



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

ENCLOSURE 4

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 172 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 175 TO FACILITY OPERATING LICENSE NO. DPR-52

AMENDMENT NO. 143 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2 AND 3

DOCKET NOS. 50-259, 50-260 AND 50-296

1.0 INTRODUCTION

By letter dated June 20, 1989 (Reference 1), the Tennessee Valley Authority (TVA or the licensee) proposed changes to the Technical Specifications (TS) for its Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. The proposed changes would modify Specifications 1.0.S, 3.10.B, and 3.10.C to correct a number of identified deficiencies. Specifically, TVA proposed to delete TS 3.10.B.1.b.2 and 3.10.B.1.b.3 which currently allow reactivity additions to the core without continuous core monitoring during refueling. TVA also proposed to clarify requirements for full core off-loads. The proposed changes result from agreements made between NRC and TVA during an enforcement conference in early 1989.

TVA considers the proposed TS changes to be interim in nature. The proposed interim TS changes will, however, support a core loading, if needed. In the meantime, General Electric (GE) is conducting a study of boiling water reactors (BWR) reactivity controls during refueling. Additional changes may be required as a result of recommendations from this study.

2.0 EVALUATION

The original BFN TS 3.10.B required that 2 source range monitors (SRMs) or fuel loading chambers (FLCs) have at least 3 counts per second (cps) during core alterations. A TS change was made to allow a full core unload with the SRM (FLC) count rate less than 3 cps (NRC approval letter dated June 13, 1975 - Reference 2). A TS change was later made for TS 3.10.B.1.b.2 which allowed fuel to be loaded with less than a 3 cps response of the SRMs (FLCs) provided that the SRM (FLC) response was checked every eight hours and the fuel was loaded in a spiral pattern (NRC approval letter dated October 11, 1979 - Reference 3). Another TS change was made for TS 3.10.B.1.b.3 which added the flexibility of first loading four irradiated fuel assemblies around each SRM to obtain a count rate of at least 3 cps and then loading fuel assemblies in a spiral sequence from the center of the core (NRC approval letter dated June 25, 1984 - Reference 4). This TS change provided a continuously observable

detector response of the SRMs. The two TS sections (3.10.B.1.b.2 and 3.10.B.1.b.3) will not, however, provide for the continuous monitoring of reactivity additions during refueling until a sufficient number of fuel assemblies have been loaded to overcome the strong neutron attenuation caused by the water between the loaded fuel assemblies and the 4 SRMs, which are located at some distance from the center of the core and in each quadrant. This deficiency of the SRMs in monitoring reactivity additions during the early stages of core monitoring can be overcome by the use of FLCs, which are movable and use the SRM electronics.

TVA began fuel loading at BFN Unit 2 in January 1989 in preparation for a restart after an extended four year shutdown. The loading was conducted using TS 3.10.B.1.b.2 but was stopped after 74 fuel assemblies were loaded when an NRC inspector questioned the adequacy of core monitoring during this fuel loading. An NRC inspection was subsequently conducted to examine various aspects of the fuel loading at BFN Unit 2. One of the conclusions of this inspection was that the BFN TS on core monitoring during refueling were inadequate (Reference 5). According to the inspection report, the safety significance of the BFN Unit 2 event is that neutron monitoring is essential during refueling operations to ensure the prompt detection of and operator response to an inadvertent criticality. However, it should be noted that, even though neutron monitoring was inadequate at that time, the staff has determined that 74 fuel assemblies that were loaded were adequately subcritical because no control rods were withdrawn and no loading sequence errors occurred.

In response to NRC concerns on the adequacy of the refueling TS for BFN, TVA proposed a number of changes to these specifications. These changes are as follows.

1. Definition 1.0.5 - Core Alteration

The current TS definition includes a statement that normal control rod movement with the control rod drive hydraulic system is not defined as a core alteration. This sentence is deleted in the proposed TS definition. Mode switch and TS requirements will provide the appropriate restrictions on control rod movement with the vessel head removed and fuel in the vessel. This change will also make the definition consistent with the GE BWR Standard Technical Specifications. We conclude, therefore, that the proposed definition is acceptable.

2. Specification 3.10.B.1 - Core Monitoring

This proposed change to the TS is to ensure that an operable SRM (FLC) is in the quadrant where fuel assemblies are being loaded and that an operable SRM (FLC) is also in an adjacent quadrant to the quadrant where fuel is being loaded. This change ensures that two SRMs (FLCs) close to the core alterations are operable. In addition, the use of FLCs, which would use the SRM electronics, in place of SRMs is allowed. The FLCs are movable and can be placed near the loaded fuel. This change clarifies and is more conservative than the current TS and is, therefore, acceptable.

3. Surveillance Requirement 4.10.B - Core Monitoring

This Surveillance Requirement has been changed because TS 3.10.B.1.b.2 is being deleted. Because the change is editorial in nature, it is acceptable.

4. Specification 3.10.B.1.b.1 - Core Monitoring

The current TS is changed and given a new number (3.10.B.1.b). This Specification is revised to be consistent with Specification 3.10.B.2. In addition, the Specification allows the use of FLCs for SRMs. These changes are acceptable.

5. Specifications 3.10.B.1.b.2 and 3.10.B.1.b.3 - Core Monitoring

These two Specifications are being deleted to prevent the possibility of performing core alterations which add reactivity without being directly monitored by SRMs or FLCs at all times. These changes are, therefore, acceptable.

6. Specification 3.10.B.2 - Core Monitoring

The change to this Specification will clarify the intent of TS 3.10.B.2. This Specification allows a complete core off-load starting with a subcritical reactor and with SRMs initially indicating a count rate of at least 3 cps. During a core off-loading, control rods are fully inserted and electrically disarmed and, consequently, inoperable. As fuel assemblies are removed, the count rate will eventually become less than 3 cps and the SRMs will no longer be required to be operable. Control rods outside the periphery of the remaining fuel assemblies may be electrically armed and moved for maintenance. The changes to this Specification clarify the intent of the Specification to perform a core off-load in such a manner that the fuel in the reactor is maintained in a subcritical condition. These changes are, therefore, acceptable.

7. Specification 3.3.C.2.a - Scram Insertion Times

This Specification is renumbered as 3.3.C.3 to correct a reference and provide for a consistent numbering of the Specification. Because the change is editorial in nature, it is acceptable.

8. Basis 3.10.B - Core Monitoring

These proposed changes to the TS clarify the intent of the core monitoring TS and conservatively require a count rate of at least 3 cps from operable SRMs (FLCs) in the quadrant where reactivity additions are being made during core alterations and in an adjacent quadrant to the core alterations. In addition, these changes will ensure continuous monitoring of neutrons during core alterations. The TS applicable to full core unloading (TS 3.10.B) were revised to clarify the requirements. The Basis

3.10.B was modified to reflect the changes to the core monitoring specifications. Finally, an editorial change was made to correct the numbering of a Specification (new TS 3.3.C.3). For the reasons presented, we conclude that these proposed changes to the TS are more restrictive, will enhance safety and are acceptable.

TVA notes that these proposed changes to the core monitoring TS are interim changes resulting from agreements made between the NRC and TVA during an enforcement conference in early 1989. TVA notes further that GE is currently working on a program to evaluate reactivity controls during refueling of BWRs. This study is expected to be completed in early 1990. TVA will evaluate recommendations of this study that affect these interim TS. The staff is aware of the GE study and will evaluate any recommendations concerning core monitoring during core refueling operations or core unloading operations. The staff's review has concluded that the proposed changes are acceptable because containment monitoring of neutrons is maintained with a count rate assuring safe refueling and core off-loading operations.

3.0 ENVIRONMENTAL CONSIDERATION

The amendments involve a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and a change to 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 radiation 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 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement nor environmental assessment need be prepared in connection with the issuance of these amendments.

4.0 Conclusion

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (54 FR 35111) on August 23, 1989 and consulted with the State of Alabama. No public comments were received and the State of Alabama did not have any comments.

The staff 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, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendments will not be inimical to the common defense and security nor to the health and safety of the public.

5.0 References

1. Letter from M.J. Ray (TVA) to NRC, dated June 20, 1989.
2. Letter from R. A. Purple (NRC) to TVA, dated June 13, 1975.
3. Letter from T.A. Ippolito (NRC) to TVA, dated October 11, 1979.
4. Letter for R. J. Clark (NRC) to TVA, dated June 25, 1984.
5. NRC Inspector Report 50-259/89-04, 50-260/89-04, and 50-296/89-04, dated March 1, 1989.

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