

SEP 17 1974

Docket Nos. 50-259 and 50-260

Tennessee Valley Authority  
ATTN: Mr. James E. Watson  
Manager of Power  
818 Power Building  
Chattanooga, Tennessee 37401

Gentlemen:

The Atomic Energy Commission has issued Amendment No. 5 (Change No. 6) to License No. DPR-33 and Amendment No. 2 (Change No. 6) to License No. DPR-52 (copies enclosed) for Browns Ferry Nuclear Plant Units 1 and 2, respectively.

Amendment No. 5 to (Unit 1) License No. DPR-33 revises the maximum average planar linear heat generation rate (MAPLHGR) curves; and describes modifications pertaining to pipe whip restraints.

Amendment No. 2 to (Unit 2) License No. DPR-52 revises the MAPLHGR curves. You were granted an exemption until the first refueling outage to General Design Criterion 4 with respect to high energy pipes outside containment for Unit 2 by Amendment No. 1 to License No. DPR-52, dated August 2, 1974.

The actions related to the MAPLHGR curves are in connection with your request dated June 3, 1974 and supplement thereto dated June 10, 1974. The modifications for the Unit 1 license on pipe whip restraints pertain to Amendment No. 49 to the application and a report submitted by your letter dated November 2, 1973 entitled "Concluding Report on the Effects of Postulated Pipe Failure Outside of Containment for Unit 1 of Browns Ferry Nuclear Plant."

Notices (2) of proposed issuance related to these amendments were published in the Federal Register on August 7, 1974, 39 FR 28452 (Unit 1); and August 9, 1974, 39 FR 28665 (Unit 2).

Copies of a related Safety Evaluation and Federal Register Notice are enclosed for your information.

Sincerely,  
Original signed by  
D.M. Crutchfield

(for) John F. Stolz, Chief  
Light Water Reactors Project Branch 3-1  
Directorate of Licensing

OFFICE >					
SURNAME >					
DATE	(see next page)				

SEP 17 1974

**Enclosures:**

1. Amendment No. 5 to License DPR-33  
(w/Change No. 6 to Appendix A)
2. Amendment No. 2 to License DPR-52  
(w/Change No. 6 to Appendix A)
3. Federal Register Notice
4. Safety Evaluation

**cc: Mr. Robert H. Marquis**  
General Counsel  
629 New Sprankle Building  
Knoxville, Tennessee 37919

bcc: J. R. Buchanan, ORNL  
Thomas B. Abernathy, DTIE  
A. Rosenthal, ASLAB  
N. H. Goodrich, ASLBP

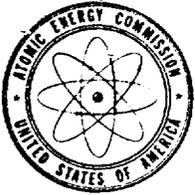
**Dr. Cecil Thomas**  
Tennessee Valley Authority  
303 Power Building  
Chattanooga, Tennessee 37401

**Mrs. Maude S. Miller, Librarian**  
Athens Public Library  
South and Forrest  
Athens, Alabama 35611

Distribution:

- AEC PDR
- Local PDR
- Docket File
- LWR 2-1 File
- Attorney, OGC
- Ro (3)
- N. Dube
- M. Jinks (w/4 encls per docket)
- V. A. Moore
- C. Hebron
- D. Foster
- A. Braitman
- F. Williams
- H. Smith
- S. Kari
- W. Miller
- D. Scaletti
- LWR 2 Branch Chiefs
- ACRS (16)
- Ellen Brown
- B. Scharf (50)

X 7391	L: LWR 2-1	L: LWR 2-1	L: LWR 2-1	OGC	L: AD: LWR 2-1
(782) OFFICE →	HSmith:ew	Williams	JFSto	R. Culp	VAMoore
SURNAME →	9/5/74	9/9/74	9/11/74	9/16/74	9/17/74
DATE →					



UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

TENNESSEE VALLEY AUTHORITY  
DOCKET NO. 50-259  
(BROWNS FERRY NUCLEAR PLANT, UNIT 1)  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 5  
License No. DPR-33

1. The Atomic Energy Commission (the Commission) having found that:
  - A. The application for amendment by the Tennessee Valley Authority (the licensee) dated June 3, 1974, and supplement thereto dated June 10, 1974, comply with the standards and requirements of the Atomic Energy Act of 1954, as amended, 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 public; and
  - E. No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.
2. Accordingly, the license is amended by a change to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 2.C.(2) of Amendment No. 2 to Facility 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, are hereby incorporated in the amended license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised by issued changes thereto through Change No. 6."

3. This license amendment is effective as of the date of its issuance.

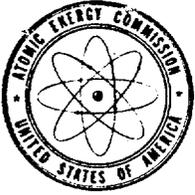
FOR THE ATOMIC ENERGY COMMISSION



Voss A. Moore, Assistant Director  
for Light Water Reactors, Group 2  
Directorate of Licensing

Attachment:  
Change No. 6 to Appendix A  
Technical Specifications

Date of Issuance: SEP 17 1974



UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

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

Amendment No. 2  
License No. DPR-52

1. The Atomic Energy Commission (the Commission) having found that:
  - A. The application for amendment by the Tennessee Valley Authority (the licensee) dated June 3, 1974, and supplement thereto dated June 10, 1974, comply with the standards and requirements of the Atomic Energy Act of 1954, as amended, 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 public; and
  - E. No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.
2. Accordingly, the license is amended by a change to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 2.C.(2) of Facility 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, are hereby incorporated in the amended license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised by issued changes thereto through Change No. 6."

3. This license amendment is effective as of the date of its issuance.

FOR THE ATOMIC ENERGY COMMISSION



Voss A. Moore, Assistant Director  
for Light Water Reactors, Group 2  
Directorate of Licensing

Attachment:  
Change No. 6 to Appendix A  
Technical Specifications

Date of Issuance: SEP 17 1974

CHANGE NO. 6

TO THE TECHNICAL SPECIFICATIONS

(APPENDIX A)

TENNESSEE VALLEY AUTHORITY

DOCKET NOS. 50-259 AND 50-260

(BROWNS FERRY NUCLEAR PLANT, UNITS 1 AND 2)

MAPLHGR

1. Delete the first paragraph on page 150 and replace with the following:

"The maximum average planar LHGR shown in Figure 3.5.1 is based on calculations employing the GEGAP III model described in the General Electric report NEDO - 20181, Revision 1. page 157."

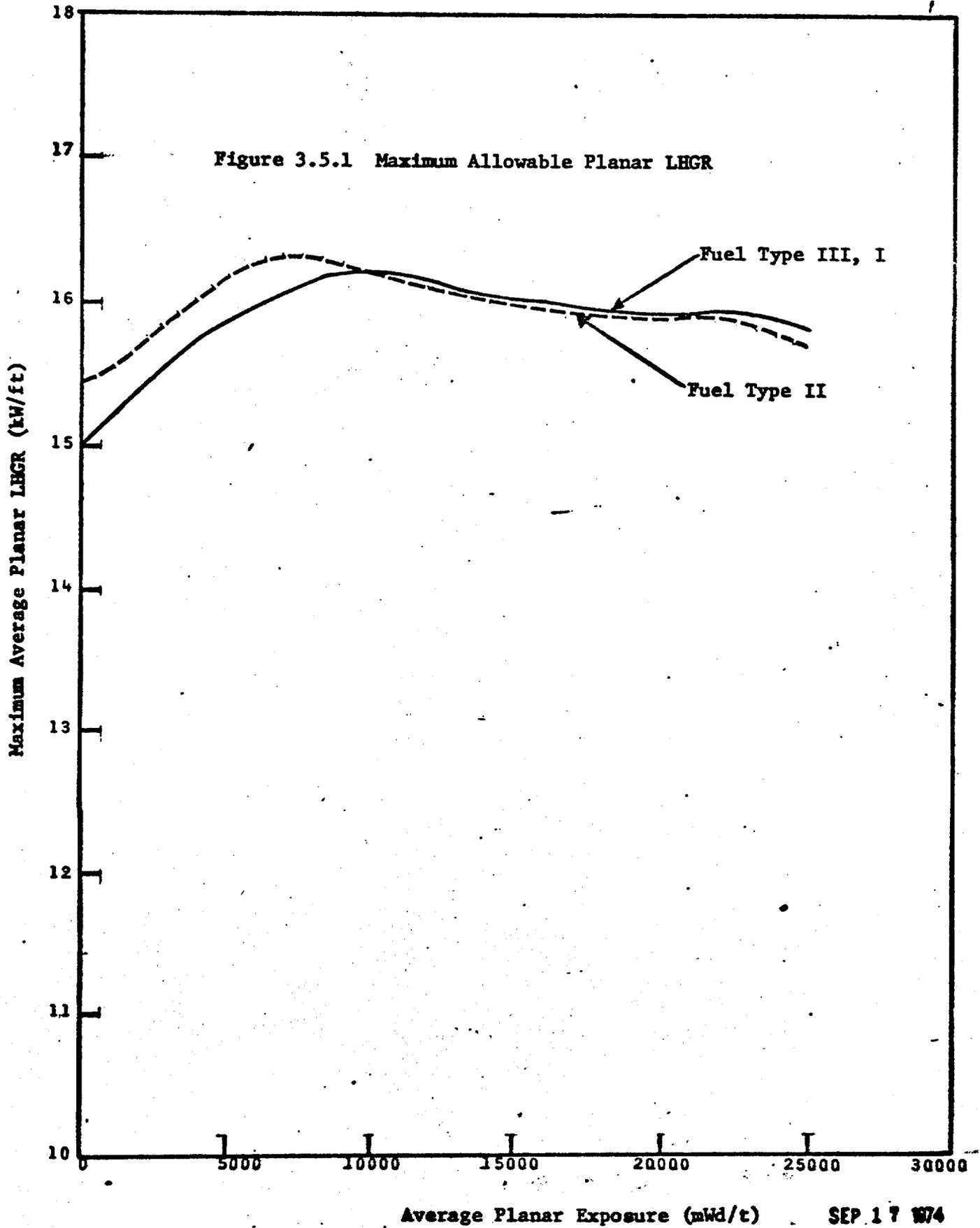
2. Delete the existing Figure 3.5.1 Maximum Allowable Planar LHGR (page 150-b) and insert the revised Figure 3.5.1 attached hereto.

High Energy Pipe Breaks

1. Add the following item 3 to Section 3.6.G Structural Integrity (page 157):

"3. Prior to startup of Unit 1 following the first refueling outage those modifications listed in 'Concluding Report on the Effects of Postulated Pipe Failure Outside of Containment for Unit 1 of the Browns Ferry Nuclear Plant' dated October 15, 1973 shall be completed. Regulatory Operations shall advise the Directorate of Licensing by written report that the work is complete."

Date: SEP 17 1974



Average Planar Exposure (mWd/t)

SEP 17 1974

150-b

Change No. 6

UNITED STATES ATOMIC ENERGY COMMISSION  
DOCKET NOS. 50-259 AND 50-260  
TENNESSEE VALLEY AUTHORITY  
NOTICE OF ISSUANCE OF AMENDMENTS TO FACILITY  
OPERATING LICENSES

Notice is hereby given that the U. S. Atomic Energy Commission (the Commission) has issued Amendment No. 5 to Facility Operating License No. DPR-33 and Amendment No. 2 to Facility Operating License No. DPR-52 to the Tennessee Valley Authority which revised Technical Specifications for operation of the Browns Ferry Nuclear Plant Units 1 and 2 located in Limestone County, Alabama. The amendments are effective as of their dates of issuance.

Amendment No. 5 to (Unit 1) License No. DPR-33 revises the maximum average planar linear heat generation rate (MAPLHGR) curves; and describes modifications pertaining to pipe whip restraints.

Amendment No. 2 to (Unit 2) License No. DPR-52 revises the MAPLHGR curves. The amendments to both licenses incorporate Change No. 6 in the Technical Specifications (Appendix A).

The application for the amendment and supplement thereto comply with the requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment.

For further details with respect to this action, see (1) the application for amendment dated June 3, 1974 and supplement thereto dated June 10, 1974; (2) Amendment No. 5 to License No. DPR-33 and Amendment No. 2 to License No. DPR-52, with any attachments; (3) the Commission's related

Safety Evaluation; (4) the Commission's Technical Report on Densification of General Electric Reactor Fuels, dated August 28, 1973, and Supplement 1 dated December 14, 1973; (5) Amendment No. 49 to the application; (6) the report entitled "Concluding Report on the Effects of Postulated Pipe Failure Outside of Containment for Unit 1 of Browns Ferry Nuclear Plant," transmitted by the licensee's letter dated November 2, 1973; and (7) the Directorate of Licensing's Safety Evaluation and Errata dated June 26, 1972, and Supplements 1 through 6 thereto. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. 20545, and at the Athens Public Library, South and Forrest, Athens, Alabama 35611.

A copy of items (2), (3), (4) and (7) may be obtained upon request addressed to the U. S. Atomic Energy Commission, Washington, D. C. 20545, Attention: Deputy Director for Reactor Projects, Directorate of Licensing - Regulation.

Dated at Bethesda, Maryland, this 17<sup>th</sup> day of September, 1974.

FOR THE ATOMIC ENERGY COMMISSION



John F. Stolz, Chief  
Light Water Reactors Project Branch 2-1  
Directorate of Licensing

SAFETY EVALUATION BY THE DIRECTORATE OF LICENSING

SUPPORTING AMENDMENT NO. 5 TO DPR-33

AND

AMENDMENT NO. 2 TO DPR-52

(CHANGE NO. 6 TO APPENDIX A OF TECHNICAL SPECIFICATIONS)

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT UNITS 1 AND 2

DOCKET NOS. 50-259 AND 50-260

ISSUANCE DATE: SEP 17 1974

## INTRODUCTION

By letters dated June 3, 1974, and June 10, 1974, Tennessee Valley Authority (TVA) requested changes to the Technical Specifications for the Browns Ferry Nuclear Plant Units 1 and 2 concerning limits imposed by fuel densification considerations.

With regard to Unit 1 modifications relating to high energy pipe breaks outside containment a statement requiring completion of these modifications prior to startup following the first refueling outage is being included in the Technical Specifications.

## DISCUSSION

### Fuel Densification - Units 1 and 2

Proposed change in TVA letter of June 3, 1974 and modified by TVA letter of June 10, 1974, would revise the Technical Specifications affected by fuel densification considerations. As a result of the Regulatory staff's review of fuel densification and its effect on reactor operation, limits were incorporated into the Technical Specifications for the Browns Ferry Nuclear Plant - Units 1 and 2 to assure that, even with the postulated effects of densification, neither the 18.5 Kw/ft design value for the linear heat generation rate (LHGR) or the 2300°F Interim Acceptance Criteria (IAC) limit on the calculated peak clad temperature following a postulated loss of coolant accident (LOCA) would be exceeded. The background analyses and references pertinent to those specifications were included in the AEC Regulatory staff reports "Technical Report on Densification of General Electric Reactor Fuels" dated August 23, 1973 and "Supplement No. 5 to the Safety Evaluation by the Directorate of Licensing USAEC in the Matter of TVA Browns Ferry Nuclear Plant Units 1, 2, and 3 Docket Nos. 50-259, 260,

and 296" dated November 8, 1973.

Subsequently, General Electric (GE) submitted a report NEDO-20181, "GEGAP III, A Model for the Prediction of Pellet-Clad Thermal Conductance in BWR Fuel Rods", November 1973, with related proprietary information provided in NEDC-20181 Supplement I (Proprietary) November 1973. The AEC Regulatory staff has revised the GEGAP III model and has issued the report entitled "Supplement 1 to the Technical Report on Densification of General Electric Reactor Fuels" dated December 14, 1973. In a letter from D. J. Skovholt to J. H. Hinds dated December 5, 1973, required modifications were transmitted to GE in an enclosure entitled "Modified GE Model for Fuel Densification" and their incorporation into the GE model was acknowledged in a letter from J. H. Hinds to V. A. Moore dated December 12, 1973.

The GEGAP III pellet-clad thermal conductance model provides an exposure dependent gap conductance, including time dependent densification, time dependent gap closure due to fuel relocation, swelling and cladding creepdown and time dependent gap thermal conductivity due to release of fission products. As a result of the staff review several modifications to the GEGAP III model were incorporated which (1) employ constraints that conservatively limit the densification kinetics such that the maximum density occurs at a burnup no greater than 4000 MWD/TU, (2) requires the predicted density increase to be as high as that experienced by like fuel during an out-of-reactor resintering anneal of 1700°C for 24 hours (which has been found to predict conservatively the maximum observed in-reactor densification) and (3) applies a correction factor which conservatively reduces the effects of clad creepdown on gap closure. The staff has reviewed the GEGAP III model, as modified, and concluded that it is

suitably conservative for the evaluation of densification effects in BWR fuel and acceptable for incorporation into the GE fuel densification model.

The proposed Technical Specifications submitted by TVA are the result of applying the accepted GE model for fuel densification to the BFNPP Units 1 and 2. The GEGAP III model yields a calculated increase in in pellet-clad conductance primarily due to the significance of fuel relocation and associated gap closure. An increase in gap conductance causes a decrease in stored energy in the fuel rods which, for a given MAPLHGR value, reduces the calculated peak clad temperature following a postulated LOCA, or, conversely, allows a compensating increase in MAPLHGR for a constant calculated peak clad temperature. The limit curves for MAPLHGR specified in the proposed change represent limiting values on LHGR and peak clad temperature following a LOCA. The staff concludes that the limitations on the MAPLHGR given in Figure 3.5.1 combined with the local LHGR limitations given in Specification 3.5.J of the Technical Specifications will assure that even after accounting for postulated effects of fuel densification the calculated peak clad temperature for the design basis LOCA will not exceed 2300°F and the design limits on LHGR and MCHFR will be maintained during normal and transient operations.

High Energy Pipe Breaks Outside Containment - Unit 1

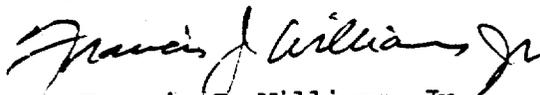
The applicant submitted by letter of November 2, 1973 a report entitled "Effects of Postulated Pipe Failure Outside of Containment for Unit 1 of the Browns Ferry Nuclear Plant." This report identified modifications required to the plant based on analysis of pipe breaks outside of containment and indicated that the modifications would be completed at the first refueling

outage of Unit 1. These modifications include pipe whip restraints for sections of High Pressure Coolant Injection (HPCI), Reactor Core Isolation, (RCIC), and Reactor Water Cleanup (RWCU) lines, and relocation and protection of certain instrumentation lines and electrical equipment.

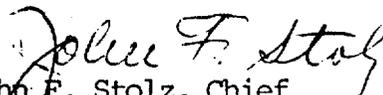
Item 2 of Supplement 6 to the Safety Evaluation for the Browns Ferry Nuclear Plant Units 1, 2 and 3 issued June 28, 1974 provided the staffs safety evaluation for deferring the same modification work for Unit 2 until its first refueling outage. This evaluation is directly applicable to Unit 1. The purpose of this change is to provide words in the Technical Specifications requiring that the Unit 1 work be completed prior to a startup of the Unit following its first refueling outage.

Conclusion

We have concluded, based on the reasons discussed above, that because the change does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the change does not involve a significant hazards consideration. We also conclude that 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 and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.



Francis J. Williams, Jr.  
Light Water Reactors Project Branch 2-1  
Directorate of Licensing



John F. Stolz, Chief  
Light Water Reactors Project Branch 2-1  
Directorate of Licensing

Date: SEP 17 1974