

March 21, 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 PLANT, UNITS 2 AND 3 - EXEMPTION FROM THE
REQUIREMENTS OF 10 CFR PART 50, APPENDIX G (TAC NOS. MB2751
AND MB2752)

Dear Mr. Scalice:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix G, for the Browns Ferry Plant, Units 2 and 3. This action is in response to your letter dated August 17, 2001, as supplemented by letters dated December 14, 2001, and February 6, 2002. The exemption allows Tennessee Valley Authority to apply the methodologies of the American Society of Mechanical Engineers (ASME) Code Case N-640, "Alternative Requirement Fracture Toughness for Development of P-T [pressure-temperature] Limit Curves for ASME B&PV Code, Section XI, Division 1," for the reactor vessel circumferential welds at Browns Ferry Plant, Units 2 and 3.

A copy of the exemption has been forwarded to the Office of the Federal Register for publication.

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. 50-260 and 50-296

Enclosure: Exemption

cc w/enclosure: See next page

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY PLANT, UNITS 2 AND 3
DOCKET NOS. 50-260 and 50-296
EXEMPTION

1.0 BACKGROUND

The Tennessee Valley Authority (TVA, the licensee) is the holder of Facility Operating License Nos. DPR-52 and DPR-68 which authorize operation of the Browns Ferry Plant, Units 2 and 3 (BFN 2 and 3), respectively. The licenses provide, among other things, that the facility is subject to all rules, regulations, and orders of the U.S. Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of a three boiling-water reactors located in Limestone County in the State of Alabama.

2.0 REQUEST/ACTION

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, requires that pressure-temperature (P-T) limits be established for reactor pressure vessels (RPVs) during normal operating and hydrostatic or leak rate testing conditions. Specifically, Appendix G to 10 CFR Part 50 states that “[t]he appropriate requirements on...the pressure-temperature limits and minimum permissible temperature must be met for all conditions.” Further, Appendix G of 10 CFR Part 50 specifies that the requirements for these limits are based on the application of evaluation procedures given in Appendix G to Section XI of the American Society of Mechanical

Engineers (ASME) Code. In this exemption, consistent with the current provisions of 10 CFR 50.55(a), all references are to the ASME Code denote the 1995 Edition of the ASME Code, including the 1996 Addenda.

In order to address the provisions of amendments to the BFN 2 and 3 Technical Specifications (TS) P-T limit curves, TVA requested in its submittal dated August 17, 2001, as supplemented December 14, 2001, and February 6, 2002, that the staff exempt the BFN 2 and 3 from the application of the specific requirements of Appendix G to 10 CFR Part 50, and substitute use of ASME Code Case N-640. ASME Code Case N-640 permits the use of an alternate reference fracture toughness curve for RPV materials for use in determining the P-T limits. The proposed exemption request is consistent with, and is needed to support, the BFN 2 and 3 TS amendments that were contained in the same submittals. The proposed BFN 2 and 3 TS amendments will establish revised P-T limits for heatup, cooldown, and inservice test limitations for the reactor coolant system (RCS) through 17.2 effective full-power years (EFPY) of operation for BFN 2 and through 13.1 EFPY of operation for BFN 3.

ASME Code Case N-640

The licensee has proposed an exemption to allow the use of ASME Code Case N-640 in conjunction with ASME Section XI, 10 CFR 50.60(a) and 10 CFR Part 50, Appendix G, to establish P-T limits for the BFN 2 and 3 RPVs.

The proposed TS amendments to revise the P-T limits for BFN 2 and 3 rely in part on the requested exemption and the application of ASME Code Case N-640. These revised P-T limits have been developed using the lower bound K_{IC} fracture toughness curve shown in ASME Section XI, Appendix A, Figure A-2200-1, in lieu of the lower bound K_{IA} fracture toughness curve of ASME Section XI, Appendix G, Figure G-2210-1, as the basis fracture toughness curve for defining the BFN 2 and 3 P-T limits.

Use of the K_{IC} curve as the basis fracture toughness curve for the development of P-T operating limits is more technically correct than the use of the K_{IA} curve. The K_{IC} curve appropriately implements the use of a relationship based on static initiation fracture toughness behavior to evaluate the controlled heatup and cooldown process of an RPV, whereas the K_{IA} fracture toughness curve codified into Appendix G to Section XI of the ASME Code was developed from the more conservative crack arrest and dynamic fracture toughness test data. The application of the K_{IA} fracture toughness curve was initially codified in Appendix G to Section XI of the ASME Code in 1974 to provide a conservative representation of RPV material fracture toughness. This initial conservatism was necessary due to the limited knowledge of RPV material behavior in 1974. However, additional knowledge has been gained about RPV materials which demonstrates that the lower bound on fracture toughness provided by the K_{IA} fracture toughness curve is well beyond the margin of safety required to protect the public health and safety from potential RPV failure. In addition, the P-T limit curves based on the K_{IC} fracture toughness curve will enhance overall plant safety by minimizing challenges to operators since requirements for maintaining a high vessel temperature during pressure testing would be lessened. Personnel safety would also be enhanced because of the corresponding lower temperatures which would exist inside containment as leakage walkdown inspections are conducted.

In summary, the ASME Section XI, Appendix G, procedure was conservatively developed based on the level of knowledge existing in 1974 concerning RPV materials and the estimated effects of operation. Since 1974, the level of knowledge about these topics has been greatly expanded. The NRC staff has determined that this increased knowledge permits relaxation of the ASME Section XI, Appendix G, requirements by application of ASME Code Case N-640, while maintaining, pursuant to 10 CFR 50.12(a)(2)(ii), the underlying purpose of the NRC regulations to ensure an acceptable margin of safety.

The NRC staff has reviewed the exemption request submitted by TVA and has concluded that the application of the technical provisions of the ASME Code Case N-640 provides sufficient margin in the development of RPV P-T limit curves for BFN 2 and 3 such that the underlying purpose of the NRC regulations continues to be met to ensure an acceptable margin of safety.

3.0 DISCUSSION

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50, when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present.

The staff has determined that an exemption would be required to approve the use of Code Case N-640. The staff examined the licensee's rationale to support the exemption request and concurred that the use of the Code Case would meet the underlying purpose of the regulations. Based upon a consideration of the conservatism that is explicitly incorporated into the methodologies of 10 CFR Part 50, Appendix G, Appendix G of the Code, and Regulatory Guide 1.99, Revision 2, the staff concludes that application of the Code Case as described would provide an adequate margin of safety against brittle failure of the RPV. This conclusion is also consistent with the determinations that the staff has reached for other licensees under similar conditions based on the same considerations.

The staff has examined the licensee's rationale to support the exemption request and concludes that the exemption under the special circumstances of 10 CFR 50.12(a)(2)(ii) is appropriate and that the methodology of Code Case N-640 may be used to revise the P-T limits for the BFN 2 and 3 RPVs such that the underlying purpose of 10 CFR Part 50, Appendix G, continues to be met to ensure an acceptable margin of safety.

4.0 CONCLUSION

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants the Tennessee Valley Authority an exemption from the requirements of 10 CFR 50, Appendix G, for Browns Ferry Plant, Units 2 and 3.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (67 FR 11721).

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

John A. Zwolinski, Director
Division of Licensing Project Management
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Dated at Rockville, Maryland, this 21st day of March 2002

Tennessee Valley Authority

BROWNS FERRY NUCLEAR PLANT

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