

March 6, 2002

Mr. J. A. Scalice  
Chief Nuclear Officer and  
Executive Vice President  
Tennessee Valley Authority  
6A Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2 AND 3 — ISSUANCE OF  
AMENDMENTS REGARDING FUEL MOVEMENT WITH INOPERABLE  
REFUELING EQUIPMENT INTERLOCKS AND USE OF CONTROL ROD  
WITHDRAWAL BLOCKS AND CONTROL RODS INSERTED  
(TAC NOS. MB2590, MB2591, AND MB2592)

Dear Mr. Scalice:

The Commission has issued the enclosed Amendment Nos. 242, 274, and 232 to Facility Operating Licenses Nos. DPR-33, DPR-52 and DPR-68 for the Browns Ferry Nuclear Plant, Units 1, 2, and 3, respectively. These amendments are in response to your application dated August 10, 2001, and supplemented February 11, 2002.

The amendments would revise Technical Specification 3.9.1, "Refueling Equipment Interlocks," to allow in-vessel fuel movement to continue with inoperable refueling equipment interlocks provided that (1) control rod withdrawals are blocked, and (2) all control rods are verified to be inserted.

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

Sincerely,

**/RA/**

Kahtan N. Jabbour, Senior Project Manager, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-259, 50-260 and 50-296

Enclosures: 1. Amendment No. 242 to  
License No. DPR-33  
2. Amendment No. 274 to  
License No. DPR-52  
3. Amendment No. 232 to  
License No. DPR-68  
4. Safety Evaluation

cc w/enclosures: See next page

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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-259

BROWNS FERRY NUCLEAR PLANT UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 242  
License No. DPR-33

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated August 10, 2001, as supplemented February 11, 2002, 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-33 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 242, 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 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

**/RA/**

Richard P. Correia, Chief, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 6, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 242

FACILITY OPERATING LICENSE NO. DPR-33

DOCKET NO. 50-259

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

3.9-1

B 3.9-4

B 3.9-5

INSERT

3.9-1

B 3.9-4

B 3.9-5

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-260

BROWNS FERRY NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 274  
License No. DPR-52

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated August 10, 2001, as supplemented February 11, 2002, 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. 274, 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 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Richard P. Correia, Chief, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 6, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 274

FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

3.9-1

B 3.9-4

B 3.9-5

INSERT

3.9-1

B 3.9-4

B 3.9-5

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-296

BROWNS FERRY NUCLEAR PLANT, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 232  
License No. DPR-68

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated August 10, 2001, as supplemented February 11, 2002, 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-68 is hereby amended to read as follows:

2. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 232, 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 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

**/RA/**

Richard P. Correia, Chief, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 6, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 232

FACILITY OPERATING LICENSE NO. DPR-68

DOCKET NO. 50-296

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

3.9-1

B 3.9-4

B 3.9-5

INSERT

3.9-1

B 3.9-4

B 3.9-5

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 242 TO FACILITY OPERATING LICENSE NO. DPR-33  
AMENDMENT NO. 274 TO FACILITY OPERATING LICENSE NO. DPR-52  
AMENDMENT NO. 232 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 August 10, 2001, as supplemented February 11, 2002, the Tennessee Valley Authority (the licensee) submitted a request for changes to the Browns Ferry Nuclear Plant, Units 1, 2, and 3 Technical Specifications (TS). The requested changes would revise TS 3.9.1, "Refueling Equipment Interlocks," which requires the refueling equipment interlocks to be operable during in-vessel fuel movement. The amendment request would allow in-vessel fuel movement to continue with inoperable refueling equipment interlocks, provided (1) control rod withdrawals are blocked and (2) all control rods are verified to be inserted. The February 11, 2002, letter provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

## 2.0 BACKGROUND

The reactivity of boiling water reactor cores during refueling can be changed by either control rod withdrawals or fuel movement and TS 3.9.1 enforces the objective that two activities that change the core reactivity should not be performed simultaneously. Also, General Design Criterion 26 of Appendix A to Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR) requires that one of the independent reactivity control systems be capable of holding the reactor subcritical under cold conditions. The control rods serve as the reactivity control system that ensure the core is kept subcritical when the core reactivity is being changed by fuel loading.

In addition, Section 15.4 of the updated final safety analysis report assumes that the refueling interlocks are functioning and will prevent reactivity-initiated events. The refueling interlocks (the all-rod-in, one-rod-out, refueling platform position, refueling platform main hoist, and service platform hoist fuel loaded) are designed to physically minimize the possibility of reactivity-initiated events by restricting combinations of fuel movements and control rod withdrawals. With the reactor mode switch in the refuel position, the refueling equipment interlocks receive and process signals from the refueling equipment interlocks to block control rod movement or operation of the fuel loading equipment. The all-rods-in interlock receives and processes full-in position indications from all the control rods and gives an all-rods-in permissive signal for the operation of the refueling platform, main hoist grapple, and service platform. The refueling platform position interlock deenergizes if there is no all-rod-in permissive and the platform is near or over the core. The refueling platform main hoist interlock also deenergizes if there is no all-rods-in permissive signal and the interlock detects loading indicative of a fuel

assembly. Therefore, the refueling equipment interlock logic combines the all-rods-in permissive signal, the position indication of the refueling platform, and the loading of the main hoist grapple and the service platform to prevent fuel movement over the core if all control rods are not inserted and blocks all control rods withdrawals if fuel movement is in progress.

In addition, the cores are designed with sufficient shutdown margin to ensure that the core will remain subcritical with the highest worth control rod withdrawn to its full-out position. With one control rod withdrawn, the one-rod-out interlock prevents the selection or withdrawal of a second control rod.

The refueling TS in Section 3.9 enforce the functions of these refueling interlocks, since these interlocks are design basis assumptions intended to preclude fuel loading and control rod withdrawal errors.

### 3.0 PROPOSED TS REVISION

The licensee proposes to revise TS 3.9.1 of the Browns Ferry Units 1, 2 and 3 TS as follows.

#### Proposed Change in TS 3.9.1

Currently TS 3.9.1 Requires	<p>The refueling equipment interlocks shall be operable.</p> <p><b>Applicability:</b> During in-vessel fuel movement with equipment associated with the interlocks.</p> <p><b>ACTIONS A.</b> One or more required refueling equipment interlock inoperable.</p> <p>A1: immediately suspend in-vessel fuel movement with equipment associated with the inoperable interlock(s)</p>
Proposed TS 3.9.1	<p>The refueling equipment interlocks shall be operable.</p> <p><b>Applicability:</b> During in-vessel fuel movement with equipment associated with the interlocks.</p> <p><b>ACTIONS A.</b> One or more required refueling equipment interlocks inoperable.</p> <p>A1: Immediately suspend in-vessel fuel movement with equipment associated with the inoperable interlock(s)</p> <p>OR</p> <p>A2.1 Immediately insert a control rod withdrawal block</p> <p>AND</p> <p>A2.2 Verify all control rods are fully inserted</p>

## 4.0 EVALUATION

### 4.1 Licensee's Justification

The licensee stated that the refueling interlocks block control rod withdrawals whenever fuel is being moved over or in the reactor vessel. Conversely, when a control rod is withdrawn, the refueling interlocks prevent fuel being moved over or in the vessel. Therefore, the interlocks permit fuel loading to continue without the need to have a control rod withdrawal block in effect at all times. Since the first safety function of the interlocks is to block control rod withdrawal during in-vessel fuel movement, the proposed Action A.2.1 would provide the same function by requiring continuous control rod withdrawal block. The second safety function of the refueling equipment interlock is to prevent in-vessel fuel movement when a control rod is already withdrawn. Action A.2.2. requires that all control rods be verified to be fully inserted, while the A.2.1 prevents control rods from being withdrawn. This verification would be done in conjunction with the 12-hour control rod position verification required in surveillance requirement (SR) 3.9.3.1. These proposed actions would ensure that control rods are not and cannot be inappropriately withdrawn because an electrical or hydraulic block will prevent the control rod withdrawals. Misloading of fuel in cells with control rods withdrawn and control rod withdrawals during fuel movement would also be prevented. The licensee concluded that the proposed alternative Actions (A.2.1 and A.2.2) would equivalently satisfy the safety objective of maintaining the reactor subcritical in cold shutdown conditions during all fuel movements and accidents by verifying all rods are fully inserted and by prohibiting control rod withdrawal.

The licensee stated that the proposed change would be beneficial by allowing refueling activities to continue in the event one or more of the refueling equipment interlocks fail, while continuing to maintain a sufficient level of protection against inadvertent criticality. In addition, the related SR 3.9.1.1, "Refueling Equipment Interlocks Channel Functional Test," has a 7-day frequency. If the 7-day test comes due shortly before the completion of the fuel movement activities, Actions A.2.1 and A.2.2 would also be beneficial. Under these proposed actions, the licensee can continue the in-vessel fuel movement, rather than halting the refueling activities to perform the SR. This would be especially true if the fuel movement was on critical path for the outage. Continuing the fuel movement operation reduces the risk associated with halting and resuming the fuel movement activities. The licensee added that the amendment does not request an extension of the 7-day frequency required by SR 3.9.1.1.

### 4.2 Staff's Evaluation:

The refueling equipment interlocks' logic combines the input signals indicating refueling and service platform loading and grapple hoist loading, and the all-rod-in permissive signals to detect and physically prevent in-vessel fuel movement unless all control rods are inserted. The staff agrees with the licensee that a continuous control rod withdrawal block during fuel movement would prevent inadvertent control rod withdrawal. A continuous control rod withdrawal block in conjunction with successful verification that all control rods are at the full-in position would provide adequate assurance that all control rods are inserted and remain inserted while fuel movement is in progress.

The proposed Action A.2.2 would replace an automatic all-rod-in permissive feature with verification that all control rods are inserted, which is subject to human error. However, the A.2.2 verification would be augmented by the 12-hour control rod position verification required in SR 3.9.3.1, providing additional assurance through the greater verification frequency. In addition, the staff agrees with the licensee that halting fuel movement operations to perform a different refueling activity entails a certain amount of risk associated with operator errors.

The staff understands that the proposed change is not intended to disable the refueling interlocks indefinitely. The alternative option (A.2.1 and A.2.2) is merely intended to provide the licensee with the flexibility to continue fuel movements under certain circumstances. It is also the staff's understanding that the licensee will perform SR 3.9.1.1 before starting in-vessel fuel movement and that the licensee does not intend to declare the refueling equipment interlocks inoperable, and enter into Actions A.2.1 and A.2.2, deferring SR 3.9.1.1.

This amendment will not affect any requirements that involve the operability and reliability of the refueling equipment hardware. Any TS or SR (whether in the TS or licensee-controlled documents) that ensures that the refueling platform and the fuel grapple main hoist are operable and can perform their functions will remain in force. The amendment involves only the instrumentation and logic of the refueling equipment interlocks.

Therefore, the staff accepts the proposed changes in TS 3.9.1 for Browns Ferry Units 1, 2, and 3, since these changes would provide adequate protection against inadvertent criticality during in-vessel fuel movement if the refueling equipment interlocks become inoperable.

## 5.0 CONCLUSION

The staff has evaluated the impact of the proposed change on SR 3.9.1.1 and finds it acceptable because

- the proposed change will adequately compensate for the functions of the inoperable refueling equipment interlocks,
- the refueling equipment hardware will still be required to be operable,
- the licensee will perform SR 3.9.1.1 before starting in-vessel fuel movements, and
- the objective of the proposed change is not to disable the refueling interlocks indefinitely but to provide flexibility under limited circumstances.

## 6.0 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.

## 7.0 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 (66 FR 57126). 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.

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

Principal Contributor: Zena Abdullahi, NRR

Date: March 6, 2002

Mr. J. A. Scalice  
Tennessee Valley Authority

**BROWNS FERRY NUCLEAR PLANT**

cc:

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