

September 21, 2006

Mr. Karl W. Singer  
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 EXTENSION OF CHANNEL CALIBRATION SURVEILLANCE REQUIREMENT PERFORMANCE FREQUENCY AND ALLOWABLE VALUE REVISION (TAC NOS. MC4070, MC4071, AND MC4072) (TS 447)

Dear Mr. Singer:

The Commission has issued the enclosed Amendment Nos. 260, 297, and 255 to Renewed 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 16, 2004, as supplemented by letters dated March 11, 2005, November 4, 2005, and April 14, 2006. These amendments extend the channel calibration frequency requirements for instrumentation in the high-pressure coolant injection, reactor core isolation cooling, and reactor water core isolation cooling systems.

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/**

Margaret H. Chernoff, Project Manager  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

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

Enclosures: 1. Amendment No. 260 to DPR-33  
2. Amendment No. 297 to DPR-52  
3. Amendment No. 255 to DPR-68  
4. Safety Evaluation

cc w/enclosures: See next page

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4. Safety Evaluation

cc w/enclosures: See next page

Package No.: ML062640009

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ADAMS Accession No.: ML062160077

\*No Legal Objection

NRR-058

OFFICE	LPL2-2/PE	LPL3-1	LPL2-2/PM	LPL2-2/LA	EICB/BC	OGC	LPL2-2/BC
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DATE	8/10/06	8/10/06	8/10/06	8/10/06	5/11/06	8/11/06	8/11/06

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SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 — ISSUANCE OF AMENDMENTS REGARDING EXTENSION OF CHANNEL CALIBRATION SURVEILLANCE REQUIREMENT PERFORMANCE FREQUENCY AND ALLOWABLE VALUE REVISION (TAC NOS. MC4070, MC4071, AND MC4072) (TS 447)

Dated: September 21, 2006

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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-259

BROWNS FERRY NUCLEAR PLANT UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 260  
Renewed 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 16, 2004, as supplemented by letters dated March 11, 2005, November 4, 2005, and April 14, 2006, 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 Renewed 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. 260, 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/*

L. Raghavan, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: September 21, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 260  
TO RENEWED FACILITY OPERATING LICENSE NO. DPR-33  
DOCKET NO. 50-259

Replace Page 3 of Renewed Operating License DPR-33 with the attached Page 3.

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

3.3-57

3.3-59

3.3-60

INSERT

3.3-57

3.3-59

3.3-60

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-260

BROWNS FERRY NUCLEAR PLANT, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 297  
Renewed 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 16, 2004, as supplemented by letters dated March 11, 2005, November 4, 2005, and April 14, 2006, 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 Renewed 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. 297, 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/*

L. Raghavan, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: September 21, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 297

TO RENEWED FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Replace Page 3 of Renewed Operating License DPR-52 with the attached Page 3.

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

3.3-60

3.3-61

INSERT

3.3-60

3.3-61

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-296

BROWNS FERRY NUCLEAR PLANT, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 255  
Renewed 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 16, 2004, as supplemented by letters dated March 11, 2005, November 4, 2005, and April 14, 2006, 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 Renewed 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. 255, 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/*

L. Raghavan, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: September 21, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 255  
TO RENEWED FACILITY OPERATING LICENSE NO. DPR-68  
DOCKET NO. 50-296

Replace Page 3 of Renewed Operating License DPR-68 with the attached Page 3.

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

3.3-60

3.3-61

INSERT

3.3-60

3.3-61

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 260  
TO RENEWED FACILITY OPERATING LICENSE NO. DPR-33  
AMENDMENT NO. 297 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-52  
AMENDMENT NO. 255 TO RENEWED 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 16, 2004, as supplemented by letters dated March 11, 2005, November 4, 2005, and April 14, 2006, the Tennessee Valley Authority (the licensee) submitted a request for changes to the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3 Technical Specifications (TSs). The requested changes would extend the channel calibration frequency requirements for instrumentation in the high pressure coolant injection, reactor core isolation cooling, and reactor water core isolation cooling systems.

The licensee's supplemental submittals dated March 11, 2005, November 4, 2005, and April 14, 2006, provided clarifying information that did not change the scope of the proposed amendment as described in the original notice of proposed action published in the *Federal Register* and did not change the initial proposed no significant hazards determination.

The licensee proposed the following specific changes to the TSs:

### Unit 1 TS Changes

- TS Section 3.3.6.1: Added a new surveillance requirement 3.3.6.1.7 which requires channel calibration to be performed every 24 months.
- TS Table 3.3.6.1-1, Functions 3.d, 3.e, 3.f, 3.g, 4.d, 4.e, 4.f, and 4.g: Change the surveillance frequency for channel calibration from 92 days to 24 months for high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) systems isolation on high area temperature.

- TS Table 3.3.6.1-1, Functions 5.a, 5.b, 5.c, 5.d, 5.e, and 5.f: Change the surveillance frequency for channel calibration from 122 days to 24 months for reactor water cleanup system (RWCU) isolation on high area temperature.
- TS Table 3.3.6.1-1, Functions 4.e, 4.f, and 4.g: Change the allowable value (AV) for these functions from  $\leq 155^{\circ}\text{F}$  to  $\leq 180^{\circ}\text{F}$ .
- TS Table 3.3.6.1-1, Function 5.e: Change the AV for this function from  $\leq 143^{\circ}\text{F}$  to  $\leq 170^{\circ}\text{F}$ .
- TS Table 3.3.6.1-1, Function 5.f : Change the AV for this function from  $\leq 170^{\circ}\text{F}$  to  $\leq 143^{\circ}\text{F}$ .

### Units 2 and 3 TS Changes

- TS Table 3.3.6.1-1, Functions 3.d, 3.e, 3.f, 3.g, 4.d, 4.e, 4.f, and 4.g: Change the surveillance frequency for channel calibration from 92 days to 24 months for HPCI and RCIC systems isolation on high area temperature.
- TS Table 3.3.6.1-1, Functions 5.b, 5.c, 5.d, 5.e, and 5.f: Change the surveillance frequency for channel calibration from 122 days to 24 months for RWCU system isolation on high area temperature.
- TS Table 3.3.6.1-1, Functions 4.e, 4.f, and 4.g: Change the AV for these functions from  $\leq 155^{\circ}\text{F}$  to  $\leq 180^{\circ}\text{F}$ .

## 2.0 EVALUATION

### 2.1 Regulatory Evaluation

Title 10, *Code of Federal Regulations* (10 CFR), Section 50.36, Paragraph (c)(3), "Surveillance Requirements," defines surveillance requirements as requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met. Also, 10 CFR Part 50, Appendix A, General Design Criterion 21, "Protection System Reliability and Testability," requires, in part, that the protection system be designed for high functional reliability and inservice testability such that no single failure results in loss of protection function and removal from service of any component or channel does not result in loss of the required minimum redundancy unless the acceptable reliability of operation of the protection system can be otherwise demonstrated.

The licensee based its evaluation on an analysis of instrument component drift performance, which the licensee stated met the guidance of Generic Letter (GL) 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle," rather than on a component reliability analysis as done in previous channel functional test evaluations. The licensee used a traditional engineering analysis instead of the guidance in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and RG 1.177, "An Approach for Plant-Specific Risk Informed Decision Making: Technical Specifications."

## 2.2 Technical Evaluation

### 2.2.1 Background

The high-pressure coolant injection (HPCI), reactor core isolation cooling (RCIC) and reactor water cleanup (RWCU) systems are affected by this license amendment request. The HPCI and RCIC systems provide high pressure make-up water to the reactor during accident and transient conditions. The RWCU system takes water from the reactor and circulates it through demineralizers for the removal of impurities before returning it to the reactor. Instrumentation are installed in the vicinity of the piping run for these systems to detect pipe rupture by high temperature in the area. These systems will be isolated on the high temperature in the vicinity of the pipes.

The primary purpose of surveillance testing is to assure that the components in a standby system (safety system) will be operable when needed. The risk contribution associated with the surveillance test interval is mainly due to the possibility that the component could fail between consecutive tests. Testing these components detects failures that may have occurred since the last surveillance, thus limiting the risk due to undetected failures. However, increasing the time between surveillance tests may also have some benefits. Increased surveillance intervals may reduce test-induced transients, test-caused failures, equipment wear, and reduce resource requirements for testing. The disadvantage is that the time that a component will be subject to failure (the fault exposure time) increases with an increased surveillance test interval.

The licensee, in its March 11, 2005, letter, stated that in order to accomplish the required calibration function for the HPCI and RCIC temperature instrumentation, plant personnel must access plant locations that involve fall hazards, high ambient temperature, and radiation dose rates, which are elevated relative to the general plant areas. Based on the operating experience at BFN Units 2 and 3, the licensee has determined that extending the surveillance test interval (STI) for these instruments will reduce personnel exposure by approximately 1 roentgen equivalent man per unit, per calendar year. Based on personnel safety and radiation exposure, the NRC staff finds that the licensee has demonstrated the operational need for this change.

### 2.2.2 Evaluation of TS Changes to Test Frequency

The licensee evaluated the proposed TS changes in accordance with the guidance provided in GL 91-04. In accordance with GL 91-04, the licensee should provide the following information to provide an acceptable basis for increasing the calibration interval for instruments that are used to perform safety functions:

- (1) Confirm that instrument drift as determined by as-found and as-left calibration data from surveillance and maintenance records have not, except on rare occasions, exceeded acceptable limits for a calibration interval.
- (2) Confirm that the values of drift for each instrument type (make, model, and range) and application have been determined with a high probability and a high degree of confidence. Provide a summary of the methodology and assumptions used to determine the rate of instrument drift with time based upon historical plant calibration data.

(3) Confirm that the magnitude of instrument drift has been determined with a high probability and a high degree of confidence for a bounding calibration interval of 30 months for each instrument type (make, model number, and range) and application that performs a safety function. Provide a list of the channels by TS section that identifies these instrument applications.

(4) Confirm that a comparison of the projected instrument drift errors has been made with the values of drift used in the setpoint analysis. If this results in revised setpoints to accommodate large drift errors, provide proposed TS changes to update trip setpoints. If the drift errors result in a revised safety analysis to support existing setpoints, provide a summary of the updated analysis conclusions to confirm that safety limits (SLs) and safety analysis assumptions are not exceeded.

(5) Confirm that the projected instrument errors caused by drift are acceptable for control of plant parameters to effect a safe shutdown with the associated instrumentation.

(6) Confirm that all conditions and assumptions of the setpoint and safety analyses have been checked and are appropriately reflected in the acceptance criteria of plant surveillance procedures for channel checks, channel functional tests, and channel calibrations.

(7) Provide a summary description of the program for monitoring and assessing the effects of increased calibration surveillance intervals of instrument drift and its effect on safety.

The licensee has performed a safety assessment of the proposed changes to the STI in accordance with the GL 91-04 guidance given above. This assessment entailed reviewing the historical maintenance and surveillance test data at the bounding STI limit, performing an evaluation to ensure that a 24-month STI for calibration test would not invalidate any assumptions in the plant licensing basis, and determining that the effect of the STI extension is small.

The licensee performed analysis of drift for these instruments for a 30-month calibration frequency (24 months plus 25 percent allowance tolerance) and used that drift number in the calculation to determine the AV. The acceptability of these AVs is discussed in Section 3.3 of this safety evaluation.

In general, the STI extension requests are usually supported by risk-information. However, the licensee stated in its letter dated April 14, 2006, that its probabilistic risk assessment model is only sensitive to the success/failure of the break isolation, and the model is insensitive to the precise point at which the isolation is accomplished. Thus, there will be no impact from the proposed TS changes to either core damage frequency or large early release frequency. Also, since the licensee demonstrated the operational need for extending the STI, as discussed above, the staff reviewed the licensee's engineering analysis to demonstrate that a failure of these temperature instruments will not be safety significant. The licensee reviewed the surveillance test history in support of the proposed change and did not identify any negative performance trend with either the bimetallic temperature switches used in the HPCI and RCIC systems or with the resistance temperature detector-based rack-mounted temperature loop

primarily used in the RWCU areas. The licensee has also stated that these same instruments have been used for other TS functions that are calibrated at 24-month intervals and that it did not identify any failure trend or drift problems with these instruments.

In its letter dated April 14, 2006, the licensee identified that, in the unlikely event HPCI and RCIC systems isolation capability is lost in such a manner as to be undetectable, the high steam flow detection instrumentation will automatically isolate on high flow for large breaks, or manual isolation of the system can be accomplished. The RWCU system can be manually isolated by the plant staff using plant procedures based on the indication of temperature and area radiation monitors. The licensee has not changed the STI for channel functional test (CFT) for these instruments (i.e., a CFT is required every 92 days for these instruments). The CFT will detect any gross failures of these instruments and the only undetectable failure could be from high drift for these instruments. Since the drift analysis for these instruments has been performed based on the NRC staff-approved methodology, as discussed in a Safety Evaluation dated September 14, 2006, the staff has reasonable assurance that there will not be any common mode failure that will affect all instrumentation at one time. Based on this, the licensee has determined that multiple safety and nonsafety related systems remain available, which are fully capable of supplying makeup water to the reactor and achieving and maintaining a hot shutdown condition, as described in the existing plant licensing basis, will not be affected.

Based on the above discussion, the licensee has demonstrated that BFN temperature instrumentation for these systems has operated reliably and, that, in the event of instrumentation failures, backups are available to the operator to take necessary corrective actions. Failure of these instruments will not result in any increase in safety significance. Therefore, the staff finds that the STI extension for channel calibration is acceptable.

### 2.2.3 TS Changes to AVs

The licensee proposed TS changes to certain instrument setpoint AVs. The licensee, in its letter of November 4, 2005, stated that none of these instruments perform a function related to the protection of a TS SL. Therefore, these instruments have been identified as limiting safety system setting instruments that are not SL-related. Since these instruments are not related to reactor protection system or emergency core cooling system functions that inject water into the core, the staff agrees with the licensee's classification. The staff reviewed the licensee's setpoint methodology used to calculate the nominal trip setpoint, acceptable as left (AAL) band, acceptable as found (AAF) band and the AV for these instruments. The AAL band has been calculated equivalent to calibration tolerance, and the AAF band has been determined based on the normal measurable accuracy for the test. Since there are no accident-related or other inaccuracies not measured during the test, the total loop uncertainties are the same as the AAF. The licensee has added additional conservatism in the analysis by increasing the margin between the AV and AAF values. The licensee established the nominal trip setpoint at a value that is more conservative than the limiting trip setpoint and AAL band combined. The NRC staff finds the licensee's method of calculation acceptable because it meets the requirements of 10 CFR 50.36. The licensee has also stated that its calibration procedure requires it to leave these instruments within the AAL band after each test. If the equipment is inoperable or is degraded, the licensee's procedure requires the technician to notify the Operations Department staff, take corrective actions to fix the problem, and document the problem for trending purposes. Based on the above, the NRC staff finds the licensee's proposed changes are acceptable.

Based on the above evaluation, the staff has determined that the licensee's proposed changes meet the requirements of 10 CFR 50.36(c)(3) and, therefore, are acceptable.

#### 2.2.4 Conclusion

On the basis of its review, the NRC staff concludes that the proposed methodologies to extend surveillance intervals for certain safety-related instrumentation components are consistent with the guidance in GL 91-04. The licensee has demonstrated that the effect of extending the surveillance interval to 24 months for channel calibration of these instruments is negligible and that the system will continue to perform within assumed limits during the longer surveillance interval. The staff finds the proposed setpoint AV changes are acceptable because they are based on the staff-approved methodology as discussed in Section 2.2.3 of this application.

### 3.0 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.

### 4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes surveillance requirements. 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 (71 FR 29680). 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.

### 5.0 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: Hukam C. Garg

Date: September 21, 2006

**BROWNS FERRY NUCLEAR PLANT**

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Tennessee Valley Authority  
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