

November 12, 1993

Docket No. 50-260

Tennessee Valley Authority  
ATTN: Dr. Mark O. Medford, Vice President  
Technical Support  
3B Lookout Place  
1101 Market Street  
Chattanooga, Tennessee 37402-2801

Dear Dr. Medford:

SUBJECT: ISSUANCE OF A TECHNICAL SPECIFICATION AMENDMENT TO FACILITATE  
MODIFICATION OF THE REACTOR VESSEL WATER LEVEL INSTRUMENTATION  
SYSTEM TO ADDRESS CONCERNS IDENTIFIED IN NRC BULLETIN 93-03  
BROWNS FERRY, UNIT 2 (TS 343T) (TAC NO. M87734)

The Commission has issued the enclosed Amendment No. 219 to Facility Operating License No. DPR-52 for the Browns Ferry Nuclear Plant (BFN), Unit 2. This amendment is in response to your application dated September 15, 1993, as supplemented on October 26, 1993, requesting a change to the BFN Technical Specifications Table 3.2.B, "Instrumentation that Initiates or Controls the Core and Containment Cooling Systems," to facilitate a modification of the reactor vessel water level instrumentation system. The purpose of the modification is to eliminate level indication errors caused by dissolved, noncondensable gases in the instrumentation reference legs coming out of solution during plant depressurizations. Such level indication errors were the subject of NRC Bulletin 93-03, "Resolution of Issues Related to Reactor Vessel Water Level Instrumentation in BWRs."

A copy of the NRC's Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,

ORIGINAL SIGNED:  
Frederick J. Hebdon, Director  
Project Directorate II-4  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 219 to License No. DPR-52
2. Safety Evaluation

cc w/enclosures:  
See next page

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DATE:	11/18/93	11/18/93	11/9/93	11/10/93	11/12/93

DOCUMENT NAME: G:\BFN\TS343T.AMD

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*DFC*

Tennessee Valley Authority  
ATTN: Dr. Mark O. Medford

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## BROWNS FERRY NUCLEAR PLANT

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AMENDMENT NO. 219 FOR BROWNS FERRY UNIT 2 - DOCKET NO. 50-260  
DATED: November 12, 1993

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cc: Plant Service list



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

TENNESSEE VALLEY AUTHORITY  
DOCKET NO. 50-260  
BROWNS FERRY NUCLEAR PLANT, UNIT 2  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 219  
License No. DPR-52

The Nuclear Regulatory Commission (the Commission) has found that:

- A. The application for amendment by Tennessee Valley Authority (the licensee) dated September 15, 1993, as supplemented on October 26, 1993, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
- B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
- C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
- D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
- E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

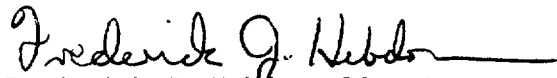
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-52 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 219, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Frederick J. Heddon, Director  
Project Directorate II-4  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: November 12, 1993

ATTACHMENT TO LICENSE AMENDMENT NO. 219

FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change. An overleaf\* page is provided to maintain document completeness.

REMOVE

3.2/4.2-14  
3.2/4.2-15

INSERT

3.2/4.2-14  
3.2/4.2-15\*

TABLE 3.2.B  
INSTRUMENTATION THAT INITIATES OR CONTROLS THE CORE AND CONTAINMENT COOLING SYSTEMS

Unit	BFN	Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2		2	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D)	≥ 470" above vessel zero.	A	1. Below trip setting initiates HPCI.
		2	Instrument Channel - Reactor Low Water Level (LIS-3-58A-D)	≥ 470" above vessel zero.	A	1. Multiplier relays initiate RCIC.
3.2/4.2-14		*2	Instrument Channel - Reactor Low Water Level (LS-3-58A-D)	≥ 398" above vessel zero.	A	1. Below trip setting initiates CSS. Multiplier relays initiate LPCI. 2. Multiplier relay from CSS initiates accident signal (15).
		2(16)	Instrument Channel - Reactor Low Water Level (LS-3-58A-D)	≥ 398" above vessel zero.	A	1. Below trip settings, in conjunction with drywell high pressure, low water level permissive, ADS timer timed out and CSS or RHR pump running, initiates ADS. 2. Below trip settings, in conjunction with low reactor water level permissive, ADS timer timed out, ADS high drywell pressure bypass timer timed out, CSS or RHR pump running, initiates ADS.
		1(16)	Instrument Channel - Reactor Low Water Level Permissive (LIS-3-184, 185)	≥ 544" above vessel zero.	A	1. Below trip setting permissive for initiating signals on ADS.
		1	Instrument Channel - Reactor Low Water Level (LIS-3-52 and LIS-3-62A)	≥ 312 5/16" above vessel zero. (2/3 core height)	A	1. Below trip setting prevents inadvertent operation of containment spray during accident condition.

\*Only one trip system will be required to be OPERABLE during the period that the Reactor Vessel water level instrumentation modification requested by NRC Bulletin 93-03 is being performed, provided that the reactor is in the COLD SHUTDOWN CONDITION. Manual and automatic initiating capability of CSS and LPCI will be available, but with a reduced number of instrument channels.

TABLE 3.2.B (Continued)

Minimum No. Operable Per Trip Sys(1)	Function	Trip Level Setting	Action	Remarks
2(18)	Instrument Channel - Drywell High Pressure (PIS-64-58 E-H)	$1 \leq p < 2.5$ psig	A	1. Below trip setting prevents inadvertent operation of containment spray during accident conditions.
2(18)	Instrument Channel - Drywell High Pressure (PIS-64-58 A-D)	$\leq 2.5$ psig	A	1. Above trip setting in conjunction with low reactor pressure initiates CSS. Multiplier relays initiate HPCI. 2. Multiplier relay from CSS initiates accident signal. (15)
2(18)	Instrument Channel - Drywell High Pressure (PIS-64-58A-D)	$\leq 2.5$ psig	A	1. Above trip setting in conjunction with low reactor pressure initiates LPCI.
2(16)(18)	Instrument Channel - Drywell High Pressure (PIS-64-57A-D)	$\leq 2.5$ psig	A	1. Above trip setting, in conjunction with low reactor water level, low reactor water level permissive, ADS timer timed out, and CSS or RHR pump running, initiates ADS.

BFN  
Unit 2

3.2/4.2-15





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

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

AMENDMENT NO.219 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 September 15, 1993 (Ref. 1) and supplemented on October 26, 1993 (Ref. 2), the Tennessee Valley Authority (the licensee) requested a temporary change to the Browns Ferry Nuclear Plant Unit 2 (BFN2) Technical Specifications (TS). The proposed temporary change allows specific reactor vessel water level instrumentation to be out of service in order to perform the reactor vessel water level instrumentation modification requested by NRC Bulletin (NRCB) 93-03 (Ref. 3). NRCB 93-03 requests that Boiling Water Reactor (BWR) plants implement modifications to their reactor vessel water level instrumentation lines to prevent erroneous high level indications due to dissolved noncondensable gases in the instrumentation reference water level legs coming out of solution during plant depressurizations.

The proposed temporary TS change would allow only one trip system for initiation of the Core Spray System (CSS) and Low Pressure Coolant Injection (LPCI) to be required operable during the time period that the level instrumentation is being modified while in cold shutdown. This would encompass the time from when the first reactor vessel water level instrument is taken out of service until all the affected instrumentation is returned to operation. It is expected that this period will not exceed 14 days. Manual and automatic initiating capability of the CSS and LPCI will be available, but with a reduced number of instrument channels.

This change was requested to provide an alternative to having to remove the reactor head, flood the vessel cavity, and remove the spent fuel pool gates in order to meet the current TS requirements for the CSS and LPCI functions of the Emergency Core Cooling System (ECCS). Measures are specified to compensate for this TS change that will maintain automatic initiation capability from the remaining trip system channel and provide water level indication from other sensors. The compensatory measures will also reduce the probability of a vessel drain down event and, if one were to occur, keep the required equipment available to mitigate the loss of level. Operators will

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also be trained and kept aware of the special plant conditions and of situations in which they may be required to manually initiate the safety functions.

BFN2 has requested this TS change in order to complete the NRCB 93-03 modifications. The licensee intends to complete the modifications during the next cold shutdown of BFN2. The licensee needs the temporary change to avoid plant evolutions that would not otherwise be necessary.

The October 26, 1993 supplement provided clarifying information which did not affect the initial proposed no significant hazards consideration determination.

## 2.0 EVALUATION

NRCB 93-03 expresses NRC staff concern about noncondensable gases that may become dissolved in the reference legs of BWR water level instrumentation and lead to a false high level indication during rapid depressurization events and also during normal plant depressurization. Interim compensating measures and long term system modifications are requested to be implemented by certain action dates. The long term modifications to ensure proper water level indication were requested to be completed at the next cold shutdown beginning after July 30, 1993.

Reference 4 presents the TVA response to NRCB 93-03 and indicates that the long term modification to prevent build up of noncondensable gases in the water level reference legs will be to inject Control Rod Drive (CRD) system charging water into the reference legs. BFN Units 1 and 3 are currently shut down and will implement the modifications before their respective restarts. Unit 2 is currently operating, and the licensee intends to complete the modifications during the next cold shutdown. It is not anticipated that BFN2 will enter into a refueling outage in the near future. The modifications will entail removing each water level reference leg from service (one at a time) and adding piping and connections from the CRD charging water line to a section of tubing on the reference leg between the level transmitter and the containment wall. The low water level trip signal will be bypassed by opening the level sensor equalizing valve, which will cause a high water level signal.

The BFN2 ECCS automatic initiation logic requires that a minimum of two instrument channels be operable to satisfy a 1-out-of-2 taken twice logic on low reactor vessel water level. When in cold shutdown, inoperability of the CSS and LPCI system (including inoperability of the automatic initiation function) is only permitted by the TS under certain conditions. Under current BFN2 TS, automatic initiation of the CSS and LPCI system is not required when the plant is in cold shutdown, the vessel head is removed, the reactor vessel cavity is flooded, and the spent fuel pool gates are removed. The licensee argues that the proposed modifications can be safely completed without having to perform those plant evolutions, provided that compensatory measures are taken and a temporary TS change is approved. The licensee further argues that those evolutions would significantly extend any forced or planned outage during which the modifications are implemented. The licensee, therefore,

proposes a temporary TS change which reduces the number of reactor vessel water level trip systems that are required to be operable.

The modifications will tie the CRD system into a specifically selected point on the reference leg tubing. The point of this connection was chosen to minimize the impact of CRD system hydraulic noise, to avoid unnecessary wear of the differential pressure cells, and to allow instrument calibration and maintenance to be performed without having to take the continuous backfill system out of service. The plant will be kept in a cold shutdown condition and depressurized during the completion of the NRCB 93-03 modification. Each reference leg must be removed from service to complete the modification and therefore a temporary TS change is necessary to avoid the extra plant evolutions needed to meet the current TS requirements.

The worst case accident for a plant in cold shutdown and the reactor vessel at atmospheric pressure is considered to be an inadvertent drain down of the reactor vessel due to a break in shutdown cooling piping, a leak in the reactor coolant pressure boundary due to maintenance or valve mispositioning, or a recirculation pump seal failure. To reduce the probability of this event and to raise the awareness level of the operators to take mitigative actions with one trip system out of service, the following compensatory measures will be implemented as commitments:

- 1) The plant will be in a cold shutdown condition with the primary system temperature at less than 212 degrees fahrenheit.
- 2) While in a cold shutdown condition, the reactor vessel will be vented through the reactor vessel head vent and the reactor vessel will be at atmospheric pressure.
- 3) Any refueling operations, core alterations, or other activities with the potential to drain the reactor vessel will be suspended. (Additionally, electrical interlocks exist to prevent (1) simultaneous alignment to shutdown cooling suction and suppression pool suction or, (2) shutdown cooling suction and injection into the suppression pool via the test return line or, (3) alignment of the shutdown cooling suction to the suppression pool via minimum flow lines for idle residual heat removal pumps.)
- 4) The reactor vessel water level instrumentation associated with the reference leg not being modified will be operable prior to removing the other reference leg from service.
- 5) The remaining reactor vessel water level instruments not affected by the removal of a reference leg from service will be operable. (This includes indication-only instruments such as 2-LI-3-55.)
- 6) Operators will receive special training to ensure that they are fully cognizant of the instruments which will be out of service and the degraded automatic response capability of the plant.

- 7) An operator aid will be posted on the control room panels to identify the instruments which will be out of service and the degraded automatic response capability of the plant.

The probability of loss of water and the need for automatic CSS and LPCI initiation is considered to be remote during the time that one trip system is out of service. The other ECCS reference leg and its associated reactor vessel water level instrumentation will remain in service and be capable of initiating the CSS, LPCI, and the multiplier relay from the CSS that initiates an accident signal. If it is, however, assumed that there is a primary system leak and a single failure of the remaining water level trip system, compensatory measures will be in place which will assure that alternate water level indications exist, equipment is available to mitigate a lowering of water level, and operators are aware of plant special conditions and can, as necessary, manually initiate safety functions.

In summary, the modifications can be safely made with only one trip system in service for the actuation of ECCS while in cold shutdown. A temporary change to the TS is necessary to reduce the number of required trip systems from two (2) to one (1) during the time period of the modification work. The primary justifications for this temporary change are as follows:

- 1) the low primary system temperature and pressure,
- 2) the low probability of an event that would result in the drain down of the reactor vessel,
- 3) the automatic initiating capability of the remaining reactor vessel water level trip system,
- 4) the compensatory measures, and
- 5) the other reactor vessel level instrumentation and equipment that is available for manual operator intervention in the event of a plant transient or accident.

The reasoning and compensatory actions to justify the temporary TS change for the reactor vessel water level instrumentation have been reviewed, and the staff concludes they are acceptable. Based on the implementation of the plant conditions and compensatory measures discussed above, the proposed temporary TS change is acceptable for BFN2 during the period that the NRCB 93-03 modification is being completed.

### 3.0 TECHNICAL SPECIFICATIONS

The following temporary change to the BFN2 TS is proposed in the application:

In Table 3.2.B, Instrumentation that Initiates or Controls the Core and Containment Cooling Systems, the Minimum Number Operable Per Trip System

column for reactor low water level instrument channels (LS-3-58A-D) will be annotated with an asterisk (\*). A footnote will be added to the bottom of Table 3.2.B as follows:

- \* - Only one trip system will be required to be OPERABLE during the period of time that the Reactor Vessel water level instrumentation modification requested by NRC Bulletin 93-03 is being performed, provided that the reactor is in the COLD SHUTDOWN CONDITION. Manual and automatic initiating capability of CSS and LPCI will be available, but with a reduced number of instrument channels.

As discussed in the previous section, this temporary change is considered acceptable, when implemented with the compensatory measures for the time period necessary to complete the NRCB 93-03 modifications while in cold shutdown.

#### 4.0 CONCLUSION

The Tennessee Valley Authority has proposed a temporary change to the BFN2 TS. The proposed temporary change allows specific reactor vessel water level instrumentation to be out of service in order to perform the reactor vessel water level instrumentation modifications requested by NRC Bulletin 93-03. Automatic and manual initiation of CSS and LPCI will be available, but with a reduced number of instrument channels. Compensatory measures are taken to lower the probability of a reactor vessel drain down accident and to ensure operators would be able to manually respond to any reactor vessel water level drop.

Upon review of the application, the applicable Technical Specification, and compensatory measures, the staff concludes that plant safety is not adversely affected by the temporary change and it is acceptable provided the specified plant conditions and the compensatory measures are implemented.

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, (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.

#### 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 amendment changes 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 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 (58 FR 51120). Accordingly, the amendment meets 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 amendment.

## 7.0 REFERENCES

1. Letter (TVA-BFN-TS-343T) from O. J. Zeringue (TVA) to USNRC dated September 15, 1993 transmitting an Application for Temporary Amendment to Browns Ferry Nuclear Plant Unit 2 Operating License.
2. Letter from P. Salas (TVA) to USNRC dated October 26, 1993 transmitting supplement 1 to Temporary Technical Specification No. 343T - Reactor Vessel Water Level Instrumentation - Unit 2.
3. NRC Bulletin 93-03, "Resolution of Issues Related to Reactor Vessel Water Level Instrumentation in BWRs," May 28, 1993.
4. Letter from O. J. Zeringue to USNRC dated July 30, 1993 transmitting Browns Ferry Nuclear Plants response to NRC Bulletin (NRCB) 93-03.

Principal Contributors: Jonathan Witter and David Trimble

Date: November 12, 1993