catawba Nuclear Station, Units 1 and 2. The second change involves an increase in the number of operable main steam line power-operated relief valves credited in the steam generator tube rupture analysis for Catawba Nuclear Station, Units 1 and 2. The third change specifies a three-minute operator response time to initiate the depressurization of the primary system and a separate three-minute response time for initiating safety injection termination. Previously, one ten-minute response time was credited for completing both the depressurization initiation and the safety injection termination actions.

The staff concludes that Revision 4 to the Topical Report DPC-NE-3002-A is acceptable. Our safety evaluation is enclosed. However, these changes are not applicable to McGuire, and Revision 4 separates the McGuire and Catawba methodology assumptions as necessary.

Sincerely,

*/RA/*

Chandu P. Patel, Project Manager, Section 1  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-413 and 50-414

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

TOPICAL REPORT DPC-NE-3002-A, REVISION 4

DUKE ENERGY CORPORATION

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

1.0 INTRODUCTION

By letter dated April 19, 2000, as supplemented by letters dated August 24 and September 22, 2000, and March 21, 2001, Duke Energy Corporation (DEC/the licensee) requested review of Revision 4 to Topical Report DPC-NE-3002-A, "UFSAR Chapter 15 System Transient Analysis Methodology." The licensee proposed three changes to the previously approved Revision 3 of the topical report. The first change corrects the description of the primary coolant volume that is used in the Updated Final Safety Analysis Report (UFSAR), Section 15.4.6, for boron dilution accident analysis in Mode 4 for Catawba Nuclear Station, Units 1 and 2. The second change involves an increase in the number of operable main steam line power-operated relief valves (PORVs) credited in the steam generator tube rupture (SGTR) analysis for Catawba, Units 1 and 2. The third change specifies a three-minute operator response time to initiate the depressurization of the primary system and a separate three-minute response time for initiating safety injection termination at Catawba, Units 1 and 2. Previously, one 10-minute response time was credited for completing both the depressurization initiation and the safety injection termination actions. These changes are discussed below in more detail.

2.0 DISCUSSION AND EVALUATION

2.1 Change in Dilution Volume for Boron Dilution Analysis

The first change corrects the description of the primary coolant volume that is used in the UFSAR, Section 15.4.6, boron dilution accident analysis in Mode 4 for Catawba Nuclear Station, Units 1 and 2. The current topical report description of the primary coolant volume used in the analysis includes the reactor coolant system excluding the pressurizer, the pressurizer surge line, and the reactor vessel upper head. The licensee later determined that the correct minimum primary coolant volume for the Mode 4 boron dilution analysis should include only those regions of the reactor coolant system that have circulation during the residual heat removal mode. The proposed change reflects the correct minimum mixing volume.

The proposed change will make topical report DPC-NE-3002-A consistent with Revision 6 of the UFSAR. The change in the methodology is a conservative change in that the mixing volume for the Mode 4 boron dilution accident is being revised to a smaller volume. Therefore, the change is acceptable to the staff.

## 2.2 Steam Line PORVs

The second change involves an increase in the number of operable main steam line PORVs credited in the SGTR analysis for Catawba, Units 1 and 2. The licensee proposed to increase the number of operable PORVs credited in the SGTR analysis from two to three. This change is consistent with the current Technical Specifications which require all four main steam line PORVs to be operable during Modes 1 - 4 when steam generators are being used for decay heat removal. The failure of the PORV to close on the ruptured steam generator is assumed to be the limiting single failure. Therefore, the staff finds the proposed change acceptable.

## 2.3 Operator Actions

The third change in the proposed revision for Catawba, Units 1 and 2, specifies a three-minute operator response time to initiate the depressurization of the primary system and a separate three-minute response time for initiating safety injection termination. Previously, one 10-minute response time was credited for completing both the depressurization initiation and the safety injection termination actions.

The licensee stated that the proposed change is consistent with that approved by the staff in a safety evaluation (SE) dated April 29, 1997, for a steam generator tube rupture analysis related to steam generator overfill. The staff requested additional information on the differences in conditions between the current and earlier analyses and also requested a current copy of procedure CNS EP/1/A/5000/E-3, "Steam Generator Tube Rupture." By letters dated August 24 and September 22, 2000, and March 21, 2001, the licensee provided additional information.

Normally the staff would use the following guidance to evaluate operator actions: Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability," ANSI/ANS 58.8 (1984), "Time Response Design Criteria for Safety-Related Operator Actions," and Information Notice 97-78, "Crediting of Operator Actions in Place of Automatic Actions and Modification of Operator Actions, Including Response Times." However, in this case the licensee is justifying the time change based on staff's evaluation dated April 29, 1997, in which the same actions were approved using the above guidance. Thus, this evaluation need only verify that the conditions surrounding the current actions are equal to, or are more favorable than, those of the 1997 safety evaluation. As a further check on the revised time intervals, the facility's steam generator tube rupture procedure was reviewed.

For several items, the staff requested that the licensee indicate where the conditions changed from the 1997 SE. The following are the licensee's response to each item:

- Control room conditions (e.g., alarms, peripheral activities being conducted) - the licensee stated that alarms, indications and activities are the same as in the 1997 SE. It is Catawba Nuclear Station practice to clear the control room of any unrelated activity at the onset of any significant event.
- Information required by the operator to initiate each action - the licensee stated that the operators will be responding to the same indication and information as in the 1997 SE.

- Information required to know that the action has been successfully completed - the licensee stated that the information required to know that the action has been successfully completed have not changed since the original submittal.
- Qualified displays providing the above information - the licensee stated that the displays providing the above information are all QA1 qualified instruments.
- Sequence of actions leading up to and to accomplish the intended result - the licensee stated that there is no change to the sequence of actions leading up to initiating depressurization and no technical change to the method of actually initiating the action (see procedural enhancements below). There is no change to terminating safety injection.
- Procedures used to accomplish the actions - the licensee stated that the procedures have been enhanced to reduce operator decision time such that the actions can actually be accomplished faster. Training was conducted on the changes in a recent re-qualification segment.
- Consequence of not accomplishing each action within the 3-minute time frame - the licensee's analysis indicates that increasing the time from three minutes to five minutes increases the expected dose from 15 rem to 16 rem, still well below 10% of the acceptance criteria of 10 CFR Part 100.
- Ability to recover from plausible errors in performance of manual actions and the expected time required to make such a recovery - the licensee stated that each action is accomplished with simple control board devices such as switches and pushbuttons that have direct indication of component status and control board indication of the affected parameters. During these evolutions, these parameters are the direct focus of the control room team, and recognition of an error would be almost immediate. Should an error occur, recovery would be neither difficult nor time consuming.

The staff concludes that conditions surrounding this event are equivalent to, or are more favorable than those surrounding the event evaluated in the SE dated April 29, 1997, in which the three-minute action times were found acceptable. In addition, based on a review of the facility's steam generator tube rupture procedure, the staff found the revised three-minute actions times acceptable. The staff, therefore, finds the revised three-minute action times to initiate depressurization and to initiate safety injection termination acceptable.

### 3.0 CONCLUSION

Based on the above discussion the staff concludes that the proposed changes in the Topical Report DPC-NE-3002- A, Revision 3 are acceptable for Catawba, Units 1 and 2. However, these changes are not applicable to McGuire, and Revision 4 separates the McGuire and Catawba methodology assumptions as necessary.

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Date: April 6, 2001

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