September 28, 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: BROWN FERRY NUCLEAR PLANT, UNIT 1 - ISSUANCE OF AMENDMENTS REGARDING IMPLEMENTATION OF 24-MONTH FUEL CYCLE (TAC NO. MC4161) (TS-433)

Dear Mr. Singer:

The Commission has issued the enclosed Amendment No. 263 to Renewed Facility Operating License No. DPR-33 for the Browns Ferry Nuclear Plant, Unit 1. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated August 16, 2004, as supplemented by letter dated September 30, 2005. The amendment revises the TSs to support 24-month fuel cycles in accordance with Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle," dated April 2, 1991.

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 No. 50-259

Enclosures:
1. Amendment No. 263 to DPR-33
2. Safety Evaluation

cc w/enclosures: See next page

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TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-259

BROWNS FERRY NUCLEAR PLANT UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 263
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 letter dated September 30, 2005, 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. 263, 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 28, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 263

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.

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
3.1-25	3.1-25
3.1-26	3.1-26
3.1-29	3.1-29
3.3-5	3.3-5
3.3-18	3.3-18
3.3-19	3.3-19
3.3-22	3.3-22
3.3-25	3.3-25
3.3-28	3.3-28
3.3-31	3.3-31
3.3-34	3.3-34
3.3-41	3.3-41
3.3-50	3.3-50
3.3-57	3.3-57
3.3-59	3.3-59
3.3-60	3.3-60
3.3-63	3.3-63
3.3-68	3.3-68
3.3-77	3.3-77
3.4-8	3.4-8
3.4-14	3.4-14
3.5-6	3.5-6
3.5-7	3.5-7
3.5-11	3.5-11
3.5-13	3.5-13
3.5-14	3.5-14
3.6-2	3.6-2
3.6-16	3.6-16
3.6-21	3.6-21
3.6-23	3.6-23
3.7-17	3.7-17

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 263

TO RENEWED FACILITY OPERATING LICENSE NO. DPR-33

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-259

1.0 INTRODUCTION

By letter dated August 16, 2004 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML042380250), as supplemented by letter dated September 30, 2005 (ADAMS Accession Number ML052730295), Tennessee Valley Authority (TVA, the licensee) submitted a request for changes to the Technical Specifications (TSs) and Surveillance Requirements (SRs) for Browns Ferry Nuclear Plant (BFN), Unit 1. The proposed change would revise TSs and SRs to support the implementation of a 24-month refueling cycle, and will result in a maximum surveillance interval of 30 months when employing the 25 percent grace period allowed by TS SR 3.0.2. TVA has previously requested and received Nuclear Regulatory Commission (NRC) approval to extend the frequency of “once-per-cycle” from 18 months to 24 months for similar Browns Ferry Units 2 and 3 equipment. TVA intends to restart Unit 1 on a 24-month fuel cycle. The supplement dated September 30, 2005, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on March 29, 2005 (70 FR 15947).

2. REGULATORY EVALUATION

NRC issued Generic Letter 91-04 (GL 91-04), “Changes in Technical Specification Surveillance Intervals to Accommodate a 24-month Fuel Cycle,” to give licensees generic guidance on preparing license amendment requests that change the TS surveillance intervals to accommodate a 24-month fuel cycle. TS that specify an 18-month surveillance interval could be changed to state that these surveillances are to be performed once per refueling interval, (i.e., 24 months). The TS provision to extend surveillance by 25 percent of the specified interval would extend the time limit for completing these surveillances from the existing limit to a maximum of 30 months. In accordance with GL 91-04, the licensee should provide the following information to justify increasing the calibration intervals for instruments used to perform safety functions (instrument calibration related TS SR):

(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 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 on instrument drift and their effects on safety.

For non-instrument calibration related TS SRs, GL 91-04 provides that licensees should:

(1) evaluate the effect on safety of the change in surveillance intervals to accommodate a 24-month fuel cycle. This evaluation should support a conclusion that the effect on safety is small;

(2) confirm that historical maintenance and surveillance data do not invalidate this conclusion; and

(3) confirm that the performance of surveillances at the bounding surveillance interval limit provided to accommodate a 24-month fuel cycle would not invalidate any assumption in the plant licensing basis.

The staff used the guidance in the GL 91-04 for evaluating the acceptability of the proposed changes to the surveillance test intervals.

3.0 TECHNICAL EVALUATION

3.1 Background

The licensee intends to implement a 24-month fuel cycle for BFN Unit 1 as part of the restart program. This amendment will allow the licensee to take advantage of improved fuel designs that support a 24-month refueling interval. The proposed changes, and technical analysis for BFN Unit 1 are primarily the same as for BFN Units 2 and 3. On November 30, 1998, the NRC issued Amendment Nos. 235, 256 and 215 to Facility Operating License Nos. DPR-33, DPR-52, and DPR-68 for the BFN Units 1, 2, and 3, respectively (ADAMS Accession Number ML042890210). These amendments were in response to the licensee's applications dated June 12, and August 14, 1998, requesting changes to the TSs to accommodate surveillance intervals to be compatible with a 24-month fuel cycle for Browns Ferry Units 2 and 3 equipment and for Unit 1 equipment that is required to support Units 2 and 3 operations and maintain Unit 1 in a shutdown condition.

3.2 Proposed Amendment

The licensee stated that the content of this submittal is based on TVA's previous applications for BFN Units 2 and 3. TVA divided the affected BFN Unit 1 TS SRs into two groups to support the implementation of the 24-month fuel cycles. The proposed change would revise the following TSs (and the associated TS SRs as defined in Tables 1 and 2 to Enclosure 1 of the licensee's letter dated August 16, 2004) to support the implementation of 24 month fuel cycles:

Group 1: TS SRs for which the proposed change from once per 18 months to once per 24 months does not constitute a change to an instrument calibration interval (non-instrument calibration TS SRs). For example, pump and valve functional tests, logic functional tests, and response time tests are Group 1 type TS SRs. This group consists of the following proposed changes to TS sections:

TS 3.1.7, "Standby Liquid Control (SLC) System"
TS 3.1.8, "Scram Discharge Volume (SDV) Vent and Drain Valves"
TS 3.3.1.1, "Reactor Protection System (RPS) Instrumentation"
TS 3.3.2.1, "Control Rod Block Instrumentation"
TS 3.3.2.2, "Feedwater and Main Turbine High Water Level Trip Instrumentation"
TS 3.3.3.2, "Backup Control System Instrumentation"
TS 3.3.4.1, "End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation"
TS 3.3.4.2, "Anticipated Transient Without Scram Recirculation Pump Trip (ATWS-RPT) Instrumentation"
TS 3.3.5.1, "Emergency Core Cooling System (ECCS) Instrumentation"
TS 3.3.5.2, "Reactor Core Isolation Cooling (RCIC) System Instrumentation"
TS 3.3.6.1, "Primary Containment Isolation Instrumentation"
TS 3.3.6.2, "Secondary Containment Isolation Instrumentation"
TS 3.3.7.1, "Control Room Emergency Ventilation (CREV) System Instrumentation"
TS 3.3.8.2, "Reactor Protection System (RPS) Electric Power Monitoring"
TS 3.4.3, "Safety/Relief Valves (S/RVs)"

TS 3.5.1, “ECCS - Operating”
TS 3.5.2, “ECCS-Shutdown”
TS 3.5.3, “RCIC System”
TS 3.6.1.1, “Primary Containment”
TS 3.6.1.3, “Primary Containment Isolation Valves (PCIVs)”
TS 3.6.1.6, “Suppression Chamber-to-Drywell Vacuum Breakers”
TS 3.7.5, “Main Turbine Bypass System”

Group 2: All other TS SRs (i.e., those for which the proposed change from once per 18 months to once per 24 months constituted an extended instrument calibration interval). This group consists of the following proposed changes to TS sections:

TS 3.3.1.1, “Reactor Protection System (RPS) Instrumentation”
TS 3.3.2.1, “Control Rod Block Instrumentation”
TS 3.3.2.2, “Feedwater and Main Turbine High Water Level Trip Instrumentation”
TS 3.3.3.1, “Post Accident Monitoring (PAM) Instrumentation”
TS 3.3.3.2, “Backup Control System Instrumentation”
TS 3.3.4.1, “End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation”
TS 3.3.4.2, “Anticipated Transient Without Scram Recirculation Pump Trip (ATWS-RPT) Instrumentation”
TS 3.3.5.1, “Emergency Core Cooling System (ECCS) Instrumentation”
TS 3.3.5.2, “Reactor Core Isolation Cooling (RCIC) System Instrumentation”
TS 3.3.6.1, “Primary Containment Isolation Instrumentation”
TS 3.3.6.2, “Secondary Containment Isolation Instrumentation”
TS 3.3.7.1, “Control Room Emergency Ventilation (CREV) System Instrumentation”
TS 3.4.5, “RCS [Reactor Coolant System] Leakage Detection Instrumentation
TS 3.6.1.5, “Reactor Building-to-Suppression Chamber Vacuum Breakers”

3.3 Evaluation of 24-Month Surveillance Test Interval

The proposed changes to the BFN Unit 1 TSs to implement a 24-month fuel cycle in support of its restart uses similar technical analyses and proposed changes that were approved by the NRC in its letter dated November 30, 1998, for BFN Units 2 and 3, and BFN Unit 1 equipment required to support Units 2 and 3 operations.

3.3.1 Group 1 Non-Instrument Calibration Related TS SRs

In its August 16, 2004, submittal, the licensee addressed the non-instrument calibration related TS SRs. The licensee performed qualitative evaluations in accordance with the GL 91-04 guidance. GL 91-04 suggests that licensees:

(1) evaluate the effect on safety of the change in surveillance intervals to accommodate a 24-month fuel cycle. This evaluation should support a conclusion that the effect on safety is small;

(2) confirm that historical maintenance and surveillance data do not invalidate this conclusion; and

(3) confirm that the performance of surveillances at the bounding surveillance interval limit provided to accommodate a 24-month fuel cycle would not invalidate any assumption in the plant licensing basis.

The licensee's evaluation included consideration of safety function, and final safety analysis report event type and purpose of the surveillance test, to determine the potential effect of the increased test interval on plant safety. The licensee categorized the affected TS SRs into eight surveillance types and assessed the impact of extending their surveillance interval on plant safety. The eight surveillance categories are:

(1) Functional tests of system/components not part of the primary success path for reactor shutdown

(2) Response time tests

(3) Logic system functional tests

(4) Simulated automatic actuation tests

(5) Functional tests of systems/components supporting low frequency accident initiators

(6) Functional tests of systems/components where redundancy exists and low failure rate experience

(7) Leak rate tests

(8) Inspections (Standby Liquid Control System sodium pentaborate solution enrichment)

Based on its assessment, the licensee determined that the affected systems and components have either other forms of testing performed on a more frequent basis that would discover possible failure or multiple redundant channels and redundant functions that could accomplish the safety function.

The licensee also reviewed historical maintenance and surveillance data from the following sources:

- Limiting conditions for operation (LCO) tracking logs
- Problem evaluation reports
- Licensee event reports
- Completed 24-month surveillance tests on similar equipment installed on Units 2 and 3
- Maintenance rule

Data from each source were compiled and evaluated. From this evaluation, the licensee did not identify any adverse trends or excessive failures for any system or component that would have more than a small effect on plant safety.

Based on its review of the licensee's submittal, the NRC staff finds that the licensee's evaluation is consistent with the GL 91-04 guidance and, therefore, the extension of the surveillance interval for the non-instrument drift related TS SRs acceptable. The evaluation of the TS SRs on the components and systems are discussed in detail in section 3.3.2 of this SE.

3.3.2 Component Evaluation

In consideration of the guidance provided in GL 91-04, the staff reviewed the proposed TS changes related to surveillance of reactor systems and components, and the licensee's justifications, on the basis that redundant systems provide adequate assurance that the increased surveillance intervals remain indicative of the operability of key systems, structures, and components, and that other required testing and surveillance is provided more frequently than those required in the TSs.

Because BFN Unit 1 has been in an extended shutdown, historical and surveillance data are not available for BFN Unit 1. Based on the similarity among the three BFN units, however, this review draws on prior NRC approval of similar amendments for BFN Units 2 and 3. For purposes for this review, the staff did not note any significant differences among the applicable components of BFN Units 1, 2, 3. The staff previously found that the licensee performed a survey of plant-specific and industry historical maintenance and surveillance data, and determined that except on rare occasions, the failure rate for the BFN system was better than the industry average. Where the BFN failure rate was higher than the industry average, the licensee performed a closer inspection of the data. Further review by the licensee revealed that the majority of these failures occurred while BFN units were in their extended outage. At the time the NRC staff issued the BFN Units 2 and 3 amendments, dated November 30, 1998, eight failures had been reported since the units had returned to service; only one of those failures was on a system of interest to the evaluation concerning the amendments, dated November 30, 1998.

To assess performance at BFN Units 2 and 3 since the issuance of the amendments, dated November 30, 1998, the NRC staff reviewed operating experience and inspection reports related to BFN Units 2 and 3. Review of the operating history has revealed no findings that would suggest that the increasing the surveillance interval from 18 to 24 months would have a significant impact on plant safety for the systems and components evaluated in Table 1 below.

Table 1. Proposed changes to Technical Specification Surveillance Requirements
(Non-Instrument Calibration Related Surveillance Requirements)

System/Component Surveillance	Surveillance Requirements
Standby Liquid Control	3.1.7.6: pump flow rate and discharge pressure
	3.1.7.7: flow path from pump into reactor pressure vessel
	3.1.7.8: piping from storage tank to pump suction
	3.1.7.9: sodium pentaborate enrichment
Scram Discharge Volume	3.1.8.3: vent/drain valves response time and functional
Safety/Relief Valves	3.4.3.2: manual actuation
Emergency Core Cooling Systems	3.5.1.8: high pressure coolant injection pump flow rate
	3.5.1.9: injection/spray subsystems automatic actuation
	3.5.1.10: automatic depressurization system automatic actuation
	3.5.1.11: automatic depressurization system valve manual actuation
	3.5.2.5: shutdown injection/spray automatic actuation
Reactor Core Isolation Cooling	3.5.3.4: pump flow rate
	3.5.3.5: automatic actuation
Primary Containment/ Suppression Chamber	3.6.1.1.2: drywell to suppression chamber ΔP and leak rate
	3.6.1.6.3: suppression chamber to drywell vacuum breakers
Primary Containment Isolation Valves	3.6.1.3.7: automatic actuation
	3.6.1.3.8: instrument line excess flow check valve automatic actuation
	3.6.1.3.9: traversing in-core probe squib valves
Main Turbine Bypass System	3.7.5.2: automatic actuation
	3.7.5.3: response time

3.3.2.1 Standby Liquid Control (SLC) System

The objective of the SLC system is to bring the reactor from full power to a shutdown condition in the event that the reactor cannot be shutdown or be kept shut down with the control rods. This objective is accomplished through injection of borated water into the reactor vessel; the boron solution absorbs neutrons and, thus, shuts down the reactor.

TS SR 3.1.7.6 ensures the capability of the SLC pumps to operate at the required pressure and flow rate; TS SR 3.1.7.7 requires flow verification through one SLC subsystem from pump into reactor pressure vessel. The staff reviewed the licensee's third ten-year inservice testing (IST) program and determined that the SLC pumps are flow rate tested on a quarterly basis, and tested for discharge pressure every two years. The licensee indicates that the continuity of the explosive squib valve charge is verified monthly. The additional system surveillance provides assurance of the capability of the SLC system. Also, the SLC system features redundant squib valves. Therefore, system redundancy also provides assurance of the capability of the SLC system.

TS SR 3.1.7.8 requires verification that piping between the SLC storage tank and the pump suction is unblocked. This TS SR ensures that sodium pentaborate has not precipitated from solution onto piping surfaces. Significant precipitation of sodium pentaborate is also indicated by changes in concentration, which is frequently monitored by the licensee. Therefore, additional surveillances provide similar assurance of sodium pentaborate concentration.

TS SR 3.1.7.9 requires verification of sodium pentaborate enrichment. Additional TS SRs proscribe a specific amount of boron-10 isotopic enrichment required for compliance with 10 CFR 50.62, "Anticipated Transients Without Scram." The licensee monitors sodium pentaborate enrichment on a more frequent basis than required by TS. This specific TS SR also requires enrichment analysis after additions are made to the SLC storage tank. Therefore, additional surveillances provide similar assurance of SLC sodium pentaborate enrichment.

3.3.2.2 Scram Discharge Volume Vent and Drain Valves

The scram discharge volume (SDV) vent and drain valves are normally open and close on a scram signal. The vent and drain valves close to isolate exhaust water from control rod drive mechanisms during a scram to minimize the loss of water from the reactor vessel. In NUREG-0803, "Generic Safety Evaluation Report Regarding Integrity of BWR [Boiling-Water Reactor] Scram System Piping," the NRC staff adopted the position that the SDV vent and drain valves are not considered a part of the reactor coolant boundary. Based on their normally open position, their function is not required for the reactor protection system to complete its scram function. The SDV vent and drain valves are provided in parallel so that the SDV can be drained if a single vent and/or drain valve fails shut.

TS SR 3.1.8.3 requires verification of SDV vent and drain valve closing times on actual or simulated scram signal and opening on signal reset. The valves are actuated during reactor startup and shutdown, which would indicate valve failure. The system also uses redundant mechanical components.

3.3.2.3 Safety/Relief Valves

The main steam safety and relief valves (S/RVs) are required to prevent the reactor vessel from exceeding its design pressure.

TS SR 3.4.3.2 requires verification that each required S/RV opens when manually actuated. The licensee's peak pressure analysis indicates that, with a single valve disabled, the reactor will remain below the 1375 psi code overpressure limit. This implies that the S/RVs contain adequate redundancy to form a basis for the extended surveillance interval. Therefore, the safety system under surveillance uses redundant mechanical components.

Six of the twelve S/RVs are designated automatic depressurization system (ADS) valves. The ADS system uses redundant signal logic to open the ADS-designated S/RVs to depressurize the reactor vessel so that the low pressure emergency core cooling system (ECCS) can inject into the vessel in the event of a loss-of-coolant accident (LOCA).

TS SR 3.5.1.11 requires the licensee to verify that each ADS valve opens when manually actuated. For the ADS to complete its function, the licensee indicates that any four of the required six are sufficient. Additionally, the licensee indicates that there are two high pressure injection systems (high pressure coolant injection and reactor core isolation cooling) to maintain coolant inventory in the event of ADS failure. Therefore, the safety system under surveillance uses redundant mechanical components, and the ADS is part of a network of redundant safety systems.

3.3.2.4 Emergency Core Cooling Systems

The high pressure coolant injection (HPCI) system is designed to pump water into the reactor vessel under small break LOCA conditions, which do not result in rapid depressurization of the pressure vessel.

TS SR 3.5.1.8 requires verification of HPCI pump total developed head and flow rate to demonstrate HPCI system capability to develop required flow at a low reactor pressure condition. In addition to this TS SR, the licensee also performs quarterly flow tests on the HPCI system. HPCI is also one of several water injection sources designed to provide makeup water in the event of a LOCA. Therefore, the HPCI system is part of a redundant network of safety systems, and other more frequent surveillances provide assurance that this system can perform its safety function.

The following TS SRs are simulated automatic actuation tests. They are performed to demonstrate the capability of the ECCS to initiate in response to an actual or simulated automatic initiation signal.

- TS SR 3.5.1.9 requires the licensee to verify that each ECCS injection spray/subsystem actuates on an actual or simulated automatic initiation signal.

- TS SR 3.5.1.10 requires verification that the ADS actuates on an actual or simulated automatic initiation signal.

- TS SR 3.5.2.5 requires verification that each ECCS injection/spray subsystem actuates on an actual or simulated automatic initiation signal.

The licensee states that redundant instrumentation channels provide actuation, and that there are redundant water injection systems available. The TS SR is augmented by daily individual channel checks and by quarterly channel functional tests. Therefore, the safety systems use redundant components, and other more frequent surveillances provide assurance that these systems and components can perform their safety function.

3.3.2.5 Reactor Core Isolation Cooling

The reactor core isolation cooling (RCIC) system can provide makeup water to the reactor vessel for core cooling under circumstances when the reactor vessel is isolated and feedwater is unavailable. RCIC is not credited in any accident analyses.

TS SR 3.5.3.4 requires verification of RCIC pump total developed head and flow rate to demonstrate RCIC system capability to develop required flow at a low reactor pressure condition. The licensee runs quarterly high pressure testing (TS SR 3.5.3.3) that also demonstrates RCIC system capability. Additionally, there are alternate water injection sources that can provide makeup water to the reactor vessel. Therefore, the RCIC system is part of a network of redundant safety systems, and other more frequent surveillances provide assurance that these systems and components can perform their safety function.

TS SR 3.5.3.5 requires verification of RCIC system actuation on an actual or simulated automatic initiation signal. Similar to the ECCS automatic actuation signal TS SRs, this TS SR demonstrates the capability of the RCIC system to initiate in response to an actual or simulated initiation signal. The TS SR is augmented by daily individual channel checks and by quarterly channel functional tests. In the event that the automatic actuation signal fails, the RCIC function can be provided by alternative sources of makeup water. Therefore, the safety systems use redundant components and other surveillances provide assurance that these systems and components can perform their safety function.

3.3.2.6 Primary Containment

The primary containment is designed to contain fission products released from a LOCA so that off site radiation dose limits specified in 10 CFR 50.67 are not exceeded, condense steam, provide a heat sink for certain safety related equipment, and to provide a source of water for ECCS and RCIC. The drywell contains steam released from a LOCA and directs it to the suppression chamber, and prevents radioactive materials from passing through its portion of the primary containment boundary. The suppression chamber condenses steam released from a LOCA. A proper pressure balance between the drywell and the suppression chamber is required to ensure that steam can be directed from the drywell to the suppression chamber, so that the steam can be condensed. Preservation of this function helps to prevent drywell overpressure events.

TS SR 3.6.1.1.2 requires verification of pressure differential between drywell and suppression chamber. This requirement ensures that the suppression chamber condensing capability is maintained such that overpressurization of the primary containment does not occur. The licensee indicates that, in the event that testing fails to meet the limits proscribed by the TS SR, the test schedule for subsequent tests must be reviewed. The staff previously found this TS SR's increased testing interval acceptable for BFN Units 2 and 3 based on review of operational data. The staff finds this acceptable based on experience with Units 2 and 3, and because additional indication of suppression pool and containment capability are available in the control room.

TS SR 3.6.1.6.3 requires verification that the differential pressure required to open each suppression pool vacuum breaker is greater than or equal to 0.5 pounds per square inch differential. This surveillance verifies that the vacuum breakers will open and that the required force for opening is within the limit assumed in the safety analysis. Redundant vacuum breakers are provided, and IST requirements assure the capability of the vacuum breakers on a more frequent basis than the proposed surveillance interval for TS SR 3.6.1.3. Therefore, the safety systems use redundant components, and other more frequent surveillances provide assurance that these systems and components can perform their safety function.

3.3.2.7 Primary Containment Isolation Valves

Primary containment isolation Valves (PCIVs) are provided to assure containment integrity by retaining coolant within the containment boundary.

TS SR 3.6.1.3.7 requires verification of PCIV actuation on an actual or simulated isolation signal. This test is intended to demonstrate the capability of each PCIV to actuate to the isolation position on an actual or simulated isolation signal. The NRC staff reviewed the licensee's inservice testing program and verified that IST requirements result in additional and more frequent testing of the PCIVs. Therefore, the PCIVs are redundant components, and other more frequent surveillances provide assurance that these systems and components can perform their safety function.

TS SR 3.6.1.3.8 requires verification of excess flow check valve (EFCV) actuation on a simulated instrument line break signal. The test demonstrates the capability of each EFCV to actuate to the isolation position on an actual or simulated instrument line break. The licensee indicates that an instrument line break coincident with an EFCV failure is a low probability event. Additionally, in the event of an EFCV failure, manual closure of an upstream isolation valve is available. Therefore, alternate components and actions provide the capability to isolate instrument lines, which provides assurance that this system can perform its safety function.

TS SR 3.6.1.3.9 requires testing of the squib valve on each shear isolation valve of the traversing in-core probe (TIP) system. The test provides assurance of the operability of the TIP shear isolation valves, which are actuated by an explosive squib charge. There is significant industry experience with squib-operated valves that shows that these devices are highly reliable. Additionally, there are redundant inboard and outboard isolation valves. The licensee also performs continuity checks on the squib charge monthly (TS SR 3.6.1.3.4). Therefore, alternative components and actions can duplicate the TIP shear isolation valve function, and other more frequent surveillances provide assurance that these systems and components can perform their safety function.

3.3.2.8 Main Turbine Bypass System

The main turbine bypass system provides the capability to bypass the turbine with as much as 25 percent of rated steam flow. This function prevents the reactor vessel from exceeding its peak pressure during a turbine trip or load reject scenario in situations where the main steam system is not isolated. The licensee credits the bypass system in transient and accident analyses; however, the system is not safety-grade.

TS SR 3.7.5.2 requires testing of system functionality; TS SR 3.7.5.3 requires verification of turbine bypass system response time. Successful completion of these TS SRs demonstrates that the main turbine bypass valves actuate to their required positions on an actual or simulated initiation signal, and that valve movement occurs within the specified time limits. These TS SRs require functional logic, and an adequate mechanical response. NEDC-30936P-A, “BWR Owner’s Group Technical Specification Improvement Analyses for ECCS Actuation Instrumentation,” showed that the overall safety systems’ reliabilities are not dominated by the reliabilities of the logic systems, but by that of the mechanical components. The mechanical components are cycled through one cycle of full travel at least once per 31 days. Therefore, the main turbine bypass system uses redundant components and other more frequent surveillances provide assurance that these systems and components can perform their safety function.

3.3.3 Group 2 Instrument Calibration Related TS SRs

The licensee performed a safety assessment on instrument channels, that are calibration related, for the proposed changes to the surveillance test interval in accordance with the GL 91-04 guidance as follows:

(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.

The licensee stated that a review of the BFN data indicated that there were only two occasions on BFN Unit 2 since the units went to 24-month calibration cycle, in which the as-found surveillance value was outside of the allowable values. An evaluation concluded that the 24-month calibration frequency for these instruments was still acceptable. The NRC staff asked the licensee to explain these two failures and the acceptance criteria of the evaluation. By letter dated September 30, 2005, the licensee provided the following response:

> The first instrument that failed its surveillance test was a primary containment isolation temperature switch. The switch failed to actuate at or before the setpoint of 200 °F. The as-found setpoint was 223 °F. This failure was evaluated under the corrective action program. The switch is a simple bi-metalic switch encased in a sealed metal housing. The evaluation determined that the setpoint drift could have been caused by physical handling during installation and removal and/or in-service factors. There were 32 calibrations performed on similar temperature switches. No other surveillance failures were identified and the switch successfully passed its next surveillance. Immediately after the failure, the primary containment isolation temperature switches were replaced by using signals from analog trip units under the provisions of 10 CFR 50.59. This design change was planned for implementation prior to the switch failing its surveillance test.

The second instrument that failed its surveillance test was a scram discharge volume level switch. The scram discharge volume level is measured by two diverse methods: either by two thermal probes (resistance temperature detector (RTD) device) or two magnetrol float switches. The failed RTD switch had an as-found value of 50.7 gallons as compared to a maximum value of 49.7 gallons. This failure was evaluated under the corrective action program. The apparent cause was a random failure of the associated circuit card. The circuit card was replaced with a new card and the as-left setpoint was in tolerance. There were a total of 16 calibrations performed on similar level switches. No other surveillance failures were identified and the switch successfully passed its next surveillance.

Based on these reviews, the licensee concluded that the two failures were random instance and not systematic in nature. If the failures are random it does not introduce a time dependent failure mechanism that will invalidate the 24-month calibration interval.

The staff has reviewed the information provided by the licensee on these two failures and concludes that the licensee performed an acceptable review in its determination that these two failures are random. The licensee's corrective action program provides the NRC staff with reasonable assurance that the methodology and controls at the plant in place will ensure that the safety functions are maintained.

(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.

The licensee conducted a statistical evaluation of both instrument component and loop surveillance data to predict, within a 95 percent/95 percent confidence level, the expected performance of an instrument component or loop based on the past performance of the instrument. In some cases, there was insufficient data to perform a statistical evaluation. For these instruments, vendor data or existing generic studies were used to determine a value for the drift. To provide an adequate basis for the plant drift studies, the data for loops and components with similar characteristics were combined. The surveillance data were analyzed to determine if the data were normally distributed. A scatter plot of the data was developed and linear regression and least-squares curve analyses performed on the data to determine time dependency.

Based on the review of the licensee's summary of the methodology and assumptions used to determine the rate of instrument drift, the staff finds that the licensee's evaluation is consistent with the GL 91-04 guidance.

(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.

The licensee stated that the drift studies were performed for a 30-month cycle for each instrument type. The drift performance was predicted with a 95 percent/95 percent confidence level. Where there was insufficient data to perform a statistical evaluation, instrument drift values were established from either vendor data or existing generic studies. The licensee provided the methodology and assumptions used in the drift studies in its letter dated September 30, 2005. The plant drift studies demonstrate that the instruments performance repeatability and the rate of instrument drift is acceptable for a bounding calibration interval.

Based on the staff's review of the licensee's methodology and assumptions used to determine the magnitude of instrument drift, the staff confirms that the licensee's evaluation is consistent with the GL 91-04 guidance .

(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 and safety analysis assumptions are not exceeded.

The licensee stated that statistical evaluations were made of the BFN Units 2 and 3 "as-found/as-left" surveillance data. The results of these evaluations were used to confirm that the theoretical drift used in determining the allowable value and setpoint bounded the plant data. There were no changes in the instrument analytical limits by this amendment, no additional safety analyses were required.

Based on the review of the licensee's methodology and assumptions used for the drift study, the staff confirmed that the licensee's evaluation is consistent with the GL 91-04 guidance, and that no changes to trip setpoints were necessary.

(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.

The licensee stated that the impact of the drift has been reviewed for each instrument setpoint calculation with a time dependent component. The calculations performed ensured that the current operating setpoints provide adequate margin to the TS allowable values and the analytical limits. The projected instrument errors caused by drift are acceptable for control of plant parameters to achieve a safe shutdown.

Based on the review of the licensee's submittal, the staff confirms that the licensee's evaluation is consistent with the GL 91-04 guidance.

(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.

The licensee stated that the drift studies of the plant surveillance data and the setpoint analyses have been fully verified. Results of setpoint calculations will be incorporated into plant surveillance procedures prior to 24-month cycle operation.

Based on the review of the licensee's submittal, the staff finds that the licensee's evaluation is consistent with the GL 91-04 guidance.

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

The licensee stated that to determine the effect of increasing the calibration intervals to 24 months, plant drift studies of the "as-found/as-left" surveillance data were performed for instruments associated with this amendment. Setpoint calculations were evaluated to determine the effects of the extended calibration interval on instrument accuracies.

The statistical evaluation was made of both instrument component and loop surveillance data to predict, within a 95 percent/95 percent confidence level, the expected performance of an instrument component or loop based on the past performance of the instrument. Studies were performed for specific instruments where surveillance data were available. To provide an adequate basis for the plant drift studies, the data for loops and components with similar characteristics were combined. To compensate for variability in plant shutdowns, the studies were performed for 24 months plus 25 percent (30 months total). The plant drift studies demonstrate that the instruments performance for repeatability and the rate of instrument drift is acceptable for a bounding calibration interval.

The drift study value, based on surveillance data for groups of instruments, was compared to the appropriate accuracy value used in the setpoint calculation for these instruments. If the plant data drift value was bounded by the current setpoint calculation value, no change in the current calculation was required. If the plant data resulted in a 30-month drift value greater than the value used in the setpoint calculation, the value derived from the drift study was applied to the existing calculation. If no drift study was available, an extended drift value was established from either vendor data or existing generic studies.

The licensee stated that evaluation of a 30-month calibration interval showed that, in essentially all cases, the current values used in the setpoint calculations bound the derived field drift value. Based on the results of the studies, none of the instruments in Group 2 of the proposed change (see affected TSs listed in Section 3.2) require a change in the TS allowable value to accommodate a 24-month (30-month maximum) calibration interval.

Based on its review, the staff finds that the licensee's evaluation is consistent with the GL 91-04 guidance and, therefore, the extension of the surveillance interval for the instrument drift related TS SRs acceptable.

3.4 Instrument Setpoint Methodology

The licensee submitted a description of its instrument setpoint methodology in a letter dated January 10, 2006 (ADAMS Accession Number ML060180452), as supplemented by letters dated April 14 (ADAMS Accession Number ML061040397), and August 1, 2006 (ADAMS Accession Number ML062130245). The NRC staff's review of the instrument setpoint methodology is described in a Safety Evaluation dated September 14, 2006 (ADAMS Accession Number ML061680008).

4.0 TECHNICAL CONCLUSION

The NRC staff reviewed the information presented by the licensee and concludes that the licensee has followed the guidance of GL 91-04 to perform the BFN Unit 1 TS SR frequency of “once-per-cycle” from 18 months to 24 months. The licensee’s determination for extending the surveillance intervals for BFN Unit 1 from 18 months to 24 months (30 months when employing the 25 percent grace period) would have insignificant effect on plant safety and would not invalidate any assumption in the plant’s licensing basis.

The licensee’s drift study concludes that evaluation of a 30-month calibration interval showed the current values used in the setpoint calculations bound the derived field drift value. Based on the results of the studies, none of the instruments in Group 2 of the proposed change require a change in the TS allowable value to accommodate a 24-month (30-month maximum) calibration interval.

Based on the above, the NRC staff finds the extension of the surveillance intervals proposed in this amendment acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the NRC staff attempted to contact the Alabama State official regarding the proposed issuance of the amendment. There was no official response.

6.0 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 (70 FR 15947). 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.

7.0 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: Hulbert C. Li
Benjamin T. Parks

Date: September 28, 2006

Mr. Karl W. Singer
Tennessee Valley Authority

BROWNS FERRY NUCLEAR PLANT

cc:

Mr. Ashok S. Bhatnagar, Senior Vice President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Larry S. Bryant, Vice President
Nuclear Engineering & Technical Services
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Brian O'Grady, Site Vice President
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Robert J. Beecken, Vice President
Nuclear Support
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

General Counsel
Tennessee Valley Authority
ET 11A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. John C. Fornicola, Manager
Nuclear Assurance and Licensing
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Bruce Aukland, Plant Manager
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Masoud Bajestani, Vice President
Browns Ferry Unit 1 Restart
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Robert G. Jones, General Manager
Browns Ferry Site Operations
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Larry S. Mellen
Browns Ferry Unit 1 Project Engineer
Division of Reactor Projects, Branch 6
U.S. Nuclear Regulatory Commission
61 Forsyth Street, SW.
Suite 23T85
Atlanta, GA 30303-8931

Mr. Glenn W. Morris, Manager
Corporate Nuclear Licensing
and Industry Affairs
Tennessee Valley Authority
4X Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. William D. Crouch, Manager
Licensing and Industry Affairs
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, AL 35611-6970

State Health Officer
Alabama Dept. of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, AL 36130-3017

Chairman
Limestone County Commission
310 West Washington Street
Athens, AL 35611