Proprietary Information and Critical Energy Infrastructure Information
Withhold from Public Disclosure Under 10 CFR 2.390
This letter is decontrolled when separated from Attachments 6, 8 10, 12, 14, 16 18, 20, 22, 24, 26, 28, 30, 32, 34, 37, 40, and 43

Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-15-169

September 21, 2015

10 CFR 50.90

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Browns Ferry Nuclear Plant, Units 1, 2, and 3
Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68
NRC Docket Nos. 50-259, 50-260, and 50-296

Subject: **Proposed Technical Specifications Change TS-505 – Request for License Amendments – Extended Power Uprate**

Reference: Letter from TVA to NRC, "Technical Specifications Changes TS-431 and TS-418 – Extended Power Uprate (EPU) – Withdrawal of Requests and Update to EPU Plans and Schedules," dated September 18, 2014 (ADAMS Accession No. ML14265A487)

In accordance with the provisions of 10 *Code of Federal Regulations* (10 CFR) 50.90, "Application for amendment of license, construction permit, or early site permit," Tennessee Valley Authority (TVA) is submitting a request for a Technical Specification (TS) amendment (TS-505) to Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68 for Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3, respectively. The proposed amendment will increase the authorized maximum steady-state reactor core power level for each unit from 3458 MWt to 3952 MWt. This license amendment request (LAR) represents an increase of approximately 20 percent above the original licensed thermal power (OLTP) level of 3293 MWt, and an increase of approximately 14.3 percent above the current licensed thermal power (CLTP) level of 3458 MWt.

The information provided in the attachments to this letter represents a consolidation of plant-specific safety analyses as well as plant-specific confirmation of generic evaluations applicable to a boiling water reactor (BWR) constant pressure power uprate for the three BFN units.

On September 8, 1998, the Nuclear Regulatory Commission (NRC) approved a stretch power uprate for BFN Units 2 and 3 to increase the authorized maximum thermal power level to 3458 MWt. By letter dated March 6, 2007, the NRC issued an amendment to the BFN Unit 1 operating license to also increase the authorized maximum thermal power level to 3458 MWt.

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NRR

Proprietary Information and Critical Energy Infrastructure Information
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In the referenced letter dated September 18, 2014, TVA withdrew previous BFN EPU LARs and provided its revised plans and schedule for the BFN EPU project. In the interim months, TVA has held several meetings with the NRC staff to provide pre-application discussions on key aspects of the EPU project, including fuel considerations, startup test plans, replacement steam dryers, flow-induced vibration, and the elimination of credit for containment accident pressure in net positive suction head (NPSH) evaluations for emergency core cooling system (ECCS) pumps. This LAR submittal is consistent with TVA's letter of September 18, 2014, which stated that a new, consolidated BFN EPU LAR would be submitted by October 2015.

The enclosure to this letter provides a summary of the proposed changes to the BFN operating licenses and Technical Specifications due to EPU operation, the no significant hazards considerations, and environmental considerations.

Attachments 1 through 52 include a description of the proposed changes to the licensing basis and provide supporting documentation. This LAR is subdivided as follows:

Attachment 1	List of Regulatory Commitments There are no commitments associated with this LAR. Those actions associated with the amendment approval will be complete prior to implementation of EPU, except where those actions require an increase in power above the currently licensed power level. In those instances, defined actions will be completed during power ascension and will be incorporated into license conditions (see Attachments 2 and 3).
Attachment 2	Proposed Technical Specification Changes (Markups) Attachment 2 provides a markup of the affected operating license and Technical Specifications pages indicating the proposed changes for EPU.
Attachment 3	Retyped Proposed Technical Specification Changes Attachment 3 provides a camera-ready retype of the affected Technical Specification pages with changes incorporated.
Attachment 4	Proposed Technical Specification Bases Changes (Markups) Attachment 4 provides a markup of the affected Technical Specification Bases pages indicating the proposed changes for EPU.
Attachment 5	Retyped Proposed Technical Specification Bases Changes Attachment 5 provides a camera-ready retype of the affected Technical Specification Bases pages with changes incorporated.

Attachment 6 NEDC-33860P, Safety Analysis Report for Browns Ferry Nuclear Plant Units 1, 2, and 3 Extended Power Uprate (proprietary)

Attachment 6 provides a proprietary version of the GE-Hitachi Nuclear Energy Americas LLC (GEH) Power Uprate Safety Analysis Report (PUSAR), NEDC-33860P, Safety Analysis Report for Browns Ferry Nuclear Plant Units 1, 2, and 3 Extended Power Uprate. This report summarizes the results of safety analyses and evaluations performed that support the proposed increase in the authorized maximum steady-state reactor core power level.

The PUSAR technical evaluations supporting the proposed EPU are based on NRC-approved licensing topical report, NEDC-33304P-A, Constant Pressure Power Uprate, Revision 4 (referred to as the Constant Pressure Power Uprate Licensing Topical Report (CLTR)). For topics outside the CLTR approved applicability (e.g., use of AREVA ATRIUM 10XM fuel), the technical evaluations are based on a series of NRC-approved AREVA methods. The content of the technical evaluations is consistent with the guidance provided in NRC Review Standard RS-001, Review Standard for Extended Power Uprates, Revision 0, dated December 2003, as it applies to the licensing basis of BFN Units 1, 2, and 3.

Certain information provided in Attachment 6 is considered proprietary information by the Electric Power Research Institute (EPRI). EPRI and GEH separately consider portions of the information provided in Attachment 6 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. Affidavits for withholding information, executed by GEH and EPRI, are provided in Attachment 50 and Attachment 52, respectively. A non-proprietary version of the document is provided in Attachment 7. Therefore, on behalf of GEH and EPRI, TVA requests that Attachment 6 be withheld from public disclosure in accordance with the GEH and EPRI affidavits and the provisions of 10 CFR 2.390.

Attachment 7 NEDO-33860, Safety Analysis Report for Browns Ferry Nuclear Plant Units 1, 2, and 3 Extended Power Uprate (non-proprietary)

Attachment 8 ANP-3403P, Fuel Uprate Safety Analysis Report for Browns Ferry Units 1, 2, and 3 (proprietary)

Attachment 8 provides a proprietary version of the AREVA Inc. (AREVA) Fuel Uprate Safety Analysis Report (FUSAR), ANP-3403P, "Fuel Uprate Safety Analysis Report for Browns Ferry Units 1, 2, and 3." This report supplements the PUSAR and summarizes the results of fuel-related safety analyses and evaluations performed that support the proposed increase in the authorized maximum steady-state reactor core power level.

The FUSAR technical evaluations supporting the proposed EPU are based on a series of NRC-approved AREVA methods that are summarized in LAR Attachment 36. The safety evaluations documented in Attachment 8 are based on the continued use of AREVA's ATRIUM 10XM fuel design. Where appropriate, evaluations for the existing ATRIUM-10 fuel design have also been included because the potential exists that some fuel of this type may still be resident in a BFN reactor core upon implementation of EPU.

The general format of the technical evaluations in Attachment 8 is consistent with the guidance provided in NRC Review Standard RS-001, as it applies to the licensing basis of BFN Units 1, 2, and 3. However, because only selected portions of RS-001 are addressed, the numbering of individual sections is discontinuous.

AREVA considers portions of the information provided in Attachment 8 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 9. Therefore, on behalf of AREVA, TVA requests that Attachment 8 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 9 ANP-3403NP, Fuel Uprate Safety Analysis Report for Browns Ferry Units 1, 2, and 3 (non-proprietary)

Attachment 10 ANP-3377P, Browns Ferry Units 1, 2, and 3 LOCA Break Spectrum Analysis for ATRIUM 10XM Fuel (EPU) (proprietary)

Attachment 10 provides the results of a loss-of-coolant accident (LOCA) break spectrum analysis for BFN Units 1, 2, and 3. The break spectrum analysis is used to identify the parameters that result in the highest calculated peak cladding temperature (PCT) during a postulated LOCA.

AREVA considers portions of the information provided in Attachment 10 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 11. Therefore, on behalf of AREVA, TVA requests that Attachment 10 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 11 ANP-3377NP, Browns Ferry Units 1, 2, and 3 LOCA Break Spectrum Analysis for ATRIUM 10XM Fuel (EPU) (non-proprietary)

Attachment 12 ANP-3378P, Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM 10XM Fuel (EPU) (proprietary)

Attachment 12 provides the results of the LOCA-ECCS analyses for BFN Units 1, 2 and 3. The LOCA-ECCS analysis specifies the maximum average planar linear heat generation rate (MAPLHGR) limit versus exposure for ATRIUM 10XM fuel and demonstrates that the MAPLHGR limit is adequate to ensure that the LOCA-ECCS criteria in 10 CFR 50.46 are satisfied for operation at or below the limit. Attachment 12 also documents the licensing basis PCT and corresponding local cladding oxidation from the metal water reaction (MWR) for ATRIUM 10XM fuel used at BFN Units 1, 2, and 3.

AREVA considers portions of the information provided in Attachment 12 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 13. Therefore, on behalf of AREVA, TVA requests that Attachment 12 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 13 ANP-3378NP, Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM 10XM Fuel (EPU) (non-proprietary)

Attachment 14 ANP-3384P, Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM-10 Fuel (EPU) (proprietary)

Attachment 14 provides the results of the LOCA-ECCS analyses for BFN Units 1, 2 and 3. The LOCA-ECCS analysis specifies the MAPLHGR limit versus exposure for ATRIUM-10 fuel and demonstrates that the MAPLHGR limit is adequate to ensure that the LOCA-ECCS criteria in 10 CFR 50.46 are satisfied for operation at or below the limit. Attachment 14 also documents the licensing basis PCT and corresponding local cladding oxidation from the MWR for ATRIUM-10 fuel used at BFN Units 1, 2, and 3.

AREVA considers portions of the information provided in Attachment 14 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 15. Therefore, on behalf of AREVA, TVA

requests that Attachment 14 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 15 ANP-3384NP, Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM-10 Fuel (EPU) (non-proprietary)

Attachment 16 ANP-3342P, Browns Ferry EPU (120% OLTP) Equilibrium Fuel Cycle Design (proprietary)

Attachment 16 provides the design results for the equilibrium cycle reactor core loading, including projected control rod patterns and evaluations of thermal and reactivity margins. The equilibrium cycle results are summarized for operation of BFN Units 1, 2, and 3 with ATRIUM 10XM fuel at EPU conditions.

AREVA considers portions of the information provided in Attachment 16 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 17. Therefore, on behalf of AREVA, TVA requests that Attachment 16 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 17 ANP-3342NP, Browns Ferry EPU (120% OLTP) Equilibrium Fuel Cycle Design (non-proprietary)

Attachment 18 ANP-3372P, Browns Ferry Unit 3 Cycle 19 EPU (120% OLTP) LAR Reference Fuel Cycle Design (proprietary)

Attachment 18 provides the design results for the BFN Unit 3 Cycle 19 reactor core loading, including projected control rod patterns and evaluations of thermal and reactivity margins. The Cycle 19 results are summarized for operation of BFN Unit 3 with ATRIUM 10XM fuel at EPU conditions based on projected Cycle 18 core operation.

AREVA considers portions of the information provided in Attachment 18 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 19. Therefore, on behalf of AREVA, TVA requests that Attachment 18 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 19 ANP-3372NP, Browns Ferry Unit 3 Cycle 19 EPU (120% OLTP)

LAR Reference Fuel Cycle Design (non-proprietary)

Attachment 20 ANP-3404P, Browns Ferry Unit 3 Cycle 19 Representative Reload Analysis at Extended Power Uprate (proprietary)

Attachment 20 provides reload licensing analyses results in support of an EPU operation at BFN. The analyses reported in Attachment 20 were performed using NRC-approved methodologies for generic application to boiling water reactors.

Reload licensing analyses were performed for potentially limiting events. The results are used to establish the Technical Specifications/Core Operating Limits Report limits and ensure design and licensing criteria are met. The results of the representative reload licensing analysis for BFN Unit 3 Cycle 19 operation are presented and support operation with equipment out-of-service.

AREVA considers portions of the information provided in Attachment 20 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 21. Therefore, on behalf of AREVA, TVA requests that Attachment 20 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 21 ANP-3404NP, Browns Ferry Unit 3 Cycle 19 Representative Reload Analysis at Extended Power Uprate (non-proprietary)

Attachment 22 ANP-3343P, Nuclear Fuel Design Report Browns Ferry EPU (120% OLTP) Equilibrium Cycle ATRIUM 10XM Fuel (proprietary)

Attachment 22 provides the results of the neutronic design analyses performed for EPU operation at BFN with equilibrium cycle ATRIUM 10XM fuel assemblies. The mechanical design parameters for the ATRIUM 10XM fuel assemblies are summarized.

AREVA considers portions of the information provided in Attachment 22 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 23. Therefore, on behalf of AREVA, TVA requests that Attachment 22 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 23 ANP-3343NP, Nuclear Fuel Design Report Browns Ferry EPU (120% OLTP) Equilibrium Cycle ATRIUM 10XM Fuel (non-proprietary)

Attachment 24 ANP-3386P, Mechanical Design Report for Browns Ferry Units 1, 2 and 3 Extended Power Uprate (EPU) ATRIUM 10XM Fuel Assemblies (proprietary)

Attachment 24 provides the results of the structural evaluation of the ATRIUM 10XM fuel assembly and fuel channel for operation of BFN at EPU conditions. This report provides a design description, the mechanical design criteria, fuel structural analysis results, and test results for the ATRIUM 10XM fuel assembly and Advanced Fuel Channel (AFC).

AREVA considers portions of the information provided in Attachment 24 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 25. Therefore, on behalf of AREVA, TVA requests that Attachment 24 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 25 ANP-3386NP, Mechanical Design Report for Browns Ferry Units 1, 2 and 3 Extended Power Uprate (EPU) ATRIUM 10XM Fuel Assemblies (non-proprietary)

Attachment 26 ANP-3385P, Mechanical Design Report for Browns Ferry Units 1, 2 and 3 Extended Power Uprate (EPU) ATRIUM-10 Fuel Assemblies (proprietary)

Attachment 26 provides the results of the structural evaluation of the ATRIUM-10 fuel assembly and fuel channel for operation of BFN at EPU conditions. This report provides a design description, the mechanical design criteria, fuel structural analysis results, and test results for the ATRIUM-10 fuel assembly and AFC.

AREVA considers portions of the information provided in Attachment 26 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 27. Therefore, on behalf of AREVA, TVA requests that Attachment 26 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 27 ANP-3385NP, Mechanical Design Report for Browns Ferry Units 1, 2 and 3 Extended Power Uprate (EPU) ATRIUM-10 Fuel Assemblies (non-proprietary)

Attachment 28 ANP-3388P, Fuel Rod Thermal-Mechanical Evaluation for Browns Ferry Extended Power Uprate (proprietary)

Attachment 28 provides the results of fuel rod thermal-mechanical analyses to demonstrate that the applicable design criteria are satisfied. The analyses are for ATRIUM 10XM fuel. These evaluations assess fuel rod performance at EPU conditions based on NRC-approved methodologies and design criteria.

AREVA considers portions of the information provided in Attachment 28 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 29. Therefore, on behalf of AREVA, TVA requests that Attachment 28 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 29 ANP-3388NP, Fuel Rod Thermal-Mechanical Evaluation for Browns Ferry Extended Power Uprate (non-proprietary)

Attachment 30 ANP-3327P, Evaluation of AREVA Fuel Thermal-Hydraulic Performance for Browns Ferry at EPU (proprietary)

Attachment 30 provides the results of thermal-hydraulic analyses that demonstrate that ATRIUM 10XM fuel is hydraulically compatible with ATRIUM-10 fuel for BFN at EPU conditions. This report also provides the hydraulic characterization of the BFN ATRIUM 10XM and ATRIUM-10 fuel designs.

AREVA considers portions of the information provided in Attachment 30 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 31. Therefore, on behalf of AREVA, TVA requests that Attachment 30 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 31 ANP-3327NP, Evaluation of AREVA Fuel Thermal-Hydraulic Performance for Browns Ferry at EPU (non-proprietary)

Attachment 32 FS1-0019629, Browns Ferry Unit 3 Cycle 19 MCPR Safety Limit Analysis With SAFLIM3D Methodology (proprietary)

Attachment 32 provides the Safety Limit Minimum Critical Power Ratio (MCPR) results for BFN Unit 3 Cycle 19 using the methodology in AREVA's licensing topical report, ANP-10307PA, AREVA MCPR Safety Limit Methodology for Boiling Water Reactors, dated June 2011, to support two-loop operation and single-loop operation of BFN at EPU conditions.

AREVA considers portions of the information provided in Attachment 32 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 33. Therefore, on behalf of AREVA, TVA requests that Attachment 32 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 33 FS1-0019630, Browns Ferry Unit 3 Cycle 19 MCPR Safety Limit Analysis With SAFLIM3D Methodology (non-proprietary)

Attachment 34 ANP-2860P Revision 2, Supplement 2, Browns Ferry Unit 1 – Summary of Responses to Request for Additional Information, Extension for Use of ATRIUM 10XM Fuel for Extended Power Uprate (proprietary)

Attachment 34 provides a review of certain NRC-approved licensing methodologies to demonstrate their applicability to the operation of BFN with AREVA's ATRIUM 10XM fuel in the EPU operating domain. General applicability of AREVA's licensing methods to BFN in the EPU operating domain is provided in AREVA technical report, ANP-2680P, Revision 2, Browns Ferry Unit 1 – Summary of Responses to Request for Additional Information. Applicability of these methods to the ATRIUM 10XM fuel design in the current operating domain is provided in ANP-2680P Revision 2, Supplement 1P.

AREVA considers portions of the information provided in Attachment 34 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 35. Therefore, on behalf of AREVA, TVA requests that Attachment 34 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 35 ANP-2860NP Revision 2, Supplement 2, Browns Ferry Unit 1 – Summary of Responses to Request for Additional Information, Extension for Use of ATRIUM 10XM Fuel for Extended Power Uprate (non-proprietary)

Attachment 36 ANP-2637, Boiling Water Reactor Licensing Methodology Compendium (non-proprietary)

Attachment 36 is a compendium of AREVA fuel-related methodologies and design criteria that are described in licensing topical reports that the NRC has found acceptable for referencing in boiling water reactor (BWR) licensing applications. This compendium provides a concise, organized source for NRC-approved, AREVA topical reports for BWR fuel-related applications.

Attachment 37 ANP-3409P, Fuel-Related Emergent Regulatory Issues (proprietary)

Attachment 37 addresses two emergent regulatory issues:

1) Proposed new criteria for the postulated LOCA in 10 CFR 50.46c; and
2) Proposed changes to the acceptance criteria for the reactivity initiated accident in NUREG-0800, U.S. Nuclear Regulatory Commission, Standard Review Plan, Section 4.2, Fuel System Design.

At present these items are not regulatory requirements and therefore are not included in the current licensing basis for BFN. However, because both issues represent potential changes to regulatory requirements that may become effective during the NRC staff's review of this LAR, the potential effect of their adoption on the BFN EPU into regulatory requirements is being addressed.

AREVA considers portions of the information provided in Attachment 37 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by AREVA, is provided in Attachment 51. A non-proprietary version of the document is provided in Attachment 38. Therefore, on behalf of AREVA, TVA requests that Attachment 37 be withheld from public disclosure in accordance with the AREVA affidavit and the provisions of 10 CFR 2.390.

Attachment 38 ANP-3409NP, Fuel-Related Emergent Regulatory Issues (non-proprietary)

Attachment 39 RHR Heat Exchanger K-values Utilized in EPU Containment Analyses

Attachment 39 provides a review of Residual Heat Removal (RHR) heat exchanger K-values used in the containment analyses for postulated events under EPU conditions. Because K-values may differ for design basis and special events based on certain assumptions and initial conditions, Attachment 39 provides the basis for these determinations. RHR heat exchanger K-values used in the containment analyses are identified for each event described in the applicable PUSAR section.

Attachment 40 Steam Dryer Analysis Report (proprietary)

Attachment 40 is GEH engineering report, NEDC-33824P, Browns Ferry Replacement Steam Dryer Stress Analysis, which documents the stress analyses for the replacement steam dryer (RSD) for each of the three BFN units. The analyses demonstrate that the RSDs will maintain structural integrity during normal plant operation and under transient and accident conditions.

A power ascension test plan for the initial cycle of EPU operation at all three BFN units is presented. The structural analyses and power ascension monitoring program provide assurance that the BFN RSDs will maintain structural integrity during normal operation and under transient and accident conditions for the design life of each RSD.

GEH considers portions of the information provided in Attachment 40 of this LAR to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by GEH, is provided in Attachment 50. A non-proprietary version of the document is provided in Attachment 41. Therefore, on behalf of GEH, TVA requests that Attachment 40 be withheld from public disclosure in accordance with the GEH affidavit and the provisions of 10 CFR 2.390.

Attachment 41 Steam Dryer Analysis Report (non-proprietary)

Attachment 42 Supplemental Environmental Report

Attachment 42 is the Supplemental Environmental Report (ER) for the EPU of BFN Units 1, 2, and 3. The ER provides an assessment of the environmental impacts of the proposed increase in power output and supports a conclusion that EPU will not result in any significant additional impacts.

Attachment 43 Transmission System Stability Evaluation

Attachment 43 provides the results of the BFN transmission system stability evaluation. This study evaluated the impact of BFN operation at EPU conditions with respect to continued compliance with 10 CFR Part 50, Appendix A, General Design Criterion (GDC)-17, Electric Power Systems. The study assumed three unit operation at a maximum power output of 1,318 MWe (each unit) based on a heat balance calculation (optimum main condenser vacuum).

Attachment 43 documents load flow analysis of the offsite power supply considering various pre-event outages and a subsequent plant design basis event LOCA. The analysis demonstrates that BFN will continue to meet GDC-17 requirements while operating at EPU conditions, and the offsite power system has the capacity and capability to supply power to safety loads and required equipment.

Because Attachment 43 contains critical energy infrastructure information that is considered sensitive, unclassified (non-safeguard) information, TVA requests that it be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390(d)(1).

Attachment 44 Probabilistic Risk Assessment

Attachment 44 provides the results of the assessment of the effect of EPU on risk as characterized as a change in the core damage frequency (CDF) and large early release frequency (LERF). In assessing these changes, TVA followed the guidelines of Regulatory Guide 1.174, An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis, to determine the resultant risk acceptance region.

Attachment 45 Flow Induced Vibration Analysis and Monitoring Program

Attachment 44 provides a detailed discussion of the analyses and testing program undertaken to provide assurance that unacceptable flow induced vibration issues are not experienced at BFN due to EPU implementation for affected piping systems.

Attachment 46 Startup Test Plan

Attachment 46 describes the testing TVA will perform following the EPU implementation outages at BFN Units 1, 2, and 3 (i.e., refueling outages scheduled for Spring 2018, Fall 2018, and Spring 2019 for Units 3, 1, and 2, respectively). Following each of these outages, TVA will conduct a comprehensive EPU startup test program to ensure the safe operation of each plant. Attachment 46 describes the test program.

Attachment 47	List and Status of Plant Modifications Attachment 47 provides a list, description, and implementation schedule of plant modifications completed or planned to support EPU for BFN Units 1, 2 and 3.
Attachment 48	NRC Review Standard for Extended Power Uprates, RS-001 Safety Evaluation Template GDC Markup (with redline/strike out) Attachment 48 provides a redline/strikeout version of the RS-001 safety evaluation template consistent with the BFN Units 1, 2, and 3 design basis.
Attachment 49	NRC Review Standard for Extended Power Uprates, RS-001 Safety Evaluation Template GDC Markup (retyped) Attachment 49 provides a clean version of the RS-001 safety evaluation template, incorporating all the redline/strikeout changes.
Attachment 50	Affidavits – GE-Hitachi Nuclear Energy Americas LLC
Attachment 51	Affidavits – AREVA Inc.
Attachment 52	Affidavit – Electric Power Research Institute

TVA has determined that there are no significant hazards considerations associated with the proposed changes and that the TS changes qualify for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and the enclosure to the Alabama State Department of Public Health.

The BFN Plant Operations Review Committee and the TVA Nuclear Safety Review Board have reviewed this proposed change and determined that operation of BFN in accordance with the proposed change will not endanger the health and safety of the public.

TVA requests approval of these proposed TS changes within 24 months of the date of this letter. The requested review period is consistent with NRC guidance and supports plans for implementation coincident with refueling outages. Once approved, the amendments will be fully implemented within 90 days of completion of refueling outages scheduled for Spring 2018, Fall 2018, and Spring 2019 for Units 3, 1, and 2, respectively. These implementation periods will provide adequate time for the installation of required modifications supporting power uprate and revision of the affected station documentation in accordance with the appropriate change control mechanisms.

There are no new regulatory commitments associated with this submittal. If there are any questions or if additional information is needed, please contact Mr. Edward D. Schrull at (423) 751-3850.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 21st day of September 2015.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosure: Discussion of Changes, No Significant Hazards Considerations, and Environmental Considerations

Attachments:

1. List of Regulatory Commitments
2. Proposed Technical Specification Changes (Markups)
3. Retyped Proposed Technical Specification Changes
4. Proposed Technical Specification Bases Changes (Markups)
5. Retyped Proposed Technical Specification Bases Changes
6. NEDC-33860P, Safety Analysis Report for Browns Ferry Nuclear Plant Units 1, 2, and 3 Extended Power Uprate (proprietary)
7. NEDO-33860, Safety Analysis Report for Browns Ferry Nuclear Plant Units 1, 2, and 3 Extended Power Uprate (non-proprietary)
8. ANP-3403P, Fuel Uprate Safety Analysis Report for Browns Ferry Units 1, 2, and 3 (proprietary)
9. ANP-3403NP, Fuel Uprate Safety Analysis Report for Browns Ferry Units 1, 2, and 3 (non-proprietary)
10. ANP-3377P, Browns Ferry Units 1, 2, and 3 LOCA Break Spectrum Analysis for ATRIUM 10XM Fuel (EPU) (proprietary)
11. ANP-3377NP, Browns Ferry Units 1, 2, and 3 LOCA Break Spectrum Analysis for ATRIUM 10XM Fuel (EPU) (non-proprietary)
12. ANP-3378P, Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM 10XM Fuel (EPU) (proprietary)
13. ANP-3378NP, Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM 10XM Fuel (EPU) (non-proprietary)
14. ANP-3384P, Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM-10 Fuel (EPU) (proprietary)

15. ANP-3384NP, Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM-10 Fuel (EPU) (non-proprietary)
16. ANP-3342P, Browns Ferry EPU (120% OLTP) Equilibrium Fuel Cycle Design (proprietary)
17. ANP-3342NP, Browns Ferry EPU (120% OLTP) Equilibrium Fuel Cycle Design (non-proprietary)
18. ANP-3372P, Browns Ferry Unit 3 Cycle 19 EPU (120% OLTP) LAR Reference Fuel Cycle Design (proprietary)
19. ANP-3372NP, Browns Ferry Unit 3 Cycle 19 EPU (120% OLTP) LAR Reference Fuel Cycle Design (non-proprietary)
20. ANP-3404P, Browns Ferry Unit 3 Cycle 19 Representative Reload Analysis at Extended Power Uprate (proprietary)
21. ANP-3404NP, Browns Ferry Unit 3 Cycle 19 Representative Reload Analysis at Extended Power Uprate (non-proprietary)
22. ANP-3343P, Nuclear Fuel Design Report Browns Ferry EPU (120% OLTP) Equilibrium Cycle ATRIUM 10XM Fuel (proprietary)
23. ANP-3343NP, Nuclear Fuel Design Report Browns Ferry EPU (120% OLTP) Equilibrium Cycle ATRIUM 10XM Fuel (non-proprietary)
24. ANP-3386P, Mechanical Design Report for Browns Ferry Units 1, 2 and 3 Extended Power Uprate (EPU) ATRIUM 10XM Fuel Assemblies (proprietary)
25. ANP-3386NP, Mechanical Design Report for Browns Ferry Units 1, 2 and 3 Extended Power Uprate (EPU) ATRIUM 10XM Fuel Assemblies (non-proprietary)
26. ANP-3385P, Mechanical Design Report for Browns Ferry Units 1, 2 and 3 Extended Power Uprate (EPU) ATRIUM-10 Fuel Assemblies (proprietary)
27. ANP-3385NP, Mechanical Design Report for Browns Ferry Units 1, 2 and 3 Extended Power Uprate (EPU) ATRIUM-10 Fuel Assemblies (non-proprietary)
28. ANP-3388P, Fuel Rod Thermal-Mechanical Evaluation for Browns Ferry Extended Power Uprate (proprietary)
29. ANP-3388NP, Fuel Rod Thermal-Mechanical Evaluation for Browns Ferry Extended Power Uprate (non-proprietary)
30. ANP-3327P, Evaluation of AREVA Fuel Thermal-Hydraulic Performance for Browns Ferry at EPU (proprietary)
31. ANP-3327NP, Evaluation of AREVA Fuel Thermal-Hydraulic Performance for Browns Ferry at EPU (non-proprietary)
32. FS1-0019629, Browns Ferry Unit 3 Cycle 19 MCPR Safety Limit Analysis With SAFLIM3D Methodology (proprietary)
33. FS1-0019630, Browns Ferry Unit 3 Cycle 19 MCPR Safety Limit Analysis With SAFLIM3D Methodology (non-proprietary)

34. ANP-2860P Revision 2, Supplement 2, Browns Ferry Unit 1 – Summary of Responses to Request for Additional Information, Extension for Use of ATRIUM 10XM Fuel for Extended Power Uprate (proprietary)
35. ANP-2860NP Revision 2, Supplement 2, Browns Ferry Unit 1 – Summary of Responses to Request for Additional Information, Extension for Use of ATRIUM 10XM Fuel for Extended Power Uprate (non-proprietary)
36. ANP-2637, Boiling Water Reactor Licensing Methodology Compendium (non-proprietary)
37. ANP-3409P, Fuel-Related Emergent Regulatory Issues (proprietary)
38. ANP-3409NP, Fuel-Related Emergent Regulatory Issues (non-proprietary)
39. RHR Heat Exchanger K-values Utilized in EPU Containment Analyses
40. Steam Dryer Analysis Report (proprietary)
41. Steam Dryer Analysis Report (non-proprietary)
42. Supplemental Environmental Report
43. Transmission System Stability Evaluation
44. Probabilistic Risk Assessment
45. Flow Induced Vibration Analysis and Monitoring Program
46. Startup Test Plan
47. List and Status of Plant Modifications
48. RS-001 SE Template GDC Markup (with redline/strike out)
49. RS-001 SE Template GDC Markup (retyped)
50. Affidavits – GE-Hitachi Nuclear Energy Americas LLC
51. Affidavits – AREVA Inc.
52. Affidavit – Electric Power Research Institute

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant
State Health Officer, Alabama State Department of Public Health
(w/o Attachments 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 37, 40, and 43)

The enclosed cover letter is for reference only. The disc includes the pdf.version of the signed letter.

The files listed below are contained on the enclosed disc. The files highlighted in yellow and containing NPUB following the file number, (e.g., 009 NPUB BFN EPU...) are considered to be proprietary and should be withheld from public disclosure under 10 CFR 2.390.

For convenience from the cover letter:

Proprietary Information and Critical Energy Infrastructure Information
Withhold from Public Disclosure Under 10 CFR 2.390
This letter is decontrolled when separated from Attachments 6, 8 10, 12, 14, 16 18, 20, 22, 24, 26, 28, 30, 32, 34, 37, 40, and 43

Thanks

Carla Edmondson
Executive Management Assistant to
J. W. Shea, VP Nuclear Licensing
cedmondson@tva.gov
423-751-2638

001 PUB CNL-15-169 BFN EPU LAR Cover Letter	9/21/2015 8:29 PM	Adobe Acrobat D...	446 KB
002 PUB BFN EPU LAR Enclosure	9/4/2015 11:43 AM	Adobe Acrobat D...	182 KB
003 PUB BFN EPU LAR Att 1-List of Reg Commitments	9/4/2015 1:08 PM	Adobe Acrobat D...	58 KB
004 PUB BFN EPU LAR Att 2-TS Markups Part 1 of 2	9/22/2015 7:45 AM	Adobe Acrobat D...	31,757 KB
005 PUB BFN EPU LAR Att 2-TS Markups Part 2 of 2	9/22/2015 7:45 AM	Adobe Acrobat D...	31,860 KB
006 PUB BFN EPU LAR Att 3-Retyped TS Changes	9/22/2015 7:45 AM	Adobe Acrobat D...	449 KB
007 PUB BFN EPU LAR Att 4-Proposed TS Bases Markups	9/22/2015 7:46 AM	Adobe Acrobat D...	3,609 KB
008 PUB BFN EPU LAR Att 5-Retyped TS Bases Changes	9/22/2015 7:46 AM	Adobe Acrobat D...	628 KB
009 NPUB BFN EPU LAR Att 6-NEDC33860P-PUSAR	9/22/2015 7:46 AM	Adobe Acrobat D...	10,382 KB
010 PUB BFN EPU LAR Att 7-NEDO-33860	9/22/2015 7:46 AM	Adobe Acrobat D...	6,254 KB
011 NPUB BFN EPU LAR Att 8-ANP-3403P-FUSAR	9/22/2015 7:46 AM	Adobe Acrobat D...	2,594 KB
012 PUB BFN EPU LAR Att 9-ANP-3403NP-FUSAR	9/22/2015 7:47 AM	Adobe Acrobat D...	2,508 KB
013 NPUB BFN EPU LAR Att 10-ANP-3377P	9/22/2015 7:47 AM	Adobe Acrobat D...	2,971 KB
014 PUB BFN EPU LAR Att 11-ANP-3377NP	9/22/2015 7:47 AM	Adobe Acrobat D...	2,066 KB
015 NPUB BFN EPU LAR Att 12-ANP-3378P	9/22/2015 7:47 AM	Adobe Acrobat D...	2,330 KB
016 PUB BFN EPU LAR Att 13-ANP-3378NP	9/22/2015 7:47 AM	Adobe Acrobat D...	1,782 KB
017 NPUB BFN EPU LAR Att 14-ANP-3384P	9/22/2015 7:48 AM	Adobe Acrobat D...	2,446 KB
018 PUB BFN EPU LAR Att 15-ANP-3384NP	9/22/2015 7:48 AM	Adobe Acrobat D...	1,779 KB
019 NPUB BFN EPU LAR Att 16-ANP-3342P	9/22/2015 7:48 AM	Adobe Acrobat D...	1,367 KB
020 PUB BFN EPU LAR Att 17-ANP-3342NP	9/22/2015 7:48 AM	Adobe Acrobat D...	1,456 KB
021 NPUB BFN EPU LAR Att 18-ANP-3372P	9/22/2015 7:48 AM	Adobe Acrobat D...	1,422 KB
022 PUB BFN EPU LAR Att 19-ANP-3372NP	9/22/2015 7:49 AM	Adobe Acrobat D...	1,470 KB
023 NPUB BFN EPU LAR Att 20-ANP-3404P	9/22/2015 7:49 AM	Adobe Acrobat D...	2,070 KB
024 PUB BFN EPU LAR Att 21-ANP-3404NP	9/22/2015 7:49 AM	Adobe Acrobat D...	2,153 KB
025 NPUB BFN EPU LAR Att 22-ANP-3343P	9/22/2015 7:49 AM	Adobe Acrobat D...	5,266 KB
026 PUB BFN EPU LAR Att 23-ANP-3343NP	9/22/2015 7:49 AM	Adobe Acrobat D...	2,330 KB
027 NPUB BFN EPU LAR Att 24-ANP-3386P	9/22/2015 7:50 AM	Adobe Acrobat D...	3,575 KB
028 PUB BFN EPU LAR Att 25-ANP-3386NP	9/22/2015 7:50 AM	Adobe Acrobat D...	880 KB
029 NPUB BFN EPU LAR Att 26-ANP-3385P	9/22/2015 7:50 AM	Adobe Acrobat D...	1,928 KB
030 PUB BFN EPU LAR Att 27-ANP-3385NP	9/22/2015 7:50 AM	Adobe Acrobat D...	675 KB
031 NPUB BFN EPU LAR Att 28-ANP-3388P	9/22/2015 7:50 AM	Adobe Acrobat D...	610 KB
032 PUB BFN EPU LAR Att 29-ANP-3388NP	9/22/2015 7:50 AM	Adobe Acrobat D...	607 KB
033 NPUB BFN EPU LAR Att 30-ANP-3327P	9/22/2015 7:51 AM	Adobe Acrobat D...	967 KB
034 PUB BFN EPU LAR Att 31-ANP-3327NP	9/22/2015 7:51 AM	Adobe Acrobat D...	428 KB
035 NPUB BFN EPU LAR Att 32-FS1-0019629	9/22/2015 7:51 AM	Adobe Acrobat D...	5,961 KB

036 PUB BFN EPU LAR Att 33-FSI-0019630	9/22/2015 7:51 AM	Adobe Acrobat D...	5,166 KB
037 NPUB BFN EPU LAR Att 34-ANP-2860P	9/22/2015 7:51 AM	Adobe Acrobat D...	5,929 KB
038 PUB BFN EPU LAR Att 35-ANP-2860NP	9/22/2015 7:51 AM	Adobe Acrobat D...	1,482 KB
039 PUB BFN EPU LAR Att 36-ANP-2637	9/22/2015 7:51 AM	Adobe Acrobat D...	1,084 KB
040 NPUB BFN EPU LAR Att 37-ANP-3409P	9/22/2015 7:52 AM	Adobe Acrobat D...	1,089 KB
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044 NPUB BFN EPU LAR Att 40-NEDC33824P-ApA Part 2...	9/22/2015 7:52 AM	Adobe Acrobat D...	9,541 KB
045 NPUB BFN EPU LAR Att 40-NEDC33824P-ApB Part 3...	9/22/2015 7:53 AM	Adobe Acrobat D...	7,231 KB
046 NPUB BFN EPU LAR Att 40-NEDC33824P-ApC Part 4...	9/22/2015 7:53 AM	Adobe Acrobat D...	9,292 KB
047 NPUB BFN EPU LAR Att 40-NEDC33824P-ApD Part 5...	9/22/2015 7:55 AM	Adobe Acrobat D...	4,335 KB
048 NPUB BFN EPU LAR Att 40-NEDC33824P-ApE Part 6 ...	9/22/2015 7:53 AM	Adobe Acrobat D...	11,860 KB
049 PUB BFN EPU LAR Att 41-NEDO-33824	9/22/2015 7:54 AM	Adobe Acrobat D...	5,122 KB
050 PUB BFN EPU LAR Att 42-Supp Env Report	9/22/2015 7:54 AM	Adobe Acrobat D...	17,453 KB
051 NPUB BFN EPU LAR Att 43-Trans Stability Study	9/22/2015 7:54 AM	Adobe Acrobat D...	340 KB
052 PUB BFN EPU LAR Att 44-PRA	9/22/2015 7:54 AM	Adobe Acrobat D...	1,737 KB
053 PUB BFN EPU LAR Att 45-FIV Analysis Monitor Prg	9/22/2015 7:55 AM	Adobe Acrobat D...	142 KB
054 PUB BFN EPU LAR Att 46-Startup Test Plan	9/22/2015 7:55 AM	Adobe Acrobat D...	6,238 KB
055 PUB BFN EPU LAR Att 47-List of Plant Mods	9/22/2015 7:55 AM	Adobe Acrobat D...	118 KB
056 PUB BFN EPU LAR Att 48-SE Template GDC Markup	9/22/2015 7:55 AM	Adobe Acrobat D...	1,109 KB
057 PUB BFN EPU LAR Att 49-SE Template GDC Markup ...	9/22/2015 7:55 AM	Adobe Acrobat D...	924 KB
058 PUB BFN EPU LAR Att 50-GEH Affidavits	9/22/2015 7:55 AM	Adobe Acrobat D...	2,289 KB
059 PUB BFN EPU LAR Att 51-Areva Affidavits	9/22/2015 7:56 AM	Adobe Acrobat D...	1,430 KB
060 PUB BFN EPU LAR Att 52-EPRI Affidavit	9/22/2015 7:56 AM	Adobe Acrobat D...	1,351 KB