



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 182 TO FACILITY OPERATING LICENSE NPF-9
AND AMENDMENT NO. 164 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 October 6, 1997, as supplemented by letter dated August 24, 1998, Duke Energy Corporation (DEC/the licensee), submitted a request for changes to the McGuire Nuclear Station, Units 1 and 2, Technical Specifications (TS). The requested changes would eliminate the safety injection (SI) actuation signal on low steam pressure.

The SI system is designed to provide borated makeup water during loss-of-coolant accidents as well as cooldown accidents such as steamline breaks. It is DEC's goal to minimize unnecessary actuation of the SI system, since the introduction of the cold water into the primary coolant system can lead to a thermal transient and pressurization of the reactor coolant system. An added concern to the licensee is that the unnecessary addition of highly borated water into the core could create challenges to plant safety equipment.

The August 24, 1998, submittal provided clarifying information and did not change the initial proposed no significant hazards determination, or expand the scope of the original Federal Register notice.

2.0 EVALUATION

DEC has determined that removing the SI signal on low steamline pressure will limit the number of unnecessary SI actuations. To determine that the removal of the SI actuation on low steamline pressure would not adversely impact the safe operation of the plant, the licensee used staff-approved methodology to evaluate each of the Updated Final Safety Analysis Report (UFSAR), Chapter 15, transient analyses.

The results of the evaluation determined that the transient analyses fall into the following three categories: (1) transients that do not have automatic SI actuation; (2) transients with automatic SI actuation, but initiated by a signal other than low steamline pressure; and (3) transients with SI actuation on low steamline pressure. Those transients that involve a significant decrease in steamline pressure were further evaluated or reanalyzed by the licensee.

The purpose of the steamline break analysis is to demonstrate short-term core cooling capability in the event of a steamline break transient. Originally, a spectrum of break sizes was analyzed for the steamline break transient to determine the most limiting break size. The limiting break sizes is 2.0 ft² for both McGuire units.

Further, it was determined that for the smaller breaks the SI will actuate on low pressurizer pressure before reaching the setpoint for SI actuation on low steamline pressure. On the other hand, for larger breaks - greater than 2.5 ft² - the SI will reach the low steamline pressure actuation setpoint before reaching the low pressurizer pressure SI actuation setpoint. Therefore, the licensee reanalyzed the larger breaks with the SI actuation on low steamline pressure removed; thus, delaying the SI actuation until the low pressurizer pressure setpoint is reached. The results showed that the minimum departure from the nuclear boiling ratio (DNBR) remained above the DNBR limit; with sufficient margin to conclude that the acceptance criteria for steamline break transient continues to be met, with the removal of SI actuation on low steamline pressure.

The mass and energy release analysis was evaluated to demonstrate that the condition inside containment does not exceed the existing environmental qualification envelope during a steamline break. Regardless of the break size, the SI will actuate on high containment pressure prior to reaching the setpoint for SI actuation on low steamline pressure. In the case of steamline break outside containment, SI will actuate on low pressurizer pressure before reaching the setpoint for SI actuation on low steamline pressure. Therefore, the removal of the low steamline pressure SI actuation signal does not have an effect on the steamline break inside and outside containment.

The worst-case scenario for loss of alternating-current power transient results in no primary or secondary depressurization, and no SI actuation. However, in the less limiting case, there is the possibility of primary and secondary depressurization due to excessive auxiliary feedwater delivered to the steam generators, which is compounded by extraction steam loads and the possibility of open steamline drains. The licensee has implemented a plant modification that allows the miscellaneous main steamline drain valves to fail open on the loss of instrument air, but maintains them closed following a single unit loss of offsite power (LOOP), if the instrument air remains available. Also, the licensee indicated in the supplemental submittal that a diesel powered instrument air compressor is being added. This modification ensures instrument air remains available to keep the drain lines closed and allow more timely control of the auxiliary feedwater flow during a dual-unit LOOP. Further, the licensee has changed its emergency operating procedures to include throttling the auxiliary feedwater in the event that 6.9 kV power is unavailable. This prompt operator action will prevent overcooling and eliminate the need for SI actuation. If the throttling action does not occur and overcooling follows, SI actuation on low pressurizer pressure is still available.

The feedwater line break is analyzed to demonstrate long-term cooling, and the analysis is required to postulate the break only at the terminal ends of the feedwater piping. For a feedwater line break at the main feedwater pumps, the check valve will prevent depressurization of the steam generator. For a feedwater line break at the steam generator,

SI actuation occurs on high containment pressure. Therefore, the elimination of the SI actuation on low steamline pressure does not adversely impact the feedwater line break transient.

The safety injection system, as a component of the engineered safety features of the McGuire Nuclear Station, is designed to the standards of General Design Criteria 20 through 24, incorporating diversity and redundancy to guard against a single failure of a channel or train preventing the protective action.

The licensee evaluated and/or reanalyzed those events that result in significant depressurization of the primary or secondary side. It was the licensee's conclusion that the removal of the SI actuation signal on low steamline pressure with the modification to throttle the auxiliary feedwater would have no adverse impact on the acceptance criteria of the McGuire UFSAR, Chapter 15, transient analyses. Specifically, the licensee has showed that in the event of a steamline break outside containment, SI will actuate on low pressurizer pressure with a minimum DNBR margin sufficient to maintain the DNBR acceptance criteria and for breaks inside the containment SI will actuate on high containment pressure regardless of break size. The staff has reviewed the licensee's submittals, agrees with the licensee's findings, and therefore, finds the proposed changes 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 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 (62 FR 61841 dated November 19, 1997). 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.

6.0 REFERENCES

1. Letter from H. B. Barron, Jr., Duke Power to USNRC, "Proposed Technical Specification to Eliminate Safety Injection Signal on Low Steam Pressure," dated October 6, 1997.
2. Letter from H.B. Barron, Duke Power to USNRC, "Proposed Technical Specification to Eliminate Safety Injection Signal on Low Steam Pressure; Response to RAI," dated August 24, 1998.
3. UFSAR for McGuire Nuclear Station.

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