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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 183 TO FACILITY OPERATING LICENSE NPF-9

AND AMENDMENT NO. 165 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 22, 1996, as supplemented by letters dated March 19, July 6, and September 15, 1998, Duke Energy Corporation (DEC/the licensee), submitted a request for changes to the McGuire Nuclear Station (McGuire), Units 1 and 2, Technical Specifications (TSs). The requested changes would allow continued plant operation at elevated containment lower compartment temperatures between 125 °F and 135°F for a period not to exceed 72 cumulative hours per calendar year. The March 19, July 6, and September 15, 1998, submittals provided clarifying information and did not change the no significant hazards determination, or expand the scope of the original Federal Register notice.

2.0 EVALUATION

Current TS 3.6.1.5, allows McGuire to operate at a containment lower compartment temperature between 100 °F and 120 °F with the stipulation that the lower compartment temperature may be between 120 °F and 125 °F for up to 90 cumulative days per calendar year provided the lower compartment temperature average over the previous 365 days is less than 120 °F. The proposed amendment would add the following:

> Within this 90 cumulative day period, containment lower compartment temperature may be between 125° and 135°F for 72 cumulative hours.

The licensee states that the inclusion of this provision will permit additional time for minor repairs should the unit experience an air handling unit failure involving the containment lower compartment ventilation (VL) system. The licensee adds that performing these repairs while the unit is on-line will avoid an unnecessary forced shutdown and the resulting transient.

The containment lower compartment is cooled by the containment lower compartment VL system during normal operation and shutdown. The VL system is cooled by water from Lake Norman. During late summer and early fall, the lake water experiences steadily increasing temperature along with increasing fouling conditions. During this period the TS limit of 120 °F

is typically exceeded for a period less than 10 days. If one of the VL system air handling units were to fail, the containment lower compartment temperature would increase approximately 10 °F, resulting in a weighted average temperature between 130 °F and 135 °F. This currently would result in exceeding the stated TS temperature limit, thereby forcing the units to cold shutdown.

The licensee already has a footnote statement in its TSs that allows operation at 125 °F for up to 90 cumulative days per calendar year. The licensee is proposing to insert an addition to that footnote allowing operation at a lower compartment temperature between 125 °F and 135 °F for 72 cumulative hours within this 90-day period to avoid a unit shutdown caused by the Lake Norman heatup of late summer and early fall.

The licensee evaluated all the transients in Section 6.2 of the Updated Final Safety Analysis Report (UFSAR) to determine the effect of raising the initial containment lower compartment temperature from 120 °F to 135 °F. It was concluded that the relative ranking of the various breaks would remain unaffected. As a result, the limiting peak containment temperature transient for McGuire remains as the steam line break accident. However, due to the complex interactions, the specific effects of a steam line break can only be determined through a reanalysis using complex computer programs.

The need for reanalyses is due to a number of factors. An increase in the initial containment lower compartment temperature will impact the peak containment temperature following a steam line break due to the reduced energy transfer to the passive heat structures in the lower containment. A lower differential temperature between these structures and the containment atmosphere results in reduced condensation of steam on the surfaces of these structures, resulting in increasing pressures and temperatures in the lower containment.

For the reanalyses, the licensee used a previously approved methodology used originally to compute the containment responses for the McGuire Nuclear Station. They also used the same nodalization for GOTHIC as those approved by the staff in 1995. The mass and energy releases were not recalculated, since a singular change to the initial lower containment would not affect the blowdown profile. The ice condenser containment response was modeled using the GOTHIC 4.0/DUKE computer code. Therefore, the reanalyses used the exact same nodalization, computer code, and blowdown profile as was used in the original analyses which were accepted by the staff in 1995. The only difference was the initial lower containment temperature, which was set at 135 °F rather than the previous value of 120 °F.

The licensee ran several steam line break cases. Examples of conservative assumptions that were used in both the original as well the most recent analyses included Technical Specifications limits for containment pressure of 0.3 psig; upper containment pressure of 100 °F; and ice condenser initial temperature of 30 °F. The assumed relative humidity level was kept the same for both sets of analyses at 100%. The only difference between the previously approved analysis and the current one is the lower containment initial temperature which was assumed to be 135 °F instead of 120 °F. The results showed that when the initial lower compartment temperature is increased to 135 °F, the maximum break compartment temperature increased to 317° F as compared to the previous peak value of 316 °F. The average containment lower compartment temperature is virtually unchanged, at 302 °F. Thus,

it is apparent that a 15 °F increase in the initial containment lower compartment temperature makes very little difference in the peak temperature.

The licensee has evaluated the potential impact on the environmental qualification (EQ) of safety-related electrical equipment located in the lower containment when the containment lower compartment temperature is increased. The licensee documented that its analyses show that the highest containment temperature and lower containment average temperatures result from a 2.4 ft² main steamline break (MSLB). The compartment temperature following an MSLB of this size is 316 °F with an initial temperature of 120 °F. The peak lower containment average temperature for this case is 302 °F. Both of these values are below the qualification of 340 °F for McGuire. When the initial containment lower compartment temperature is increased to 135 °F, the maximum break containment temperature increases to 317 °F. The average containment lower compartment temperature is virtually unchanged at 302 °F.

The staff noted that the licensee's evaluation only addressed the bounding condition for the peak temperature conditions and did not address the conditions for the duration of a postulated loss-of-coolant accident (LOCA) and MSLB. The staff requested the licensee to provide the qualification temperature test profiles for a representative set of safety-related electrical components located in the containment lower compartment area and to demonstrate that these EQ test profiles still bound the new containment response profiles resulting from the proposed increase of initial containment lower compartment temperature.

By letter dated July 6, 1998, the licensee responded to the staff's request, and provided test profile curves for several safety-related electrical components located in the containment lower compartments. The licensee also provided the long-term containment response (lower containment temperature) for both the 120 °F and 135 °F initial conditions. The more severe initial temperature profile results from the MSLB during blowdown of the faulted generator. Following the blowdown period, the containment temperature drops rapidly and the long-term containment temperature is less than the LOCA profile. A comparison of these curves indicates that a 10 °F increase in the initial containment lower compartment temperature does not make significant differences in containment lower compartment accident and post-accident responses. The EQ test profiles bound the accident profiles, including the peak conditions, with an adequate margin. In addition, the allowable window of 72 cumulative hours at the maximum temperature of 135 °F is small.

Since the licensee has performed all the transients in Section 6.2 of the UFSAR to determine the effect of raising the initial containment lower compartment temperature from 120 °F to 135 °F, and has evaluated the potential impact on the EQ of the safety-related electrical equipment located in the lower containment for the noted temperature increase, the staff finds that allowing the containment lower compartment temperature increase to 135 °F for a period of 72 cumulative hours will not have a significant impact on the safety-related electrical equipment and the qualification of other equipment located in the lower compartment of the containment. Therefore, the staff concludes that the proposed amendments will not have an adverse impact on the health and safety of the public, and finds the proposed change 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 and change surveillance requirements. 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 6574 dated February 12, 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.

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