1101 Market Street, Chattanooga, Tennessee 37402

CNL-16-126

August 24, 2016

10 CFR 50.90

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

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

Subject: **Response to NRC Request for Additional Information Related to License Amendment Request for Adding New Specifications to Technical Specification 3.3.8.3 (BFN-TS-486) (CAC Nos. MF6738, MF6739, and MF6740) - Letter 6**

References:

1. Letter from TVA to NRC, CNL-15-073, "Application to Modify the Browns Ferry Nuclear Plant, Units 1, and 2 Technical Specifications by Adding New Specification TS 3.3.8.3, 'Emergency Core Cooling System Preferred Pump Logic, Common Accident Signal (CAS) Logic, and Unit Priority Re-Trip Logic,' and Unit 3 TS by adding New Specification TS 3.3.8.3, 'Common Accident Signal (CAS) Logic, and Unit Priority Re-Trip Logic,' (BFN-TS-486)," dated September 16, 2015 (ML15260B125)
2. Letter from NRC to TVA, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Request for Additional Information Related to License Amendment Request for Adding New Specifications to Technical Specification 3.3.8.3 (CAC Nos. MF6738, MF6739, and MF6740)," dated July 25, 2016 (ML16203A027)

By letter dated September 16, 2015 (Reference 1), Tennessee Valley Authority (TVA) submitted a license amendment request (LAR) for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3, to revise the BFN, Units 1 and 2, Technical Specifications (TS) by adding a new specification governing the safety functions for the Emergency Core Cooling System (ECCS) Preferred Pump Logic, Common Accident Signal Logic, and the Unit Priority Re-Trip Logic. In addition, the LAR relocated the BFN, Unit 3 requirements for Common Accident Signal Logic and Unit Priority Re-trip Logic to a new specification governing the safety functions for the Common Accident Signal Logic, and the Unit Priority Re-Trip Logic for consistency with the changes to the BFN, Units 1 and 2 TS.

The NRC requested additional information in the letter dated July 25, 2016 (Reference 2). Enclosure 1 provides the TVA responses to NRC RAIs. The responses provided in Enclosure 1 to this letter are due by August 24, 2016. Enclosure 2 provides revised proposed TS 3.3.8.3, "Emergency Core Cooling System (ECCS) Preferred Pump, Common Accident Signal (CAS), and Unit Priority Re-Trip Logic," pages and associated Bases as described in the TVA response to RAIs in Enclosure 1.

Consistent with the standards set forth in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50.92(c), TVA has determined that the additional information, as provided in this letter, does not affect the no significant hazards consideration associated with the proposed application previously provided in Reference 1.

There are no new regulatory commitments associated with this submittal. Please address any questions regarding this request to Edward D. Schrull at (423) 751 3850.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 24th day of August 2016.

Respectfully,

for

J. W. Shea
Vice President, Nuclear Licensing

Enclosures

cc: See page 3
Enclosures: 1. TVA Responses to NRC Request for Additional Information
2. Revised Proposed Technical Specifications and Associated Bases

Enclosure
cc (Enclosure):

NRC Regional Administrator - Region II
NRC Resident Inspector – Browns Ferry Nuclear Plant
NRC Project Manager – Browns Ferry Nuclear Plant
State Health Officer, Alabama Department of Public Health

ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT UNITS 1, 2, AND 3

TVA Responses to NRC Request for Additional Information

EEEB RAI 5[1]

In response to EEEB RAI 3, TVA stated, in its letter dated May 11, 2016 (ADAMS Accession No. ML16133A566):

> *Extended Operation (>24 hours)*
>
> *If it becomes necessary to establish Suppression Pool Cooling on Units 1 and 2 simultaneously, operators may need to parallel the Unit 1/2 Diesel Generators with their respective Unit 3 Diesel Generators in accordance with the BFN Loss of Off-Site Power/Station Blackout procedure. This will allow a Unit 1 and a Unit 2 RHR pump to be operated off the same 4kV Shutdown Board and support extended operation without overloading the Diesel Generators.*

However, in Section 8.5 of the BFN Updated Final Safety Analysis Report (UFSAR), the following is stated:

> *Operation of the Diesel Generators During the Long-Term Decay Heat Removal Period (Greater Than 10 Minutes)*
>
> *In the long term following an accident, the four diesel generators assigned to Units 1 and 2 and the four diesel generators assigned to Unit 3 may be paralleled as shown in Figure 8.5-24 (4.16-kV shutdown board A to 4.16-kV shutdown board 3EA, etc.). Synchronizing equipment is provided in the Units 1 and 2 control room, and paralleling will be accomplished from this location.*

Explain which plant conditions may require parallel operation of the Unit 3 diesel generators with the Units 1 and 2 diesel generators before 24 hours, but after 10 minutes, of an accident.

TVA Response

The plant conditions assumed in the BFN safety design basis no longer require parallel diesel generator operation. A recent GE analysis of the requirements for post shutdown suppression pool cooling has shown that only one RHR pump is needed in the non-accident units to support suppression pool cooling and maintain the suppression pools below their design temperature limits. Therefore, the design feature of diesel paralleling has been changed from a safety design basis function to a Defense-In-Depth function.

[1] The NRC letter dated March 21, 2016 contains Electrical Engineering Branch (EEEB) RAIs 1 through 4. The TVA response to these RAIs were contained in TVA Letter to NRC, CNL-16-078,"Response to NRC Request for Additional Information Related to License Amendment Request for Adding New Specifications to Technical Specification 3.3.8.3 (BFN-TS-486) (CAC Nos. MF6738, MF6739, and MF6740) - Letter 3," dated May 11, 2016

Section 8.5.2.3 of the UFSAR is being revised as follows:

> In the long term (greater than 10 minutes), three of the Unit 1 and 2 diesel generators, paralleled with the three respective Unit 3 diesel generators, shall be adequate to supply all required loads for the safe shutdown and cooldown of all three units in the event of a loss of offsite power and a design basis accident in any one unit. This feature is considered to be a Defense-In-Depth capability feature because paralleling is not required to safely shutdown and cool all three units following an accident in one unit and a loss of offsite power. Reference GEH Report 002N4870, Revision 0, "Task Report, Tennessee Valley Authority, Browns Ferry Nuclear Plant, Non-Accident Unit Shutdown Containment Response" (EDMS R05 160531 001).

BFN procedure 0-AOI-57-1A, Loss of Offsite Power (161 and 500kV) / Station Blackout, provides the operators with the steps needed to parallel the diesel generators if desired or if operational flexibility dictates the need to start a large electrical load. For example, 0-AOI-57-1A would be used if needed to operate two RHR pumps on the same Unit 1/2 4kV Shutdown Board, or to start a Condenser Circulating Water (CCW pump) to establish the main condenser as a heat sink. These examples of the flexibility of the BFN electrical system are no longer required by the safety design basis, but are available as Defense-In-Depth functions.

EEEB RAI 6

TVA, in Attachment 1, "Revised Proposed BFN, Unit 1 TS 3.3.8.3," of Enclosure 3, "Revised Proposed Technical Specifications and Associated Bases," to its submittal dated June 16, 2016, stated that, "The logic systems for each FUNCTION in Table 3.3.8.3-1 shall be OPERABLE." The word "FUNCTION" is capitalized. However, FUNCTION is not defined in the BFN TSs. Define the word FUNCTION in TSs or change it to lower case. Also, briefly describe each function in the TS Bases as to how these functions are derived.

TVA Response

The word “FUNCTION” has been changed to lower case “Function.”

The background section in the Bases section has been revised to clarify which Function is being described in the section.

The revised proposed TS and TS Bases pages are provided in Enclosure 2.

EEEB RAI 7

TVA, in Attachment 1 of Enclosure 3 to its submittal dated June 16, 2016, proposed to perform Surveillance Requirements (SR) 3.3.8.3.1 at BFN with a frequency of 24 months.

Clarify how a logic function failure will be detected if any pump logic function fails in a period between performing SR 3.3.8.3. Provide a summary of the frequency and results of the pump logic function surveillance/testing performed for the past 6 years, and discuss any failure (if any occurred) during any of these tests.

TVA Response

The RHR and Core Spray logic functional tests are performed every 24 months. The core spray and RHR relays that provide the preferred pump logic function are normally de-energized relays that are energized to perform the function. There is no method of detecting a failure of a normally de-energized relay other than by testing or during operation where the relay is actuated. The GE HFA, HGA relays, and Agastat ETR time delay relays used at BFN were selected based on their excellent reliability and operating history at BFN and other GE BWR plants.

A review of the last eight years of the RHR (LPCI) and Core Spray logic functional tests and work orders associated with these relays was performed. There were no failures found in the past 6 years. However, in 2008, two relays, both associated with the Unit 1 and Unit 2 Unit Priority Re-Trip logic for diesel generator C, were replaced due to component failures identified during testing (BFN-1-RLY-10AK132B and BFN-2-RLY-10AK132B). Several other relays have been replaced under a periodic maintenance replacement schedule due to age of the relays, or due to a 10 CFR Part 21 issue on similar relays as a precaution.

EICB RAI 4[2]

In response to EICB RAI 3, in its letter dated June 16, 2016, TVA revised the original proposed Condition A in TS 3.3.8.3, which would have allowed both divisions of ECCS Preferred Pump Logic (PPL) to be inoperable for up to 7 days. The revised proposed Condition A would allow only one division of ECCS PPL to be Inoperable for up to 7 days.

Specifically, the revised proposed Condition A requires actions for:

> *One required ECCS Preferred Pump Logic - RHR division inoperable.*
>
> *OR*
>
> *One required ECCS Preferred Pump Logic - Core Spray division inoperable.*
>
> *OR*
>
> *Required ECCS Preferred Pump Logic - RHR Division I and required ECCS Preferred Pump Logic - Core Spray Division I inoperable*
>
> *OR*
>
> *Required ECCS Preferred Pump Logic - RHR Division II and required ECCS Preferred Pump Logic - Core Spray Division II inoperable.*

The TS Bases for TS 3.3.8.3 use a similar justification for the 7 days to complete repairs on an Inoperable ECCS PPL Division as used in the CAS, which is, "The plant electrical system response is degraded, and the potential for inappropriate electrical system alignment is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division(s) of ECCS Preferred Pump Logic is capable of performing its intended function." (underline added for emphasis).

In response to APLA RAI 6b (TVA letter dated May 11, 2016, Enclosure 1, page 22 of 47), in the table under "Effect of ECCS PPL Inoperable with an Accident and Spurious Accident Signal," TVA showed that with BFN, Unit 1, Division I Core Spray PPL Component Inoperable, the required ECCS in UFSAR Table 6.5-3 (minimum equipment required) would not be met. Several similar entries in the table were noted. The statement in the table appears to contradict the statements in the bases. Justify or explain this discrepancy.

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[2] The NRC letter dated March 21, 2016, contains Instrumentation and Controls Branch (EICB) RAIs 1 through 3. The TVA response to these RAIs were contained in TVA Letters to NRC for EICB RAI 1 and 2, CNL-16-078,"Response to NRC Request for Additional Information Related to License Amendment Request for Adding New Specifications to Technical Specification 3.3.8.3 (BFN-TS-486) (CAC Nos. MF6738, MF6739, and MF6740) - Letter 3," dated May 11, 2016, and EICB RAI 3, CNL-16-078,"Response to NRC Request for Additional Information Related to License Amendment Request for Adding New Specifications to Technical Specification 3.3.8.3 (BFN-TS-486) (CAC Nos. MF6738, MF6739, and MF6740) - Letter 5," dated June 16, 2016

TVA Response

The requirement for BFN accident signal initiation logic to accommodate a spurious accident signal is part of the original design basis as stated in Supplement 4 to the BFN SER dated September 10, 1973. SER Supplement No. 4 further stated that a spurious accident signal is considered to be a single failure. If a division of the preferred pump logic were inoperable (either the RHR or the Core Spray subsystem), the following multiple failures would have to occur for the minimum ECCS requirements to not be satisfied:

- Failure 1: An RHR or Core Spray subsystem preferred pump logic component is detected as failed and the affected division is declared inoperable in accordance with LCO 3.3.8.3 A.
- Failure 2: During the seven day LCO action period prior to repair of the failed preferred pump logic component, a LOCA/LOOP occurs in Unit 1 or Unit 2.
- Failure 3: A spurious accident signal is initiated in the non-accident unit (design basis single failure during the LOCA/LOOP).

The results of these multiple failures follows:

- Impact on Unit 1 Accident: If the preferred pump logic component failure were in Division I, the Division I RHR and Core Spray pumps assigned to Unit 1 would not be available. If the failure were in Division II, the Unit 1 Division I preferred pumps would not be affected.
- Impact on Unit 2 Accident: If the preferred pump logic component failure were in Division II, the Division II RHR and Core Spray pumps assigned to Unit 1 would not be available. If the failure were in Division I, the Unit 2 Division II preferred pumps would not be affected.

The Probabilistic Risk Assessment (PRA) submitted in support of the LAR has shown that the probability of a LOCA/LOOP in conjunction with a design basis spurious accident signal during the seven day LCO action period is sufficiently low to support the seven day LCO action duration.

The TS Bases for TS 3.3.8.3 have been revised to clarify the intent of the statement concerning the remaining divisions of preferred pump logic available as it depends on which division is inoperable and which unit is the accident unit.

The revised proposed TS and TS Bases pages are provided in Enclosure 2.

EICB-RAI-5

In response to EICB RAI 3, in its letter dated June 16, 2016, TVA revised the original proposed Condition F to state:

> *Two or more required ECCS Preferred Pump Logic divisions inoperable for reasons other than Condition A*
>
> *OR*
>
> *Two divisions of CAS Logic inoperable.*
>
> *OR*
>
> *Two divisions of Unit Priority Re-Trip Logic inoperable.*

Condition F, and the bases for Condition F, implies that if there are two divisions of ECCS PPL logic inoperable, then immediately enter Limiting Condition for Operation 3.0.3.

However, the reason for and meaning of the added phrase in Condition F, "for reasons other than Condition A," is not clear. It may be TVA's way of reminding that a division of ECCS PPL has two "subdivisions" or two "channels."

The LAR stated (page E-11, Section 4.3, "Technical Analysis") that, "There are two divisions of ECCS Preferred Pump Logic, each consisting of two channels: a LPCI channel and a Core Spray channel." Clarify how this phrase is interpreted.

TVA Response

Condition F has been revised to remove the statement “other than Condition A” as follows:

> “Two required ECCS Preferred Pump Logic divisions inoperable.
>
> OR
>
> Two divisions of CAS Logic inoperable.
>
> OR
>
> Two divisions of Unit Priority Re-Trip Logic inoperable.”

The TS Bases has been revised to use the term “subsystems” to describe that the RHR (LPCI) and Core Spray subsystems make up each division of the ECCS Preferred Pump Logic divisions. This also is consistent with the use of the term “subsystems” in TS 3.5.

The revised proposed TS and TS Bases pages are provided in Enclosure 2.

EICB RAI 6

In response to EICB RAI 3 (TVA letter dated June 16, 2016, Enclosure 3, page 18 of 25), TVA used the term "division" in SR 3.3.8.3.1, Note 1, but in the TS Bases discussing SR 3.3.8.3.1, the term used is "channel."

TVA (page E-11, Section 4.3, "Technical Analysis," of LAR dated September 16, 2015) stated that, "There are two divisions of ECCS Preferred Pump Logic, each consisting of two channels: a LPCI channel and a Core Spray channel." Clarify whether this inconsistency in use of terms is generic or an overlooked inconsistency.

TVA Response

The TS Bases has been revised to use the term “subsystems” to describe that the RHR (LPCI) and Core Spray subsystems make up each division of the ECCS Preferred Pump Logic divisions. This also is consistent with the use of the term “subsystems” in TS 3.5.

The revised proposed TS Bases pages are provided in Enclosure 2.

ENCLOSURE 2

Tennessee Valley Authority

Browns Ferry Nuclear Plant, Units 1, 2, and 3

Revised Proposed Technical Specifications and Associated Bases

Enclosure 2 provides the revised proposed Browns Ferry Nuclear Plant Unit 1 and Unit 2 Technical Specification 3.3.8.3, "Emergency Core Cooling System (ECCS) Preferred Pump, Common Accident Signal (CAS), and Unit Priority Re-Trip Logic," page inserts and associated revised proposed Bases page inserts as discussed in the TVA responses to Requests for Additional Information EEEB RAI 6, EICB RAI 4, EICB RAI 5, and EICB RAI 6 provided in Enclosure 1 to this letter.

ENCLOSURE 2

Tennessee Valley Authority

Browns Ferry Nuclear Plant, Units 1, 2, and 3

Revised Proposed Technical Specifications and Associated Bases

Attachment 1

Revised Proposed BFN, Unit 1 TS 3.3.8.3

3.3 INSTRUMENTATION

3.3.8.3 Emergency Core Cooling System (ECCS) Preferred Pump, Common Accident Signal (CAS), and Unit Priority Re-Trip Logic

LCO 3.3.8.3 The logic systems for each Function in Table 3.3.8.3-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.8.3-1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required ECCS Preferred Pump Logic division inoperable.	A.1 Restore required ECCS Preferred Pump Logic division to OPERABLE.	7 days
B. One CAS Logic division inoperable.	B.1 Restore logic division to OPERABLE status.	7 days
C. One Unit Priority Re-Trip Logic division inoperable.	C.1 Restore logic division to OPERABLE status.	7 days
D. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 1, 2, or 3.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	12 hours 36 hours

(continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition A not met in MODE 4 or 5 with Unit 2 in MODE 1, 2, or 3.	E.1 ----------NOTE---------- Only applicable in MODE 4 and 5. ---------- Declare associated ECCS components inoperable.	Immediately
F. Two required ECCS Preferred Pump Logic divisions inoperable. <u>OR</u> Two divisions of CAS Logic inoperable. <u>OR</u> Two divisions of Unit Priority Re-Trip Logic inoperable.	F.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.8.3.1	----------NOTES---------- 1. When a division is placed in an inoperable status solely for performance of required Surveillance, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated redundant division is OPERABLE. 2. Breakers associated with Unit 2 are not required to actuate for proper completion of this Surveillance. ---------- Perform LOGIC SYSTEM FUNCTIONAL TEST including breaker actuation.	24 months

Table 3.3.8.3-1 (page 1 of 1)
Emergency Core Cooling System (ECCS) Preferred Pump, Common Accident Signal (CAS), and Unit Priority Re-Trip Logic

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED DIVISIONS
1. ECCS Preferred Pump Logic	1,2,3	2
	4[(a)],5[(a)]	[(b)]
2. CAS Logic	1,2,3	2
3. Unit Priority Re-Trip Logic	1,2,3	2

(a) When associated RHR or Core Spray pumps are required to be OPERABLE, or are in operation, and Unit 2 is in MODE 1, 2, or 3.

(b) The number of Required Divisions is dependent on the configuration of the RHR or Core Spray pumps required to be OPERABLE, or are in operation.

ENCLOSURE 2

Tennessee Valley Authority

Browns Ferry Nuclear Plant, Units 1, 2, and 3

Revised Proposed Technical Specifications and Associated Bases

Attachment 2

Revised Proposed BFN, Unit 2 TS 3.3.8.3

3.3 INSTRUMENTATION

3.3.8.3 Emergency Core Cooling System (ECCS) Preferred Pump, Common Accident Signal (CAS), and Unit Priority Re-Trip Logic

LCO 3.3.8.3 The logic systems for each Function in Table 3.3.8.3-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.8.3-1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required ECCS Preferred Pump Logic division inoperable.	A.1 Restore required ECCS Preferred Pump Logic division to OPERABLE.	7 days
B. One CAS Logic division inoperable.	B.1 Restore logic division to OPERABLE status.	7 days
C. One Unit Priority Re-Trip Logic division inoperable.	C.1 Restore logic division to OPERABLE status.	7 days
D. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 1, 2, or 3.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	12 hours 36 hours
		(continued)

E. Required Action and associated Completion Time of Condition A not met in MODE 4 or 5 with Unit 1 in MODE 1, 2, or 3.	E.1	----------NOTE---------- Only applicable in MODE 4 and 5. ---------- Declare associated ECCS components inoperable.	Immediately
F. Two required ECCS Preferred Pump Logic divisions inoperable. <u>OR</u> Two divisions of CAS Logic inoperable. <u>OR</u> Two divisions of Unit Priority Re-Trip Logic inoperable.	F.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.8.3.1	----------NOTES---------- 1. When a division is placed in an inoperable status solely for performance of required Surveillance, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated redundant division is OPERABLE. 2. Breakers associated with Unit 1 are not required to actuate for proper completion of this Surveillance. ---------- Perform LOGIC SYSTEM FUNCTIONAL TEST including breaker actuation.	24 months

Table 3.3.8.3-1 (page 1 of 1)
Emergency Core Cooling System (ECCS) Preferred Pump, Common Accident Signal (CAS), and Unit Priority Re-Trip Logic

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED DIVISIONS
1. ECCS Preferred Pump Logic	1,2,3	2
	4[(a)],5[(a)]	[(b)]
2. CAS Logic	1,2,3	2
3. Unit Priority Re-Trip Logic	1,2,3	2

(a) When associated RHR or Core Spray pumps are required to be OPERABLE, or are in operation, and Unit 1 is in MODE 1, 2, or 3.

(b) The number of Required Divisions is dependent on the configuration of the RHR or Core Spray pumps required to be OPERABLE, or are in operation.

ENCLOSURE 2

Tennessee Valley Authority

Browns Ferry Nuclear Plant, Units 1, 2, and 3

Revised Proposed Technical Specifications and Associated Bases

Attachment 3

Revised Proposed BFN, Unit 1 TS 3.3.8.3 Bases

B 3.3.8.3 INSTRUMENTATION

B 3.3.8.3 Emergency Core Cooling System (ECCS) Preferred Pump, Common Accident Signal (CAS), and Unit Priority Re-Trip Logic

BASES

BACKGROUND

ECCS Preferred Pump Logic Function

The ECCS preferred pump logic is a function performed by components in the Residual Heat Removal (RHR) system and the Core Spray (CS) system that prevents overloading the shared Unit 1/2 4kV Shutdown Boards in the event of an accident in Units 1 or 2. Each division of ECCS preferred pump logic consists of two subsystems: one RHR subsystem and one CS subsystem.

In the event of an accident signal in either Unit 1 or Unit 2, all of the ECCS equipment associated with the accident unit will start. All eight diesel generators in the plant will be started on an accident signal in any unit as a pre-emergency action in case of a subsequent power blackout.

The diesel generators and Standby AC Power System are designed to accommodate spurious accident signals from any unit and in any order, real followed by a spurious signal, real coincident with a spurious signal, and spurious followed by a real accident signal. If the ECCS loads for both Units 1 and 2 were allowed to start during combinations of real and spurious accident signals, the combined Unit 1/2 ECCS pumps would overload the 4kV shutdown boards and their associated diesel generators.

During combinations of real and spurious accident signals, the Units 1 and 2 ECCS preferred pump logic will assign the Unit 1 ECCS loads to the Division I 4kV shutdown boards and the Unit 2 ECCS loads to the Division II 4kV shutdown boards. The CS and low pressure coolant injection (LPCI) logic (i.e., LCO 3.3.5.1 Functions 1.a, 1.b, 1.c, 2.a, 2.b, 2.c) would send redundant signals to initiate the ECCS preferred pump logic to trip the Unit 1 Division II RHR and CS pumps (if running) and the Unit 2 Division I RHR and CS pumps (if running). The ECCS preferred pump logic signal also inhibits the automatic start of the Unit 1 Division II RHR and CS pumps and the Unit 2 Division I RHR and CS pumps (after 60 seconds, manual control of the pumps is restored). For combinations of real and spurious accident signals, the Unit 1 and 2 ECCS preferred pump logic would allow the Unit 1 Division I RHR and CS pumps (1A and 1C) to start and load on the Division I 4kV shutdown boards, and the Unit 2 Division II RHR and CS pumps (2B and 2D) to start and load on the Division II 4kV shutdown boards. This action would ensure that the shared Unit 1/2 4kV shutdown boards are not overloaded while still maintaining the minimum number of required ECCS injection subsystems.

If only one unit (Unit 1 or Unit 2) has an accident signal present, any Division I and Division II RHR or CS pumps that were already running in the non-accident unit (e.g., for shutdown cooling), would be tripped by the ECCS preferred pump logic. The ECCS preferred pump logic signal also inhibits the RHR and CS pumps automatic start logic in the non-accident unit (after 60 seconds, manual control of the pumps is restored). This ensures that any running RHR or CS pumps in the non-accident unit would be tripped, unloading the Unit 1/2 4kV shutdown boards prior to the accident unit starting its Division I and Division II ECCS pumps on a real accident signal.

Common Accident Signal Logic Function

The Unit 1/2 and Unit 3 Common Accident Signal (CAS) Logic functions to strip any running loads off the diesel generators so that ECCS loads may be started on the diesel generators in the proper order as described in the UFSAR Table 8.5-1 to ensure that the diesels are not overloaded by the inrush current of the large RHR and CS pump motors. The CAS logic also serves to align the BFN electrical distribution system to a reliable, analyzed lineup in the event of an accident signal in either Units 1, 2 or 3 and the electrical system had been previously aligned to an alternate configuration. Selected loads are tripped to ensure the availability of offsite power to Units 1 and 2 in the event of a LOCA with offsite power available. The Unit 1/2 CAS logic controls the Unit 1/2 electrical distribution system and the Unit 3 CAS logic controls the Unit 3 electrical distribution system. An accident signal in either of Units 1, 2 or 3 will initiate both the Unit 1/2 and Unit 3 CAS systems. Each of the Unit 1/2 and Unit 3 CAS systems consist of two fully redundant divisions (CASA and CASB). Note that there is also a Pre-Accident Signal logic that is separate from the CAS logic and provides a Defense-In Depth function that sends a redundant start signal to the Diesel Generators.

The CS low reactor vessel water level (LCO 3.3.5.1 Function 1.a) or high drywell pressure (LCO 3.3.5.1 Function 1.b) coincident with low reactor pressure signals (LCO 3.3.5.1 Function 1.c) are used to generate a CAS, which affects the operation of components associated with all three units. The redundant Pre-Accident Signal logic is initiated from these same signals on a low reactor vessel water level or low reactor pressure. The CAS performs the following functions:

- sends a signal to start all eight diesel generators for Unit 1/2 and Unit 3 (Redundant to the Defense-In Depth Pre-Accident Signal)
- trips the diesel generator output breakers (if closed)
- defeats selected diesel generator protective trips
- blocks the 4kV Shutdown Board auto transfer logic
- trips and blocks the fire pumps A, B, and C auto start logic
- starts the RHR Service Water (RHRSW) (aligned to EECW) pumps
- blocks subsequent RHRSW (aligned to EECW) pump start signal (if already running)

- blocks the 4kV degraded voltage trips
- trips the RHRSW pumps A2 and C2
- trips the Raw Cooling Water (RCW) pump 1D

Diesel Generator Breaker Unit Priority Re-Trip Logic

The Unit Priority Re-Trip Logic functions to ensure that the diesel generators are loaded in the proper sequence as described in the UFSAR Table 8.5-1. Following the initiation of a CAS on either Unit 2 or 3 all eight diesel generator breakers are tripped to load shed any existing running loads on the diesels prior to starting RHR, CS, RHRSW Pumps (aligned for EECW) and the other loads described in the UFSAR Table 8.5-1. Subsequent accident signal trips of the diesel breakers are blocked by the CAS logic to enhance the reliability of the diesel generators. However, during combinations of real and spurious accident signals between Units 1, 2 and 3, the first accident signal would initiate the CAS logic and trip the diesel generator breakers and block any subsequent trips. If the second accident signal occurred after a sufficient time delay, a RHRSW Pump aligned for EECW could have been started and loaded onto the diesel generator prior to initiation of the second accident signal. A second diesel breaker trip on a "unit priority" basis is provided to ensure that during combinations of spurious and real accident signals, the diesel supplied buses are stripped prior to starting the RHR pumps and other ECCS loads on the second accident signal. This diesel breaker re-trip would only occur if a spurious accident signal or a real accident signal from the other unit had previously tripped the diesel breakers. Inputs from the LPCI initiation circuitry indicating low reactor vessel water level (LCO 3.3.5.1 Function 2.a) or high drywell pressure (LCO 3.3.5.1 Function 2.b) coincident with low reactor pressure (LCO 3.3.5.1 Function 2.c), combined with an existing CAS trip signal, will re-trip the diesel breakers on the unit where the LPCI initiation signal originated. The other unit's diesels would be unaffected by this second trip. Thus each unit is given priority over the block of subsequent CAS diesel breaker trips for its diesels. This diesel breaker Unit Priority Re-Trip ensures that the diesel buses are stripped prior to starting the RHR (LPCI) pumps, CS pumps and other required loads. For Units 1 and 2 only, with a real and spurious accident signal present, the Unit 1 initiated unit priority re-trip signal will only re-trip the Division I diesel breakers while the Unit 2 initiated unit priority re-trip signal will only re-trip the Division II diesel breakers. This would ensure that a spurious unit priority re-trip signal would not re-trip all four Unit 1/2 diesel breakers, which would result in interrupting both division’s RHR and CS pumps supplying the opposite unit in a real accident.

The ECCS Preferred Pump, CAS, and Unit Priority Re-Trip logics are discussed in the UFSAR, Sections 7.4.3 and 8.5.4 (Refs. 1 and 2, respectively).

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

For Units 1 and 2 only, the RHR and CS pumps for both units are powered from the same 4kV shutdown boards. If the ECCS loads for both Units 1 and 2 were allowed to start during combinations of real and spurious accident signals, the combined Unit 1/2 ECCS pumps would overload the 4kV shutdown boards and their associated diesel generators on a loss of offsite power, and the 4kV shutdown buses if normal power were available.

During operation in MODES 1, 2 or 3 (Table 3.3.8.3-1), two ECCS Preferred Pump Logic divisions (each division consisting of an RHR subsystem and a CS subsystem) are required to be OPERABLE during combinations of real and spurious accident signals in Units 1 and 2. The Unit 1/2 ECCS Preferred Pump Logic ensures that the shared Unit 1/2 4kV shutdown boards are not overloaded by both Unit 1 and 2 ECCS loads while still maintaining the minimum number of required ECCS injection subsystems in the accident unit.

Table 3.3.8.3-1 Footnote (a) is added to address ECCS Preferred Pump Logic OPERABILITY requirements in MODES 4 and 5 and Unit 2 is in MODE 1, 2, or 3. Table 3.3.8.3-1 Footnote (b) is added to address the number of Required Divisions in MODES 4 and 5. During Unit 1 operation in MODES 4 or 5 (Table 3.3.8.3-1) with Unit 2 in MODES 1, 2 or 3, the Unit 1 ECCS Preferred Pump Logic divisions associated with any running Unit 1 RHR or CS Pump(s) must be OPERABLE to ensure that these pumps are tripped on a valid Unit 2 accident signal so that the shared Unit 1/2 4kV shutdown boards are not overloaded by both Unit 1 and 2 ECCS loads while still maintaining the minimum number of required ECCS injection subsystems in Unit 2.

The CS logic initiated CAS and the LPCI logic initiated Unit Priority Re Trip are required to ensure that the shared Unit 1/2 4kV shutdown boards are stripped prior to starting the RHR pumps, CS pumps, and other required loads when the shutdown boards are being supplied by the diesel generators.

The ECCS Preferred Pump, CAS, and Unit Priority Re-Trip Logic satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

The OPERABILITY of the ECCS Preferred Pump, CAS, and Unit Priority Re-Trip Logic is dependent upon the OPERABILITY of the individual logic Functions specified in Table 3.3.8.3-1. Each Function must have the required number of divisions. In general, the individual Functions are required to be OPERABLE in the MODES or other specified conditions that may require ECCS initiation to mitigate the consequences of a design basis transient or accident. There are no Allowable Values associated with these logic systems.

Two divisions of CAS and Unit Priority Re-Trip Logics are required to be OPERABLE to ensure that at least one is available, assuming that a single failure disables the other division coincident with a DBA. These logic systems must be OPERABLE to ensure the DGs would perform and alignments would occur as assumed during a DBA.

In MODES 1, 2, and 3, the CAS and Unit Priority Re-Trip Logics are required to be OPERABLE consistent with the OPERABILITY requirements of the diesel generators.

In MODES 4, and 5, the CAS and Unit Priority Re-Trip Logic are not required to be OPERABLE because the diesel generators are not required to be OPERABLE.

ACTIONS

A.1

Unit 1 operating in MODES 1, 2 or 3 (Table 3.3.8.3-1) with one required division of ECCS Preferred Pump Logic (i.e., one RHR subsystem, one CS subsystem, or one RHR subsystem and one CS subsystem in the same division) inoperable, the potential exists that during a limiting design basis LOCA in conjunction with a spurious accident signal from the non-accident unit, the limits specified by 10 CFR 50.46 could be exceeded in the accident unit. Therefore, both ECCS Preferred Pump Logic divisions must be OPERABLE to accommodate combinations of real and spurious accident signal in Units 1 and 2 where the spurious accident signal is the single failure required to be assumed by 10 CFR 50.46.

During Unit 1 operation in MODES 4 or 5 (Table 3.3.8.3-1) with Unit 2 in MODES 1, 2 or 3 and Unit 1 is operating RHR Pump(s) (e.g., for shutdown cooling) or CS Pump(s) with the division(s) of ECCS Preferred Pump Logic associated with the running RHR or CS Pump(s) inoperable, the potential exists that during a limiting design basis LOCA in Unit 2, the limits specified by 10 CFR 50.46 could be exceeded if both divisions of Unit 2 ECCS were affected. Therefore, the Unit 1 ECCS Preferred Pump Logic divisions associated with any running Unit 1 RHR or CS Pump(s) must be OPERABLE to ensure that these pumps are tripped on a valid Unit 2 accident signal.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 7 day Completion Time takes into account a reasonable time for repairs, and the low probability of a DBA with a spurious accident signal occurring during this period.

B.1

With one division of CAS Logic inoperable, the plant electrical system response is degraded, and the potential for inappropriate electrical

system alignment is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division of CAS Logic is capable of performing its intended function.

The 7 day Completion Time takes into account the capability of the remaining division of common accident signal logic, reasonable time for repairs, and the low probability of a DBA occurring during this period.

C.1

With one division of Unit Priority Re-Trip Logic inoperable, the plant electrical system response is degraded, and the potential for inappropriate electrical system alignment is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division of Unit Priority Re-Trip Logic is capable of performing its intended function such that that the remaining division's diesel generators are not affected and are available.

The 7 day Completion Time takes into account the capability of the remaining division diesel generators, reasonable time for repairs, and the low probability of a DBA occurring during this period.

D.1 and D.2

If the required ECCS Preferred Pump, CAS, or Unit Priority Re-Trip Logic division(s) cannot be restored to OPERABLE status within the associated Completion Time in MODE 1, 2, or 3, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours, and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

E.1

If the required ECCS Preferred Pump Logic division(s) cannot be restored to OPERABLE status within the associated Completion Time in MODE 4 or 5, the associated ECCS components must be declared inoperable.

F.1

Condition F corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.3.8.3.1

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the ECCS Preferred Pump Logic for a specific division. The system functional test of the breakers is included as a part of this test, overlapping the LOGIC SYSTEM FUNCTIONAL TEST, to provide complete testing of the safety function. Therefore, if a breaker is incapable of operating, the associated logic would also be inoperable. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlaps this Surveillance to complete testing of the assumed safety function.

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the CAS and Unit Priority Re-Trip Logics for a specified division. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 and the DG testing performed by SR 3.8.1.6 overlap this Surveillance to complete testing of the assumed safety function.

The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience with these components supports performance of the Surveillance at the 24 month Frequency.

SR 3.3.8.3.1 is modified by two Notes. Note 1 indicates that when a division is placed in an inoperable status solely for performance of Surveillance, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated redundant division is OPERABLE. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the division must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. The six-hour allowance is not a risk-informed change. The allowance is based on the reliability analysis (Reference 3) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the six-hour testing allowance does not significantly reduce the probability that the ECCS will initiate when necessary. The six-hour allowance is not changed by the License Amendment Request.

Note 2 indicates that testing of the Unit 2 breakers is not required for a successful test. This allowance is necessary to preclude unnecessary challenges to an operating unit. Testing of the Unit 2 breakers is required by Unit 2 SR 3.3.8.3.1.

REFERENCES

1. UFSAR, Section 7.4.3.
2. UFSAR, Section 8.5.4.
3. NEDC-30936-P-A, "BWR Owners' Group Technical Specification Improvement Analyses for ECCS Actuation Instrumentation, Part 2," December 1988

ENCLOSURE 2

Tennessee Valley Authority

Browns Ferry Nuclear Plant, Units 1, 2, and 3

Revised Proposed Technical Specifications and Associated Bases

Attachment 4

Revised Proposed BFN, Unit 2 TS 3.3.8.3 Bases

B 3.3.8.3 INSTRUMENTATION

B 3.3.8.3 Emergency Core Cooling System (ECCS) Preferred Pump, Common Accident Signal (CAS), and Unit Priority Re-Trip Logic

BASES

BACKGROUND

ECCS Preferred Pump Logic Function

The ECCS preferred pump logic is a function performed by components in the Residual Heat Removal (RHR) system and the Core Spray (CS) system that prevents overloading the shared Unit 1/2 4kV Shutdown Boards in the event of an accident in Units 1 or 2. Each division of ECCS preferred pump logic consists of two subsystems: one RHR subsystem and one CS subsystem.

In the event of an accident signal in either Unit 1 or Unit 2, all of the ECCS equipment associated with the accident unit will start. All eight diesel generators in the plant will be started on an accident signal in any unit as a pre-emergency action in case of a subsequent power blackout.

The diesel generators and Standby AC Power System are designed to accommodate spurious accident signals from any unit and in any order, real followed by a spurious signal, real coincident with a spurious signal, and spurious followed by a real accident signal. If the ECCS loads for both Units 1 and 2 were allowed to start during combinations of real and spurious accident signals, the combined Unit 1/2 ECCS pumps would overload the 4kV shutdown boards and their associated diesel generators.

During combinations of real and spurious accident signals, the Units 1 and 2 ECCS preferred pump logic will assign the Unit 1 ECCS loads to the Division I 4kV shutdown boards and the Unit 2 ECCS loads to the Division II 4kV shutdown boards. The CS and low pressure coolant injection (LPCI) logic (i.e., LCO 3.3.5.1 Functions 1.a, 1.b, 1.c, 2.a, 2.b, 2.c) would send redundant signals to initiate the ECCS preferred pump logic to trip the Unit 1 Division II RHR and CS pumps (if running) and the Unit 2 Division I RHR and CS pumps (if running). The ECCS preferred pump logic signal also inhibits the automatic start of the Unit 1 Division II RHR and CS pumps and the Unit 2 Division I RHR and CS pumps (after 60 seconds, manual control of the pumps is restored). For combinations of real and spurious accident signals, the Unit 1 and 2 ECCS preferred pump logic would allow the Unit 1 Division I RHR and CS pumps (1A and 1C) to start and load on the Division I 4kV shutdown boards, and the Unit 2 Division II RHR and CS pumps (2B and 2D) to start and load on the Division II 4kV shutdown boards. This action would ensure that the shared Unit 1/2 4kV shutdown boards are not overloaded while still maintaining the minimum number of required ECCS injection subsystems.

If only one unit (Unit 1 or Unit 2) has an accident signal present, any Division I and Division II RHRCS pumps that were already running in the non-accident unit (e.g., for shutdown cooling), would be tripped by the ECCS preferred pump logic. The ECCS preferred pump logic signal also inhibits the RHR and CS pumps automatic start logic in the non-accident unit (after 60 seconds, manual control of the pumps is restored). This ensures that any running RHR or CS pumps in the non-accident unit would be tripped, unloading the Unit 1/2 4kV shutdown boards prior to the accident unit starting its Division I and Division II ECCS pumps on a real accident signal.

Common Accident Signal Logic Function

The Unit 1/2 and Unit 3 Common Accident Signal (CAS) Logic functions to strip any running loads off the diesel generators so that ECCS loads may be started on the diesel generators in the proper order as described in the UFSAR Table 8.5-1 to ensure that the diesels are not overloaded by the inrush current of the large RHR and CS pump motors. The CAS logic also serves to align the BFN electrical distribution system to a reliable, analyzed lineup in the event of an accident signal in either Units 1, 2 or 3 and the electrical system had been previously aligned to an alternate configuration. Selected loads are tripped to ensure the availability of offsite power to Units 1 and 2 in the event of a LOCA with offsite power available. The Unit 1/2 CAS logic controls the Unit 1/2 electrical distribution system and the Unit 3 CAS logic controls the Unit 3 electrical distribution system. An accident signal in either of Units 1, 2 or 3 will initiate both the Unit 1/2 and Unit 3 CAS systems. Each of the Unit 1/2 and Unit 3 CAS systems consist of two fully redundant divisions (CASA and CASB). Note that there is also a Pre-Accident Signal logic that is separate from the CAS logic and provides a Defense-In Depth function that sends a redundant start signal to the Diesel Generators.

The CS low reactor vessel water level (LCO 3.3.5.1 Function 1.a) or high drywell pressure (LCO 3.3.5.1 Function 1.b) coincident with low reactor pressure signals (LCO 3.3.5.1 Function 1.c) are used to generate a CAS, which affects the operation of components associated with all three units. The redundant Pre-Accident Signal logic is initiated from these same signals on a low reactor vessel water level or low reactor pressure. The CAS performs the following functions:

- sends a signal to start all eight diesel generators for Unit 1/2 and Unit 3 (Redundant to the Defense-In Depth Pre-Accident Signal)
- trips the diesel generator output breakers (if closed)
- defeats selected diesel generator protective trips
- blocks the 4kV Shutdown Board auto transfer logic
- trips and blocks the fire pumps A, B, and C auto start logic
- starts the RHR Service Water (RHRSW) (aligned to EECW) pumps
- blocks subsequent RHRSW (aligned to EECW) pump start signal (if already running)

- blocks the 4kV degraded voltage trips
- trips the RHRSW pumps A2 and C2
- trips the Raw Cooling Water (RCW) pump 1D

Diesel Generator Breaker Unit Priority Re-Trip Logic
The Unit Priority Re-Trip Logic functions to ensure that the diesel generators are loaded in the proper sequence as described in the UFSAR Table 8.5-1. Following the initiation of a CAS on either Unit 1 or 3 all eight diesel breakers are tripped to load shed any existing running loads on the diesels prior to starting RHR, CS, RHRSW Pumps (aligned for EECW) and the other loads described in the UFSAR Table 8.5-1. Subsequent accident signal trips of the diesel generator breakers are blocked by the CAS logic to enhance the reliability of the diesel generators. However, during combinations of real and spurious accident signals between Units 1, 2 and 3, the first accident signal would initiate the CAS logic and trip the diesel generator breakers and block any subsequent trips. If the second accident signal occurred after a sufficient time delay, a RHRSW Pump aligned for EECW could have been started and loaded onto the diesel generator prior to initiation of the second accident signal. A second diesel breaker trip on a "unit priority" basis is provided to ensure that during combinations of spurious and real accident signals, the diesel supplied buses are stripped prior to starting the RHR pumps and other ECCS loads on the second accident signal. This diesel breaker re-trip would only occur if a spurious accident signal or a real accident signal from the other unit had previously tripped the diesel breakers. Inputs from the LPCI initiation circuitry indicating low reactor vessel water level (LCO 3.3.5.1 Function 2.a) or high drywell pressure (LCO 3.3.5.1 Function 2.b) coincident with low reactor pressure (LCO 3.3.5.1 Function 2.c), combined with an existing CAS trip signal, will re-trip the diesel breakers on the unit where the LPCI initiation signal originated. The other unit's diesels would be unaffected by this second trip. Thus each unit is given priority over the block of subsequent CAS diesel breaker trips for its diesels. This diesel breaker Unit Priority Re-Trip ensures that the diesel buses are stripped prior to starting the RHR (LPCI) pumps, CS pumps and other required loads. For Units 1 and 2 only, with a real and spurious accident signal present, the Unit 1 initiated unit priority re-trip signal will only re-trip the Division I diesel breakers while the Unit 2 initiated unit priority re-trip signal will only re-trip the Division II diesel breakers. This would ensure that a spurious unit priority re-trip signal would not re-trip all four Unit 1/2 diesel breakers, which would result in interrupting both division’s RHR and CS pumps supplying the opposite unit in a real accident.

The ECCS Preferred Pump, CAS, and Unit Priority Re-Trip logics are discussed in the UFSAR, Sections 7.4.3 and 8.5.4 (Refs. 1 and 2, respectively).

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

For Units 1 and 2 only, the RHR and CS pumps for both units are powered from the same 4kV shutdown boards. If the ECCS loads for both Units 1 and 2 were allowed to start during combinations of real and spurious accident signals, the combined Unit 1/2 ECCS pumps would overload the 4kV shutdown boards and their associated diesel generators on a loss of offsite power, and the 4kV shutdown buses if normal power were available.

During operation in MODES 1, 2 or 3 (Table 3.3.8.3-1), two ECCS Preferred Pump Logic divisions each division consisting of a RHR subsystem and a CS subsystem are required to be OPERABLE during combinations of real and spurious accident signals in Units 1 and 2. The Unit 1/2 ECCS Preferred Pump Logic ensures that the shared Unit 1/2 4kV shutdown boards are not overloaded by both Unit 1 and 2 ECCS loads while still maintaining the minimum number of required ECCS injection subsystems in the accident unit.

Table 3.3.8.3-1 Footnote (a) is added to address ECCS Preferred Pump Logic OPERABILITY requirements in MODES 4 and 5 and Unit 1 is in MODE 1, 2, or 3. Table 3.3.8.3-1 Footnote (b) is added to address the number of Required Divisions in MODES 4 and 5. During Unit 2 operation in MODES 4 or 5 (Table 3.3.8.3-1) with Unit 1 in MODES 1, 2 or 3, the Unit 2 ECCS Preferred Pump Logic divisions associated with any running Unit 2 RHR or CS Pump(s) must be OPERABLE to ensure that these pumps are tripped on a valid Unit 1 accident signal so that the shared Unit 1/2 4kV shutdown boards are not overloaded by both Unit 1 and 2 ECCS loads while still maintaining the minimum number of required ECCS injection subsystems in Unit 1.

The CS logic initiated CAS and the LPCI logic initiated Unit Priority Re-Trip are required to ensure that the shared Unit 1/2 4kV shutdown boards are stripped prior to starting the RHR pumps, CS pumps, and other required loads when the shutdown boards are being supplied by the diesel generators.

The ECCS Preferred Pump, CAS, and Unit Priority Re-Trip Logic satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

The OPERABILITY of the ECCS Preferred Pump, CAS, and Unit Priority Re-Trip Logic is dependent upon the OPERABILITY of the individual logic Functions specified in Table 3.3.8.3-1. Each Function must have the required number of divisions. In general, the individual Functions are required to be OPERABLE in the MODES or other specified conditions that may require ECCS initiation to mitigate the consequences of a design basis transient or accident. There are no Allowable Values associated with these logic systems.

Two divisions of CAS and Unit Priority Re-Trip Logics are required to be OPERABLE to ensure that at least one is available, assuming that a single failure disables the other division coincident with a DBA. These logic systems must be OPERABLE to ensure the DGs would perform and alignments would occur as assumed during a DBA.

In MODES 1, 2, and 3, the CAS and Unit Priority Re-Trip Logics are required to be OPERABLE consistent with the OPERABILITY requirements of the diesel generators.

In MODES 4, and 5, the CAS and Unit Priority Re-Trip Logic are not required to be OPERABLE because the diesel generators are not required to be OPERABLE.

ACTIONS

A.1

Unit 2 operating in MODES 1, 2 or 3 (Table 3.3.8.3-1) with one required division of ECCS Preferred Pump Logic (i.e., one RHR subsystem, one CS subsystem, or one RHR subsystem and one CS subsystem in the same division) inoperable the potential exists that during a limiting design basis LOCA in conjunction with a spurious accident signal from the non-accident unit, the limits specified by 10 CFR 50.46 could be exceeded in the accident unit. Therefore, both ECCS Preferred Pump Logic divisions must be OPERABLE to accommodate combinations of real and spurious accident signal in Units 1 and 2 where the spurious accident signal is the single failure required to be assumed by 10 CFR 50.46.

During Unit 2 operation in MODES 4 or 5 (Table 3.3.8.3-1) with Unit 1 in MODES 1, 2 or 3 and Unit 2 is operating RHR Pump(s) (e.g., for shutdown cooling) or CS Pump(s) with the division(s) of ECCS Preferred Pump Logic associated with the running RHR or CS Pump(s) inoperable, the potential exists that during a limiting design basis LOCA in Unit 1, the limits specified by 10 CFR 50.46 could be exceeded if both divisions of Unit 1 ECCS were affected. Therefore, the Unit 2 ECCS Preferred Pump Logic divisions associated with any running Unit 2 RHR or CS Pump(s) must be OPERABLE to ensure that these pumps are tripped on a valid Unit 1 accident signal.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. The 7 day Completion Time takes into account a reasonable time for repairs, and the low probability of a DBA with a spurious accident signal occurring during this period.

B.1

With one division of CAS Logic inoperable, the plant electrical system response is degraded, and the potential for inappropriate electrical system alignment is increased with attendant potential challenge to plant

safety systems. In this condition, however, the remaining division of CAS Logic is capable of performing its intended function.

The 7 day Completion Time takes into account the capability of the remaining division of common accident signal logic, reasonable time for repairs, and the low probability of a DBA occurring during this period.

C.1

With one division of Unit Priority Re-Trip Logic inoperable, the plant electrical system response is degraded, and the potential for inappropriate electrical system alignment is increased with attendant potential challenge to plant safety systems. In this condition, however, the remaining division of Unit Priority Re-Trip Logic is capable of performing its intended function such that that the remaining division's diesel generators are not affected and are available.

The 7 day Completion Time takes into account the capability of the remaining division diesel generators, reasonable time for repairs, and the low probability of a DBA occurring during this period.

D.1 and D.2

If the required ECCS Preferred Pump, CAS, or Unit Priority Re-Trip Logic division(s) cannot be restored to OPERABLE status within the associated Completion Time in MODE 1, 2, or 3, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours, and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

E.1

If the required ECCS Preferred Pump Logic division(s) cannot be restored to OPERABLE status within the associated Completion Time in MODE 4 or 5, the associated ECCS components must be declared inoperable.

F.1

Condition F corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.3.8.3.1

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the ECCS Preferred Pump Logic for a specific division. The system functional test of the breakers is included as a part of this test, overlapping the LOGIC SYSTEM FUNCTIONAL TEST, to provide complete testing of the safety function. Therefore, if a breaker is incapable of operating, the associated logic would also be inoperable. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 overlaps this Surveillance to complete testing of the assumed safety function.

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the CAS and Unit Priority Re-Trip Logics for a specified division. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.1 and the DG testing performed by SR 3.8.1.6 overlap this Surveillance to complete testing of the assumed safety function.

The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience with these components supports performance of the Surveillance at the 24 month Frequency.

SR 3.3.8.3.1 is modified by two Notes. Note 1 indicates that when a division is placed in an inoperable status solely for performance of Surveillance, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated redundant division is OPERABLE. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the division must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. The six-hour allowance is not a risk-informed change. The allowance is based on the reliability analysis (Reference 3) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the six-hour testing allowance does not significantly reduce the probability that the ECCS will initiate when necessary. The six-hour allowance is not changed by the License Amendment Request.

Note 2 indicates that testing of the Unit 1 breakers is not required for a successful test. This allowance is necessary to preclude unnecessary challenges to an operating unit. Testing of the Unit 1 breakers is required by Unit 1 SR 3.3.8.3.1.

REFERENCES

1. UFSAR, Section 7.4.3.

2. UFSAR, Section 8.5.4.

3. NEDC-30936-P-A, "BWR Owners' Group Technical Specification Improvement Analyses for ECCS Actuation Instrumentation, Part 2," December 1988