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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 219 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 235 TO FACILITY OPERATING LICENSE NO. DPR-52

AMENDMENT NO. 193 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 October 12, 1993, the Tennesse Valley Authority (the licensee) requested changes to the Technical Specifications (TS) for the Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3. The proposed changes would revise Tables to clarify isolation valve grouping for all three units, change the BFN Unit 3 TS to reflect modifications that replace existing Reactor Water Cleanup (RWCU) Isolation System high compartment temperature detection switches with resistance temperature detector (RTD) loops, and add additional temperature detection instruments. The proposed BFN Unit 3 changes are similar to TS changes approved for BFN Unit 2 on February 6, 1991 and May 5, 1993.

2.0 DISCUSSION AND EVALUATION - BFN UNIT 3 CHANGES

Reactor Water Cleanup System

The RWCU system provides continuous purification of the reactor coolant system (RCS). The system consists of pumps (two pumps 180 gpm each, one running - one standby), heat exchangers, filter-demineralizers, strainers and associated piping located in various compartments within the reactor building. The system is designed to automatically isolate under conditions which could cause any of the following:

a. Excessive loss of coolant from the reactor vessel leading to core uncovery;

b. Unacceptable radiological consequences of a small reactor coolant line break outside containment;

c. Damage to safety-related structures and equipment.

RWCU systems also have non-safety-grade isolation functions for RWCU equipment protection.

ENCLOSURE 4

RWCU Isolation System

A Group 3 isolation causes closure of RWCU suction containment isolation valves FCV-69-1 and FCV-69-2, and return line isolation valve FCV-69-12. The initiation signals for Group 3 isolation are:

1. Reactor Vessel Low Water (same level as scram setpoint)
2. RWCU System High Water Temperature Downstream of Nonregenerative Heat Exchanger
3. RWCU Pipe Break Detection ("J" signal)
4. Standby Liquid Control System Actuation

The temperature detectors for RWCU break detection are located in the RWCU Pump Rooms, RWCU Heat Exchanger Rooms, RWCU Pipe Trench Area and Main Steam Valve Vault. The temperature setpoints are selected so as to be high enough to avoid spurious actuations due to events such as loss of ventilation, and low enough to ensure sufficiently rapid break detection to meet the criteria (a), (b) and (c) above.

RWCU System Design Changes

Due to RWCU pump vibration and seal leakage problems associated with the high temperature of the coolant to be purified, the licensee has modified the BFN Unit 3 RWCU system flow path such that the RCS fluid is cooled in the RWCU nonregenerative heat exchanger before entering the RWCU pump suction. As discussed below, a high-energy line break (HELB) analysis of the new configuration indicated a need for additional temperature detection switches for RWCU isolation in the event of an RWCU line break and associated reactor coolant leakage in certain associated reactor building compartments. Certain floor drain high temperature detection switches which were part of the RWCU isolation instrumentation system were determined to be unnecessary and were deleted. Remaining high temperature detection switch circuits are being replaced by resistance temperature detectors (RTDs) installed in analog instrument loops.

HELB Analysis

HELB analyses are performed to determine the environmental conditions that would result from postulated high energy line breaks outside containment. The licensee's HELB analyses use a RELAP5/MOD2 computer model to calculate the associated mass and energy release profile for a postulated line break. The mass and energy data were used as a boundary condition for a MONSTER model of the reactor building. RELAP5 and MONSTER are digital computer codes for performing thermal hydraulic analyses. The results provide a time-temperature profile of compartment response to the line break. This time-temperature profile is used to determine the minimum analytical setpoint for the RTDs in that compartment. In a safety evaluation dated May 5, 1993, the staff provided its basis for acceptance of the licensee's methodology. Acceptance was based on a confirmatory staff analysis which verified that the licensee's

RELAP/MONSTER methodology provides a conservative analysis of compartment response to an HELB. The staff has reviewed its May 5, 1993 evaluation for BFN Unit 2, and has determined the methodology is also applicable to BFN Unit 3. Therefore, the BFN Unit 3 analysis is acceptable on the basis of the staff's BFN Unit 2 findings.

Dose Analyses

New dose calculations are not required. The affected piping and compartments are located within a secondary containment fission product boundary. The secondary containment vent effluent paths are provided with automatic isolation by an independent secondary containment isolation system whose setpoints are unaffected by this amendment.

Proposed TS Changes

The staff reviewed the proposed TS changes to determine if they provide appropriate Limiting Conditions for Operation (LCOs) and Surveillance Requirements (SRs) as required by 10 CFR 50.36. LCOs and SRs for former instruments including two channels (in each of two trip systems) of Floor Drain High Temperature detectors and two channels (in each of two trip systems) of RWCU Space High Temperature detectors would be deleted. These instruments are no longer necessary due to the modification revising the flow path. New operability and surveillance requirements would be added for new high temperature detection instruments for the following spaces: main steam valve vault, RWCU Pipe Trench, RWCU Pump Room 3A, RWCU Pump Room 3B, RWCU Heat Exchanger Room. The changes to the LCOs and SRs are reflected in revisions to Tables 3.2.A and 4.2.A and in the BASES of the TS. The Action Statements for the new instruments are the same as for the former instruments. The calibration intervals for the former switches was once per cycle, but for the new RTDs will be every four months.

The staff has reviewed its evaluations of February 6, 1991 and May 5, 1993 for similar changes for BFN Unit 2, and has confirmed these evaluations are applicable to BFN Unit 3. The staff finds that the new instrumentation satisfy appropriate design requirements, including environmental qualification and IEEE standards. The staff also finds that the temperature setpoint and system logic provide reasonable assurance that the RWCU will not be vulnerable to spurious isolation, and will be properly isolated in the event of an RWCU pipe break. Therefore, the proposed changes to the BFN Unit 3 TS as described above are acceptable.

3.0 OTHER CHANGES - BFN UNITS 1, 2, AND 3

Also included in the proposed amendments are some editorial and grammatical changes to Tables 3.2.A and 3.2.B, for all three Browns Ferry units. These changes do not affect the actual operability and surveillance requirements, and are acceptable.

4.0 EVALUATION SUMMARY

The plant modifications and associated TS changes for BFN Unit 3 are similar to previous BFN Unit 2 changes described in previous amendments and are acceptable on a similar basis, as discussed above. The proposed changes will not adversely affect the RWCU isolation system's capability to isolate an RWCU HELB to prevent: (a) excessive loss of coolant from the reactor vessel leading to core uncovery, (b) unacceptable radiological consequences of a small reactor coolant line break outside containment, and (c) damage to safety-related structures and equipment. The editorial and grammatical changes for BFN Units 1, 2 and 3 are acceptable on the basis that they do not result in any actual changes to the facilities' operability and surveillance requirements.

5.0 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.

6.0 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 changes the 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 (59 FR 630). 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.

7.0 CONCLUSION

The Commission has concluded, based upon 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 (3) issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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