



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 189 TO FACILITY OPERATING LICENSE NPF-9  
AND AMENDMENT NO. 170 TO FACILITY OPERATING LICENSE NPF-17

DUKE ENERGY CORPORATION

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

**1.0 INTRODUCTION**

By letter dated April 6, 1999, Duke Energy Corporation (the licensee) submitted a request to amend facility operating licenses NPF-09 and NPF-17 for McGuire Nuclear Station, Units 1 and 2, respectively. The amendments propose changes to the allowable values (AVs) in the Technical Specifications (TS) for reactor trip system (RTS) instrumentation as follows:

TS Table 3.3.1-1, Function 16a, Intermediate Range (IR) Neutron Flux, P-6: Revise the AVs from  $\geq 6E-11$  to  $\geq 4E-11$ .

TS Table 3.3.1-1, Function 16d, Power Range (PR) Neutron Flux, P-10: Revise the AVs from  $\geq 9$  percent Rated Thermal Power (RTP) and  $\leq 11$  percent RTP to  $\geq 7$  percent RTP and  $\leq 11$  percent RTP.

The licensee has proposed these changes because the current AVs are inadequate with respect to the Westinghouse-recommended deadband between the trip and reset setpoints and the allowance for instrument drift. The expanded range will allow the trip setpoint to be set near the nominal value instead of near the upper value of the allowable range, and the reset setpoint to be set within the allowable range with adequate deadband between the trip and reset setpoints as recommended by Westinghouse.

**2.0 BACKGROUND**

The PR neutron flux trips the reactor when two of the four PR neutron flux channels exceed the trip setpoint. Each channel consists of two independent bistables, each having its own trip setpoint, one for a high-range and one for a low-range trip setting. The high-range trip setting provides protection during normal power operation, and the low-range trip setting provides protection during startup. The low trip setting can be manually bypassed when two out of four PR neutron flux channels are above the P-10 setpoint, and the setting is automatically reinstated when three out of four PR neutron flux channels decrease below the P-10 reset value.

The IR neutron flux trips the reactor when one out of two IR neutron flux channels exceeds the trip setpoint. This trip can be manually blocked if two out of four PR neutron flux channels are

above the P-10 setpoint, and the trip is automatically reinstated when three out of four channels decrease below the P-10 reset value.

The source range (SR) neutron flux trips the reactor when one out of two SR neutron flux channels exceeds the trip setpoint. This trip can be manually bypassed when one out of two IR neutron flux channels is above the P-6 setpoint and is automatically reinstated when both IR neutron flux channels decrease below the P-6 reset value. This trip is also automatically bypassed when two out of four PR channels are above the P-10 setpoint.

### 3.0 EVALUATION

Westinghouse, in a document titled, "Precautions, Limitation and Setpoints," prepared for McGuire Nuclear Station, stated that PR bistables should have loop width adjustment set to give a deadband of approximately 2 percent RTP. This deadband is necessary to prevent the bistables from cycling because of insignificant fluctuations in neutron flux near the P-10 nominal trip setpoint. This document also stated that IR bistables should have the loop width adjustment set to give a deadband of approximately 50 percent of the setpoint. This deadband is again necessary to prevent the bistables from cycling as a result of insignificant fluctuations in neutron flux near the P-6 nominal trip setpoint.

In order to accommodate this deadband and the tolerance on the bistable reset value and provide some margin for instrument drift, the licensee has proposed to change the allowable value of P-10 interlocks from  $\geq 9$  percent RTP and  $\leq 11$  percent RTP to  $\geq 7$  percent RTP and  $\leq 11$  percent RTP. This change allows the licensee to set the trip setpoint at a nominal value of 10 percent RTP with the reset set at a nominal value of 8 percent RTP. The licensee has also proposed to change the allowable value of the P-6 Interlock from  $\geq 6E-11$  amp to  $\geq 4E-11$  amp. This change allows the licensee to set the trip setpoint at a nominal value of  $1E-10$  amp with the reset set at a nominal value of  $5E-11$  amp.

Lowering the P-6 allowable value from  $\geq 6E-11$  amp to  $\geq 4E-11$  amp would allow the SR neutron flux channels to be blocked at a lower increasing reactor power level and would delay resetting of the permissive at a lower decreasing reactor power level. The licensee has reviewed the Updated Final Safety Analysis Report (UFSAR) Chapter 15 analysis and finds that no credit has been taken for the SR neutron flux reactor trip for any accident condition. Therefore, this change does not impact the safety analysis.

Also, lowering the lower value of the P-10 AV from  $\geq 9$  percent RTP to  $\geq 7$  percent RTP would allow for tripping and resetting of the permissive at a lower reactor power level. As discussed above, that UFSAR Chapter 15 accident analysis does not take credit for SR neutron flux reactor trip for any UFSAR accidents. Therefore, this change does not impact the safety analysis for the SR neutron flux reactor trip. The P-10 interlocks also affect the IR and PR reactor trip permissive and bypass condition. The licensee's review of the UFSAR Chapter 15 accident analyses has determined that no credit is taken for the IR neutron flux trip function. Therefore, this change does not impact the safety analysis for the IR neutron flux channels. However, the licensee's review of UFSAR Chapter 15 accident analyses finds that credit is taken for the PR neutron flux low setpoint trip for a feedwater system malfunction causing an increase in feedwater flow accident (Section 15.1.2), uncontrolled rod cluster control assembly bank withdrawal from a subcritical or low power startup condition accident (Section 15.4.1), and a spectrum of rod cluster control assembly ejection accidents (Section 15.4.8). All three of these accident scenarios are bounded by cases at 0 percent RTP taking credit for the PR

neutron flux low setpoint trip and cases at  $\geq 10$  percent RTP taking credit for the PR neutron flux high setpoint trip. Therefore, these safety analyses remain adequately bounded.

In addition, the uncontrolled rod cluster control assembly bank withdrawal from power accident analyses (Section 15.4.2) assume the P-10 reset function at approximately 10 percent RTP. With the P-10 reset function changed to as low as 7 percent RTP, the conclusion of Section 15.4.2 would not change because of the similarity in the transient response regardless of the slight difference in the initial power level (7 percent vs. 10 percent). Since the uncontrolled bank withdrawal event is analyzed from both zero power and 10 percent RTP, all low-power initial conditions are adequately bounded. Therefore, changing the P-10 permissive lowest AV to 7 percent RTP is acceptable.

Since the proposed changes are consistent with the licensee's UFSAR Chapter 15 accident analysis, the staff concludes that the proposed TS changes for P-6 and P-10 interlock allowable values are acceptable.

## **6.0 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.

## **7.0 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 effluents 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 finding (64 FR 27319). 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.

## **8.0 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.

Principal Contributor: H. Garg

Date: November 30, 1999