



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

ENCLOSURE 2

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 202 TO FACILITY OPERATING LICENSE NO. DPR-52

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-260

1.0 INTRODUCTION

By letter dated May 13, 1992, the Tennessee Valley Authority (the licensee) submitted a request to change the Browns Ferry Nuclear Plant (BFN) Unit 2 Technical Specifications. The proposed changes revise Technical Specification (TS) Table 3.2.C, TS 3.5.K, and TS 4.5.K.2, modifying the operability requirements for the Rod Block Monitor (RBM) system if sufficient thermal margin, as measured by the Minimum Critical Power Ratio (MCPR), can be maintained. These changes were requested because BFN Unit 2 has experienced an unusually large number of failures of Local Power Range Monitor (LPRM) instruments which threaten the continued operability of the RBM. The RBM operability issue will be resolved when LPRM problems are addressed during the upcoming BFN Unit 2 refueling outage. Therefore, the amendment is a temporary change, and expires at the end of the current fuel cycle (Cycle 6).

To support its request, TVA submitted the proposed TS changes, a description and evaluation of the physical and analytical changes, and a General Electric Company (GE) proprietary report (GE-NE-770-06-0392) on the operability requirements for a revised RBM operational analyses for BFN Unit 2 Cycle 6. The changes requested by TVA are similar to those requested by other utilities, such as Hatch 1 and 2, Monticello, and Fermi 2.

2.0 EVALUATION

2.1 Rod Block Monitor System

The Rod Block Monitor System is used to prevent violation of fuel thermal-hydraulic limits in the event of inadvertent continuous withdrawal of a control rod. When a control rod is selected for withdrawal, the surrounding Local Power Range Monitor (LPRM) strings are selected. The RBM system monitors their response to the withdrawal, and will block the withdrawal if that response exceeds certain limits.

In the submittal for BFN Unit 2, TVA proposed changes to the RBM system that are generally identical to those changes previously reviewed and approved for other facilities, including changes to the instrumentation system and the new approaches, analyses and setpoints.

2.2 MCPR Requirements

The function of the RBM system is to assist the operator in safe plant operation in the power range by:

- a. initiating a rod block to prevent violation of the fuel integrity safety criteria during withdrawal of a single control rod, and
- b. provide a signal to permit operator evaluation of the change in the local relative power during control rod movement.

The probability of an administrative error in selection of rods for withdrawal is not increased, because the proposed amendment only changes the range of the allowable values for the initial MCPR during rod withdrawal. The proposed amendment does not revise the administrative limitations on the selection and withdrawal of rods. GE's analyses showed that, even if the RBM did not intervene, the MCPR would not decrease below the allowable safety limit if the operator withdrew one or more rods erroneously while operating the core within the MCPR limits proposed by this amendment. GE also showed that the proposed initial MCPR requirements during rod withdrawal are bounded by previously analyzed limits and thus do not violate the thermal margin requirements based on other analyzed transients.

The data base as described in the GE report was used to determine the MCPR operating limits with the condition that no rod withdrawal error could lead to exceeding MCPR safety limits. The results of the analysis demonstrated that additional limits on thermal mechanical margin were not required. The analysis also showed that the following limiting MCPR values would provide the required margin for full withdrawal of any control rod:

- a. MCPR greater than or equal to 1.40 with the reactor power greater than or equal to 90 percent of rated thermal power, and
- b. MCPR greater than or equal to 1.70 with the reactor power less than 90 percent of rated thermal power.

Thus, when the operating MCPR is within these limits, the RBM is allowed to be bypassed completely because it is not required to be operable. When the operating MCPR is below these values, the plant is operating with a "limiting control rod pattern," and the RBM system must be operable.

We have reviewed these changes and analyses for the RBM and have concluded that the analyses, methods used, criteria, and setpoints are acceptable.

2.3 Technical Specification Changes

Implementing the hardware changes and revised analyses described above requires changes in the BFN Unit 2 Technical Specifications. These changes allow the RBM to be inoperable when the MCPR is within specified limits, and will expire at the end of the current fuel cycle. These changes are discussed below.

Limiting Condition for Operation Table 3.2.C

Notes 7.e. and 7.f. are added to provide the thermal margin limits that permit the RBM to be inoperable. These notes read as follows:

7.e. "The RBM need not be OPERABLE when reactor power is greater or equal to 90 percent and the MCPR is greater than or equal to 1.40."

7.f. "The RBM need not be OPERABLE when reactor power is less than 90 percent and the MCPR is greater than or equal to 1.70."

Notes 7.c. and 7.d. are revised to include references to the new notes 7.e. and 7.f.

Note 7.a. is revised by adding the word "edge" to clarify the meaning of "peripheral control rod." This clarification is acceptable.

These changes to Table 3.2.C and the associated bases are based on the GE study, GE-NE-770-06-0392, for BFN Unit 2 Cycle 6. The study shows that if the initial MCPR is as specified in item 7.e. and 7.f. of Table 3.2.C, then no single rod withdrawal error can cause the MCPR to decrease below the MCPR safety limit. Also, when the core operating conditions have been verified to be within the limits of items 7.e. and 7.f. of Table 3.2.C, the RBM is not required. When the RBM is required, the minimum instrument channel requirements apply. These changes also include requirements for sufficient instrumentation to ensure that the single failure criteria are met.

Limiting Condition for Operation 3.5.K and Surveillance Requirement 4.5.k.2

The change to section 3.5.K stipulates that except when the provisions of note 7 to Table 3.2.C are being employed due to the inoperability of the Rod Block Monitor, the minimum critical power ratio (MCPR) as a function of scram time and core flow, shall be equal to or greater than that shown in TS Figure 3.5.k-1 multiplied by the K_f shown in TS Figure 3.5.2.

The change to section 4.5.K.2 stipulates that except as provided by note 7 of Table 3.2.C, the MCPR safety limit shall be determined for each fuel type.

The changes to the TS allow control rod withdrawal operations appropriate for proper core management at times when thermal margin is sufficient to obviate the need for the RBM. The staff reviewed the analyses provided by TVA and found that the proposed changes are safe, because when no RBM channels are operable, control rods can be withdrawn only during those conditions in which the MCPR is high enough that the RBM need not intervene.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Alabama State official was notified of the proposed issuance of the amendment. The State Official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement 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 amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding (57 FR 21833). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Part 51.22(c)(9). Pursuant to 10 CFR Part 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The NRC staff has reviewed the reports submitted by TVA for the continued operation of BFN Unit 2 Cycle 6 and concludes that the appropriate material was submitted for Technical Specification changes pertaining to the inoperability of the RBM system. GE's study has shown that these new thermal limits can be met. Therefore, we conclude that the requested TS changes satisfy the staff's positions and requirements in these areas.

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 amendment will not be inimical to the common defense and security, or to the health and safety of the public.

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