



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

ENCLOSURE 3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 206 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 179 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1 AND 3

DOCKET NOS. 50-259 AND 50-296

1.0 INTRODUCTION

By letter dated January 14, 1992, the Tennessee Valley Authority (the licensee) requested Technical Specification (TS) changes for the Browns Ferry Nuclear Plant (BFN) Units 1 and 3. The proposed changes define regions on the operating power-flow map and operating restrictions on activities relating to those regions. These same changes had been previously approved for BFN Unit 2 on October 5, 1989. There were also proposed changes to the Bases for TS 4.2 for all three units.

The proposed regions and restrictions for BFN Units 1 and 3 are intended to avoid problems with thermal-hydraulic instability. Design requirements to avoid this instability are given in 10 CFR 50, Appendix A, General Design Criterion 12, "Suppression of reactor power oscillations."

Thermal-hydraulic instability concerns have been a focus of NRC attention following the LaSalle instability event of March 1988. This attention resulted in the issuance of NRC Bulletin (NRCB) 88-07 and NRCB 88-07, Supplement 1. NRCB 88-07 and NRCB 88-07, Supplement 1 requested utilities to provide operator training, instrumentation verification, and operating procedures intended to minimize instability potential or consequences. The requested operating procedures of NRCB 88-07, Supplement 1 are based on the General Electric (GE) Interim Recommendations for Stability Actions (IRSA), and are presented in an attachment to the supplement. These recommendations, along with other NRC staff requests presented in the supplement, constitute current NRC recommendations for BWR thermal-hydraulic stability (THS) operations. They were the result of calculations and reviews by the NRC, GE, the BWR Owner's Group (BWROG), and associated consultants.

NRCB 88-07, Supplement 1 requested that licensees implement the IRSA (and other associated requests) by modifying relevant procedures. Modification of the TS was not specifically requested. However, several licensees have modified their TS to correspond to the bulletin requests. Since BFN Unit 2 did not have stability-related TS when startup was requested in 1989, the NRC indicated that, in addition to procedural changes, the licensee should provide TS addressing NRCB 88-07, Supplement 1 requests before BFN Unit 2 restart. The licensee has now also requested the same TS modifications for BFN Units 1 and 3.

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The proposed changes to the BFN Units 1 and 3 TS are (1) addition of TS 3.5.M.1, 3.5.M.2, 3.5.M.3, 4.5.M.1, Figure 3.5.M.1 and the addition of the associated Bases 3.5.M, and (2) changes to TS 3.6.F.3 and 4.6.F.3, the addition of 3.6.F.4 and additions to the Bases for 3.6.F/4.6.F. There are also associated changes to the Table of Contents and List of Illustrations. In addition, the licensee's letter of January 14, 1992 proposed changes to Bases 4.2, unrelated to THS, for all three units which clarify testing requirements for high pressure coolant injection and reactor core isolation cooling. This change to Bases 4.2 was accepted by the staff in a letter dated July 31, 1992.

2.0 EVALUATION

The IRSA specify three regions (A, B, and C) on the power-flow map involving different degrees of allowed or prohibited operation. These are bounded by constant flow lines or control rod lines (lines of flow variation with all other reactor parameters, particularly control rod position, held constant). Region A is above the 100 percent rod line (intercepts 100 percent rated power at 100 percent rated flow) and below 40 percent flow. Region B is between the 80 and 100 percent rod lines and below 40 percent flow. Region C is above the 80 percent rod line and between 40 and 45 percent flow. Deliberate entry into regions A and B is not permitted. If it occurs, immediate exit is required. For a Group 2 plant (such as BFN Units 1 and 3), an immediate scram is required in region A, while for region B, control rod insertion or flow increase may be used to exit. Operations may be conducted in region C, with suitable surveillance, if required during startup to prevent fuel damage. If during operations in regions B or C, instability occurs, the reactor shall be immediately scrammed, with evidence for instability coming from Average Power Range Monitor (APRM) oscillation greater than 10 percent or Local Power Range Monitor (LPRM) upscale or downscale alarms.

The proposed BFN Units 1 and 3 TS conservatively implement these region designations and associated operation requirements by adding a new specification, TS 3/4.5.M, Core Thermal-Hydraulic Stability, and a power-flow map, Figure 3.5.M-1. The regions designated in Figure 3.5.M-1 are the same as in IRSA, except that regions B and C are combined into a single Region II, with region A designated Region I. The IRSA operating restrictions of Region B are conservatively applied throughout Region II. There is no allowed operation such as is permitted by IRSA, such as for startup in Region C. TS 3.5.M.1, 3.5.M.2, and 3.5.M.3 specify that operation is not permitted in Regions I and II. Upon inadvertent entry, a reactor scram is required if in Region I, and immediate action to depart by control rod insertion or flow increase is required for Region II. While exiting Region II, scram is required if there are indications of instability as evidenced by APRM oscillations above 10 percent peak-to-peak of rated power or LPRM oscillations above 30 percent, and LPRM upscale or downscale alarms require immediate checks of APRM and LPRM readings. These requirements all meet or exceed the IRSA specifications, and are acceptable for meeting the bulletin requests for implementing the interim recommendations. TS 4.5.M provides appropriate surveillance requirements for determining that operation is outside of Regions I and II when operating in the vicinity of these regions, and are also acceptable. The new Bases 3.5.M provides a reasonable discussion of the

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background, regions, operations, and requirements for these specifications and is also acceptable.

NRCB 88-07, Supplement 1 also requested that plants which do not have effective automatic scram protection for regional oscillations (Group 2 plants in the IRSA), should initiate a manual reactor scram when two recirculation pumps trip (or with no pumps operating) with the reactor in the RUN mode. BFN Units 1 and 3 are Group 2 plants, and the proposed addition of TS 3.6.F.4 to recirculation pump requirements is intended to comply with this request. It specifies that the reactor shall not be operated in the RUN mode with both recirculation pumps out-of-service, and an immediate manual scram is required, in the RUN mode, following a trip of both recirculation pumps. This is an acceptable implementation of the NRCB 88-07 recommendation.

There are also modifications to TS 3/4.6.F.3 which currently permits operation for up to 12 hours with both recirculation pumps out-of-service. The modifications permit such operation at power only while not in the RUN mode (i.e., permitted only at low power). This change is consistent with the requirements for recirculation pump operation discussed above, and is acceptable.

The staff concludes that the proposed TS changes and the material submitted to support the changes are acceptable. It should be noted however, that the NRC staff, its consultants, the BWROG, GE, and others are continuing the review of THS concerns. The BWROG is developing several long-term solutions for this problem. In connection with the experience gained in that work, the BWROG, in a March 18, 1992 letter to BWROG representatives, provided further "Implementation Guidance for Stability Interim Corrective Actions." The NRC endorses this guidance, and recommends that it be considered as useful enhancement of current guidance.

3.0 SUMMARY

The NRC staff has reviewed the reports submitted by TVA for BFN Units 1 and 3, proposing TS changes relating to THS requirements for power-flow map operating constraints and surveillance. Based on this review, the staff concludes that appropriate documentation was submitted and the proposed power-flow action regions, surveillance and TS changes satisfy staff positions and requirements in these areas. Operation in the modes proposed is acceptable.

4.0 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.

5.0 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,

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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 (57 FR 13138). 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.

6.0 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: Howard Richings

Dated: May 31, 1994

