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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 141 TO FACILITY OPERATING LICENSE NPF-9

AND AMENDMENT NO. 123 TO FACILITY OPERATING LICENSE NPF-17

DUKE POWER COMPANY

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

1.0 INTRODUCTION

By letter dated October 25, 1993 (Reference 1), as supplemented December 3, 1993 (Reference 2), and February 14, 1994 (Reference 3), Duke Power Company (the licensee) submitted a request for changes to the McGuire Nuclear Station, Units 1 and 2, Technical Specifications (TS). The requested changes would reduce the required minimum measured reactor coolant system flow from 385,000 gallons per minute (gpm) to 382,000 gpm. The December 3, 1993, letter provided information in response to the staff's November 19, 1993, request for additional information. The February 14, 1994, letter requested NRC staff approval that the flow-reduction portion of the requested TS change be separated from the approval of the safety limit portion of the requested TS change. Therefore, the remaining changes to TS Figures 2.1-1 and 3.2-1, and TS Table 2.2-1, to reflect a reduction in the reactor coolant system minimum required flow rate, are approved as discussed below. The licensee's February 14, 1994, requested change reduced the scope of the October 25, 1993, application and reduced the scope of the initial proposed no significant hazards consideration determination, but otherwise did not change the NRC staff's initial determination that the three standards of 10 CFR 50.92(c) are satisfied.

The reasons for the licensee's request in the October 25, 1993, application, as supplemented December 3, 1993, and February 14, 1994, are that the degrading of the steam generator tubes in McGuire, Units 1 and 2, have necessitated that tubes be plugged or sleeved, which reduces the available flow area in the steam generators and consequently reduces flow through the core. In addition, a hot leg temperature streaming phenomenon has affected the ability to accurately measure flow. As a result of these effects, it was difficult to ensure meeting the TS minimum flow requirements to maintain 100% power operation.

The following TS were modified to reflect the reduction in reactor coolant system (RCS) flow:

1) Figure 2.1-1, Reactor Core Protection Limits - Four Loops in Operation,

2) Figure 3.2-1, Reactor Coolant System Total Flow Rate Versus Rated Thermal Power - Four Loops in Operation, and

3) The overtemperature delta T (OTΔT) and overpower delta T (OPΔT) setpoint equation constants in Table 2.2-1, Reactor Trip System Instrumentation Trip Setpoints.

These revisions are applicable to McGuire, Units 1 and 2.

2.0 EVALUATION

2.1 Revision of OTΔT and OTΔP Parameters in Table 2.2-1

To support the reduction in measured minimum RCS flow (MMF), changes were required for the OPΔT setpoints for McGuire, Units 1 and 2. These changes involved recalculation of the TS allowable values of the trip functions. The revised core thermal limits were generated to reflect the reduced MMF of 382,000 gpm. Based on these new protection limits, the OTΔT setpoint constants (Note 1 of Table 2.2-1), and the OPΔT setpoint equation constants (Notes 2 and 3 of Table 2.2-1) were revised to reflect the necessary changes. The impact of the reduced flow on the coefficients was partially offset by a reduction in the margin assumed in the calculation of the coefficients.

The revised OPΔT allowable values are more restrictive than the existing values. In the course of the these calculations, a minor error was discovered by the licensee that affected the existing allowable values. This resulted in a recalculation of the allowable value affected by the flow reduction.

The revision required for the McGuire OTΔT allowable value is less restrictive than the existing value. To improve clarity, the maximum trip setpoint limit in Notes 2 and 4 of TS Table 2.2-1 will be expressed in percent of rated thermal power (RTP) instead of percent instrument span.

In response to a request for additional information, the licensee responded (Reference 2) with information which provided the approved methodology (Reference 4) for the changes made relating to OPΔT and OTΔT. The staff, therefore, finds these changes to be acceptable.

2.2 The Effect of Reduced Flow on the Final Safety Analysis Report Analyses

The licensee performed analyses to justify reduction in the minimum RCS flow to 382,000 gpm. These analyses were to show that the reduced flow rate will not have a significant impact on any accident analyses presented in the Final Safety Analysis Report (FSAR) Chapters 4, 6, or 15.

2.2.1 Thermal Hydraulic Design, FSAR Section 4.4

The thermal hydraulic design for the McGuire units was analyzed by the licensee with the reduction in RCS MMF to 382,000 gpm. The reduced flow rate resulted in a slight reduction of the margin in the core DNB limits. TS Figure 3.2-1, Reactor Coolant System Total Flow Rate Versus Rated Thermal Power - Four Loops in Operation, was revised to reflect the lower allowable

flow rate. For the changes made in RCS flow at reduced power, the licensee stated (Reference 2) that the RCS flow values were determined using the same 2% power per 1% flow reduction factor used in the existing TS figure. The axial Flux Difference Limits, TS Section 3.2.1, are unchanged and all the current thermal hydraulic design criteria are satisfied at the reduced flow conditions.

2.2.2 Mass and Energy Releases for Containment Analyses, FSAR Chapter 6

Duke Power stated that the reduction in MMF flow affects the mass and energy releases for containment analysis only through a change in the RCS temperature input assumption. As the RCS average temperature will remain unchanged with the change in MMF, the RCS initial fluid and metal stored energy will remain unchanged. Also, a constant RCS average temperature implies that the driving temperature difference for primary-to-secondary heat transfer will remain unchanged. These two parameters, initial energy content and rate of energy transfer, are the means by which mass and energy releases influence containment response for the transients analyzed in Chapter 6 of the FSAR. Since the reduction in MMF is being made with a negligible change in RCS temperature, the licensee stated that the mass and energy releases calculated in FSAR Chapter 6 will not be affected.

2.2.3 Accident Analyses, FSAR Chapter 15

All of the FSAR Chapter 15 accident analyses which are applicable to the McGuire units were explicitly analyzed by the licensee with an initial RCS flow assumption that corresponds to an MMF of 382,000 gpm, or have been evaluated to determine the impact of a reduction in MMF of 3,000 gpm.

The following analyses were reanalyzed by DPC with an initial RCS flow assumption which is less than or equal to an MMF flow of 382,000 gpm.

15.1.5	Steam System Piping Failure
15.2.3b	Turbine Trip - Peak Primary Pressure
15.2.6	Loss of Non-emergency AC Power
15.2.7	Loss of Normal Feedwater Flow
15.2.8	Feedwater System Pipe Break
15.3.1	Partial Loss of Reactor Coolant System Flow
15.3.2	Complete Loss of Reactor Coolant System Flow
15.3.3	Locked Rotor
15.4.1	Uncontrolled Bank Withdrawal from Subcritical
15.4.2	Uncontrolled Bank Withdrawal at Power
15.4.3	Rod Assembly Misoperation
15.4.8	Rod Ejection
15.6.3	Steam Generator Tube Rupture
15.6.5	Loss of Coolant Accident

Events that were not reanalyzed included those that are bounded by other more limiting events as stated in the licensee's Topical Report DPC-NE-3002-A and events which are analyzed with the acceptance criteria of no departure from nucleate boiling.

As noted above, the licensee has performed reanalyses or has made evaluations that determine that the reduction in MMF will not adversely affect the steady state or transient analyses documented in Chapters 4, 6, and 15 of the McGuire FSAR. Duke Power stated (Reference 2) that the reanalyses used approved codes (References 5 to 9). Therefore, the staff finds the decrease in the MMF from 385,000 gpm to 382,000 gpm in the McGuire, Units 1 and 2, TS to be acceptable.

The staff has reviewed the licensee's submittal to support the reduction in the required minimum measured reactor coolant system flow and finds the TS changes to be acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the North Carolina State official was notified of the proposed issuance of the amendments. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluent that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such findi g (58 FR 67842 dated December 22, 1993). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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REFERENCES

1. Letter from M. S. Tuckman, DPC, to USNRC, dated October 25, 1993.

2. Letter from M. S. Tuckman, DPC, to USNRC, dated December 3, 1993.

3. Letter from M. S. Tuckman, DPC, to USNRC, dated February 14, 1994.

4. Letter from T. C. McMeekin, DPC, to USNRC, dated April 26, 1993.

5. Kabadi, J. N., et al., "The 1981 Version of the Westinghouse ECCS Evaluation Model Using the BASH Code," WCAP-10266P-A, Rev. 2, March 1987.

6. N. Lee, et al., "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054P-A, August 1985.

7. DPC-NE-3000P-A, Rev. 1, "Thermal-Hydraulic Transient Analysis Methodology," November 1991.

8. DPC-NE-3001P-A, "Multidimensional Reactor Transients and Safety Analysis Physics Parameter Methodology," November 1991.

9. DPC-NE-3002-A, "FSAR Chapter 15 System Transient Analysis Methodology," November 1991.