Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

July 8, 2004

TVA-BFN-TS-427

10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of) Docket No. 50-259
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 1 - TECHNICAL SPECIFICATIONS (TS) CHANGE 427 - DELETION OF THE LOW PRESSURE COOLANT INJECTION MOTOR-GENERATOR SETS

Pursuant to 10 CFR 50.90, Tennessee Valley Authority (TVA) is submitting a request for a TS change (TS-427) to license DPR-33 for BFN Unit 1. The proposed TS change removes the requirement to maintain an automatic transfer capability for the power supply to the Low Pressure Coolant Injection (LPCI) inboard injection and recirculation pump discharge valves.

Due primarily to obsolescence of equipment, the Unit 1 LPCI Motor-Generator (M-G) Sets and associated 480V Reactor Motor Operated Valve (RMOV) Boards D and E will be removed from service prior to restart. The Units 2 and 3 480V M-G sets may be removed from service in the future.

Unit 1 480V RMOV Boards D and E automatically transfer the power supply from the normal source to the alternate source upon detection of low voltage at the board. The automatic transfer of the power supply for the LPCI inboard injection and recirculation pump discharge valves, which are powered from 480V RMOV Boards D and E, is not required to satisfy regulatory requirements. Regulatory requirements are met by the use of two independent divisions of Emergency Core Cooling System (ECCS) equipment.

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Deletion of the automatic transfer function will not change the number of ECCS subsystems credited in the current BFN licensing basis. Therefore, Surveillance Requirement 3.5.1.12, which requires the periodic testing of this automatic transfer function, and associated Action 3.8.7.C.1 are being deleted.

The electrical loads currently supplied power from 480V RMOV Boards D and E can be relocated onto other safety-related RMOV boards. The relocation of these loads has been analyzed and determined to be acceptable. Therefore, the references to RMOV Boards D and E are being deleted from Limiting Condition for Operation 3.8.7, and the Actions in 3.8.7 are being revised and/or renumbered, as appropriate.

Since there are no changes to the compliance with regulatory requirements or the number of ECCS subsystems credited in the current BFN licensing basis, the requested TS changes are not being submitted as a "risk-informed licensing action" as defined by Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decision on Plant-Specific Changes to the Licensing Basis."

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies 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 enclosures to the Alabama State Department of Public Health.

Enclosure 1 provides TVA's evaluation of the proposed TS changes. Enclosure 2 contains copies of the appropriate marked-up Unit 1 TS pages, showing the proposed changes. Enclosure 3 contains copies of the appropriate updated Unit 1 TS pages which show the resulting changes. Enclosure 4 contains copies of the appropriate marked-up Unit 1 TS Bases pages showing the associated changes. Enclosure 5 contains copies of the updated Unit 1 TS Bases pages which show the resulting changes. The TS Bases changes in Enclosures 4 and 5 are provided for information and do not require NRC approval.

The proposed TS changes are necessary to support the restart of Unit 1. To support this schedule, TVA requests that the TS change be approved by July 1, 2005, and that the implementation of the revised TS be within 60 days of approval.

There are no regulatory commitments associated with this submittal. If you have any questions about this matter, please contact me at (256) 729-2636.

I declare under penalty of perjury that the foregoing is true and correct. Executed on July 8, 2004.

Sincerely,

T. E. Abney
Manager of Licensing
and Industry Affairs

Enclosures:

1. TVA Evaluation of Proposed Unit 1 Technical Specifications changes
2. Marked-up Unit 1 Technical Specifications pages
3. Revised Unit 1 Technical Specifications pages
4. Marked-up Unit 1 Technical Specification Bases pages
5. Revised Unit 1 Technical Specification Bases pages

Enclosures
cc(Enclosures):
State Health Officer
Alabama State Department of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, Alabama 36130-3017

Enclosure 1

Browns Ferry Nuclear Plant (BFN) Unit 1

Technical Specifications (TS) Change TS-427 Deletion of the Low Pressure Coolant Injection Motor-Generator Sets

TVA Evaluation of Proposed TS Changes

INDEX

TABLES

FIGURES

1.0 DESCRIPTION

This letter requests TS changes to license DPR-33 for BFN Unit 1. The proposed TS changes remove the requirement to maintain an automatic transfer capability for the power supply to the Low Pressure Coolant Injection (LPCI) inboard injection and recirculation pump discharge valves.

Due primarily to obsolescence of equipment, the Unit 1 LPCI Motor-Generator (M-G) Sets and associated 480V Reactor Motor Operated Valve (RMOV) Boards D and E will be removed from service prior to restart. The Units 2 and 3 480V M-G sets may be removed from service in the future.

Unit 1 480V RMOV Boards D and E automatically transfer the power supply from the normal source to the alternate source upon detection of low voltage at the board. The automatic transfer of the power supply for the LPCI inboard injection and recirculation pump discharge valves, which are powered from 480V RMOV Boards D and E, is not required to satisfy regulatory requirements. Regulatory requirements are met by the use of two independent divisions of Emergency Core Cooling System (ECCS) equipment. Deletion of the automatic transfer function will not change the number of ECCS subsystems credited in the current BFN licensing basis. Therefore, Surveillance Requirement 3.5.1.12, which requires the periodic testing of this automatic transfer function, and associated Action 3.8.7.C.1 are being deleted.

The electrical loads currently supplied power from 480V RMOV Boards D and E can be relocated onto other safety-related RMOV boards. The relocation of these loads has been analyzed and determined to be acceptable. Therefore, the references to RMOV Boards D and E are being deleted from Limiting Condition for Operation 3.8.7, and the Actions in 3.8.7 are being revised and/or renumbered, as appropriate.

The proposed TS changes are necessary to support the restart of Unit 1. To support this schedule, TVA requests that the TS changes for all three units be approved by July 1, 2005 and that the implementation of the revised TS be within 60 days of approval.

2.0 PROPOSED TECHNICAL SPECIFICATION CHANGES

The proposed change removes the requirement to maintain an automatic transfer capability for the power supply to the LPCI inboard injection and recirculation pump discharge valves. The specific proposed TS changes are described below. The associated TS Bases changes are provided for information and do not require NRC approval.

2.1 Proposed Technical Specification Changes

A. Current Unit 1 TS SR 3.5.1.12:

SURVEILLANCE	FREQUENCY
Verify automatic transfer of the power supply from the normal source to the alternate source for each LPCI subsystem inboard injection valve and each recirculation pump discharge valve.	18 months

The proposed change is to delete SR 3.5.1.12 for Unit 1.

B. Current Unit 1 TS LCO 3.8.7:

The following AC and DC electrical power distribution subsystems shall be OPERABLE: …

c. Unit 1 480V RMOV Boards 1A, 1B, 1D, and 1E;

Proposed Unit 1 TS LCO 3.8.7:

The following AC and DC electrical power distribution subsystems shall be OPERABLE: …

c. Unit 1 480V RMOV Boards 1A and 1B;

C. The Actions in 3.8.7 for Unit 1 are being revised and/or renumbered as described below:

- Action A - The references in the Note are being revised to reflect the deletion of current Condition C;
- Action B -The current Note: "Enter Condition C when Condition B results in no power source to 480 volt RMOV board 1D or 1E" is being deleted;

- Action C - The current condition, required action, and completion time (i.e., to declare the affected RHR subsystem inoperable immediately following the inoperability of 480V RMOV Board 1A or 1B), is being deleted;

- Action D - The current condition and required action are being renumbered to reflect the deletion of Action C;

- Action E - The current condition and required action are being renumbered to reflect the deletion of Action C;

- Action F - The current condition, references to other conditions, and required actions are being renumbered to reflect the deletion of Action C;

- Action G - The current condition, required action and note are being renumbered to reflect the deletion of Action C;

- Action H - The current condition and required action are being renumbered to reflect the deletion of Action C; and

- Action I - The current condition and required action are being renumbered to reflect the deletion of Action C.

A mark-up of the proposed changes to the Unit 1 TS is provided as Enclosure 2. Enclosure 3 contains copies of the appropriate updated TS pages, which show the resulting changes.

2.2 Associated Technical Specification Bases Changes

Enclosure 4 contains copies of the appropriate marked-up Unit 1 TS Bases pages, showing the associated changes. Enclosure 5 contains copies of the updated TS Bases pages, which show the resulting changes. The TS Bases changes in Enclosures 4 and 5 are provided for information and do not require NRC approval.

3.0 BACKGROUND

3.1 Current Electrical Distribution System

BFN is a three-unit plant. As discussed in Updated Final Safety Analysis Report (UFSAR) Sections 8.4, *Normal Auxiliary Power System,* and 8.5, *Standby AC Power Supply and Distribution,* there are several sources of offsite and onsite power for BFN. There are eight diesel generators at BFN. Four diesel generators are shared between Units 1 and 2 and four diesel generators support Unit 3.

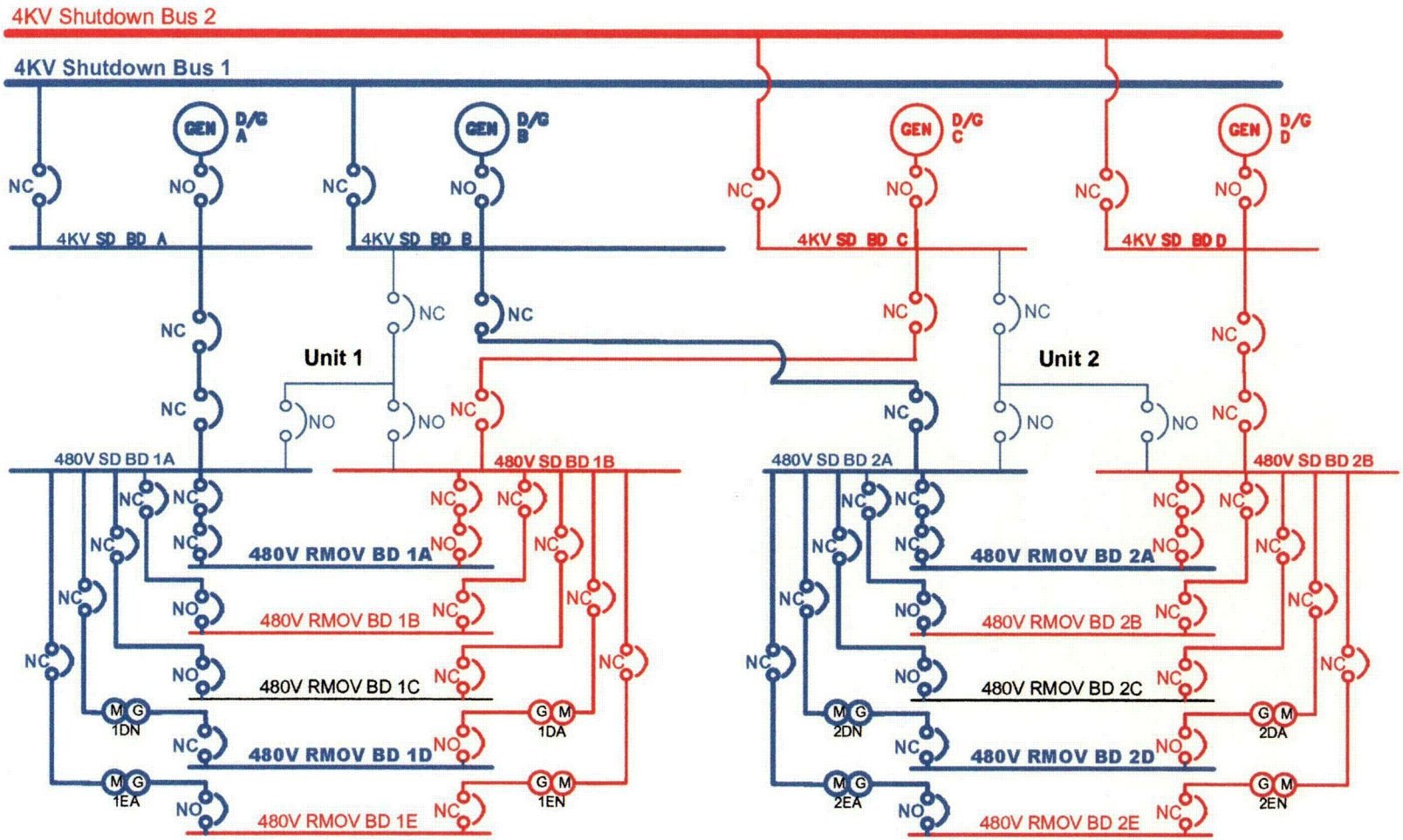
During normal operation, station auxiliary power is taken from the main generator through the unit station service transformers. During startup and shutdown, auxiliary power is supplied from the 500-kV system through the main transformers to the unit station service transformer with the main generators isolated by the main generator breakers. Auxiliary power is also available through the two common station service transformers which are fed from the 161-kV system.

There are two Shutdown Buses. Shutdown Bus 1 is normally aligned to Unit Station Service Transformer 1B (via 4KV Unit Board 1A) and provides Division I power to Units 1 and 2. Shutdown Bus 2 is normally aligned to from Unit Station Service Transformer 2B (via 4KV Unit Board 2A) and provides Division II power to Units 1 and 2.

There are four 4KV Shutdown Boards shared by Units 1 and 2. Each 4KV Shutdown Board on Units 1 and 2 is normally supplied by offsite power from one of the two Shutdown Buses.

On Unit 1, 4KV Shutdown Board A provides the Division I power to 480V Shutdown Board 1A. 4KV Shutdown Board C provides the Division II power to 480V Shutdown Board 1B. On Unit 2, 4KV Shutdown Board B provides the Division I power to 480V Shutdown Board 2A. 4KV Shutdown Board D provides the Division II power to 480V Shutdown Board 2B (See Figure 1).

FIGURE 1
CURRENT UNITS 1 AND 2 ELECTRICAL DISTRIBUTION SYSTEM



Legend:

Blue: Division I NC: Normally closed

Red: Division II NO: Normally open

480V RMOV Boards 1C and 2C are considered quality-related for non-safety related support functions.

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There are five 480V RMOV Boards (A-E) powered by 480V Shutdown Boards A and B for each unit. 480V RMOV Boards A and D are normally powered from 480V Shutdown Board A with Division I power. 480V Shutdown Board B is the alternate power supply. 480V RMOV Boards B, C and E are normally powered from 480V Shutdown Board B with Division II power. 480V Shutdown Board A is the alternate power supply. (Note that the designations used for the boards, valves and M-G sets in the text of this submittal have been generalized to improve readability. The actual board designations are 1A through 1E on Unit 1, and 2A through 2E on Unit 2. The valve and M-G set designations are also prefixed with the associated unit number.)

Unit 1 480V RMOV Board D provides Division I power to the following loads:

FCV-68-79, Recirculation Pump Discharge Valve;
FCV-74-7, Residual Heat Removal (RHR) Pumps A and C Minimum Flow Bypass Valve;
FCV-74-53, RHR LPCI Injection Valve; and
FCV-74-59, RHR Test Valve.

Unit 1 480V RMOV Board E provides Division II power to the following loads:

FCV-68-3, Recirculation Pump Discharge Valve;
FCV-74-30, RHR Pumps B & D Minimum Flow Bypass Valve;
FCV-74-67, RHR LPCI Injection Valve; and
FCV-74-73, RHR Test Valve.

The 480V RMOV Boards D and E power supplies are designed to automatically transfer to the alternate source (the opposite division 480V Shutdown Board), upon detection of an under voltage condition from the normal source.

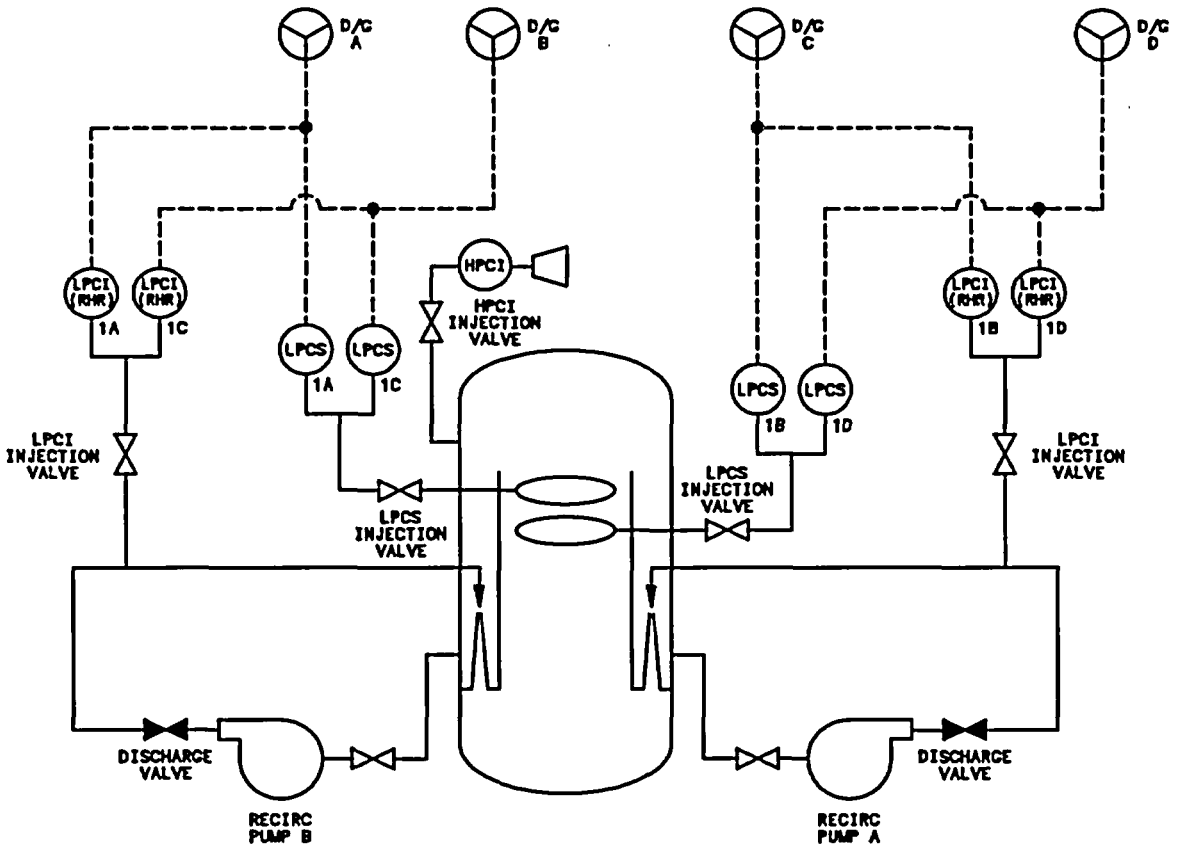
Presently, there are four Unit 1 LPCI M-G Sets, which feed the normal and alternate power to RMOV Boards D and E from 480V Shutdown Boards A and B. M-G set DN is the normal feed to RMOV Board D and M-G set DA is the alternate feed. M-G set EN is the normal feed to RMOV Board E and M-G set EA is the alternate feed.

3.2 Design of the Emergency Core Cooling System

As shown in Figure 2, the BFN ECCS consists of the following:

- High Pressure Coolant Injection (HPCI);
- Automatic Depressurization System (ADS);
- Low Pressure Core Spray (LPCS); and
- LPCI, which is an operating mode of RHR.

FIGURE 2
LAYOUT OF THE UNIT 1 EMERGENCY CORE COOLING SYSTEM



The ECCS subsystems are designed to limit clad temperature over the complete spectrum of possible break sizes in the nuclear system process barrier, including the design basis break. The design basis break is defined as the complete and sudden circumferential rupture of the largest pipe connected to the reactor vessel (i.e., one of the recirculation loop pipes) with displacement of the ends so that blowdown occurs from both ends.

The low-pressure ECCS consists of LPCS and LPCI. The LPCS consists of two independent loops. Each loop consists of two pumps, a spray sparger inside the core shroud and above the core, piping and valves to convey water from the pressure suppression pool to the sparger, and the associated controls and instrumentation. When the system is actuated, water is taken from the pressure suppression pool. Flow then passes through a normally open motor-operated valve in the suction line to each 50 percent capacity pump.

The RHR System is designed for five modes of operation (i.e., shutdown cooling; containment spray and suppression pool cooling; LPCI; standby cooling; and supplemental fuel pool cooling). During LPCI operation, the four RHR pumps take suction from the pressure suppression pool and discharge to the reactor vessel into the core region through both of the recirculation loops. Two pumps discharge to each recirculation loop.

The design function for the equipment powered from Unit 1 480V RMOV Boards D and E is as follows. Refer to UFSAR Section 6.4 for additional information.

- Recirculation Pump Discharge Valves - After receipt of a LPCI initiation signal, a signal is transmitted to the recirculation pump discharge valve control logic in each loop of the Recirculation System to close each valve once the reactor vessel pressure has sufficiently decreased.

- RHR Pumps Minimum Flow Bypass Valves - The RHR pump minimum flow bypass line header isolation valves are automatically controlled by control logic to start or stop flow through the two RHR pump minimum flow bypass lines of the associated loop. The isolation valve is automatically opened if its associated loop injection flow is less than approximately 3,500 gpm, concurrent with indication that either of the two RHR pumps in the respective loop is running. The isolation valve is automatically closed if its associated loop injection flow is greater than the setpoint.

- RHR Inboard Valves - The RHR Inboard valves are opened upon receipt of a LPCI initiation signal.

- RHR Test (and Suppression Pool Cooling) Valves - For the purposes of LPCI actuation, these valves are designed to stay fully closed. They are also used for TS required testing of the LPCI mode of RHR and for long term cooling of the Suppression Pool. For the Technical Specification testing requirement, this valve may be in the open position at the start of an initiating event. For the long term cooling mode of operation, the valve is required to be open.

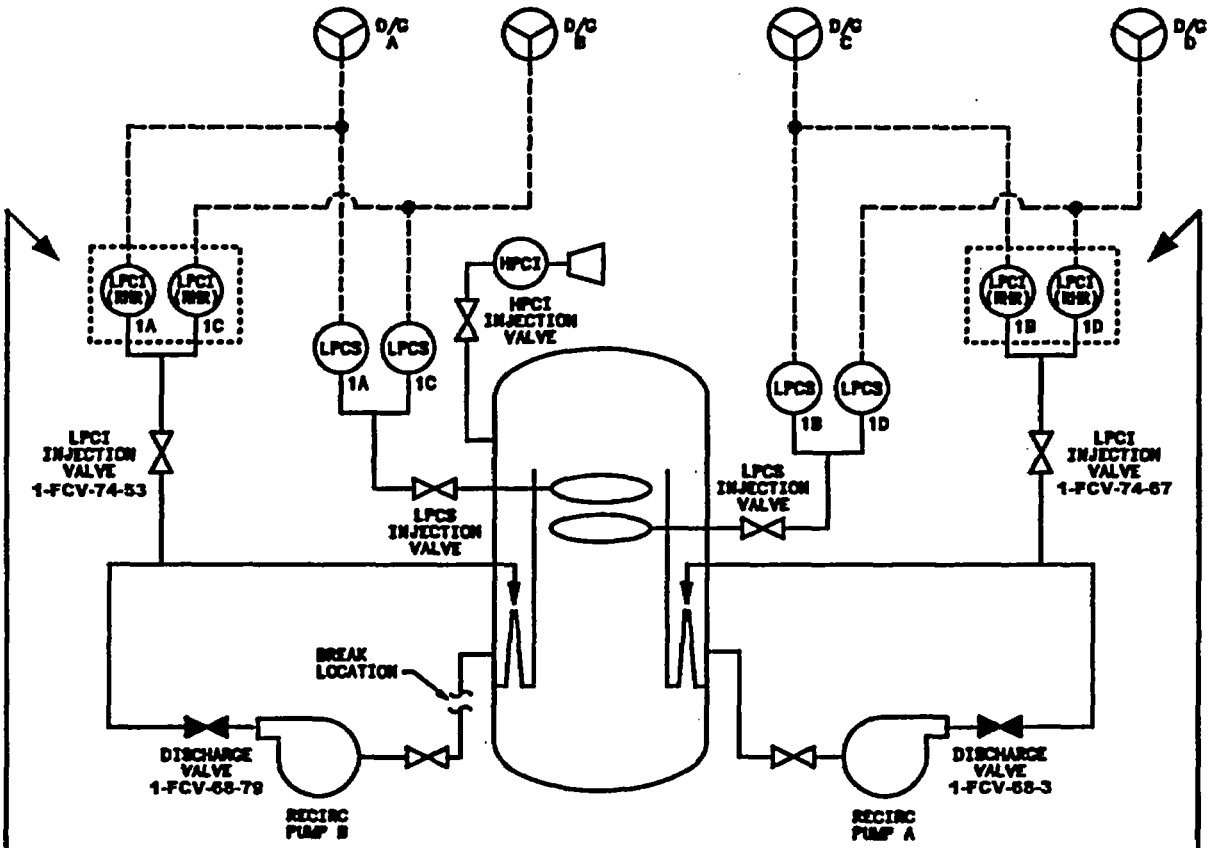
Even though the Unit 1 RHR pump minimum flow bypass valves and the RHR test (suppression pool cooling) valves are currently powered by the RMOV Boards D and E, these functions do not require the automatic transfer to an alternate power source to support their function. As was previously completed for Units 2 and 3, these loads will be relocated from RMOV Boards D and E to RMOV Boards A and B in order to provide environmental qualification (10 CFR 50.49) for their function. Therefore, these two functions are no longer explicitly discussed below.

3.3 Historical Basis for the Electrical and Emergency Core Cooling Systems Design

As discussed in UFSAR Section 1.5, *Principal Design Criteria*, sufficient redundancy and independence is provided for essential safety functions to ensure that no single failure of active components can prevent the required actions. For systems or components to which IEEE-279 is applicable, single failures of passive electrical components is also considered.

Following initial startup and operation, the electrical system design was modified to satisfy the more stringent limitations required by 10 CFR 50, Appendix K and to resolve other regulatory issues (late 1970s). Browns Ferry was using the General Electric SAFE/CHASTE/REFLOOD Loss of Coolant Accident (LOCA) analysis methodology when it modified the ECCS logic. In order to obtain acceptable results utilizing the SAFE/CHASTE/REFLOOD LOCA analysis methodology, TVA had to ensure that at least one RHR pump would be operating in each LPCI loop prior to the postulated single failure to mitigate the consequences of a recirculation suction line break. Refer to Figure 3.

FIGURE 3
HISTORICAL ECCS PERFORMANCE REQUIREMENTS
USING THE SAFE/REFLOOD LOCA ANALYSIS METHODOLOGY



Either RHR pump 1A or 1C in Recirculation Loop B AND either RHR pump 1B or 1D in Recirculation Loop A had to be running to satisfy the ECCS performance requirements using the previous LOCA analysis methodology (SAFE/ REFLOOD) for a recirculation suction line break.

The automatic transfer capability for 480V RMOV Boards D and E was designed to ensure that the LPCI injection occurred from both loops with at least one pump in each loop. If one loop's LPCI injection valve (either FCV-74-53 or FCV-74-67) and the associated reactor recirculation loop discharge valve (either FCV-68-79 or FCV-68-3) lost power (from either 480V RMOV Boards D or E), the RMOV board would automatically transfer to the opposite division's power supply to ensure operation of the valves. With this transfer scheme in place, TVA was concerned that the automatic transfer could propagate an electrical fault to both divisions of power supply. As a result, M-G sets were included in the design for both the normal and alternate power supplies to provide electrical isolation between the associated 480V Shutdown Board and the RMOV Board.

3.4 Description of Current ECCS Performance Analysis

After years of research with large-scale experiments and the development of best estimate codes, NRC generically approved the SAFER/GESTR-LOCA analysis methodology (Reference 1). This methodology calculated more realistic (yet conservative) peak cladding temperatures. The development of SAFER/GESTR-LOCA was intended to relieve unnecessary plant operating and licensing restrictions.

In 1996, TVA replaced the SAFE/CHASTE/REFLOOD LOCA analysis methodology with the SAFER/GESTR-LOCA methodology. The plant specific analysis to support the change to the SAFER/GESTR model and the associated TS changes were provided to NRC in References 2 and 3. NRC issued the change in Reference 4. The results of the current ECCS performance analysis for a complete spectrum of pipe break sizes and postulated single failures are provided in UFSAR Section 6.5, *Emergency Core Cooling Systems - Safety Evaluation*. The limiting [1] postulated failures evaluated in the LOCA analysis are:

- The failure of a unit battery board, with offsite power either available or not available;
- A spurious accident signal from another unit;
- The failure of a LPCI injection valve;
- The failure of a diesel generator with offsite power not available; or
- The failure of HPCI.

As part of the implementation of the SAFER/GESTR-LOCA methodology, Table 6.5-3 was added to the UFSAR. Table 6.5-3 summarized the ECCS systems that were credited in the SAFER/GESTR-LOCA analysis to mitigate the consequences of either a recirculation suction line break or a recirculation discharge line break assuming several bounding postulated failures.

1 Other postulated failures are not specifically considered because they all result in at least as much ECCS capacity as one of the assumed failures discussed herein.

TABLE 1
CURRENT UFSAR TABLE 6.5-3 - SINGLE FAILURE EVALUATION

Assumed Failure[1]	Recirculation Suction Break Systems Remaining[2]	Recirculation Discharge Break Systems Remaining
Battery[3]	ADS[3], 1LPCS[4], 2LPCI (2 pumps into 1 loop)	ADS[3], 1LPCS
Opposite Unit False LOCA Signal	ADS, HPCI, 1LPCS, 2LPCI (2 pumps into 1 loop)	ADS, HPCI, 1LPCS
LPCI Injection Valve	ADS, HPCI, 2LPCS, 2LPCI (2 pumps into 1 loop)	ADS, HPCI, 2LPCS
Diesel Generator	ADS, 1LPCS, HPCI, 2LPCI (2 pumps into 1 loop)	ADS, HPCI, 1LPCS
HPCI	ADS, 2LPCS, 4LPCI (2 per loop)	ADS, 2LPCS, 2LPCI (2 pumps into 1 loop)

(1) Other postulated failures are not specifically considered because they all result in at least as much ECCS capacity as one of the above assumed failures.

(2) Systems remaining, as identified in this table for recirculation suction line breaks, are applicable to other non-ECCS line breaks. For a LOCA from an ECCS line break, the systems remaining are those listed for recirculation suction breaks, less the ECCS in which the break is assumed.

(3) Six ADS valves are available. The previous analysis assumed for the battery failure, the worst-case scenario is that five ADS valves are available with HPCI being inoperable. Another scenario for battery failure is that four ADS valves are available with HPCI operable, but this scenario is bounded by the worst-case scenario (five ADS valves without HPCI). For GE14 fuel, the analysis assumed all six ADS valves are available with HPCI inoperable with a supplemental analysis to support one ADS valve out of service.

(4) Each LPCS means operation of two core spray pumps in a system. It is assumed that both pumps in a system must operate to take credit for core spray cooling or inventory makeup.

NOTE: Technical Specification Change 424[2] has been implemented.

2 NRC letter, K.N. Jabbour to J.A. Scalice, dated April 1, 2004, "Browns Ferry Nuclear Plant, Units 1, 2 and 3 - Issuance of Amendments Regarding the Emergency Core Cooling Systems (TAC Nos. MB8423, MB8424 AND MB8425) (TS-424)

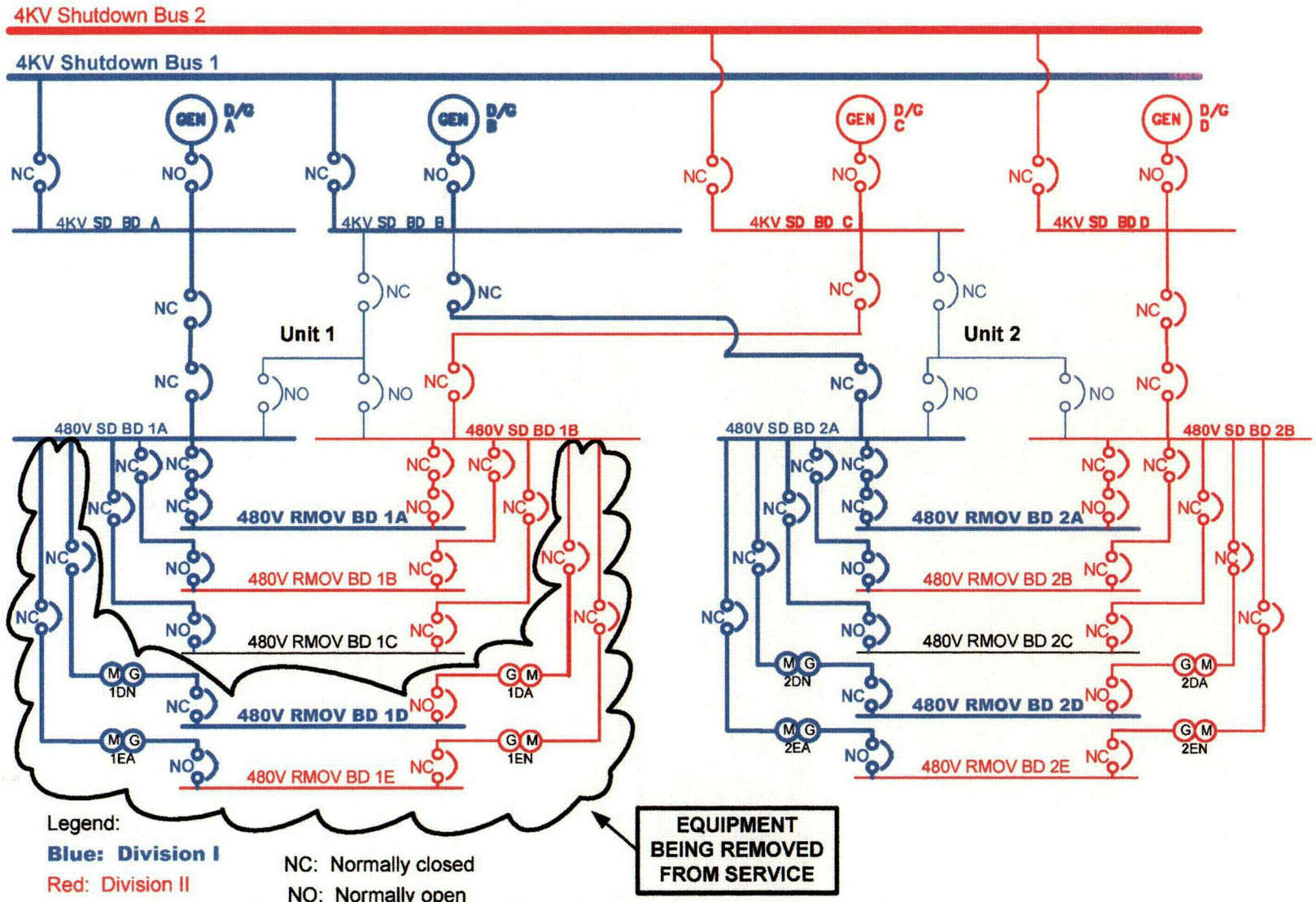
As discussed in UFSAR Section 6.5.3.1, the recirculation suction line break with a battery failure results in the highest peak clad temperature. The recirculation suction line break would result in the most rapid depressurization and inventory loss. The longer time needed to reflood the vessel results in the higher peak clad temperature. The recirculation discharge line break with a battery failure has the least ECCS equipment available to mitigate the consequences of the accident.

3.5 Proposed Change to the Electrical Distribution System

The Unit 1 LPCI Motor-Generator Sets and associated 480V Reactor Motor Operated Valve (RMOV) Boards D and E will be removed from service prior to restart. The Unit 1 equipment being removed from service is shown in Figure 4. There are no proposed changes to Units 2 and 3.

FIGURE 4

PROPOSED UNIT 1 ELECTRICAL DISTRIBUTION SYSTEM



480V RMOV Boards 1C and 2C are considered quality-related for non-safety related support functions.

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The loads on Unit 1 480V RMOV Boards D and E will be transferred to the respective Division I and II 480V RMOV Boards A and B. 480V RMOV Boards A and B are physically located within the Reactor Building, in a mild environment.

3.6 Effect of Proposed Change on Actual ECCS Performance and the LOCA Analysis

The BFN specific SAFER/GESTR-LOCA analysis incorporated values for some ECCS performance parameters that are more conservative, relative to either the basis for the current TS or actual equipment performance. The intent was to perform the analysis in a very conservative manner to allow for future potential relaxations of ECCS equipment performance requirements.

The proposed change does not affect the available equipment for four of the five limiting postulated failures evaluated in the current LOCA analyses:

- The failure of a unit battery board, with offsite power either available or not available;
- A spurious accident signal from another unit;
- The failure of a LPCI injection valve; or
- The failure of HPCI.

During a LOCA (suction or discharge line break), without offsite power available, the loss of a diesel generator as the assumed single failure will cause the loss of power to either 480V RMOV Boards A and D or B and E. After the proposed change is implemented, the loads previously powered off of either 480V RMOV Boards D or E will not automatically transfer to receive power. Therefore, there will be one less LPCI pump actually available for injection into the vessel.

As shown in Tables 2 and 3, there are no changes in ECCS equipment credited in the LOCA analyses for each of the postulated bounding single failures. Therefore, the proposed change does not affect the LOCA analyses.

TABLE 2
ECCS EQUIPMENT AVAILABLE AND CREDITED IN THE LOCA ANALYSIS FOR A RECIRCULATION SUCTION LINE BREAK BEFORE AND AFTER THE PROPOSED CHANGE

Assumed Failure	ECCS Systems **Actually Available Before** the Proposed Change	ECCS Systems **Actually Available After** the Proposed Change	ECCS Systems **Credited in the Analysis** (Shown in FSAR Table 6.5-3) **Before** the Change	ECCS Systems **Credited in the Analysis** (Shown in FSAR Table 6.5-3) **After** the Change
Battery	ADS, 1LPCS, 3LPCI (3 pumps into 2 loops)	ADS, 1LPCS, 2LPCI (2 pumps into 1 loop)	ADS, 1LPCS, 2LPCI * (2 pumps into 1 loop)	(Same as credited before the proposed change)
Opposite Unit False LOCA Signal (Units 1 and 2)	ADS, HPCI, 1LPCS, 2LPCI (2 pumps into 2 loops)	ADS, HPCI, 1LPCS, 2LPCI (2 pumps into 1 loop)	ADS, HPCI, 1LPCS, 2LPCI (2 pumps into 1 loop)	(Same as credited before the proposed change)
LPCI Injection Valve	ADS, HPCI, 2LPCS, 2LPCI (2 pumps into 1 loop)	(Same as available before the proposed change)	ADS, HPCI, 2LPCS, 2LPCI (2 pumps into 1 loop)	(Same as credited before the proposed change)
Diesel Generator	ADS, 1LPCS, HPCI, 3LPCI (3 pumps into 2 loops)	ADS, 1LPCS, HPCI, 2LPCI (2 pumps into 1 loop)	ADS, 1LPCS, HPCI, 2LPCI (2 pumps into 1 loop)	(Same as credited before the proposed change)
HPCI	ADS, 2LPCS, 4LPCI (2 per loop)	(Same as available before the proposed change)	ADS, 2LPCS, 4LPCI (2 per loop)	(Same as credited before the proposed change)

* - Minimum equipment required by the ECCS analysis.

NOTE: Technical Specification Change 424[3] has been implemented.

3 NRC letter, K.N. Jabbour to J.A. Scalice, dated April 1, 2004, "Browns Ferry Nuclear Plant, Units 1, 2 and 3 - Issuance of Amendments Regarding the Emergency Core Cooling Systems (TAC Nos. MB8423, MB8424 AND MB8425) (TS-424)

TABLE 3
ECCS EQUIPMENT AVAILABLE AND CREDITED IN THE LOCA ANALYSIS FOR A RECIRCULATION DISCHARGE LINE BREAK BEFORE AND AFTER THE PROPOSED CHANGE

Assumed Failure	ECCS Systems **Actually Available Before** the Proposed Change	ECCS Systems **Actually Available After** the Proposed Change	ECCS Systems **Credited in the Analysis** (Shown in FSAR Table 6.5-3) **Before** the Change	ECCS Systems **Credited in the Analysis** (Shown in FSAR Table 6.5-3) **After** the Change
Battery	ADS, 1LPCS, 1LPCI (1 pump into 1 loop)	ADS, 1LPCS	ADS, 1LPCS	(Same as credited before the proposed change)
Opposite Unit False LOCA Signal (Units 1 and 2)	ADS, HPCI, 1LPCS, 1LPCI (1 pump into 1 loop)	ADS, HPCI, 1LPCS	ADS, HPCI, 1LPCS	(Same as credited before the proposed change)
LPCI Injection Valve	ADS, HPCI, 2LPCS	(Same as available before the proposed change)	ADS, HPCI, 2LPCS	(Same as credited before the proposed change)
Diesel Generator	ADS, HPCI, 1LPCS, 1LPCI (1 pump into 1 loop)	ADS, HPCI, 1LPCS	ADS, HPCI, 1LPCS	(Same as credited before the proposed change)
HPCI	ADS, 2LPCS, 2LPCI (2 pumps into 1 loop)	(Same as available before the proposed change)	ADS, 2LPCS, 2LPCI (2 pumps into 1 loop)	(Same as credited before the proposed change)

* - Minimum equipment required by the ECCS analysis.

NOTE: Technical Specification Change 424[4] has been implemented.

4 NRC letter, K.N. Jabbour to J.A. Scalice, dated April 1, 2004, "Browns Ferry Nuclear Plant, Units 1, 2 and 3 - Issuance of Amendments Regarding the Emergency Core Cooling Systems (TAC Nos. MB8423, MB8424 AND MB8425) (TS-424)

3.7 Evaluation of Proposed Change on the Electrical Distribution System

The following evaluations were performed on the transfer of the loads from Unit 1 480V RMOV Boards 1D and 1E to the respective Unit 1 Division I and II 480V RMOV Boards 1A and 1B:

- Electrical calculations have been revised to show that the additional loading on the 480V RMOV Boards 1A and 1B is acceptable and voltage at the loads are adequate. The cables will be routed to ensure adequate separation is maintained between redundant equipment to satisfy divisional and Appendix R requirements.

- Altering the configuration in this manner has the potential for introducing different failure modes than was previously considered. A Failure Modes Evaluation (FME) was performed to evaluate potential failure of the diesel generator supplying emergency power, the 480V RMOV Board, and individual component failures. The FME concluded that there will be no new failure modes or adverse effects as a result of the proposed changes.

- The cables have been sized to meet the ampacity, voltage drop and short circuit requirements of the transformers.

- The Boards are seismic Class I and meet seismic equipment qualification requirements.

- Heat load calculations have been revised to reflect the increase in heat load. There were no adverse impacts.

- Control power for the 480V RMOV Boards are provided by control power transformers within the compartments. Moving the loads will have no effect on control power availability.

TVA's proposed change is in conformance with 10 CFR 50.55a(h) (2) and the BFN licensing basis. The BFN licensing basis for ECCS protection systems is described in UFSAR Sections 8.9, *Safety Systems Independence Criteria and Bases for Electrical Cable Installation,* and 7.4, *Emergency Core Cooling Control and Instrumentation.* These systems are designed to meet the intent of the IEEE proposed criteria for Nuclear Power Plant Protection Systems (IEEE-279-1971).

In summary, the transfer of the loads from Unit 1 480V RMOV Boards 1D and 1E to the respective Unit 1 Division I and II 480V RMOV Boards 1A and 1B has been evaluated. The design functions associated with the affected equipment will be satisfied.

4.0 TECHNICAL ANALYSIS

In summary, the automatic transfer of the power supply for the LPCI inboard injection and recirculation pump discharge valves is not required to satisfy regulatory requirements. Regulatory requirements are met by the use of two independent divisions of ECCS equipment. Deletion of the automatic transfer function will not change the number of ECCS subsystems credited in the current BFN licensing basis.

The electrical loads currently supplied power from Unit 1 480V RMOV Boards D and E are being relocated onto other safety-related RMOV boards. The relocation of these loads has been analyzed and determined to be acceptable for Unit 1.

The results of the deterministic evaluation provided in Sections 3.6 and 3.7 assure that the equipment required to safely shutdown the plant and mitigate the effects of a design basis accident, transient, or special event, will remain capable of performing their safety function with the deletion of the requirement to maintain an automatic transfer capability for the power supply to the LPCI inboard injection and recirculation pump discharge valves.

5.0 REGULATORY SAFETY ANALYSIS

The Tennessee Valley Authority (TVA) is submitting a Technical Specification (TS) change request to license DPR-33 for BFN Unit 1. The proposed TS change removes the requirement to maintain an automatic transfer capability for the power supply to the Low Pressure Coolant Injection (LPCI) inboard injection and recirculation pump discharge valves.

5.1 No Significant Hazards Consideration

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed TS changes by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment", as discussed below:

1. Does the proposed Technical Specification change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

Neither Reactor Motor Operated Valve (RMOV) Boards D and E, the equipment they power, nor the automatic power transfer feature provided for these boards are precursors to any accident previous evaluated in the Updated Final Safety Analysis Report (UFSAR). Therefore, the probability of an evaluated accident is not increased by modifying this equipment.

The proposed deletion of the requirement to maintain an automatic transfer capability for the power supply to the LPCI inboard injection and recirculation pump discharge valves does not change the number of Emergency Core Cooling System (ECCS) subsystems credited in the BFN licensing basis. Therefore, the proposed TS changes will not significantly increase the consequences of an accident previously evaluated.

2. Does the proposed Technical Specification change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed deletion of the requirement to maintain an automatic transfer capability for the power supply to the LPCI inboard injection and recirculation pump discharge valves does not introduce new equipment, which could create a new or different kind of accident.

No new external threats, release pathways, or equipment failure modes are created. Therefore, the proposed deletion of the requirement to maintain an automatic transfer capability for the power supply to the LPCI inboard injection and recirculation pump discharge valves will not create a possibility for an accident of a new or different type than those previously evaluated.

3. Does the proposed Technical Specification change involve a significant reduction in a margin of safety?

Response: No

The proposed deletion of the requirement to maintain an automatic transfer capability for the power supply to the LPCI inboard injection and recirculation pump discharge valves does not change the number of ECCS subsystems credited in the BFN licensing basis. The requirements of 10 CFR 50.46 and Appendix K continue to be met. Therefore, the proposed change does not involve a significant reduction in the margin of safety.

Based on the above, TVA concludes that the proposed TS changes present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

The proposed deletion of the requirement for an automatic transfer of the power supply to the LPCI inboard injection and recirculation pump discharge valves does not alter compliance with the requirements of 10 CFR 50, Appendix A, General Design Criterion 17 - Electric Power Systems, or the guidelines in Regulatory Guide 1.9, Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants.

TVA's proposed change is in conformance with 10 CFR 50.55a(h) (2) and the BFN licensing basis. The BFN licensing basis for ECCS protection systems is described in UFSAR Sections 8.9, *Safety Systems Independence Criteria and Bases for Electrical Cable Installation*, and 7.4, *Emergency Core Cooling Control and Instrumentation*. These systems are designed to meet the intent of the IEEE proposed criteria for Nuclear Power Plant Protection Systems (IEEE-279-1971).

The Normal Auxiliary Power System, Emergency A-C Power System and the proposed electrical distribution system will support the electrical loads necessary to mitigate the consequences of a design basis accident. The proposed deletion of the requirement to maintain an automatic transfer capability for the power supply to the LPCI inboard injection and recirculation pump discharge valves does not change the number of ECCS subsystems credited in the BFN licensing basis. Therefore, the requirements of 10 CFR 50.46 and Appendix K continue to be met.

10 CFR 50, Appendix A, Criterion 21, *Protection System Reliability and Testability,* requires the protection system be designed for high functional reliability and inservice testability commensurate with the safety functions to be performed. Redundancy and independence designed into the protection system shall be sufficient to assure that: (1) no single failure results in loss of the protection function; and (2) removal from service of any component or channel does not result in loss of the required minimum redundancy unless the acceptable reliability of operation of the protection system can be otherwise demonstrated. The protection system shall be designed to permit periodic testing of its functioning when the reactor is in operation, including a capability to test channels independently to determine failures and losses of redundancy that may have occurred. The proposed deletion of the automatic transfer capability does not reduce the redundancy or independence of the instrumentation and circuitry that initiates accident signals. Therefore, the proposed change does not alter TVA's compliance with Criterion 21.

In conclusion, based on the considerations discussed above, (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 TS changes will not be inimical to the common defense and security or the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed TS changes would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed TS changes do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed TS changes meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed TS changes.

7.0 REFERENCES

1. NRC letter, C.O. Thomas to J.F. Quirk (General Electric), "Acceptance for Referencing of Licensing Topical Report NEDE-23785, Revision 1, Volume III (P), The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident," June 1, 1984.

2. TVA letter, T.E. Abney to NRC, "Browns Ferry Nuclear Plant (BFN) - Units 1, 2 and 3 - Adoption of the General Electric (GE) SAFER/GESTR Loss of Coolant Accident Methodology," March 11, 1997.

3. TVA letter, T.E. Abney to NRC, "Browns Ferry Nuclear Plant (BFN) - Units 2 and 3 - Revision to Technical Specification (TS) Bases (TS-389)," April 24, 1997.

4. NRC letter, J.F. Williams to O.D. Kingsley, "Browns Ferry Nuclear Plant Units 1, 2 and 3 - Revision to Technical Specification Bases (TAC Nos. M97911, M97912, M97913, M98695 and M98696) (TS 388 and TS 389)," July 8, 1997.

Enclosure 2

Browns Ferry Nuclear Plant (BFN) Unit 1

Technical Specification Changes - Deletion of the Low Pressure Coolant Injection Motor-Generator Sets (TS-427)

Mark-up of Technical Specification Changes

I. AFFECTED PAGE LIST

Unit 1
3.5-7
3.8-33
3.8-34
3.8-35
3.8-36
3.8-37

II. MARKED PAGES

See attached.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.5.1.10	----------NOTE---------- Valve actuation may be excluded. ----------	
	Verify the ADS actuates on an actual or simulated automatic initiation signal.	18 months
SR 3.5.1.11	----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. ----------	
	Verify each ADS valve opens when manually actuated.	18 months
~~SR 3.5.1.12~~	~~Verify automatic transfer of the power supply from the normal source to the alternate source for each LPCI subsystem inboard injection valve and each recirculation pump discharge valve.~~	~~18 months~~

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Distribution Systems - Operating

LCO 3.8.7 The following AC and DC electrical power distribution subsystems shall be OPERABLE:

a. Unit 1 and 2 4.16 kV Shutdown Boards;

b. Unit 1 480 V Shutdown Boards;

c. Unit 1 480 V RMOV Boards 1A, and 1B;

Deleted: ,

Deleted: , 1D, and 1E

d. Unit 1 and 2 DG Auxiliary Boards;

e. Unit DC Boards and 250 V DC RMOV Boards 1A, 1B, and 1C;

f. Unit 1 and 2 Shutdown Board DC Distribution Panels; and

g. Unit 2 and 3 AC and DC Boards needed to support equipment required to be OPERABLE by LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," and LCO 3.7.3, "Control Room Emergency Ventilation (CREV) System."

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One Unit 1 and 2 4.16 kV Shutdown Board inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of Condition B, C, D, and FG when Condition A results in no power source to a required 480 volt board. ----------		
	A.1	Restore the Unit 1 and 2 4.16 kV Shutdown Board to OPERABLE status.	5 days AND 12 days from discovery of failure to meet LCO
	AND		
	A.2	Declare associated diesel generator inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One Unit 1 480 V Shutdown Board inoperable. OR 480 V RMOV Board 1A inoperable. OR 480 V RMOV Board 1B inoperable.	B.1 Restore Board to OPERABLE status.	8 hours AND 12 days from discovery of failure to meet LCO
C. One Unit 1 and 2 DG Auxiliary Board inoperable.	C.1 Restore Unit 1 and 2 DG Auxiliary Board to OPERABLE status.	5 days AND 12 days from discovery of failure to meet LCO

(continued)

Deleted: ——NOTE——
Enter Condition C when Condition B results in no power source to 480 volt RMOV board 1D or 1E.

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Deleted: C. Unit 1 480 V RMOV Board 1D inoperable.
OR
Unit 1 480 V RMOV Board 1E inoperable.

Deleted: C.1 Decl are the affected RHR subsystem inoperable.

Deleted: Immediat ely

Deleted: D

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ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~E~~D. One Unit DC Board inoperable. OR One Unit 1 and 2 Shutdown Board DC Distribution Panel inoperable. OR 250 V DC RMOV Board 1A inoperable. OR 250 V DC RMOV Board 1B inoperable. OR 250 V DC RMOV Board 1C inoperable.	~~E~~D.1 Restore required Board or Shutdown Board DC Distribution Panel to OPERABLE status.	7 days AND 12 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~FE~~. Unit 1 and 2 4.16 kV Shutdown Board A and B inoperable. OR Unit 1 and 2 4.16 kV Shutdown Board C and D inoperable.	----------NOTE---------- Enter applicable conditions and required actions of Condition B, C, ~~D~~, and ~~G~~ F when Condition ~~F~~ E results in no power source to a required 480 volt board. ---------- ~~FE~~.1 Restore one 4.16 kV Shutdown Board to OPERABLE status.	8 hours AND 12 days from discovery of failure to meet LCO
~~G~~F. One or more required Unit 2 or 3 AC or DC Boards inoperable.	~~G~~F.1 Declare the affected SGT or CREV subsystem inoperable.	Immediately
~~H~~G. Required Action and associated Completion Time of Condition A, B, C, D, ~~E~~, or ~~EF~~ not met.	~~H~~G.1 Be in MODE 3. AND ~~H~~G.2 Be in MODE 4.	12 hours 36 hours
~~I~~H. Two or more electrical power distribution subsystems inoperable that result in a loss of function.	~~I~~H.1 Enter LCO 3.0.3.	Immediately

Enclosure 3

Browns Ferry Nuclear Plant (BFN) Unit 1

Technical Specification Changes - Deletion of the Low Pressure Coolant Injection Motor-Generator Sets (TS-427)

Revised Technical Specification Pages

I. AFFECTED PAGE LIST

Unit 1
3.5-7
3.8-33
3.8-34
3.8-35
3.8-36
3.8-37

II. REVISED PAGES

See attached.

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.5.1.10	----------NOTE---------- Valve actuation may be excluded. ----------	
	Verify the ADS actuates on an actual or simulated automatic initiation signal.	18 months
SR 3.5.1.11	----------NOTE---------- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. ----------	
	Verify each ADS valve opens when manually actuated.	18 months

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Distribution Systems - Operating

LCO 3.8.7 The following AC and DC electrical power distribution subsystems shall be OPERABLE:

a. Unit 1 and 2 4.16 kV Shutdown Boards;

b. Unit 1 480 V Shutdown Boards;

c. Unit 1 480 V RMOV Boards 1A and 1B;

d. Unit 1 and 2 DG Auxiliary Boards;

e. Unit DC Boards and 250 V DC RMOV Boards 1A, 1B, and 1C;

f. Unit 1 and 2 Shutdown Board DC Distribution Panels; and

g. Unit 2 and 3 AC and DC Boards needed to support equipment required to be OPERABLE by LCO 3.6.4.3, "Standby Gas Treatment (SGT) System," and LCO 3.7.3, "Control Room Emergency Ventilation (CREV) System."

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Unit 1 and 2 4.16 kV Shutdown Board inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of Condition B, C, and F when Condition A results in no power source to a required 480 volt board. ----------	
	A.1 Restore the Unit 1 and 2 4.16 kV Shutdown Board to OPERABLE status.	5 days AND 12 days from discovery of failure to meet LCO
	AND	
	A.2 Declare associated diesel generator inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One Unit 1 480 V Shutdown Board inoperable. OR 480 V RMOV Board 1A inoperable. OR 480 V RMOV Board 1B inoperable.	B.1 Restore Board to OPERABLE status.	8 hours AND 12 days from discovery of failure to meet LCO
C. One Unit 1 and 2 DG Auxiliary Board inoperable.	C.1 Restore Unit 1 and 2 DG Auxiliary Board to OPERABLE status.	5 days AND 12 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One Unit DC Board inoperable. OR One Unit 1 and 2 Shutdown Board DC Distribution Panel inoperable. OR 250 V DC RMOV Board 1A inoperable. OR 250 V DC RMOV Board 1B inoperable. OR 250 V DC RMOV Board 1C inoperable.	D.1 Restore required Board or Shutdown Board DC Distribution Panel to OPERABLE status.	7 days AND 12 days from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Unit 1 and 2 4.16 kV Shutdown Board A and B inoperable. OR Unit 1 and 2 4.16 kV Shutdown Board C and D inoperable.	----------NOTE---------- Enter applicable conditions and required actions of Condition B, C, and F when Condition E results in no power source to a required 480 volt board. ---------- E.1 Restore one 4.16 kV Shutdown Board to OPERABLE status.	8 hours AND 12 days from discovery of failure to meet LCO
F. One or more required Unit 2 or 3 AC or DC Boards inoperable.	F.1 Declare the affected SGT or CREV subsystem inoperable.	Immediately
G. Required Action and associated Completion Time of Condition A, B, C, D, or E not met.	G.1 Be in MODE 3. AND G.2 Be in MODE 4.	12 hours 36 hours
H. Two or more electrical power distribution subsystems inoperable that result in a loss of function.	H.1 Enter LCO 3.0.3.	Immediately

Enclosure 4

Browns Ferry Nuclear Plant (BFN) Unit 1

Technical Specification Changes - Deletion of the Low Pressure Coolant Injection Motor-Generator Sets (TS-427)

Mark-up of Technical Specification Bases Changes

I. AFFECTED PAGE LIST

Unit 1
B3.5-3
B3.5-21
B3.8-86
B3.8-90
B3.8-91*
B3.8-92*
B3.8-93
B3.8-94
B3.8-95
B3.8-96
B3.8-97
B3.8-98
B3.8-99
B3.8-100
B3.8-101*
B3.8-102

* - Included with submittal for information only. No changes proposed to this page.

II. MARKED PAGES

See attached.

BASES

BACKGROUND (continued)

immediately when offsite power is available and B, C, and D pumps approximately 7, 14, and 21 seconds afterwards and if offsite power is not available all pumps 7 seconds after AC power is available). When the RPV pressure drops sufficiently, CS System flow to the RPV begins. A full flow test line is provided to route water from and to the suppression pool to allow testing of the CS System without spraying water in the RPV.

LPCI is an independent operating mode of the RHR System. There are two LPCI subsystems (Ref. 2), each consisting of two motor driven pumps and piping and valves to transfer water from the suppression pool to the RPV via the corresponding recirculation loop.

The two LPCI pumps and associated motor operated valves in each LPCI subsystem are powered from separate 4 kV shutdown boards. Both pumps in a LPCI subsystem inject water into the reactor vessel through a common inboard injection valve and depend on the closure of the recirculation pump discharge valve following a LPCI injection signal. Therefore, each LPCI subsystem's common inboard injection valve and recirculation pump discharge valve are powered from one of the two 4 kV shutdown boards associated with that subsystem. ~~The ability to provide power to the inboard injection valve and the recirculation pump discharge valve from two independent 4 kV shutdown boards ensures that a single failure of a diesel generator (DG) will not result in the failure of both LPCI pumps in one subsystem.~~

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.11 (continued)

The Frequency of 18 months is based on the need to perform the Surveillance under the conditions that apply just prior to or during a startup from a plant outage. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

~~SR 3.5.1.12~~

~~Verification every 18 months of the automatic transfer capability between the normal and alternate power supply (480 V shutdown boards) for the RMOV boards which supply power for each LPCI subsystem inboard injection valve and each recirculation pump discharge valve demonstrates that AC electrical power is available to operate these valves following loss of power to one of the 4 kV shutdown boards. The ability to provide power to the inboard injection valve and the recirculation pump discharge valve from two independent 4 kV shutdown boards ensures that single failure of an EDG will not result in the failure of both LPCI pumps in one subsystem. Therefore, the failure of the automatic transfer capability will result in the inoperability of the affected LPCI subsystem. The 18 month Frequency has been found to be acceptable based on engineering judgment and operating experience.~~

(continued)

BASES (continued)

LCO

The required electrical power distribution subsystems listed in Table B 3.8.7-1 ensure the availability of AC and DC electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an abnormal operational transient or a postulated DBA. The AC and DC electrical power distribution subsystems are required to be OPERABLE.

Maintaining the AC and DC electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor.

The AC electrical power distribution subsystems require the associated buses and electrical circuits to be energized to their proper voltages. ~~In addition, for the D or E RMOV Boards to be OPERABLE, they must be able to auto-transfer on loss of voltage. This feature ensures that the failure of one Diesel Generator will not result in the loss of an RHR subsystem.~~ OPERABLE DC electrical power distribution subsystems require the associated buses to be energized to their proper voltage from either the associated battery or charger.

Based on the number of safety significant electrical loads associated with each board listed in Table B 3.8.7-1, if one or more of the boards becomes inoperable, entry into the appropriate ACTIONS of LCO 3.8.7 is required. Other boards, such as motor control centers (MCC) and distribution panels which help comprise the AC and DC distribution systems may not be listed in Table B 3.8.7-1. The loss of electrical loads associated with these boards may not result in a complete loss of a redundant safety function necessary to shut down the reactor and maintain it in a safe condition. Therefore, should

(continued)

BASES

ACTIONS

A.1 (continued)

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a Unit DC board is inoperable and subsequently returned OPERABLE, this LCO may already have been not met for up to 7 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the 4.16 kV shutdown board. At this time a Unit DC board could again become inoperable, and the 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This results in establishing the "time zero" at the time this LCO was initially not met, instead of at the time Condition A was entered. The 12 day Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, ~~D,~~ or ~~GF~~ would not be entered even if the 4.16 kV shutdown board was inoperable, resulting in de-energization of a 480 V board. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no power source to a required 480 V board, Actions B, C, ~~D~~, or ~~GF~~ must be immediately entered. This allows Condition A to provide requirements for the loss of the 4.16 kV shutdown board without regard to whether a 480 V shutdown board is de-energized. Actions B, C, ~~D,~~ or ~~GF~~ provide the appropriate restrictions for a de-energized 480 V board.

(continued)

BASES

ACTIONS (continued)

A.2

With a shutdown board inoperable, the associated DG would have no power distribution mechanism and would hence also be inoperable. Required actions for an inoperable DG are included in LCO 3.8.1.

B.1

With one Unit 1 480 V shutdown board inoperable, the remaining 480 V shutdown board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V shutdown board could result in the minimum required ESF functions not being supported. Therefore, the inoperable 480 V shutdown board must be restored to OPERABLE status within 8 hours. This condition also bounds the inoperability of 480 V RMOV boards 1A or 1B.

The Condition B postulated worst case scenario is one division (480 V shutdown board) without AC power (i.e., no offsite power to the division and the associated DG inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

(continued)

BASES

ACTIONS

B.1 (continued)

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limit.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action B.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial failure of the LCO, to restore the 480 V board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition B was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

(continued)

BASES

ACTIONS

B.1 (continued)

Pursuant to LCO 3.0.6, the Distribution System Action C would not be entered even if the 480-V shutdown board was inoperable, resulting in de-energization of a 480-V RMOV board. Therefore, the Required Actions of Condition B are modified by a Note to indicate that when Condition B is entered with no power source to 480-V RMOV board 1D or 1E, Action C must be immediately entered. This allows Condition B to provide requirements for the loss of the 480-V shutdown board without regard to whether 480-V RMOV board 1D or 1E is de-energized. Action C provides the appropriate restrictions for a de-energized 480-V RMOV board 1D or 1E.

C.1

480-V RMOV board 1D or 1E is inoperable if the automatic transfer capability between the normal and alternate power supply (LPCI MG sets) is inoperable for any reason. (Refer also to bases for SR 3.5.1.12.)

With 480-V RMOV Board D or E inoperable, the respective RHR subsystem supported by each affected board is inoperable for LPCI. The overall reliability is reduced because of the loss of one LPCI/RHR subsystem. In this condition, the remaining OPERABLE ECCS subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced, because a single failure in one of the remaining OPERABLE subsystems, concurrent with a LOCA, may result in the ECCS not being able to perform its intended safety function. Therefore, the associated RHR subsystem must be declared inoperable immediately, and the actions in the appropriate system specification taken.

(continued)

BASES

ACTIONS (continued)

C.1

Deleted: D

With one Units 1 and 2 480 V diesel auxiliary board inoperable, the remaining 480 V diesel auxiliary board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V diesel auxiliary board could result in the minimum required ESF functions not being supported. Therefore, the 480 V diesel auxiliary board must be restored to OPERABLE status within 5 days.

The Condition C postulated worst scenario is one 480 V diesel auxiliary board without AC power (i.e., no offsite power to the diesel auxiliary board). In this Condition, the Unit 1 and 2 DGs and SGT trains A and B are more vulnerable to a complete loss of AC power. These boards are normally fed from Shutdown Boards A and D. However, both of these boards have an alternate source of power coming from 4.16 kV shutdown board B. Thus, each auxiliary board has access to two DGs. Therefore, the 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

Deleted: D

a. The remaining diesel auxiliary board has an alternate source of AC power in addition to the normal source and their dedicated DG.

b. The potential for an event in conjunction with a single failure of a redundant component in the 480 V diesel auxiliary board with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

(continued)

BASES

ACTIONS

DC.1 (continued)

The second Completion Time (12 days) for Required Action DC.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition DC is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 10 days, since initial failure of the LCO, to restore the 480 V DG auxiliary board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V DG auxiliary board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition DC was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

ED.1

With one Unit DC board or one Unit 1 and 2 Shutdown Board DC Distribution Panel inoperable, the remaining boards are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining boards could result in the minimum required ESF functions not being supported. Therefore, the required Unit DC board or Unit 1 and 2 Shutdown Board DC Distribution Panel must be restored to OPERABLE status within 7 days by powering it from the associated battery or charger. This condition also bounds the inoperability of 250 V RMOV boards 1A, 1B, or 1C.

(continued)

BASES

ACTIONS

ED.1 (continued)

Condition ED represents one Unit DC board or one Unit 1 and 2 Shutdown Board DC Distribution Panel without adequate DC power, potentially with both the battery significantly degraded and the associated charger nonfunctioning. In this situation the plant is significantly more vulnerable to a partial loss of DC power. However, the three Unit DC boards have ESF loads for the three BFN units distributed among them so that redundant subsystems on each unit have separate normal and alternate power supplies. The 7 day Completion Time is partially based on this and reflects a reasonable time to assess unit status as a function of the inoperable Unit DC board or Unit 1 and 2 Shutdown Board DC Distribution Panel and, if not restored to OPERABLE status, to prepare to effect an orderly and safe shutdown.

The second Completion Time for Required Action ED.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition ED is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the Unit DC board or the Shutdown Board DC Distribution Panel. At this time, a 4.16 kV shutdown board could again become inoperable, and the Unit DC board or the Shutdown Board DC Distribution Panel could be restored OPERABLE. This could continue indefinitely.

(continued)

BASES

ACTIONS

ED.1 (continued)

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition ED was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

FE.1

With one division of 4.16 kV shutdown boards inoperable, the remaining division of shutdown boards is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 4.16 kV shutdown boards could result in the minimum required ESF functions not being supported.

Therefore, one of the inoperable 4.16 kV shutdown boards must be restored to OPERABLE status within 8 hours.

The Condition FE postulated worst case scenario is one division of 4.16 kV shutdown board without AC power (i.e., no offsite power to the division and the associated DGs inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

(continued)

BASES

ACTIONS

FE.1 (continued)

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limit.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action FE.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition FE is entered while, for instance, a 480 V DG auxiliary board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial failure of the LCO, to restore the 480 V shutdown board. At this time, a 480 V DG auxiliary board could again become inoperable, and a 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock."

This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition FE was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

(continued)

BASES

ACTIONS

~~E~~.1 (continued)

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, ~~D~~, or ~~G~~F would not be entered even if the 4.16 kV shutdown boards were inoperable, resulting in de-energization of a 480 V board. Therefore, the Required Actions of Condition ~~E~~ are modified by a Note to indicate that when Condition ~~E~~ is entered with no AC source to the 4.16 kV shutdown boards, Actions B, C, ~~D~~, or ~~G~~F must be immediately entered. This allows Condition ~~E~~ to provide requirement for the loss of the 4.16 kV shutdown boards without regard to whether 480 V board is de-energized. Actions B, C, ~~D~~, or ~~G~~F provide the appropriate restrictions for a de-energized 480 V board.

~~G~~F.1

Required Action ~~G~~F.1 is intended to provide assurance that a loss of one or more required Unit 2 or 3 AC or DC boards does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). With one or more of the required boards inoperable, the SGT or CREVS train supported by each affected board is inoperable. Therefore, the associated SGT or CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

(continued)

BASES

ACTIONS (continued)

~~HG~~.1 and ~~HG~~.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

~~H~~.1

Condition ~~H~~ corresponds to a level of degradation in the electrical distribution system that causes a required safety function to be lost. When more than one AC or DC electrical power distribution subsystem is lost, and this results in the loss of a required function, the plant is in a condition outside the accident analysis. Therefore, no additional time is justified for continued operation. LCO 3.0.3 must be entered immediately to commence a controlled shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.

(continued)

BASES (continued)

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. Regulatory Guide 1.93, December 1974.
4. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

Table B 3.8.7-1 (page 1 of 1)
AC and DC Electrical Power Distribution Systems

TYPE	VOLTAGE	ELECTRICAL POWER DISTRIBUTION SUBSYSTEMS
AC safety boards	4160 V	Shutdown Board A Shutdown Board B Shutdown Board C Shutdown Board D
		Shutdown Board 3EB or 3EC Shutdown Board 3ED
	480 V	Shutdown Board 1A Shutdown Board 1B Shutdown Board 3B RMOV Board 1A RMOV Board 1B ~~RMOV Board 1D~~ ~~RMOV Board 1E~~ SGT Board
		Diesel Auxiliary Board A Diesel Auxiliary Board B
DC boards	250 V	Unit DC Board 1 Unit DC Board 2 Unit DC Board 3
		250 V DC RMOV Board 1A 250 V DC RMOV Board 1B 250 V DC RMOV Board 1C
		Shutdown Board DC Distribution Panel A Shutdown Board DC Distribution Panel B Shutdown Board DC Distribution Panel C Shutdown Board DC Distribution Panel D Shutdown Board DC Distribution Panel 3EB

Enclosure 5

Browns Ferry Nuclear Plant (BFN) Unit 1

Technical Specification Changes - Deletion of the Low Pressure Coolant Injection Motor-Generator Sets (TS-427)

Revised Technical Specification Bases Pages

I. AFFECTED PAGE LIST

Unit 1
B3.5-3
B3.5-21
B3.8-86
B3.8-90
B3.8-91*
B3.8-92*
B3.8-93
B3.8-94
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B3.8-96
B3.8-97
B3.8-98
B3.8-99
B3.8-100**
B3.8-101
B3.8-102**
B3.8-103**
B3.8-104**
B3.8-105**
B3.8-106**
B3.8-107**

* - Included with submittal for information only. No changes proposed to this page.
** - Page number updated. No other changes to this page.

II. REVISED PAGES

See attached.

BASES

BACKGROUND (continued)

immediately when offsite power is available and B, C, and D pumps approximately 7, 14, and 21 seconds afterwards and if offsite power is not available all pumps 7 seconds after AC power is available). When the RPV pressure drops sufficiently, CS System flow to the RPV begins. A full flow test line is provided to route water from and to the suppression pool to allow testing of the CS System without spraying water in the RPV.

LPCI is an independent operating mode of the RHR System. There are two LPCI subsystems (Ref. 2), each consisting of two motor driven pumps and piping and valves to transfer water from the suppression pool to the RPV via the corresponding recirculation loop.

The two LPCI pumps and associated motor operated valves in each LPCI subsystem are powered from separate 4 kV shutdown boards. Both pumps in a LPCI subsystem inject water into the reactor vessel through a common inboard injection valve and depend on the closure of the recirculation pump discharge valve following a LPCI injection signal. Therefore, each LPCI subsystem's common inboard injection valve and recirculation pump discharge valve are powered from one of the two 4 kV shutdown boards associated with that subsystem.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.1.11 (continued)

The Frequency of 18 months is based on the need to perform the Surveillance under the conditions that apply just prior to or during a startup from a plant outage. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

(continued)

BASES (continued)

LCO

The required electrical power distribution subsystems listed in Table B 3.8.7-1 ensure the availability of AC and DC electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an abnormal operational transient or a postulated DBA. The AC and DC electrical power distribution subsystems are required to be OPERABLE.

Maintaining the AC and DC electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor.

The AC electrical power distribution subsystems require the associated buses and electrical circuits to be energized to their proper voltages. OPERABLE DC electrical power distribution subsystems require the associated buses to be energized to their proper voltage from either the associated battery or charger.

Based on the number of safety significant electrical loads associated with each board listed in Table B 3.8.7-1, if one or more of the boards becomes inoperable, entry into the appropriate ACTIONS of LCO 3.8.7 is required. Other boards, such as motor control centers (MCC) and distribution panels which help comprise the AC and DC distribution systems may not be listed in Table B 3.8.7-1. The loss of electrical loads associated with these boards may not result in a complete loss of a redundant safety function necessary to shut down the reactor and maintain it in a safe condition. Therefore, should

(continued)

BASES

ACTIONS

A.1 (continued)

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a Unit DC board is inoperable and subsequently returned OPERABLE, this LCO may already have been not met for up to 7 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the 4.16 kV shutdown board. At this time a Unit DC board could again become inoperable, and the 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This results in establishing the "time zero" at the time this LCO was initially not met, instead of at the time Condition A was entered. The 12 day Completion Time is an acceptable limitation on this potential to fail to meet the LCO indefinitely.

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, or F would not be entered even if the 4.16 kV shutdown board was inoperable, resulting in de-energization of a 480 V board. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no power source to a required 480 V board, Actions B, C, or F must be immediately entered. This allows Condition A to provide requirements for the loss of the 4.16 kV shutdown board without regard to whether a 480 V shutdown board is de-energized. Actions B, C, or F provide the appropriate restrictions for a de-energized 480 V board.

(continued)

BASES

ACTIONS (continued)

A.2

With a shutdown board inoperable, the associated DG would have no power distribution mechanism and would hence also be inoperable. Required actions for an inoperable DG are included in LCO 3.8.1.

B.1

With one Unit 1 480 V shutdown board inoperable, the remaining 480 V shutdown board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V shutdown board could result in the minimum required ESF functions not being supported. Therefore, the inoperable 480 V shutdown board must be restored to OPERABLE status within 8 hours. This condition also bounds the inoperability of 480 V RMOV boards 1A or 1B.

The Condition B postulated worst case scenario is one division (480 V shutdown board) without AC power (i.e., no offsite power to the division and the associated DG inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

(continued)

BASES

ACTIONS

B.1 (continued)

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limit.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action B.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial failure of the LCO, to restore the 480 V board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition B was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

(continued)

BASES

ACTIONS (continued)

C.1

With one Units 1 and 2 480 V diesel auxiliary board inoperable, the remaining 480 V diesel auxiliary board is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 480 V diesel auxiliary board could result in the minimum required ESF functions not being supported. Therefore, the 480 V diesel auxiliary board must be restored to OPERABLE status within 5 days.

The Condition C postulated worst scenario is one 480 V diesel auxiliary board without AC power (i.e., no offsite power to the diesel auxiliary board). In this Condition, the Unit 1 and 2 DGs and SGT trains A and B are more vulnerable to a complete loss of AC power. These boards are normally fed from Shutdown Boards A and D. However, both of these boards have an alternate source of power coming from 4.16 kV shutdown board B. Thus, each auxiliary board has access to two DGs. Therefore, the 5 day time limit before requiring a unit shutdown in this Condition is acceptable because:

a. The remaining diesel auxiliary board has an alternate source of AC power in addition to the normal source and their dedicated DG.

b. The potential for an event in conjunction with a single failure of a redundant component in the 480 V diesel auxiliary board with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

(continued)

BASES

ACTIONS

C.1 (continued)

The second Completion Time (12 days) for Required Action C.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition C is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 10 days, since initial failure of the LCO, to restore the 480 V DG auxiliary board. At this time, a 4.16 kV shutdown board could again become inoperable, and the 480 V DG auxiliary board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition C was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

D.1

With one Unit DC board or one Unit 1 and 2 Shutdown Board DC Distribution Panel inoperable, the remaining boards are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining boards could result in the minimum required ESF functions not being supported. Therefore, the required Unit DC board or Unit 1 and 2 Shutdown Board DC Distribution Panel must be restored to OPERABLE status within 7 days by powering it from the associated battery or charger. This condition also bounds the inoperability of 250 V RMOV boards 1A, 1B, or 1C.

(continued)

BASES

ACTIONS

D.1 (continued)

Condition D represents one Unit DC board or one Unit 1 and 2 Shutdown Board DC Distribution Panel without adequate DC power, potentially with both the battery significantly degraded and the associated charger nonfunctioning. In this situation the plant is significantly more vulnerable to a partial loss of DC power. However, the three Unit DC boards have ESF loads for the three BFN units distributed among them so that redundant subsystems on each unit have separate normal and alternate power supplies. The 7 day Completion Time is partially based on this and reflects a reasonable time to assess unit status as a function of the inoperable Unit DC board or Unit 1 and 2 Shutdown Board DC Distribution Panel and, if not restored to OPERABLE status, to prepare to effect an orderly and safe shutdown.

The second Completion Time for Required Action D.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition D is entered while, for instance, a 4.16 kV shutdown board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 12 days, since initial failure of the LCO, to restore the Unit DC board or the Shutdown Board DC Distribution Panel. At this time, a 4.16 kV shutdown board could again become inoperable, and the Unit DC board or the Shutdown Board DC Distribution Panel could be restored OPERABLE. This could continue indefinitely.

(continued)

BASES

ACTIONS

D.1 (continued)

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition D was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

E.1

With one division of 4.16 kV shutdown boards inoperable, the remaining division of shutdown boards is capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition assuming no single failure. The overall reliability is reduced because a single failure in the remaining 4.16 kV shutdown boards could result in the minimum required ESF functions not being supported.

Therefore, one of the inoperable 4.16 kV shutdown boards must be restored to OPERABLE status within 8 hours.

The Condition E postulated worst case scenario is one division of 4.16 kV shutdown board without AC power (i.e., no offsite power to the division and the associated DGs inoperable). In this condition, the unit is more vulnerable to a complete loss of AC power. It is, therefore, imperative that the unit operators' attention be focused on minimizing the potential for loss of power to the remaining division by stabilizing the unit, and on restoring power to the affected division. The 8 hour time period before requiring a unit shutdown is acceptable because:

(continued)

BASES

ACTIONS

E.1 (continued)

a. There is a potential for decreased safety if the unit operator's attention is diverted from the evaluations and actions necessary to restore power to the affected division to the actions associated with taking the unit to shutdown within this time limit.

b. The potential for an event in conjunction with a single failure of a redundant component in the division with AC power is minimal. (The redundant component is verified OPERABLE in accordance with Specification 5.5.11, "Safety Function Determination Program (SFDP).")

The second Completion Time (12 days) for Required Action E.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable in any single contiguous occurrence of failing to meet the LCO. If Condition E is entered while, for instance, a 480 V DG auxiliary board is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 5 days. This situation could lead to a total duration of 5 days and 8 hours, since initial failure of the LCO, to restore the 480 V shutdown board. At this time, a 480 V DG auxiliary board could again become inoperable, and a 4.16 kV shutdown board could be restored OPERABLE. This could continue indefinitely.

This Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock."

This allowance results in establishing the "time zero" at the time the LCO was initially not met, instead of at the time Condition E was entered. The 12 day Completion Time is an acceptable limitation on this potential of failing to meet the LCO indefinitely.

(continued)

BASES

ACTIONS

E.1 (continued)

Pursuant to LCO 3.0.6, the Distribution System Actions B, C, or F would not be entered even if the 4.16 kV shutdown boards were inoperable, resulting in de-energization of a 480 V board. Therefore, the Required Actions of Condition E are modified by a Note to indicate that when Condition E is entered with no AC source to the 4.16 kV shutdown boards, Actions B, C, or F must be immediately entered. This allows Condition E to provide requirement for the loss of the 4.16 kV shutdown boards without regard to whether 480 V board is de-energized. Actions B, C, or F provide the appropriate restrictions for a de-energized 480 V board.

F.1

Required Action F.1 is intended to provide assurance that a loss of one or more required Unit 2 or 3 AC or DC boards does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). With one or more of the required boards inoperable, the SGT or CREVS train supported by each affected board is inoperable. Therefore, the associated SGT or CREVS subsystem must be declared inoperable immediately, and the ACTIONS in the appropriate system Specification taken.

(continued)

BASES

ACTIONS (continued)

G.1 and G.2

If the inoperable distribution subsystem cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

H.1

Condition H corresponds to a level of degradation in the electrical distribution system that causes a required safety function to be lost. When more than one AC or DC electrical power distribution subsystem is lost, and this results in the loss of a required function, the plant is in a condition outside the accident analysis. Therefore, no additional time is justified for continued operation. LCO 3.0.3 must be entered immediately to commence a controlled shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.8.7.1

This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.

(continued)

BASES (continued)

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. Regulatory Guide 1.93, December 1974.
4. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

Table B 3.8.7-1 (page 1 of 1)
AC and DC Electrical Power Distribution Systems

TYPE	VOLTAGE	ELECTRICAL POWER DISTRIBUTION SUBSYSTEMS
AC safety boards	4160 V	Shutdown Board A Shutdown Board B Shutdown Board C Shutdown Board D Shutdown Board 3EB or 3EC Shutdown Board 3ED
	480 V	Shutdown Board 1A Shutdown Board 1B Shutdown Board 3B RMOV Board 1A RMOV Board 1B SGT Board Diesel Auxiliary Board A Diesel Auxiliary Board B
DC boards	250 V	Unit DC Board 1 Unit DC Board 2 Unit DC Board 3 250 V DC RMOV Board 1A 250 V DC RMOV Board 1B 250 V DC RMOV Board 1C Shutdown Board DC Distribution Panel A Shutdown Board DC Distribution Panel B Shutdown Board DC Distribution Panel C Shutdown Board DC Distribution Panel D Shutdown Board DC Distribution Panel 3EB

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Distribution Systems - Shutdown

BASES

BACKGROUND	A description of the AC and DC electrical power distribution system is provided in the Bases for LCO 3.8.7, "Distribution Systems - Operating."
APPLICABLE SAFETY ANALYSES	The initial conditions of Design Basis Accident and transient analyses in the FSAR, Chapter 6 (Ref. 1) and Chapter 14 (Ref. 2), assume Engineered Safety Feature (ESF) systems are OPERABLE. The AC and DC electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. The OPERABILITY of the AC and DC electrical power distribution system is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The OPERABILITY of the minimum AC and DC electrical power sources and associated power distribution subsystems during MODES 4 and 5, and during movement of irradiated fuel assemblies in the secondary containment ensures that:

a. The facility can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident.

The AC and DC electrical power distribution systems satisfy Criterion 3 of the NRC Policy Statement (Ref. 3).

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific plant condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of Technical Specifications required systems, equipment, and components - both specifically addressed by their own LCO, and implicitly required by the definition of OPERABILITY.

(continued)

BASES

LCO (continued)

In addition, some components that may be required by Unit 1 receive power through the Unit 3 electrical power distribution subsystems (e.g., Standby Gas Treatment (SGT) System, and Control Room Emergency Ventilation System (CREVS)). Therefore, the Unit 3 AC and DC electrical power distribution subsystems needed to support the required equipment must also be OPERABLE.

For a unit in MODE 4 or 5, the AC and DC boards can be placed on their alternate feeder breakers and considered OPERABLE as long as the restrictions on the associated drawings are met.

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the plant in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents and inadvertent reactor vessel draindown).

APPLICABILITY

The AC and DC electrical power distribution subsystems required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core in case of an inadvertent draindown of the reactor vessel;

b. Systems needed to mitigate a fuel handling accident are available;

(continued)

BASES

APPLICABILITY (continued)

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The AC and DC electrical power distribution subsystem requirements for MODES 1, 2, and 3 are covered in LCO 3.8.7.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5

Although redundant required features may require redundant divisions of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem division may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, fuel movement, and operations with a potential for draining the reactor vessel. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystem LCO's Required Actions. In many instances this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made, (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the secondary containment, and any activities that could result in inadvertent draining of the reactor vessel).

(continued)

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the plant safety systems.

Notwithstanding performance of the above conservative Required Actions, a required residual heat removal-shutdown cooling (RHR-SDC) subsystem may be inoperable. In this case, Required Actions A.2.1 through A.2.4 do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the RHR-SDC ACTIONS would not be entered. Therefore, Required Action A.2.5 is provided to direct declaring RHR-SDC inoperable, which results in taking the appropriate RHR-SDC ACTIONS.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution subsystems should be completed as quickly as possible in order to minimize the time the plant safety systems may be without power.

(continued)

BASES (continued)

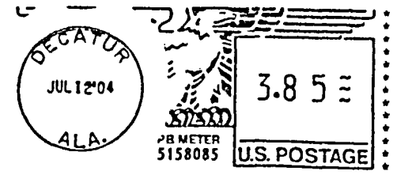
SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, as well as other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. FSAR, Chapter 6.
2. FSAR, Chapter 14.
3. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.



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