



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

SAFETY EVALUATION REPORT

RELATED TO AMENDMENT NO. 42 TO FACILITY OPERATING LICENSE NPF-9

AND TO AMENDMENT NO. 23 TO FACILITY OPERATING LICENSE NPF-17

DUKE POWER COMPANY

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

I. INTRODUCTION

By letter dated November 16, 1984, Duke Power Company requested changes to Technical Specifications to reflect the transition to the use of optimized fuel assemblies (OFA). One of the requested changes was addressed by Amendment Nos. 39 and 20 to McGuire Nuclear Station, Units 1 and 2, Facility Operating Licenses NPF-9 and NPF-17, respectively. This evaluation addresses the remaining changes.

II. EVALUATION

This submittal is closely related to previous submittals by Duke Power Company for the Unit 1 first reload and for the generic transition to OFA loadings for Units 1 and 2 (enclosures to references 2 and 3).

The Unit 2, Cycle 2 reload is very similar to the Unit 1, Cycle 2 reload and change to OFA fuel, and almost everything reviewed and approved for it and the associated Technical Specification changes as described by Amendment Nos. 32 and 13 to McGuire Nuclear Station, Units 1 and 2, Facility Operating Licenses NPF-9 and NPF-17, respectively, is directly applicable to Unit 2. Unit 2 is being reloaded with 60 new OFA fuel assemblies as was Unit 1. The core parameters related to transient analyses, for the most part, will remain within the range covered by the approved generic transition of OFA analyses as did Unit 1. Where these parameters are changed, the transient events have been reexamined. There are a number of changes to Unit 2 relating to analysis methodology changes and operational parameter changes. These were covered in the Unit 1 and generic reviews. The following changes for Unit 2 were evaluated and found acceptable in the previous Unit 1 Amendment No. 32 and need not be further evaluated here.

1. Change to OFA fuel; fuel mechanical design, nuclear design, thermal-hydraulic design
2. Change in axial power distribution control from constant axial offset control (CAOC) to relaxed axial offset control (RAOC) or base load operation
3. Change from standard thermal-hydraulic design methodology to improved thermal-design procedure using WRB-1

4. Change to allow a positive Moderator Temperature Coefficient over part of the operating power range
5. Change of shutdown margin in Modes 1, 2, 3 and 4 from 1.6 to 1.3 percent delta k
6. Change of $F_{\Delta H}$ power dependent modifier from 0.2 to 0.3
7. Removal of rod bow related requirement for $F_{\Delta H}$.

As with the Unit 1 reload, core nuclear parameters for Unit 2 reload fall within bounds used in analyses for the generic OFA submittal analyses, and new transient and accident analyses are not required because of these parameters. As with Unit 1, the dropped rod events were reanalyzed for Unit 2, as required by the approved methodology, and were satisfactory.

Differences from Unit 1 Review

The Unit 2 submittal (and review) differs from the Unit 1 submittal primarily in two areas, (1) a new loss of coolant accident (LOCA) analysis, and (2) a reevaluation of transients and accidents because of a core flow reduction relative to the generic OFA and Unit 1 reload analyses.

LOCA

LOCA for Unit 1 was reanalyzed using analysis applicable for transition and full OFA cores for McGuire 1 and 2 as discussed in the generic transition OFA report. However, the Unit 2 analysis used BART (WCAP-9561) for core reflood heat transfer calculations. BART is approved for use on non-UHI plants but had not been approved for a UHI plant such as McGuire Unit 2. This methodology and the analysis for Unit 2 have been reviewed and are acceptable. This analysis for Unit 2 met LOCA criteria using a power peaking factor, F_Q , of 2.26, and this value has been incorporated in the Unit 2 Technical Specifications.

Reduced Core Flow

The generic transition OFA submittal assumed a Thermal Design Flow (TDF) of 386,000 gpm. For Unit 2, Cycle 2 the TDF will be 382,000 gpm. This is a one percent reduction in core flow from the approved analysis. As a result of this reduction, all relevant transients and accident analyses from the generic report were reexamined and when necessary reanalyzed and departure from nucleate boiling (DNB) and non-DNB limits evaluated; and the protection system setpoints and time constants were reviewed and recalculated and changed where necessary.

The reexamination verified that the core DNB limits are unchanged from the generic OFA report and Unit 1 reload values, and the DNB basis is met for all the relevant transients. The Technical Specification limits relating to DNB remain unchanged but the vessel exit boiling limits become more restrictive.

Each event in which non-DNB limits are of interest was also reexamined.

The control rod withdrawal at zero power, loss of load, steamline break and locked rotor events were reexamined to verify that fuel and clad temperature and system pressure changes (which were all small) would remain within limits. For the steamline break this was determined via conclusions that the return to power was less severe. The loss of feedwater/station blackout, rupture of main feedwater line, and limiting control rod ejection events were reanalyzed with reduced flow and found to fall within limits. The primary events for overtemperature and over-power ΔT trip protection, control rod withdrawal at power and small steamline breaks, were reanalyzed, using new setpoints and time constants and met DNB limits.

For the loss of feedwater/station blackout and rupture of main feedwater line events the steam generator level low-low setpoint used a revised value in the reanalysis, and these values are in the new Technical Specifications.

The new LOCA analysis used the reduced flow value.

Our review of this reexamination has concluded that a suitable examination of the effects of the decreased flow has been carried out and, with the related review of the Technical Specifications, appropriate core limits will be maintained.

Technical Specifications

A number of Technical Specification changes are proposed for the Unit 2, Cycle 2 reload operation. Most of these changes are the same as (or have only minor variations from) those for Unit 1, Cycle 2. This applies to both specification changes and corresponding bases changes. The Unit 2 changes were presented both in Attachment 1 and Attachment 2A to the November 16, 1984, submittal. Attachment 1 also contained a few Technical Specification changes for both Units 1 and 2 that are primarily administrative changes. We have reviewed the proposed changes, line by line, and find them acceptable. The following list of changes (from Attachment 1) does not include further discussion where the change has already been discussed in the previous Unit 1 Amendment No. 32.

Technical Specification Changes

Section 2.1; Figure 2.1-1b: The safety limits for DNB for Unit 2 have not further changed beyond the changes resulting from the use of OFA fuel and corresponding changes in analyses methodology discussed in the Unit 1 SER, but the boiling limits are more restrictive because of the change in core flow. The bases for Section 2.1 have changed to reflect the OFA related thermal-hydraulic methodology changes. These changes are acceptable.

Section 2.2; Table 2.2-1: The change to a lower core flow, to the altered steam generator water level low-low setpoint, and to the overpower and over temperature T setpoints and time constants for Unit 2 are given in this table. These changes are approved as a result of the review of the analyses of the effects of the flow and setpoint changes on transients and accidents and the changes from using OFA fuel and the related methodology (as in Unit 1). The procedures and methodology for overpower, overtemperature T trip setpoint changes (Reference 4) are standard as used for all cycles of Westinghouse designed reactors approved by the staff and are acceptable.

Section 3/4.1.1.1 and Bases (and Bases for 3/4.1.2): The change for the shutdown margin in Modes 1, 2, 3 and 4 is from 1.6 to 1.3 percent Δk as in Unit 1.

Section 3/4.1.1.3: This change is to allow a positive moderator temperature coefficient as in Unit 1.

Section 3/4.2.1 and Bases: The change is from CAOC to RAOC and Base Load Operation as in Unit 1 (including the supplemental review for Unit 1 Base Load).

Section 3/4.2.2: The change in Unit 2 to an F_Q of 2.26 is approved as a result of the approval of the LOCA analysis using this value. The change to F_Q surveillance (from F_{xy} surveillance) is as in Unit 1.

Section 3/4.2.3: The change in the $F_{\Delta H}$ power factor from 0.2 to 0.3 and the elimination of the rod bow factor are as in Unit 1.

Table 3.3-2 and 3.3-4: The changes in time constants and setpoints are the same as in Section 2.2, Table 2.2-1.

Section 3/4.3.3.2: This change in Unit 2 and for consistency, in Unit 1, reflects the elimination of F_{xy} surveillance.

Section 3.5.1.1: The cold leg injection accumulator volume and pressure values are changed to those used in the LOCA analyses and are acceptable.

Section 6.9.1.9: This is a reporting requirement for W (z) values for RAOC as in Unit 1.

III. ENVIRONMENTAL CONSIDERATION

These amendments involve a change in use of facility components located within the restricted area as defined in 10 CFR Part 20 and changes in surveillance requirements. The 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

exposure. The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration, and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR Section 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 these amendments.

IV. CONCLUSION

The Commission made a proposed determination that the amendments involve no significant hazards consideration which was published in the Federal Register (49 FR 50802) on December 31, 1984, and consulted with the state of North Carolina. No public comments were received, and the state of North Carolina did not have any comments.

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

V. REFERENCES

1. Letter to H. R. Denton (NRC) from H. B. Tucker (Duke Power) "McGuire Nuclear Station, Docket Nos. 50-369 and 50-370, McGuire 2/Cycle 2 OFA Reload", November 16, 1984.
2. Letter to E. G. Adensam (NRC) from H. B. Tucker (Duke Power) "McGuire Nuclear Station, Docket Nos. 50-369 and 50-370, McGuire 1/Cycle 2 OFA Reload", December 12, 1983.
3. Letter to E. G. Adensam (NRC) from H. B. Tucker (Duke Power) "McGuire Nuclear Station, Docket Nos. 50-369 and 50-370", November 14, 1983.
4. S. L. Ellenberger, et al., "Design Basis for the Thermal Overpower T and Thermal Overtemperature ΔT Trip Functions", WCAP-8745, March 1977.

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AMENDMENT NO. 42 TO FACILITY OPERATING LICENSE NPF-9 - McGUIRE NUCLEAR STATION, UNIT 1
AMENDMENT NO. 23 TO FACILITY OPERATING LICENSE NPF-17 - McGUIRE NUCLEAR STATION, UNIT 2

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