TENNESSEE
VALLEY
AUTHORITY

1101 Market Street, Chattanooga, Tennessee 37402

CNL-21-008

March 5, 2021

10 CFR 50.90

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

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

Subject: **Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Application to Revise Technical Specifications to Adopt TSTF-582, "RPV WIC Enhancements" (BFN TS-532)**

Reference: NRC Letter to TVA, “Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Issuance of Amendment Nos. 311, 334, and 294 to Adopt Technical Specifications Task Force Traveler, TSTF-542, Revision 2, ‘Reactor Pressure Vessel Water Inventory Control’ (EPID L-2019-LLA-0010),” dated December 26, 2019 (ML19294A011)

Pursuant to 10 CFR 50.90, Tennessee Valley Authority (TVA) is submitting a request for an amendment to the Technical Specifications (TS) for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3.

TVA requests adoption of TSTF-582, "RPV WIC Enhancements." The TS related to reactor pressure vessel water inventory control (RPV WIC) are revised to incorporate operating experience and to correct errors and omissions in TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control."

The enclosure provides a description and assessment of the proposed changes. Attachment 1 provides the existing TS pages marked-up to show the proposed changes. Attachment 2 provides revised (final retyped) TS pages. Attachment 3 provides the existing TS Bases pages marked to show revised text associated with the proposed TS changes and is provided for information only (only the BFN Unit 1 Bases are provided, as they are nearly identical to the Unit 2 and 3 Bases for purposes of this application).

TVA requests that the amendment be reviewed under the Consolidated Line Item Improvement Process. Approval of the proposed amendment is requested within six months of completion of the Nuclear Regulatory Commission (NRC) acceptance review. Once approved, the amendment shall be implemented concurrently with the referenced TSTF-542 License Amendment (i.e., implemented for all three units prior to the start of the interval beginning with the Browns Ferry Nuclear Plant, Unit 3, spring 2022, Cycle 20, refueling outage (3U20)).

There are no new regulatory commitments made in this submittal.

In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the Alabama State Department of Public Health.

If you should have any questions regarding this submittal, please contact Kimberly Hulvey, Senior Manager, Fleet Licensing, at 423-751-3275.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 5th day of March 2021.

Respectfully,

James T. Polickoski
Director, Nuclear Regulatory Affairs

Enclosure: Description and Assessment

Attachments:
1. Proposed Technical Specification Changes (Mark-Ups) for Browns Ferry Units 1, 2, and 3
2. Proposed Technical Specification Changes (Final Retyped) for Browns Ferry Units 1, 2, and 3
3. Proposed Technical Specification Bases Changes (Mark-Ups) for Browns Ferry Unit 1 (For Information Only)

cc: (with Enclosure):

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

Enclosure

Description and Assessment

Subject: Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Application to Revise Technical Specifications to Adopt TSTF-582, "RPV WIC Enhancements" (BFN TS-532)

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ATTACHMENTS

1. Proposed Technical Specification Changes (Mark-Ups) for Browns Ferry Units 1, 2, and 3.
2. Proposed Technical Specification Changes (Final Retyped) for Browns Ferry Units 1, 2, and 3
3. Proposed Technical Specification Bases Changes (Mark-Ups) for Browns Ferry Unit 1 (For Information Only)

1.0 DESCRIPTION

Tennessee Valley Authority (TVA) requests adoption of Technical Specification Task Force (TSTF) traveler TSTF-582, "RPV WIC Enhancements." The Technical Specifications (TS) related to reactor pressure vessel water inventory control (RPV WIC) are revised to incorporate operating experience and to correct errors and omissions in TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control."

2.0 ASSESSMENT

2.1 APPLICABILITY OF SAFETY EVALUATION

TVA has reviewed the Safety Evaluation for TSTF-582 provided to the TSTF in a letter dated August 13, 2020. This review included a review of the Nuclear Regulatory Commission (NRC) staff's evaluation, as well as the information provided in TSTF-582. As described herein, TVA has concluded that the justifications presented in TSTF-582 and the safety evaluation prepared by the NRC staff are applicable to Browns Ferry Nuclear Plant (BFN) Units 1, 2, and 3, and justify this amendment for the incorporation of the changes to the BFN TS.

In justification of the deletion of Surveillance Requirement (SR) 3.5.2.4, TVA verifies that the required emergency core cooling system (ECCS) injection/spray subsystem can be aligned and the pump started using relatively simple evolutions involving the manipulation of a small number of components. These actions can be performed in a short time (less than the minimum Drain Time of 1 hour) from the control room following plant procedures.

2.2 OPTIONAL CHANGES AND VARIATIONS

TVA is proposing the following variations from the TS changes described in TSTF-582 or the applicable parts of the NRC staff's safety evaluation:

The BFN TS utilize different numbering and titles from the Standard Technical Specifications (STS) on which TSTF-582 was based. The following table lists the differences. These differences are administrative and do not affect the applicability of TSTF-582 to the BFN TS.

TSTF-582 TS	TSTF-582 Action	BFN TS	BFN Action
SR 3.5.2.5	SR 3.5.2.5 is deleted	SR 3.5.2.4	SR 3.5.2.4 is deleted
SR 3.5.2.7	Revised numbering to SR 3.5.2.6	SR 3.5.2.6	Revised numbering to SR 3.5.2.5

The BFN TS contain requirements that differ from the STS on which TSTF-582 was based but are encompassed in the TSTF-582 justification. These variations are considered to be administrative. Specifically:

TSTF-582 TS	TSTF-582 Action	BFN TS	Disposition
SR 3.5.2.2	Deletes "low pressure coolant injection"	SR 3.5.2.2	The BFN SR does not contain the term "low pressure injection system"
TS 3.6.1.3	Deletes Condition G	TS 3.6.1.3	The BFN TS 3.6.1.3 does not have this Condition related to recently irradiated fuel
SR 3.6.1.3.1 SR 3.6.1.3.2	Note referring to Modes 1, 2, and 3 is deleted	SR 3.6.1.3.1	The analogous BFN SR 3.6.1.3.1 does not contain the verbiage of this Note
SR 3.6.1.3.7 SR 3.6.1.3.12 SR 3.6.1.3.14 SR 3.6.1.3.15	Note referring to Modes 1, 2, and 3 is deleted	N/A	The BFN TS do not contain analogous SRs
SR 3.6.1.3.13	Note referring to Modes 1, 2, and 3 is deleted	SR 3.6.1.3.10	The analogous BFN SR does not contain this Note

Certain changes in TSTF-582 were incorporated in the BFN TS as variations during adoption of TSTF-542.[1] Therefore, the TSTF-582 changes are not needed. Other changes were added as variations during adoption of TSTF-542 which have been superseded by the changes in TSTF-582. These plant-specific changes are replaced by the TSTF-582 STS changes. These variations are considered to be administrative. Specifically:

TSTF-582 TS	TSTF-582 Action	BFN TS Disposition
SR 3.3.5.2.3	"Perform Logic System Functional Test" is deleted	Incorporated with variation for manual ECCS initiation in TSTF-542 license amendment

[1] NRC Letter to TVA, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Issuance of Amendment Nos. 311, 334, and 294 to Adopt Technical Specifications Task Force Traveler, TSTF-542, Revision 2, 'Reactor Pressure Vessel Water Inventory Control' (EPID L-2019-LLA-0010)," dated December 26, 2019 (ML19294A011)

TSTF-582 TS	TSTF-582 Action	BFN TS Disposition
Table 3.3.5.2-1 Function 1.b, SR 3.3.5.2.1 [referenced in Surveillance Requirements column]	SR 3.3.5.2.1 is deleted	Incorporated with variation for not including certain Channel Checks that were not applicable to the BFN design in TSTF-542 license amendment
Table 3.3.5.2-1 Functions 1.c and 2.c	Function 1.c and 2.c, Manual Initiation, is deleted	Incorporated with variation for manual ECCS initiation in TSTF-542 license amendment
Table 3.3.5.2-1 Function 2.b	Function 2.b is deleted	Incorporated with variation for not including this function due to plant design in TSTF-542 license amendment
TS 3.5.2 Required Action D.3	Required Action D.3 adds automatic isolation	Incorporated with variation to allow taking advantage of operable secondary containment isolation valves in TSTF-542 license amendment
SR 3.5.2.6	SR 3.5.2.6 is changed to SR 3.5.2.5, “through the recirculation line” is deleted, and two Notes are added.	This SR corresponds to SR 3.5.2.5. A variation was taken in the TSTF-542 license amendment from “through the recirculation line” to “through the test return line”
SR 3.5.2.8	SR 3.5.2.8 is changed to SR 3.5.2.7, “actuates on a manual initiation signal” is deleted, and “can be manually operated” is inserted.	This SR corresponds to SR 3.5.2.7. A variation was taken in the TSTF-542 license amendment that incorporated the change to the SR text
TS 3.6.1.3, Applicability	Applicability link to LCO 3.3.6.1 is deleted.	A variation was taken in the TSTF-542 license amendment that incorporated this change
TS 3.6.1.3, Condition F	Text regarding Modes 1, 2, or 3 is deleted.	A variation was taken in the TSTF-542 license amendment that incorporated this change
TS 3.6.1.3, Condition H	Condition H was deleted.	A variation was taken in the TSTF-542 license amendment that incorporated this change for analogous Condition F

TSTF-582 TS	TSTF-582 Action	BFN TS Disposition
SR 3.8.2.1	Note 1 was revised to delete the SRs associated with diesel generator (DG) auto-start. Note 2 was deleted. The SR text was revised to exclude the SRs associated with DG auto-start.	A variation was taken in the TSTF-542 license amendment that revised Note 1 to delete the SRs associated with DG auto-start. BFN does not have Note 2. A variation was taken in the TSTF-542 license amendment that revised the SR Text to exclude the SRs associated with DG auto-start. (See also the technical variation below related to TSTF-583-T)

Correction of BFN Unit 2 Spelling Errors

An error in the spelling of “DRAIN TIME” is corrected in the last paragraph of the BFN Unit 2 TS Section 1.1 DRAIN TIME definition. Additionally, BFN Unit 2 TS 3.5.2 Required Action D.4 corrects the spelling of “subsystems.” These are administrative variations.

Removal of Note from LCO 3.5.2

With the adoption of TSTF-542, a Note was located to Limiting Condition for Operation (LCO) 3.5.2 regarding the one low pressure ECCS injection/spray subsystem that is required to be Operable:

> A Low Pressure Coolant Injection (LPCI) subsystem may be considered Operable during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.

TSTF-582 deleted SR 3.5.2.5. The NRC Safety Evaluation for TSTF-582, dated August 13, 2020 (ML20223A000), Section 3.4.2.1, describes this change:

> SR 3.5.2.5 requires verification that each manual, power operated, and automatic valve in the required ECCS injection/spray subsystem flow path that is not locked, sealed, or otherwise secured in position is in the correct position. The requirement that the ECCS injection/spray subsystem valves continuously be in the correct position is replaced with the requirement that the required ECCS subsystem be capable of manual alignment and initiation from the control room.
>
> There is no longer a specified "correct position" for the subsystem valves to support initiation from the ECCS instrumentation. The changes to STS 3.5.2 no longer credit the use of automatic valves that respond to an ECCS signal. The STS 3.5.2 permits the use of operator action to align power operated valves. Licensee control of

> manual valves will be as needed to support manual alignment and initiation of the ECCS subsystem from the control room.

BFN SR 3.5.2.5 requires operating the ECCS subsystem periodically to verify its operability. TSTF-582 added a Note to BFN SR 3.5.2.5 (and renamed it to SR 3.5.2.4) that permits a subsystem to be credited for operating in normal mode as demonstrating operation of the required ECCS subsystem. As stated in the TSTF-582 justification, "This Note permits crediting the normal operation of an RHR Shutdown Cooling subsystem to satisfy the SR. The revised SR continues to ensure the ECCS injection/spray subsystem can inject water into the RPV if needed for defense-in-depth, while eliminating unnecessary testing."

Therefore, the removal of SR 3.5.2.5 by TSTF-582 and the addition of the SR Note to SR 3.5.2.6 (renumbered SR 3.5.2.5) eliminates the need for the LCO Note to consider the ECCS subsystem operable while operating in decay heat removal mode. This is considered to be an administrative variation.

The proposed variation is consistent with TSTF-587-T, “Delete LCO 3.5.2 Note.”

<u>Correction of TSTF-582 Automatic Diesel Start (Technical Variation)</u>

TSTF-582, "RPV WIC Enhancements," states:

> The ECCS injection/spray subsystem required to be operable by LCO 3.5.2 must be capable of being manually started as defense-in-depth against an unexpected draining event. The changes in TSTF-542 did not assume automatic actuation of the ECCS subsystem. TS 3.5.2, Required Action D.1 requires an additional method of water injection and that the required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. However, LCO 3.5.2 does not assume that the onsite electrical power source will start automatically on an ECCS or loss of power signal.
>
> LCO 3.8.2, "AC Sources - Shutdown," requires one offsite circuit and one diesel generator to be operable in Modes 4 and 5. SR 3.8.2.1 lists the TS 3.8.1, "AC Sources - Operating," SRs that are applicable in Modes 4 and 5. In an oversight in TSTF-542, the TS 3.8.1 SRs that test automatic start and loading of a diesel generator on an ECCS or loss of offsite power signal were not excluded from SR 3.8.2.1.

TSTF-582 revises STS 3.8.2, "AC Sources – Shutdown," SR 3.8.2.1, to exclude SRs that verify the ability of the diesel generators to automatically start and load on an ECCS initiation signal or loss of offsite power signal.

The NRC Safety Evaluation for TSTF-582 (ADAMS Accession No. ML20223A000, dated, August 13, 2020), Section 3.6, "Alternating Current Sources - Shutdown, STS 3.8.2," states:

> STS 3.5.2, “Reactor Pressure Vessel Water Inventory Control (RPV WIC),” does not require automatic ECCS initiation to mitigate a draining event in Modes 4 and 5, and the ECCS initiation signal related to the automatic ECCS initiation is removed from the STS. Because the automatic ECCS initiation and related ECCS initial signal in

> Modes 4 and 5 are eliminated, the automatic start of the DG on an ECCS initiation signal is not required in Modes 4 and 5. … [T]he NRC staff finds that STS 3.5.2 provides enough time from the onset of the [loss of offsite power] LOOP event for the operator to manually start the DG required to supply power to the water injection equipment to mitigate the draining event in Modes 4 and 5. In addition, STS 3.5.2 does not require the automatic initiation of the ECCS injection/spray subsystem or the additional method of water injection. Therefore, since STS 3.5.2 allows enough time to manually start the DG and the equipment for water injection, the NRC staff finds that the automatic start and loading of the DG are not necessary on a LOOP signal or LOOP concurrent with an ECCS initiation signal to mitigate a draining event in Modes 4 and 5.

Furthermore, the NRC staff notes that other events postulated in Modes 4 and 5 (e.g., Fuel Handling Accident, waste gas tank rupture) and during movement of [recently] irradiated fuel assemblies in the [primary and secondary containment] do not assume a LOOP event or an automatic ECCS initiation.

TSTF-582 did not include all of the TS changes needed to reflect that TS 3.8.2 should not require automatic start and loading of a diesel generator within 10 seconds on an ECCS initiation signal or a loss of offsite power signal.

- BFN TS 3.3.8.1, "Loss of Power (LOP) Instrumentation," is applicable in Modes 1, 2, and 3, and when the associated diesel generator is required to be operable by TS 3.8.2. TSTF-582 revised TS 3.8.2 to no longer require automatic start and loading of a diesel generator on a loss of offsite power signal. Consequently, the LOP instrumentation that generates the loss of offsite power signal should not be required to be operable when the diesel generator is required to be operable by TS 3.8.2. The Applicability of LCO 3.3.8.1 is revised to not include the specified condition "When the associated diesel generator is required to be OPERABLE by LCO 3.8.2, 'AC Sources – Shutdown'."

- BFN TS SR 3.8.1.4 requires that the DG starts from standby condition and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions in the design basis LOCA analysis. This capability is not required during a manual diesel generator start to respond to a draining event, which has a minimum Drain Time of one hour. Therefore, SR 3.8.1.4 is added to the list of TS 3.8.1 SRs that are not applicable under SR 3.8.2.1.

- BFN TS SR 3.8.1.8 states, "Verify interval between each sequenced load block is within the allowable values for each load sequencer timer." TSTF-582 retained the equivalent STS SR 3.8.1.18 as a test that must be met but not performed. The sequencer load blocks are only used for the automatic start and loading of the diesel generator and are not used during a manual diesel generator start. Therefore, SR 3.8.1.8 is added to the list of TS 3.8.1 SRs that are not applicable under SR 3.8.2.1.

The TS 3.8.2 LCO Bases were not updated by TSTF-542 or TSTF-582 to reflect that automatic start and loading of diesel generators are not required. The LCO 3.8.2 and SR 3.8.2.1 Bases are revised to reflect the TS requirements.

This variation provides consistency within the TS after incorporating the TSTF-582 changes to SR 3.8.2.1.

As an editorial improvement, SR 3.8.2.1 is revised to list the TS 3.8.1 SRs that are applicable instead of listing the TS 3.8.1 SRs that are not applicable. The SR 3.8.2.1 Bases are not affected and explain why the omitted TS 3.8.1 SRs are not applicable to TS 3.8.2.

The proposed variation is consistent with TSTF-583-T, "TSTF-582 Diesel Generator Variation."

Addition of Recirculation Loop Sample Isolation Instrumentation Function to TS Table 3.3.5.2-1 (Technical Variation)

It is desirable to create a Mode 4 and 5 Operability requirement to allow crediting auto-isolation of the recirculation loop sample valves in support of the Exception 2 in the Drain Time definition for penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the top of active fuel (TAF) when actuated by RPV water level isolation instrumentation. Regarding this, BFN TS Table 3.3.6.1-1 Function 1.a [Main Steam Line Isolation Reactor Vessel Water Level – Low Low Low, Level 1] controls automatic closure of the Group 1 primary containment isolation valves (PCIVs). The Group 1 PCIVs include the recirculation loop sample isolation valves. This function specifies two Required Channels Per Trip System, for a total of four Operable channels, in order to account for a single active failure. However, as described in Section 3.3 of the TSTF-542 Safety Evaluation (ML16343B008), only one ECCS injection/ spray subsystem is required to be operable in Modes 4 and 5, as no additional single failure is assumed. In developing this BFN Table 3.3.5.2-1 change, that principle is carried forward in requiring only a single recirculation loop sample isolation valve to be Operable to be credited in the Drain Time Exception, and thus one channel in both trip systems are required to be Operable for proposed Function 3.a. The Allowable Value (AV) is ≥ 398 inches above vessel zero, which is consistent with the AV for TS Table 3.3.6.1-1 Function 1.a.

Addition of Recirculation Pump Discharge Isolation Instrumentation Function to TS Table 3.3.5.2-1 (Technical Variation)

It is desirable to create a Mode 4 and 5 Operability requirement to allow crediting auto-isolation of the recirculation pump discharge isolation valves in support of the Exception 2 in the Drain Time definition for penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation. Regarding this, BFN TS Table 3.3.5.1-1 Function 2.a [Low Pressure Coolant Injection (LPCI) System Reactor Vessel Water Level - Low Low Low, Level 1] and Function 2.d [LPCI System Reactor Steam Dome Pressure - Low (Recirculation Discharge Valve Permissive)] controls automatic closure of the recirculation pump discharge isolation valves. These functions specify four Required Channels Per Function. The four reactor water level channels input to two two-out-of-two trip systems, with each of the two trip systems associated with one of the two recirculation pump discharge isolation valves which accounts for single active failure. However, as described in Section 3.3 of the TSTF-542 Safety Evaluation (ML16343B008), only one

ECCS injection/ spray subsystem is required to be operable in Modes 4 and 5, as no additional single failure is assumed. In developing this BFN Table 3.3.5.2-1 change, that principle is carried forward in requiring the recirculation pump discharge valve credited in the Drain Time Exception to have two channels in one trip system Operable for proposed Function 4.a and 4.b. The AVs are ≥ 398 inches above vessel zero, and ≥ 215 psig, respectively, which are consistent with the AVs for TS Table 3.3.5.1-1 Functions 2.a and 2.d.

3.0 REGULATORY ANALYSIS

3.1 NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Tennessee Valley Authority (TVA) requests adoption of TSTF-582, "Reactor Pressure Vessel Water Inventory Control (RPV WIC) Enhancements." The Technical Specifications (TS) related to RPV WIC are revised to incorporate operating experience and to correct errors and omissions that were incorporated into the plant TS when adopting TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control." TSTF-582 includes the following changes to the Browns Ferry Nuclear Plant (BFN) TS:

1. The Drain Time definition is revised to move the examples of common mode failure mechanisms to the Bases and seismic events are no longer considered a common mode failure mechanism.
2. The Drain Time definition exception from considering the Drain Time for penetration flow paths isolated with manual or automatic valves that are "locked, sealed, or otherwise secured" is revised to apply the exception for manual or automatic valves that are "closed and administratively controlled."
3. The TS are revised to permit placing an inoperable isolation channel in trip as an alternative to declaring the associated penetration flow path incapable of automatic isolation.
4. A Surveillance Requirement (SR) that requires operating the required Emergency Core Cooling System (ECCS) injection/spray subsystem for at least 10 minutes through the recirculation line, is modified to permit crediting normal operation of the system to satisfy the SR and to permit operation through the test return line.
5. A correction is taken to TSTF-582 to delete additional surveillances associated with diesel generator auto-start that are not required in Modes 4 and 5.
6. The TS are revised to use wording and to define acronyms in a manner consistent with the remainder of the TS. These changes are made for consistency and have no effect on the application of the TS.
7. Spelling errors are corrected in the BFN Unit 2 Drain Time definition, and in BFN Unit 2 TS 3.5.2 Required Action D.4.

The following additional variations are taken:

1. Revised TS to delete an unnecessary Note from Limiting Condition for Operation 3.5.2.
2. Revised TS to eliminate the need for diesel generator auto-start on loss-of-power in Modes 4 and 5 in TS 3.3.8.1 and TS 3.8.2.
3. Included instrumentation functions to allow crediting the automatic closure of recirculation sample valves and recirculation pump discharge valves.

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below.

1. *Does the proposed amendment involve a significant increase in the probability or consequence of an accident previously evaluated?*

   Response: No.

   The proposed change incorporates operating experience and corrects errors and omissions that were incorporated into the plant TS when adopting TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control." Draining of RPV water inventory in Mode 4 (i.e., cold shutdown) and Mode 5 (i.e., refueling) is not an accident previously evaluated and, therefore, revising the existing TS controls to prevent or mitigate such an event has no effect on any accident previously evaluated. RPV water inventory control in Mode 4 or Mode 5 is not an initiator of any accident previously evaluated. The existing and revised TS controls are not mitigating actions assumed in any accident previously evaluated.

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?*

   Response: No.

   The proposed change incorporates operating experience and corrects errors and omissions that were incorporated into the plant TS when adopting TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control." The event of concern under the current requirements and the proposed change is an unexpected draining event. The TS have contained requirements related to an unexpected draining event during shutdown for over 40 years and this event does not appear as an analyzed event in the Updated Final Safety Analysis Report (UFSAR) for any plant or in the NRC's Standard Review Plan (NUREG-0800). Therefore, an unexpected draining event is not a new or different kind of accident not considered in the design and licensing bases that would have been considered a design basis accident in the UFSAR had it been previously identified.

   None of the equipment affected by the proposed change has a design function described in the UFSAR to mitigate an unexpected draining event in Modes 4 or 5, although the equipment may be used for that purpose. Therefore, the proposed change will not alter the design function of the affected equipment. The proposed change will affect the operation of certain equipment, such as the manual initiation function and related instrumentation to permit initiation of the required ECCS injection/spray subsystem, and the control of valves credited for preventing a draining event. However, these changes provide adequate protection to prevent or mitigate an unexpected draining event and do not create the possibility of a new or different kind of accident due to credible new failure mechanisms, malfunctions, or accident initiators not considered in the design and licensing bases.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. *Does the proposed amendment involve a significant reduction in a margin of safety?*

Response: No.

The proposed change incorporates operating experience and corrects errors and omissions that were incorporated into the plant TS when adopting TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control."

The safety basis for the RPV WIC requirements is to protect Safety Limit 2.1.1.3. The proposed change does not affect any specific values that define a safety margin as established in the licensing basis. The proposed change does not affect a design basis or safety limit, or any controlling value for a parameter established in the UFSAR or the license.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, TVA concludes that the proposed change presents 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.

3.2 CONCLUSION

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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

4.0 ENVIRONMENTAL CONSIDERATION

The proposed change 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 change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that maybe released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets 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 change.

Attachment 1

Proposed Technical Specification Changes (Mark-Ups) for Browns Ferry Units 1, 2, and 3

1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."
DRAIN TIME	The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming: a. The water inventory above the TAF is divided by the limiting drain rate; b. The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure ~~(e.g., seismic event, loss of normal power, single human error)~~, for all penetration flow paths below the TAF except: 1. Penetration flow paths connected to an intact closed system, ~~or isolated~~ by manual or automatic valves that ~~are locked, sealed, or otherwise secured~~ closed and administratively controlled in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

(continued)

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

A.1 Initiate action to place channel in trip.
OR

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~A. One or more channels inoperable.~~	~~A.1 Enter the Condition referenced in Table 3.3.5.2-1 for the channel.~~	~~Immediately~~ Immediately
~~B. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~B.1~~ Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	AND	
	~~B.2 Calculate DRAIN TIME.~~	Immediately
~~C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~C.1 Place channel in trip.~~	~~1 hour~~

A.
A.2.1
One or more channels inoperable.
A.2.2 Initiate action to calculate DRAIN TIME.

~~(continued)~~

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~D. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~D.1 Restore channel to OPERABLE status.~~	~~24 hours~~
~~E. Required Action and associated Completion Time of Condition C or D not met.~~	~~E.1 Declare associated low pressure Emergency Core Cooling System (ECCS) injection/spray subsystem inoperable.~~	~~Immediately~~

SURVEILLANCE REQUIREMENTS

These SRs apply to each Function in Table 3.3.5.2-1.

----------NOTE----------

~~Refer to Table 3.3.5.2-1 to determine which SRs apply for each ECCS Function.~~

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	24 hours
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	92 days

3. Recirculation Loop Sample Isolation

a. Reactor Vessel Water Level - Low Low Low, Level 1	(a)	1 per trip system	≥ 398 inches above vessel zero

Table 3.3.5.2-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	~~CONDITIONS REFERENCED FROM REQUIRED ACTION A.1~~	~~SURVEILLANCE REQUIREMENTS~~	ALLOWABLE VALUE
~~1. Core Spray System~~					
~~a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~	~~4, 5~~	~~2 per trip system[(a)]~~	~~C~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≤ 465 psig~~
~~b. Core Spray Pump Discharge Flow - Low (Bypass)~~	~~4, 5~~	~~1 per subsystem[(a)]~~	~~D~~	~~SR 3.3.5.2.2~~	~~≥ 1647 gpm and ≤ 2910 gpm~~
~~2. Low Pressure Coolant Injection (LPCI) System~~					
~~a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~	~~4, 5~~	~~2 in one trip system[(a)]~~	~~C~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≤ 465 psig~~
1. ~~3.~~ Shutdown Cooling System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	~~(b)~~	1 per trip system	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ 528 inches above vessel zero
2. ~~4.~~ Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	~~(b)~~	1 per trip system	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ 528 inches above vessel ~~zero~~

(a) ~~Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control."~~

~~(b)~~ When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

4. Recirculation Pump Discharge Isolation

a. Reactor Vessel Water Level - Low Low Low, Level 1	(a)	2 in one trip system	≥ 398 inches above vessel zero
b. Reactor Steam Dome Pressure - Low (Recirculation Discharge Valve Permissive)	(a)	2 in one trip system	≥ 215 psig

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Table 3.3.8.1-1 Function on 4 kV shutdown boards A, B, C, and D shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.
~~When the associated diesel generator is required to be OPERABLE by LCO 3.8.2, "AC Sources - Shutdown."~~

ACTIONS

NOTE
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One degraded voltage relay channel inoperable on one or more shutdown board(s). AND The loss of voltage relay channels on the affected shutdown board(s) are OPERABLE.	A.1 Verify by administrative means that the other two degraded voltage relay channels and associated timers on the affected shutdown board(s) are OPERABLE. AND A.2 Place the degraded voltage relay channel in trip.	Immediately 15 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours.

AND

One low pressure ECCS injection/spray subsystem shall be OPERABLE.

~~NOTE~~

~~A Low Pressure Coolant Injection (LPCI) subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.~~

APPLICABILITY: MODES 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without offsite electrical power.	Immediately
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1 Verify secondary containment boundary is capable of being established in less than the DRAIN TIME. AND	4 hours (continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. (continued)	C.2	Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME. (SGT)	4 hours
	AND		
	C.3	Verify two standby gas treatment subsystems are capable of being placed in operation in less than the DRAIN TIME.	4 hours
D. DRAIN TIME < 8 hours.	D.1	---------- NOTE ---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	
		Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.	Immediately
	AND		
	D.2	Initiate action to establish secondary containment boundary.	Immediately
	AND		(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	D.3 Initiate action to isolate each secondary containment penetration flow path or verify it can be automatically or manually isolated from the control room.	Immediately
	AND	
	D.4 Initiate action to verify two ~~standby gas treatment~~ SGT subsystems are capable of being placed in operation.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. OR DRAIN TIME < 1 hour.	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME ≥ 36 hours.	12 hours
SR 3.5.2.2	Verify, for a required ECCS injection/spray subsystem, the suppression pool water level is ≥ -6.25 inches with or -7.25 inches without differential pressure control.	12 hours
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	31 days
~~SR 3.5.2.4~~	~~Verify, for the required ECCS injection/spray subsystem, each manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.~~	~~31 days~~
SR 3.5.2.~~5~~ 4	Operate the required ECCS injection/spray subsystem ~~through the test return line~~ for ≥ 10 minutes.	92 days
SR 3.5.2.~~6~~ 5	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	24 months
SR 3.5.2.~~7~~ 6	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required ECCS injection/spray subsystem can be manually operated.	24 months

----------NOTES----------
1. Operation may be through the test return line.
2. Credit may be taken for normal system operation to satisfy this SR.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.5, SR 3.8.1.7~~, and SR 3.8.1.8~~. ----------	
	~~For~~ Unit 1 and 2 AC sources required to be OPERABLE~~; the SRs of Specification 3.8.1 are applicable, except SR 3.8.1.6 and SR 3.8.1.9.~~	In accordance with applicable SRs
SR 3.8.2.2	For the required Unit 3 DG, the SRs of Unit 3 Technical Specifications are applicable.	In accordance with applicable SRs

The following SRs are applicable for

SR 3.8.1.1, SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.5, SR 3.8.1.7, and SR 3.8.1.10

and

:

1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."
DRAIN TIME	The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming: a. The water inventory above the TAF is divided by the limiting drain rate; b. The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure ~~(e.g., seismic event, loss of normal power, single human error)~~, for all penetration flow paths below the TAF except: 1. Penetration flow paths connected to an intact closed system, or isolated by manual or

(continued)

closed and administratively controlled

1.1 Definitions (continued)

DRAIN TIME (continued)

automatic valves that are ~~locked, sealed, or otherwise secured~~ in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

2. Penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation; or

3. Penetration flow paths with isolation devices that can be closed prior to the RPV water level being equal to the TAF by a dedicated operator trained in the task, who is in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation devices without offsite power.

c. The penetration flow paths required to be evaluated per paragraph b are assumed to open instantaneously and are not subsequently isolated, and no water is assumed to be subsequently added to the RPV water inventory;

d. No additional draining events occur; and

e. Realistic cross-sectional areas and drain rates are used.

A bounding DRAN TIME may be used in lieu of a calculated value.

INSERVICE TESTING PROGRAM

The INSERVICE TESTING PROGRAM is the licensee program that fulfills the requirements of 10 CFR 50.55a(f).

(continued)

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

A.1 Initiate action to place channel in trip.
OR

ACTIONS

NOTE
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~A. One or more channels inoperable.~~	~~A.1 Enter the Condition referenced in Table 3.3.5.2-1 for the channel.~~	~~Immediately~~ Immediately
~~B. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~B.1~~ Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	AND	
	~~B.2 Calculate DRAIN TIME.~~	Immediately
~~C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~C.1 Place channel in trip.~~	~~1 hour~~

A.
A.2.1
One or more channels inoperable.
A.2.2 Initiate action to calculate DRAIN TIME.

~~(continued)~~

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~D. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~D.1 Restore channel to OPERABLE status.~~	~~24 hours~~
~~E. Required Action and associated Completion Time of Condition C or D not met.~~	~~E.1 Declare associated low pressure Emergency Core Cooling System (ECCS) injection/spray subsystem inoperable.~~	~~Immediately~~

SURVEILLANCE REQUIREMENTS

These SRs apply to each Function in Table 3.3.5.2-1.

----------NOTE----------

~~Refer to Table 3.3.5.2-1 to determine which SRs apply for each ECCS Function.~~

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	24 hours
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	92 days

3. Recirculation Loop Sample Isolation

a. Reactor Vessel Water Level - Low Low Low, Level 1	(a)	1 per trip system	≥ 398 inches above vessel zero

Table 3.3.5.2-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	~~CONDITIONS REFERENCED FROM REQUIRED ACTION A.1~~	~~SURVEILLANCE REQUIREMENTS~~	ALLOWABLE VALUE
~~1. Core Spray System~~					
~~a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~	~~4, 5~~	~~2 per trip system[(a)]~~	~~C~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≤ 465 psig~~
~~b. Core Spray Pump Discharge Flow - Low (Bypass)~~	~~4, 5~~	~~1 per subsystem[(a)]~~	~~D~~	~~SR 3.3.5.2.2~~	~~≥ 1647 gpm and ≤ 2910 gpm~~
~~2. Low Pressure Coolant Injection (LPCI) System~~					
~~a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~	~~4, 5~~	~~2 in one trip system[(a)]~~	~~C~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≤ 465 psig~~
3. Shutdown Cooling System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	~~(b)~~	1 per trip system	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ 528 inches above vessel zero
4. Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	~~(b)~~	1 per trip system	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ 528 inches above vessel zero

1. 2. (a)

~~(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control."~~

~~(b)~~ When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

4. Recirculation Pump Discharge Isolation

a. Reactor Vessel Water Level - Low Low Low, Level 1	(a)	2 in one trip system	≥ 398 inches above vessel zero
b. Reactor Steam Dome Pressure - Low (Recirculation Discharge Valve Permissive)	(a)	2 in one trip system	≥ 215 psig

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Table 3.3.8.1-1 Function on 4 kV shutdown boards A, B, C, and D shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.
~~When the associated diesel generator is required to be OPERABLE by LCO 3.8.2, "AC Sources - Shutdown."~~

ACTIONS

NOTE
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One degraded voltage relay channel inoperable on one or more shutdown board(s). AND The loss of voltage relay channels on the affected shutdown board(s) are OPERABLE.	A.1 Verify by administrative means that the other two degraded voltage relay channels and associated timers on the affected shutdown board(s) are OPERABLE. AND A.2 Place the degraded voltage relay channel in trip.	Immediately 15 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours.

AND

One low pressure ECCS injection/spray subsystem shall be OPERABLE.

~~NOTE~~

~~A Low Pressure Coolant Injection (LPCI) subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.~~

APPLICABILITY: MODES 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without offsite electrical power.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1 Verify secondary containment boundary is capable of being established in less than the DRAIN TIME.	4 hours
	AND	
	C.2 Verify each secondary containment penetration flow path is capable of being isolated inless than the DRAIN TIME.	4 hours
	AND	
	C.3 Verify two standby gas treatment subsystems are capable of being placed in operation in less than the DRAIN TIME. (SGT)	4 hours
D. DRAIN TIME < 8 hours.	D.1 ----------NOTE---------- Required ECCS injection/ spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	
	Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.	Immediately
	AND	

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. (continued)	D.2	Initiate action to establish secondary containment boundary.	Immediately
	AND		
	D.3	Initiate action to isolate each secondary containment penetration flow path or verify it can be automatically or manually isolated from the control room.	Immediately
	AND		
	D.4	Initiate action to verify two ~~standby gas treatment~~ subsysems are capable of being placed in operation.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. OR DRAIN TIME < 1 hour.	E.1	Initiate action to restore DRAIN TIME to ≥ 36 hours.	Immediately

SGT

t

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME ≥ 36 hours.	12 hours
SR 3.5.2.2	Verify, for a required ECCS injection/spray subsystem, the suppression pool water level is ≥ -6.25 inches with or -7.25 inches without differential pressure control.	12 hours
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	31 days
~~SR 3.5.2.4~~	~~Verify, for the required ECCS injection/spray subsystem, each manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.~~	~~31 days~~
SR 3.5.2.~~5~~ 4	Operate the required ECCS injection/spray subsystem ~~through the test return line~~ for ≥ 10 minutes.	92 days
SR 3.5.2.~~6~~ 5	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	24 months
SR 3.5.2.~~7~~ 6	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required ECCS injection/spray subsystem can be manually operated.	24 months

----------NOTES----------
1. Operation may be through the test return line.
2. Credit may be taken for normal system operation to satisfy this SR.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.5, SR 3.8.1.7~~, and SR 3.8.1.8~~. ----------	
	~~For~~ Unit 1 and 2 AC sources required to be OPERABLE~~, the SRs of Specification 3.8.1 are applicable, except SR 3.8.1.6 and SR 3.8.1.9.~~	In accordance with applicable SRs
SR 3.8.2.2	For the required Unit 3 DG, the SRs of Unit 3 Technical Specifications are applicable.	In accordance with applicable SRs

The following SRs are applicable for

SR 3.8.1.1, SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.5, SR 3.8.1.7, and SR 3.8.1.10

and

:

1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."
DRAIN TIME	The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming: a. The water inventory above the TAF is divided by the limiting drain rate; b. The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure ~~(e.g., seismic event, loss of normal power, single human error)~~, for all penetration flow paths below the TAF except: 1. Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that ~~are locked, sealed, or otherwise secured~~ closed and administratively controlled in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

(continued)

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

A.1 Initiate action to place channel in trip.
OR

ACTIONS

NOTE
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~A. One or more channels inoperable.~~	~~A.1 Enter the Condition referenced in Table 3.3.5.2-1 for the channel.~~	~~Immediately~~ Immediately
A. ~~B. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	A.2.1 ~~B.1~~ Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
One or more channels inoperable.	AND A.2.2 Initiate action to calculate DRAIN TIME. ~~B.2 Calculate DRAIN TIME.~~	Immediately
~~C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~C.1 Place channel in trip.~~	~~1 hour~~

~~(continued)~~

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~D. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~D.1 Restore channel to OPERABLE status.~~	~~24 hours~~
~~E. Required Action and associated Completion Time of Condition C or D not met.~~	~~E.1 Declare associated low pressure Emergency Core Cooling System (ECCS) injection/spray subsystem inoperable.~~	~~Immediately~~

SURVEILLANCE REQUIREMENTS

These SRs apply to each Function in Table 3.3.5.2-1.

----------NOTE----------

~~Refer to Table 3.3.5.2-1 to determine which SRs apply for each ECCS Function.~~

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	24 hours
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	92 days

3. Recirculation Loop Sample Isolation

a. Reactor Vessel Water Level - Low Low Low, Level 1	(a)	1 per trip system	≥ 398 inches above vessel zero

Table 3.3.5.2-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	~~CONDITIONS REFERENCED FROM REQUIRED ACTION A.1~~	~~SURVEILLANCE REQUIREMENTS~~	ALLOWABLE VALUE
~~1. Core Spray System~~					
~~a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~	~~4, 5~~	~~2 per trip system[(a)]~~	~~C~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≤ 465 psig~~
~~b. Core Spray Pump Discharge Flow - Low (Bypass)~~	~~4, 5~~	~~1 per subsystem[(a)]~~	~~D~~	~~SR 3.3.5.2.2~~	~~≥ 1647 gpm and ≤ 2910 gpm~~
~~2. Low Pressure Coolant Injection (LPCI) System~~					
~~a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~	~~4, 5~~	~~2 in one trip system[(a)]~~	~~C~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≤ 465 psig~~
1. 3. Shutdown Cooling System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	~~(b)~~	1 per trip system	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ 528 inches above vessel zero
2. 4. Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	~~(b)~~	1 per trip system	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ 528 inches above vessel zero

(a) ~~Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control."~~

(b) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

(a)

4. Recirculation Pump Discharge Isolation

a. Reactor Vessel Water Level - Low Low Low, Level 1	(a)	2 in one trip system	≥ 398 inches above vessel zero
b. Reactor Steam Dome Pressure - Low (Recirculation Discharge Valve Permissive)	(a)	2 in one trip system	≥ 215 psig

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Table 3.3.8.1-1 Function on 4 kV shutdown boards 3EA, 3EB, 3EC, and 3ED shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3, ~~When the associated diesel generator is required to be OPERABLE by LCO 3.8.2, "AC Sources - Shutdown."~~

ACTIONS

NOTE
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One degraded voltage relay channel inoperable on one or more shutdown board(s). AND The loss of voltage relay channels on the affected shutdown board(s) are OPERABLE.	A.1 Verify by administrative means that the other two degraded voltage relay channels and associated timers on the affected shutdown board(s) are OPERABLE. AND A.2 Place the degraded voltage relay channel in trip.	Immediately 15 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours.

AND

One low pressure ECCS injection/spray subsystem shall be OPERABLE.

~~NOTE~~

~~A Low Pressure Coolant Injection (LPCI) subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.~~

APPLICABILITY: MODES 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without offsite electrical power.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1	Verify secondary containment boundary is capable of being established in less than the DRAIN TIME.	4 hours
	AND		
	C.2	Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours
	AND		
	C.3	Verify two standby gas treatment (SGT) subsystems are capable of being placed in operation in less than the DRAIN TIME.	4 hours
D. DRAIN TIME < 8 hours.	D.1	---------- NOTE ---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	
		Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.	Immediately
	AND		(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. (continued)	D.2	Initiate action to establish secondary containment boundary.	Immediately
	AND		
	D.3	Initiate action to isolate each secondary containment penetration flow path or verify it can be automatically or manually isolated from the control room.	Immediately
	AND		
	D.4	Initiate action to verify two ~~standby gas treatment~~ SGT subsystems are capable of being placed in operation.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. OR DRAIN TIME < 1 hour.	E.1	Initiate action to restore DRAIN TIME to ≥ 36 hours.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME ≥ 36 hours.	12 hours
SR 3.5.2.2	Verify, for a required ECCS injection/spray subsystem, the suppression pool water level is ≥ -6.25 inches with or -7.25 inches without differential pressure control.	12 hours
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	31 days
~~SR 3.5.2.4~~	~~Verify, for the required ECCS injection/spray subsystem, each manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.~~	~~31 days~~
SR 3.5.2.~~5~~ 4	Operate the required ECCS injection/spray subsystem ~~through the test return line~~ for ≥ 10 minutes.	92 days
SR 3.5.2.~~6~~ 5	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	24 months
SR 3.5.2.~~7~~ 6	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required ECCS injection/spray subsystem can be manually operated.	24 months

----------NOTES----------
1. Operation may be through the test return line.
2. Credit may be taken for normal system operation to satisfy this SR.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.5, SR 3.8.1.7~~, and SR 3.8.1.8~~. ----------	
	~~For~~ Unit 3 AC sources required to be OPERABLE~~, the SRs of Specification 3.8.1 are applicable, except for SR 3.8.1.6 and SR 3.8.1.9.~~	In accordance with applicable SRs
SR 3.8.2.2	For the required Unit 1 and 2 DG, the SRs of Unit 1 and 2 Technical Specifications are applicable.	In accordance with applicable SRs

The following SRs are applicable for

SR 3.8.1.1, SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.5, SR 3.8.1.7, and SR 3.8.1.10

and

:

Attachment 2

Proposed Technical Specification Changes (Final Retyped) for Browns Ferry Units 1, 2, and 3

1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."
DRAIN TIME	The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming: a. The water inventory above the TAF is divided by the limiting drain rate; b. The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure, for all penetration flow paths below the TAF except: 1. Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are closed and administratively controlled in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

(continued)

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Initiate action to place channel in trip.	Immediately
	OR	
	A.2.1 Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	AND	
	A.2.2 Initiate action to calculate DRAIN TIME.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------

These SRs apply to each Function in Table 3.3.5.2-1.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	24 hours
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	92 days

Table 3.3.5.2-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	ALLOWABLE VALUE
1. Shutdown Cooling System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
2. Reactor Water Cleanup (RWCU) System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
3. Recirculation Loop Sample Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	1 per trip system	≥ 398 inches above vessel zero
4. Recirculation Pump Discharge Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	2 in one trip system	≥ 398 inches above vessel zero
b. Reactor Steam Dome Pressure – Low (Recirculation Discharge Valve Permissive)	(a)	2 in one trip system	≥ 215 psig

(a) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Table 3.3.8.1-1 Function on 4 kV shutdown boards A, B, C, and D shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One degraded voltage relay channel inoperable on one or more shutdown board(s). <u>AND</u> The loss of voltage relay channels on the affected shutdown board(s) are OPERABLE.	A.1 Verify by administrative means that the other two degraded voltage relay channels and associated timers on the affected shutdown board(s) are OPERABLE. <u>AND</u> A.2 Place the degraded voltage relay channel in trip.	Immediately 15 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours

AND

One low pressure ECCS injection/spray subsystem shall be OPERABLE.

APPLICABILITY: MODES 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without electrical power.	Immediately
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1 Verify secondary containment boundary is capable of being established in less than the DRAIN TIME. AND	4 hours (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. (continued)	C.2 Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours
	AND	
	C.3 Verify two standby gas treatment (SGT) subsystems are capable of being placed in operation in less than the DRAIN TIME.	4 hours
D. DRAIN TIME < 8 hours.	D.1 ---------- NOTE ---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	
	Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.	Immediately
	AND	
	D.2 Initiate action to establish secondary containment boundary.	Immediately
	AND	
		(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	D.3 Initiate action to isolate each secondary containment penetration flow path or verify it can be automatically or manually isolated from the control room.	Immediately
	AND	
	D.4 Initiate action to verify two SGT subsystems are capable of being placed in operation.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. OR DRAIN TIME < 1 hour.	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME ≥ 36 hours.	12 hours
SR 3.5.2.2	Verify, for the required ECCS injection/spray subsystem, the suppression pool water level is ≥ -6.25 inches with or -7.25 inches without differential pressure control.	12 hours
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	31 days
SR 3.5.2.4	----------NOTES---------- 1. Operation may be through the test return line. 2. Credit may be taken for normal system operation to satisfy this SR. ---------- Operate the required ECCS injection/spray subsystem for ≥ 10 minutes.	92 days
SR 3.5.2.5	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	24 months
SR 3.5.2.6	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required ECCS injection/spray subsystem can be manually operated.	24 months

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.5, and SR 3.8.1.7. ---------- The following SRs are applicable for Unit 1 and 2 AC sources required to be OPERABLE: SR 3.8.1.1, SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.5, SR 3.8.1.7, and SR 3.8.1.10.	In accordance with applicable SRs
SR 3.8.2.2	For the required Unit 3 DG, the SRs of Unit 3 Technical Specifications are applicable.	In accordance with applicable SRs

1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."
DRAIN TIME	The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming: a. The water inventory above the TAF is divided by the limiting drain rate; b. The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure, for all penetration flow paths below the TAF except: 1. Penetration flow path connected to an intact closed system, or isolated by manual or

(continued)

1.1 Definitions (continued)

DRAIN TIME (continued)

automatic valves that are closed and administratively controlled in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

2. Penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation; or

3. Penetration flow paths with isolation devices that can be closed prior to the RPV water level being equal to the TAF by a dedicated operator trained in the task, who is in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation devices without offsite power.

c. The penetration flow paths required to be evaluated per paragraph b are assumed to open instantaneously and are not subsequently isolated, and no water is assumed to be subsequently added to the RPV water inventory;

d. No additional draining events occur; and

e. Realistic cross-sectional areas and drain rates are used.

A bounding DRAIN TIME may be used in lieu of a calculated value.

INSEVICE TESTING PROGRAM

The INSERVICE TESTING PROGRAM is the licensee program that fulfills the requirements of 10 CFR 50.55a(f).

(continued)

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Initiate action to place channel in trip.	Immediately
	OR	
	A.2.1 Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	AND	
	A.2.2 Initiate action to calculate DRAIN TIME.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------

These SRs apply to each Function in Table 3.3.5.2-1.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	24 hours
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	92 days

Table 3.3.5.2-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	ALLOWABLE VALUE
1. Shutdown Cooling System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
2. Reactor Water Cleanup (RWCU) System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
3. Recirculation Loop Sample Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	1 per trip system	≥ 398 inches above vessel zero
4. Recirculation Pump Discharge Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	2 in one trip system	≥ 398 inches above vessel zero
b. Reactor Steam Dome Pressure – Low (Recirculation Discharge Valve Permissive)	(a)	2 in one trip system	≥ 215 psig

(a) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Table 3.3.8.1-1 Function on 4 kV shutdown boards A, B, C, and D shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One degraded voltage relay channel inoperable on one or more shutdown board(s). <u>AND</u> The loss of voltage relay channels on the affected shutdown board(s) are OPERABLE.	A.1 Verify by administrative means that the other two degraded voltage relay channels and associated timers on the affected shutdown board(s) are OPERABLE. <u>AND</u> A.2 Place the degraded voltage relay channel in trip.	Immediately 15 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours

AND

One low pressure ECCS injection/spray subsystems shall be OPERABLE.

APPLICABILITY: MODES 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without electrical power.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1 Verify secondary containment boundary is capable of being established in less than the DRAIN TIME. AND C.2 Verify each secondary containment penetration flow path is capable of being isolated inless than the DRAIN TIME. AND C.3 Verify two standby gas treatment (SGT) subsystems are capable of being placed in operation in less than the DRAIN TIME.	4 hours 4 hours 4 hours
D. DRAIN TIME < 8 hours.	D.1 ----------NOTE---------- Required ECCS injections/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ---------- Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours. AND	Immediately (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	D.2 Initiate action to establish secondary containment boundary.	Immediately
	AND	
	D.3 Initiate action to isolate each secondary containment penetration flow path or verify it can be automatically or manually isolated from the control room.	Immediately
	AND	
	D.4 Initiate action to verify two SGT subsystems are capable of being placed in operation.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. OR DRAIN TIME < 1 hour.	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME ≥ 36 hours.	12 hours
SR 3.5.2.2	Verify, for a required ECCS injection/spray subsystem, the suppression pool water level is ≥ -6.25 inches with or -7.25 inches without differential pressure control.	12 hours
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	31 days
SR 3.5.2.4	----------NOTES---------- 1. Operation may be through the test return line. 2. Credit may be taken for normal system operation to satisfy this SR. ---------- Operate the required ECCS injection/spray subsystem for ≥ 10 minutes.	92 days
SR 3.5.2.5	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	24 months
SR 3.5.2.6	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required ECCS injection/spray subsystem can be manually operated.	24 months

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.5, and SR 3.8.1.7. ---------- The following SRs are applicable for Unit 1 and 2 AC sources required to be OPERABLE: SR 3.8.1.1, SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.5, SR 3.8.1.7, and SR 3.8.1.10.	In accordance with applicable SRs
SR 3.8.2.2	For the required Unit 3 DG, the SRs of Unit 3 Technical Specifications are applicable.	In accordance with applicable SRs

1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."
DRAIN TIME	The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming: a. The water inventory above the TAF is divided by the limiting drain rate; b. The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure, for all penetration flow paths below the TAF except: 1. Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are closed and administratively controlled in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths;

(continued)

3.3 INSTRUMENTATION

3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.2 The RPV Water Inventory Control Instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Initiate action to place channel in trip.	Immediately
	OR	
	A.2.1 Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	AND	
	A.2.2 Initiate action to calculate DRAIN TIME.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------

These SRs apply to each Function in Table 3.3.5.2-1.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	24 hours
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	92 days

Table 3.3.5.2-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	ALLOWABLE VALUE
1. Shutdown Cooling System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
2. Reactor Water Cleanup (RWCU) System Isolation			
a. Reactor Vessel Water Level - Low, Level 3	(a)	1 per trip system	≥ 528 inches above vessel zero
3. Recirculation Loop Sample Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	1 per trip system	≥ 398 inches above vessel zero
4. Recirculation Pump Discharge Isolation			
a. Reactor Vessel Water Level – Low Low Low, Level 1	(a)	2 in one trip system	≥ 398 inches above vessel zero
b. Reactor Steam Dome Pressure – Low (Recirculation Discharge Valve Permissive)	(a)	2 in one trip system	≥ 215 psig

(a) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

3.3 INSTRUMENTATION

3.3.8.1 Loss of Power (LOP) Instrumentation

LCO 3.3.8.1 The LOP instrumentation for each Table 3.3.8.1-1 Function on 4 kV shutdown boards 3EA, 3EB, 3EC, and 3ED shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One degraded voltage relay channel inoperable on one or more shutdown board(s). <u>AND</u> The loss of voltage relay channels on the affected shutdown board(s) are OPERABLE.	A.1 Verify by administrative means that the other two degraded voltage relay channels and associated timers on the affected shutdown board(s) are OPERABLE. <u>AND</u> A.2 Place the degraded voltage relay channel in trip.	Immediately 15 days

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LCO 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours

AND

One low pressure ECCS injection/spray subsystems shall be OPERABLE.

APPLICABILITY: MODES 4 and 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without electrical power.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1	Verify secondary containment boundary is capable of being established in less than the DRAIN TIME.	4 hours
	AND		
	C.2	Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours
	AND		
	C.3	Verify two standby gas treatment (SGT) subsystems are capable of being placed in operation in less than the DRAIN TIME.	4 hours
D. DRAIN TIME < 8 hours.	D.1	---------- NOTE ---------- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----------	
		Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.	Immediately
	AND		

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	D.2 Initiate action to establish secondary containment boundary.	Immediately
	<u>AND</u>	
	D.3 Initiate action to isolate each secondary containment penetration flow path or verify it can be automatically or manually isolated from the control room.	Immediately
	<u>AND</u>	
	D.4 Initiate action to verify two SGT subsystems are capable of being placed in operation.	Immediately
E. Required Action and associated Completion Time of Condition C or D not met. <u>OR</u> DRAIN TIME < 1 hour.	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify DRAIN TIME ≥ 36 hours.	12 hours
SR 3.5.2.2	Verify, for a required ECCS injection/spray subsystem, the suppression pool water level is ≥ -6.25 inches with or -7.25 inches without differential pressure control.	12 hours
SR 3.5.2.3	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	31 days
SR 3.5.2.4	----------NOTES---------- 1. Operation may be through the test return line. 2. Credit may be taken for normal system operation to satisfy this SR. ---------- Operate the required ECCS injection/spray subsystem for ≥ 10 minutes.	92 days
SR 3.5.2.5	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	24 months
SR 3.5.2.6	----------NOTE---------- Vessel injection/spray may be excluded. ---------- Verify the required ECCS injection/spray subsystem can be manually operated.	24 months

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.5, and SR 3.8.1.7. ---------- The following SRs are applicable for Unit 3 AC sources required to be OPERABLE: SR 3.8.1.1, SR 3.8.1.2, SR 3.8.1.3, SR 3.8.1.5, SR 3.8.1.7, and SR 3.8.1.10.	In accordance with applicable SRs
SR 3.8.2.2	For the required Unit 1 and 2 DG, the SRs of Unit 1 and 2 Technical Specifications are applicable.	In accordance with applicable SRs

Attachment 3

Proposed Technical Specification Bases Changes (Mark-Ups) for Browns Ferry Unit 1
(For Information Only)

Note - The predecessor TSTF-542 License Amendment has not yet been implemented at Browns Ferry. Accordingly, the previously submitted TSTF-542 Bases pages that are affected are provided in red, with changes shown in green.

B 3.3 INSTRUMENTATION

B 3.3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

BASES

BACKGROUND

The RPV contains penetrations below the top of the active fuel (TAF) that have the potential to drain the reactor coolant inventory to below the TAF. If the water level should drop below the TAF, the ability to remove decay heat is reduced, which could lead to elevated cladding temperatures and clad perforation. Safety Limit 2.1.1.3 requires the RPV water level to be above the top of active irradiated fuel at all times to prevent such elevated cladding temperatures.

Technical Specifications are required by 10 CFR 50.36 to include limiting safety system settings (LSSS) for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The actual settings for the automatic isolation channels are the same as those established for the same functions in MODES 1, 2, and 3 in LCO 3.3.5.1, "Emergency Core Cooling System (ECCS) Instrumentation," or LCO 3.3.6.1, "Primary Containment Isolation Instrumentation."

With the unit in MODE 4 or 5, RPV water inventory control is not required to mitigate any events or accidents evaluated in the safety analyses. RPV water inventory control is required in

(continued)

BASES

BACKGROUND (continued)

MODES 4 and 5 to protect Safety Limit 2.1.1.3 and the fuel cladding barrier to prevent the release of radioactive material should a draining event occur. Under the definition of DRAIN TIME, some penetration flow paths may be excluded from the DRAIN TIME calculation if they will be isolated by valves that will close automatically without offsite power prior to the RPV water level being the TAF when actuated by RPV water level isolation instrumentation.

equal to

The purpose of the RPV Water Inventory Control Instrumentation is to support the requirements of LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control," and the definition of DRAIN TIME. There are functions that ~~are required for manual operation of the ECCS injection/spray subsystem required to be OPERABLE by LCO 3.5.2 and other functions that~~ support automatic isolation of the Residual Heat Removal (RHR) Shutdown Cooling system ~~and~~ Reactor Water Cleanup system penetration flow path(s) on low RPV water level.

,

Recirculation Loop sample line, and Recirculation Pump discharge

~~The RPV Water Inventory Control Instrumentation supports operation of core spray (CS) and low pressure coolant injection (LPCI). The equipment involved with each of these systems is described in the Bases for LCO 3.5.2.~~

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

With the unit in MODE 4 or 5, RPV water inventory control is not required to mitigate any events or accidents evaluated in the safety analyses. RPV water inventory control is required in MODES 4 and 5 to protect Safety Limit 2.1.1.3 and the fuel cladding barrier to prevent the release of radioactive material should a draining event occur.

considered

A double-ended guillotine break of the Reactor Coolant System (RCS) is not ~~postulated in~~ MODES 4 and 5 due to the reduced RCS pressure, reduced piping stresses, and ductile piping systems. Instead, an event is ~~postulated~~ in which ~~a single operator error or~~ initiating event allows draining of the RPV water inventory through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure

an

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~(e.g., seismic event, loss of normal power, single human error).~~ It is assumed, based on engineering judgment, that while in MODES 4 and 5, one low pressure ECCS injection/spray subsystem can be manually started to maintain adequate reactor vessel water level.

As discussed in References 1, 2, 3, 4, and 5, operating experience has shown RPV water inventory to be significant to public health and safety. Therefore, RPV Water Inventory Control satisfies Criterion 4 of 10 CFR 50.36(c)(2)(ii).

Permissive and interlock setpoints are generally considered as nominal values without regard to measurement accuracy.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

~~Core Spray and Low Pressure Coolant Injection Systems~~

~~1.a, 2.a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~

~~Low reactor steam dome pressure signals are used as permissives for the low pressure ECCS injection/spray subsystems. This function ensures that, prior to opening the injection valves of the low pressure ECCS subsystems, the reactor pressure has fallen to a value below these subsystems' maximum design pressure. While it is assured during MODES 4 and 5 that the reactor steam dome pressure will be below the ECCS maximum design pressure, the Reactor Steam Dome Pressure - Low signals are assumed to be OPERABLE and capable of permitting injection valve opening as part of a manual start of the ECCS.~~

~~The Core Spray System Reactor Steam Dome Pressure - Low signals are initiated from two pressure transmitters per subsystem that sense reactor steam dome pressure. The transmitters for each subsystem are connected to two trip units. The outputs of the trip units are connected to relays whose contacts are arranged in a one-out-of-two logic. While four~~

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~channels are available, only a single channel per subsystem is required to be OPERABLE.~~

~~The Low Pressure Coolant Injection System Reactor Steam Dome Pressure - Low signals are initiated from four pressure transmitters (two channels in two trip systems) that sense reactor steam dome pressure. Either trip system can fulfill the function with a two-out-of-two logic. Therefore, two channels in one trip system are required to be OPERABLE.~~

~~The Allowable Value is low enough to prevent overpressuring the equipment in the low pressure ECCS.~~

~~The channels of Reactor Steam Dome Pressure - Low Function are required to be OPERABLE in MODES 4 and 5 when the ECCS subsystem is required to be OPERABLE by LCO 3.5.2.~~

~~1.b Core Spray Pump Discharge Flow - Low (Bypass)~~

~~The minimum flow instruments are provided to protect the associated Core Spray pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump.~~

~~One flow switch per Core Spray subsystem is used to detect the subsystem flow rate. The logic is arranged such that the flow switch causes the associated subsystem minimum flow valve to open. The logic will close the minimum flow valve once sufficient flow is achieved. The Core Spray Pump Discharge Flow - Low (Bypass) Allowable Values are high enough to ensure that the pump flow rate is sufficient to protect the pump, yet low enough to ensure that the closure of the minimum flow valve is initiated to allow full flow into the core.~~

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~One channel of the Core Spray Pump Discharge Flow - Low (Bypass) Function is required to be OPERABLE in MODES 4 and 5 when the associated Core Spray pump is required to be OPERABLE by LCO 3.5.2 to ensure the pump is capable of injecting into the Reactor Pressure Vessel when manually started.~~

Shutdown Cooling System Isolation

~~3~~.a - Reactor Vessel Water Level - Low, Level 3

1

The definition of Drain Time allows crediting the closing of penetration flow paths that are capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation. The Reactor Vessel Water Level - Low, Level 3 Function associated with the RHR Shutdown Cooling System isolation may be credited for automatic isolation of penetration flow paths associated with the RHR System.

Reactor Vessel Water Level - Low, Level 3 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. While four channels (two channels per trip system) of the Reactor Vessel Water Level - Low, Level 3 Function are available, only two channels (one channel for trip system A and one channel for trip system B) are required to be OPERABLE.

The Reactor Vessel Water Level - Low, Level 3 Allowable Value was chosen to be the same as the Primary Containment Isolation Instrumentation Reactor Vessel Water Level - Low, Level 3 Allowable Value (LCO 3.3.6.1), since the capability to cool the fuel may be threatened.

The Reactor Vessel Water Level - Low, Level 3 Function is only required to be OPERABLE when automatic isolation of the associated penetration flow path is credited in calculating DRAIN TIME.

This Function isolates the Group 2 valves.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Reactor Water Cleanup (RWCU) System Isolation

4.a - Reactor Vessel Water Level - Low, Level 3

2

The definition of Drain Time allows crediting the closing of penetration flow paths that are capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation. The Reactor Vessel Water Level - Low, Level 3 Function associated with RWCU System isolation may be credited for automatic isolation of penetration flow paths associated with the RWCU System.

Reactor Vessel Water Level - Low, Level 3 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. While four channels (two channels per trip system) of the Reactor Vessel Water Level - Low, Level 3 Function are available, only two channels (one channel for trip system A and one channel for trip system B) are required to be OPERABLE.

The Reactor Vessel Water Level - Low, Level 3 Allowable Value was chosen to be the same as the Primary Containment Isolation Instrumentation Reactor Vessel Water Level - Low, Level 3 Allowable Value (LCO 3.3.6.1), since the capability to cool the fuel may be threatened.

The Reactor Vessel Water Level - Low, Level 3 Function is only required to be OPERABLE when automatic isolation of the associated penetration flow path is credited in calculating DRAIN TIME.

This Function isolates the Group 3 valves.

Insert 1

(continued)

Insert 1

Recirculation Loop Sample Isolation

3.a - Reactor Vessel Water Level - Low Low Low, Level 1

The definition of Drain Time allows crediting the closing of penetration flow paths that are capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation. The Reactor Vessel Water Level - Low Low Low, Level 1 Function associated with recirculation loop sample valve isolation may be credited for automatic isolation of penetration flow paths associated with the Sampling and Water Quality System.

Reactor Vessel Water Level - Low Low Low, Level 1 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. While four channels of the Reactor Vessel Water Level - Low Low Low, Level 1 Function are available, only one channel in each trip system is required to be OPERABLE.

The Reactor Vessel Water Level - Low Low Low, Level 1 Allowable Value was chosen to be the same as the Primary Containment Isolation Instrumentation Reactor Vessel Water Level - Low Low Low, Level 1 Allowable Value (LCO 3.3.6.1) for Function 1.a, since the capability to cool the fuel may be threatened.

The Reactor Vessel Water Level - Low Low Low, Level 1 Function is only required to be OPERABLE when automatic isolation of the associated penetration flow path is credited in calculating DRAIN TIME.

This Function isolates the Group 1 valves.

Recirculation Pump Discharge Isolation

4.a and 4.b- Reactor Vessel Water Level - Low Low Low, Level 1 and Reactor Steam Dome Pressure - Low

The definition of Drain Time allows crediting the closing of penetration flow paths that are capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation. The Reactor Vessel Water Level - Low Low Low, Level 1 Function with the Reactor Steam Dome Pressure - Low (Recirculation Discharge Valve Permissive) associated with recirculation pump discharge valve isolation may be credited for automatic isolation of penetration flow paths associated with the Reactor Recirculation System.

Reactor Vessel Water Level - Low Low Low, Level 1 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. While four channels of the Reactor Vessel Water Level - Low Low Low, Level 1 Function are available, only two channels in one trip system are required to be OPERABLE.

The Reactor Vessel Water Level - Low Low Low, Level 1 Allowable Value was chosen to be the same as the ECCS Instrumentation Reactor Vessel Water Level - Low Low Low, Level 1

Allowable Value (LCO 3.3.5.1) for Function 2.a, since the capability to cool the fuel may be threatened.

The Reactor Steam Dome Pressure - Low (Recirculation Discharge Valve Permissive) signals are initiated from four pressure transmitters that sense the reactor dome pressure. While four channels of the Reactor Steam Dome Pressure - Low are available, only two channels in one trip system are required to be OPERABLE.

The Reactor Vessel Water Level - Low Low Low, Level 3 and Reactor Steam Dome Pressure - Low (Recirculation Discharge Valve Permissive) Functions are only required to be OPERABLE when automatic isolation of the associated penetration flow path is credited in calculating DRAIN TIME.

BASES

ACTIONS

A Note has been provided to modify the ACTIONS related to RPV Water Inventory Control instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition discovered to be inoperable or not within limits will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable RPV Water Inventory Control instrumentation channels provide appropriate compensatory measures for separate inoperable Condition entry for each inoperable RPV Water Inventory Control instrumentation channel.

~~A.1~~

~~Required Action A.1 directs entry into the appropriate Condition referenced in Table 3.3.5.2-1. The applicable Condition referenced in the Table is Function dependent. Each time a channel is discovered inoperable, Condition A is entered for that channel and provides for transfer to the appropriate subsequent Condition.~~

~~B.1 and B.2~~ A.1, A.2.1, and A.2.2

Shutdown Cooling System Isolation, Reactor Vessel Water Level - Low, Level 3, and Reactor Water Cleanup System Isolation, Reactor Vessel Water Level - Low, Level 3 functions are applicable when automatic isolation of the associated penetration flow path is credited in calculating Drain Time. If the instrumentation is inoperable and credited for the DRAIN TIME calculation, Required Action ~~B~~.1 directs ~~an immediate declaration that~~ the associated penetration flow path(s) ~~are~~ incapable of automatic isolation. Required Action ~~B.2 directs calculation of~~ DRAIN TIME (reference SR 3.5.2.1). The calculation cannot credit automatic isolation of the affected penetration flow paths.

A

immediate action to place the channel in trip. With the inoperable channel in the trip condition, the remaining channel will isolate the penetration flow path on low water level. If both channels are inoperable and placed in trip, the penetration flow path will be isolated. Alternatively, Required Action A.2.1 requires

initiating action to calculate

to be immediately declared

A.2.2

(continued)

BASES

ACTIONS (continued)

~~C.1~~

~~Low reactor steam dome pressure signals are used as permissives for manually aligning the low pressure ECCS injection/spray subsystem. If the permissive is inoperable, manual alignment of ECCS is precluded. Therefore, the permissive must be placed in the trip condition within 1 hour. With the permissive in the trip condition, manual alignment may be performed.~~

~~The Completion Time of 1 hour is intended to allow the operator time to evaluate any discovered inoperabilities and to place the channel in trip.~~

~~D.1~~

~~If a Core Spray Pump Discharge Flow - Low (Bypass) function is inoperable, there is a risk that the associated Core Spray pump could overheat when the pump is operating and the associated injection valve is not fully open. In this condition, the operator can manually secure the pump or open the injection valve to ensure the pump does not overheat, but this is not the preferred condition.~~

~~The 24 hour Completion Time was chosen to allow time for the operator to evaluate and repair any discovered inoperabilities. The Completion Time is appropriate given the ability to manually secure the Core Spray pump or manually open the injection valve to ensure the pump does not overheat.~~

~~E.1~~

~~With the Required Action and associated Completion Time of Condition C or D not met, the associated low pressure ECCS injection/spray subsystem may be incapable of performing the intended function, and must be declared inoperable immediately.~~

(continued)

The following SRs apply to

BASES

SURVIELLANCE REQUIREMENTS

~~As noted in the beginning of the SRs, the SRs for~~ each RPV Water Inventory Control Instrument Function ~~are found~~ in ~~the SRs column of~~ Table 3.3.5.2-1.

SR 3.3.5.2.1

Performance of the CHANNEL CHECK ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the instrument channels could be an indication of excessive instrument drift in one of the channels or something even more serious. A CHANNEL CHECK guarantees that undetected outright channel failure is limited; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL FUNCTIONAL TEST.

Agreement criteria are determined by the plant staff, based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit.

The frequency of 12 hours is based upon operating experience that demonstrates channel failure is rare.

The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the channels required by the LCO.

SR 3.3.5.2.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function.

(continued)

BASES

ACTIONS (continued)

I.1 ~~and I.2~~

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the associated penetration flow path(s) should be closed. However, if the shutdown cooling function is needed to provide core cooling, these Required Actions allow the penetration flow path(s) to remain unisolated provided action is immediately initiated to restore the channel to OPERABLE status ~~or to isolate the RHR Shutdown Cooling System (i.e., provide alternate decay heat removal capabilities so the penetration flow path(s) can be isolated)~~. Actions must continue until the channel is restored to OPERABLE status. ~~or the RHR Shutdown Cooling System is isolated.~~

SURVEILLANCE REQUIREMENTS

As noted (Note 1) at the beginning of the SRs, the SRs for each Primary Containment Isolation instrumentation Function are found in the SRs column of Table 3.3.6.1-1.

The Surveillances are modified by a Note (Note 2) to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains trip capability. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the reliability analysis (Refs. 5 and 6) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the PCIVs will isolate the penetration flow path(s) when necessary.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis. The channel devices for each shutdown board are listed in Table B 3.3.8.1-1.

1. 4.16 kV Shutdown Board Undervoltage (Loss of Voltage)

Loss of voltage on a 4.16 kV shutdown board indicates that offsite power may be completely lost to the respective shutdown board and is unable to supply sufficient power for proper operation of the applicable equipment. Therefore, the power supply to the board is transferred from offsite power to DG power upon total loss of shutdown board voltage for 1.5 seconds. The transfer will not occur if the voltage recovers to the specified Allowable Value for Reset Voltage within 1.5 seconds. This ensures that adequate power will be available to the required equipment.

The Time Delay Allowable Values are long enough to provide time for the offsite power supply to recover to normal voltages, but short enough to ensure that power is available to the required equipment.

Two channels of 4.16 kV Shutdown Board Undervoltage (Loss of Voltage) Function per associated shutdown board are required to be OPERABLE when the associated DG is required to be OPERABLE to ensure that no single instrument failure can preclude the DG function. Refer to LCO 3.8.1, "AC Sources - Operating~~,"~~ ~~and 3.8.2, "AC Sources - Shutdown,"~~ for Applicability Bases for the DGs.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

2. 4.16 kV Shutdown Board Undervoltage (Degraded Voltage)

A reduced voltage condition on a 4.16 kV shutdown board indicates that, while offsite power may not be completely lost to the respective shutdown board, available power maybe insufficient for starting large ECCS motors without risking damage to the motors that could disable the ECCS function. Therefore, power supply to the board is transferred from offsite power to onsite DG power when the voltage on the board drops below the Degraded Voltage Function Allowable Values (degraded voltage with a time delay). This ensures that adequate power will be available to the required equipment. The Board Undervoltage Allowable Values are low enough to prevent inadvertent power supply transfer, but high enough to ensure that sufficient power is available to the required equipment. The Time Delay Allowable Values are long enough to provide time for the offsite power supply to recover to normal voltages, but short enough to ensure that sufficient power is available to the required equipment.

Three channels of 4.16 kV Shutdown Board Undervoltage (Degraded Voltage) Function per associated board are required to be OPERABLE when the associated DG is required to be OPERABLE to ensure that no single instrument failure can preclude the DG function. Refer to LCO 3.8.1 ~~and LCO 3.8.2~~ for Applicability Bases for the DGs.

3. 4.16 kV Shutdown Board Voltage Unbalanced (Unbalanced Voltage Relay)

An unbalanced voltage condition on a 4.16kV shutdown board indicates that, while offsite power may not be completely degraded to the board undervoltage level, available power may be insufficient for starting and running ECCS motors without risking damage to the motors that could disable the ECCS function. Therefore, power supply to the board is transferred from offsite power to onsite DG power when the unbalanced voltage level increases above the Unbalanced Voltage Function

(continued)

BASES

SURVEILLANCE REQUIREMENTS

As noted (Note 1) at the beginning of the SRs, the SRs for each LOP instrumentation Function are located in the SRs column of Table 3.3.8.1-1.

SR 3.3.8.1.1 and SR 3.3.8.1.2

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Frequency is based upon the calibration interval assumed in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.8.1.3

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required actuation logic for a specific channel. The system functional testing performed in LCO 3.8.1 ~~and LCO 3.8.2~~ overlaps this Surveillance to provide complete testing of the assumed safety functions.

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.

(continued)

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

B 3.5.2 Reactor Pressure Vessel (RPV) Water Inventory ControlECCS – Shutdown

BASES

BACKGROUND

The RPV contains penetrations below the top of active fuel (TAF) that have the potential to drain the reactor coolant inventory to below the TAF. If the water level should drop below the TAF, the ability to remove decay heat is reduced, which could lead to elevated cladding temperatures and clad perforation. Safety Limit 2.1.1.3 requires the RPV water level to the above the top of the active irradiated fuel at all times to prevent such elevated cladding temperatures.A description of the Core Spray (CS) System and the low pressure coolant injection (LPCI) mode of the Residual Heat Removal (RHR) System is provided in the Bases for LCO 3.5.1, "ECCS – Operating." For LCO 3.5.2, only one pump is required for an OPERABLE subsystem, as stated in the LCO Bases below.

be

APPLICABLE SAFETY ANALYSES

With the unit in MODE 4 or 5, RPV water inventory control is notThe ECCS performance is evaluated for the entire spectrum of required to mitigate any events or accidents evaluated in the safety analyses. RPV water inventory control is required in MODES 4 and 5 to protect Safety Limit 2.1.1.3 and the fuel cladding barrier to prevent the release of radioactive material to the environment should an unexpected draining event occur.

considered

A double-ended guillotine break of the Reactor Coolant System (RCS) is not postulated in MODES 4 and 5 due to the reduced RCS pressure, reduced piping stresses, and ductile piping systems. Instead, an event is considered in which single operator error or initiating event allows draining of the RPV water inventory through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure (e.g., seismic event, loss of normal power, single human

an

an event that creates a drain path through multiple vessel penetrations located below top of active fuel, such as

or a

(continued)

error).break sizes in the long term cooling analysis (Ref. 1) for a postulated loss of coolant accident (LOCA). The ECCS requirements are significantly reduced during shutdown since a LOCA is not postulated to occur. However, some ECCS capability may be required to restore and maintain the reactor coolant level in the event of an inadvertent draindown. It is reasonable to assumed, based on engineering judgment, that while in MODES 4 and 5, one low pressure ECCS injection/spray subsystem can maintain adequate reactor vessel water level. in the event of an inadvertent vessel draindown. To provide redundancy, a minimum of two low pressure ECCS injection/spray subsystems are required to be OPERABLE in MODES 4 and 5.

As discussed in References 1, 2, 3, 4, and 5, operating experience has shown RPV water inventory to be significant to public health and safety. Therefore, RPV Water Inventory Control satisfies Criterion 4 of 10 CFR50.36(c)(2)(ii).The low pressure ECCS subsystems satisfy Criterion 3 of the NRC Policy Statement (Ref. 2).

(continued)

BASES (continued)

LCO

The RPV water level must be controlled in MODES 4 and 5 to ensure that if an unexpected draining event should occur, the reactor coolant water level remains above the top of the active irradiated fuel as required by Safety Limit 2.1.1.3.

The Limiting Condition for Operation (LCO) requires the DRAIN TIME of RPV water inventory to the TAF to be ≥ 36 hours. A DRAIN TIME of 36 hours is considered reasonable to identify and initiate action to mitigate unexpected draining of reactor coolant. An event that could cause loss of RPV water inventory and result in the RPV water level reaching the TAF in greater than 36 hours does not represent a significant challenge to Safety Limit 2.1.1.3 and can be managed as part of normal plant operation.

aligned and started from the control room

OPERABILITY of the ECCS injection/spray subsystem includes any necessary valves, instrumentation, or controls needed to manually align and start the subsystem from the control room

One Two low pressure ECCS injection/spray subsystems is are required to be OPERABLE and capable of being manually started to provide defense-in-depth should an unexpected draining event occur. AThe low pressure ECCS injection/spray subsystems includeconsists of either one Core Spray (CS) subsystems orand one Low Pressure Coolant Injection (LPCI) subsystems. Each CS subsystem consists of one motor driven pump, piping, and valves to transfer water from the suppression pool to the reactor pressure vessel (RPV). Each LPCI subsystem consists of one motor driven pump, piping, and valves to transfer water from the suppression pool to the RPV. The necessary portions of the Emergency Equipment Cooling Water System are also required to provide adequate cooling to each required ECCS subsystem.

The LCO is modified by a Note which allows a required An LPCI subsystem tomay be aligned for decay heat removal and considered OPERABLE for the ECCS function, if it can be manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. Because of the restrictions on DRAIN TIME, sufficient time will be available following an unexpected draining event low pressure and low temperature conditions in MODES 4 and 5, sufficient time will be available to manually align and initiate LPCI subsystem operation to maintain RPV

(continued)

water inventory prior to the RPV water level reaching the TAF. to provide core cooling prior to postulated fuel uncovery.

APPLICABILITY

RPV water inventory control is required in MODES 4 and 5. Requirements on water inventory control in other MODES are contained in LCOs in Section 3.3, "Instrumentation," and other LCOs in Section 3.5, "Emergency Core Cooling Systems (ECCS), RPV Water Inventory Control, and Reactor Core Isolation Cooling (RCIC) System." RPV water inventory control is required to protect Safety Limit 2.1.1.3 which is applicable whenever irradiated fuel is in the reactor vessel.OPERABILITY of the low pressure ECCS injection/spray subsystems is required in MODES 4 and 5 to ensure adequate coolant inventory and sufficient heat removal capability for the irradiated fuel in the core in case of an inadvertent draindown of the vessel. Requirements for ECCS OPERABILITY during MODES 1, 2, and 3 are discussed in the Applicability section of the Bases for LCO 3.5.1. ECCS subsystems are not required to be OPERABLE during MODE 5 with the spent fuel storage pool gates removed and the water level maintained at ≥ 22 ft above the RPV flange. This provides sufficient coolant inventory to allow operator action to terminate the inventory loss prior to fuel uncovery in case of an inadvertent draindown.

(continued)

BASES

ACTIONS C.1, C.2, and C.3 (continued)

The required verification is an administrative activity and does not require manipulation or testing of equipment.

Required Actions C.1, C.2, and C.3 are considered to be met when Secondary Containment, Secondary Containment Isolation Valves, and the Standby Gas Treatment System are OPERABLE.

in accordance with LCO 3.6.4.1, 3.6.4.2, and 3.6.4.3.

D.1, D.2, D.3, and D.4

With the DRAIN TIME less than 8 hours, mitigating actions are implemented in case an unexpected draining event should occur. Note that if the DRAIN TIME is less than 1 hour, Required Action E.1 is also applicable.

Required Action D.1 requires immediate action to establish an additional method of water injection augmenting the ECCS injection/spray subsystem required by the LCO. The additional method of water injection includes the necessary instrumentation and controls, water sources, and pumps and valves needed to add water to the RPV or refueling cavity should an unexpected draining event occur. The Note to Required Action D.1 states that either the ECCS injection/spray subsystem or the additional method of water injection must be capable of operating without offsite electrical power. The additional method of water injection may be manually initiated and may consist of one or more systems or subsystems. The additional method of water injection must be able to access water inventory capable of being injected to maintain the RPV water level above the TAF for ≥ 36 hours. The additional method of water injection and the ECCS injection/spray subsystem may share all or part of the same water sources. If recirculation of injected water would occur, it may be credited in determining the required water volume.

(continued)

BASES

ACTIONS D.1, D.2, D.3, and D.4 (continued)

Should a draining event lower the reactor coolant level to below the TAF, there is potential for damage to the reactor fuel cladding and release of radioactive material. Additional actions are taken to ensure that radioactive material will be contained, diluted, and processed prior to being released to the environment.

The secondary containment provides a control volume in which fission products can be contained, diluted, and processed prior to release to the environment. Required Action D.2 requires that actions be immediately initiated to establish the secondary containment boundary. With the secondary containment boundary established, two SGT subsystems are capable of maintaining a negative pressure in the secondary containment with respect to the environment.

The secondary containment penetrations form a part of the secondary containment boundary. Required Action D.3 requires that actions be immediately initiated to verify that each secondary containment penetration flow path is isolated or to verify that it can be automatically or manually isolated from the control room.

Two SGT subsystems are capable of maintaining the secondary containment at a negative pressure with respect to the environment and filter gaseous releases. Required Action D.4 requires that actions be immediately initiated to verify that at least two SGT subsystems are capable of being placed in operation. The required verification is an administrative activity and does not require manipulation or testing of equipment.

Required Actions D.2, D.3, and D.4 are considered to be met when Secondary Containment, Secondary Containment Isolation Valves, and the Standby Gas Treatment System are OPERABLE in accordance with LCO 3.6.4.1, 3.6.4.2, and 3.6.4.3.

(continued)

the control rod guide tube. If the control rod blade will be raised from the penetration to adjust or verify seating of the blade, the exposed cross- sectional area of the RPV penetration flow path is used.

The definition of DRAIN TIME excludes from the calculation those penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are ~~locked, sealed, or otherwise secured in the closed position~~, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths. A blank flange or other bolted device must be connected with a sufficient number of bolts to prevent draining ~~in the event of an Operating Basis Earthquake~~. Normal or expected leakage from closed systems or past isolation devices is permitted. Determination that a system is intact and closed or isolated must consider the status of branch lines ~~and ongoing plant maintenance and testing activities~~.

closed and administratively controlled

The Residual Heat Removal (RHR) Shutdown Cooling System is only considered an intact closed system when misalignment issues (Reference 6) have been precluded by functional valve interlocks or by isolation devices, such that redirection of RPV water out of an RHR subsystem is precluded.

a single

should

The exclusion ~~of~~ penetration flow paths from the determination of DRAIN TIME ~~must~~ consider the ~~potential~~ effects of ~~a single operator error or initiating event on items supporting maintenance and testing~~ (rigging, scaffolding, temporary shielding, piping plugs, ~~snubber removal,~~ freeze seals, etc.). ~~If failure of~~ such ~~items could result and would~~ cause ~~a~~ draining event from a closed system or between the RPV and the isolation device, ~~the penetration flow path may not be excluded from the DRAIN TIME calculation~~.

, or multiple penetration flow paths susceptible to a common mode failure,

ing

temporary alterations in support of maintenance

If reasonable controls are implemented to prevent

temporary alterations from

,

Surveillance Requirement 3.0.1 requires SRs to be met between performances. Therefore, any changes in plant conditions that would change the DRAIN TIME requires that a new DRAIN TIME be determined.

the effect of the temporary alterations on DRAIN TIME need not be considered. Reasonable controls include, but are not limited to controls consistent with the guidance oin NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 4, NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management," or commitments to NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants."

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.21 (continued)

The 12 hour Frequency of these SRs was developed considering operating experience related to suppression pool water level variations and instrument drift during the applicable MODES. Furthermore, the 12 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal suppression pool water level condition.

SR 3.5.2.2, SR 3.5.2.4, and SR 3.5.2.5

The Bases provided for SR 3.5.1.1, SR 3.5.1.6, and SR 3.5.1.9 are applicable to SR 3.5.2.2, SR 3.5.2.4, and SR 3.5.2.5, respectively.

SR 3.5.2.3

an ECCS actuation

The flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the required ECCS injection/spray subsystems full of water ensures that the ECCS subsystem will perform properly. This may also prevent a water hammer following a manual ECCS initiation. One acceptable method of ensuring that the lines are full is to vent at the high points. The 31 day Frequency is based on the gradual nature of void buildup in the ECCS piping, the procedural controls governing system operation, and operating experience.

SR 3.5.2.43

Verifying the correct alignment for manual, power operated, and automatic valves in the required ECCS subsystem flow paths provides assurance that the proper flow paths will be available exist for ECCS operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an initiation signal is

(continued)

allowed to be in a nonaccident position provided the valve will automatically reposition in the proper stroke time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves. The 31 day Frequency is appropriate because the valves are operated under procedural control and the probability of their being mispositioned during this time period is low.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

~~SR 3.5.2.43 (continued)~~

~~In MODES 4 and 5, the RHR System may operate in the shutdown cooling mode to remove decay heat and sensible heat from the reactor. Therefore, RHR valves that are required for LPCI subsystem operation may be aligned for decay heat removal. Therefore, this SR is modified by a Note that allows one LPCI subsystem of the RHR System to be considered OPERABLE for the ECCS function if all the required valves in the LPCI flow path can be manually realigned (remote or local) to allow injection into the RPV, and the system is not otherwise inoperable. This will ensure adequate core cooling if an inadvertent RPV draindown should occur.~~

4

SR 3.5.2.~~5~~

aligned, and the pump

d

Verifying that the required ECCS injection/spray subsystem can be manually ~~s~~started and operate ~~for~~ at least 10 minutes demonstrates that the subsystem is available to mitigate a draining event. ~~Testing~~ the ECCS injection/spray subsystem through the test return line ~~is necessary~~ to avoid overfilling the refueling cavity. The minimum operating time of 10 minutes was based on engineering judgement. The performance frequency of 92 days is consistent with similar at-power testing required by SR 3.5.1.6.

This SR is modified by two Notes. Note 1 states that testing

may be done

Note 2 states that credit for meeting the SR may be taken for normal system operation that satisfies the SR, such as using the RHR mode of LPCI for ≥ 10 minutes.

SR 3.5.2.~~6~~

5

Verifying that each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated RPV water level isolation signal is required to prevent RPV water inventory from dropping below the TAF should an unexpected draining event occur. 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 has shown these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

6

SR 3.5.2.7

~~The required ECCS subsystem is required to have a manual start capability. The ECCS subsystem is verified to start manually from a standby configuration.~~

This Surveillance verifies that a required CS or LPCI subsystem can be manually aligned and started from the control room, including any necessary valve alignment, instrumentation, or controls, to transfer water from the suppression pool or CST to the RPV.

The 24 month Frequency is based on the need to perform the 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 has shown that these components usually pass the SR when performed at the 24 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note that excludes vessel injection/spray during the Surveillance. Since all active components are testable and full flow can be demonstrated by recirculation through the test return line, coolant injection into the RPV is not required during the Surveillance.

REFERENCES

~~1. NEDC-32484P, "Browns Ferry Nuclear Plant Units 1, 2, and 3, "SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," February 1996.~~

~~2. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.~~

1. Information Notice 84-81 "Inadvertent Reduction in Primary Coolant Inventory in Boiling Water Reactors During Shutdown and Startup," November 1984.

2. Information Notice 86-74, "Reduction of Reactor Coolant Inventory Because of Misalignment of RHR Valves," August 1986.

3. Generic Letter 92-04, "Resolution of the Issues Related to Reactor Vessel Water Level Instrumentation in BWRs Pursuant to 10 CFR 50.54(F), " August 1992.

BASES

APPLICABLE SAFETY ANALYSES (continued)

In the event of an accident during shutdown, this LCO ensures the capability of supporting systems necessary for avoiding immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite (diesel generator (DG)) power.

The AC sources satisfy Criterion 3 of the NRC Policy Statement (Ref. 1).

LCO

One offsite circuit capable of supplying the onsite Class 1E power distribution subsystem(s) of LCO 3.8.8, "Distribution Systems - Shutdown," ensures that all required loads are powered from offsite power. Two Unit 1 and 2 DGs and Unit 3 DGs required to support OPERABLE SGT and CREV Systems, each associated with a Distribution System Engineered Safety Feature (ESF) 4.16 kV shutdown board required OPERABLE by LCO 3.8.8, ensures that a diverse LCO power source is available for providing electrical power support assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and DGs ensures the availability of sufficient AC sources to operate the plant in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents ~~and reactor vessel draindown~~).

the ability to manually start

The qualified offsite circuit(s) must be capable of maintaining rated frequency and voltage while connected to their respective 4.16 kV shutdown boards, and of accepting required loads during an accident. Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit.

(continued)

BASES

LCO (continued)

Minimum required switchyard voltages are determined by evaluation of plant accident loading and the associated voltage drops between the transmission network and these loads. These minimum voltage values are provided to TVA's Transmission Operations for use in system studies to support operation of the transmission network in a manner that will maintain the necessary voltages.

Transmission Operations is required to notify BFN Operations if it is determined that the transmission network may not be able to support accident loading or shutdown operations as required by 10 CFR 50, Appendix A, GDC-17. Any offsite power circuits supplied by that transmission network cannot be credited as a qualified offsite circuit and are inoperable.

Multiple units can claim a 161 kV offsite power circuit simultaneously. However, once a load is connected to a 161 kV offsite power circuit, notes on plant drawings require disabling the automatic transfer of selected 4.16 kV unit boards and/or 4.16 kV common boards to the 161 kV circuits. With the most restrictive manual actions in place, upon a loss of the normal 500 kV offsite circuit, the diesel generators would supply the associated safety-related loads in both divisions ~~needed to mitigate the immediate consequences of an accident or analyzed operational transient~~. Therefore, the 161 kV supplied CSSTs can still be credited as a qualified alternate offsite circuit for multiple units. However, access to the 161 kV circuit will require a delayed manual transfer when operators can manually control the loads on the 4.16 kV start buses to support long term post accident or transient recovery and shutdown.

(continued)

BASES

being manually started

LCO (continued)

The required DGs must be capable of ~~starting~~, accelerating to rated speed and voltage, connecting to respective 4.16 kV shutdown boards ~~on detection of bus undervoltage~~, and accepting required loads. ~~This sequence must be accomplished within 10 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the 4.16 kV shutdown boards.~~

~~Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.~~

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 4 and 5 and during movement of irradiated fuel assemblies in the secondary containment to provide assurance that:

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

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

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

(continued)

BASES

ACTIONS (continued)

C.1

Required Action C.1 is intended to provide assurance that a loss of offsite power, during the period that a required Unit 3 DG is inoperable, does not result in a complete loss of safety function of critical systems (i.e., SGT or CREVS). These features consist of SGT or CREVS trains redundant to trains supported by the inoperable Unit 3 DG.

The 30 day completion time takes into account the operability of the redundant required features and their offsite and DG power availability. Additionally, the 30 day completion time takes into account the capacity and capability of the remaining AC sources, reasonable time for repairs, and low probability of an event occurring during this period. If the redundant required feature(s) is(are) not OPERABLE, the second completion time requires immediately declaring the required feature(s), supported by the inoperable AC source, inoperable. This results in taking the appropriate Actions in the supported system specification for the inoperable function.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.1.4,

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the Unit 1 and 2 AC sources in other than MODES 1, 2, and 3. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR. SR 3.8.1.6 and SR 3.8.1.9 are excluded because DG auto-start on an accident signal is not required in MODES 4 and 5.

, SR 3.8.1.8,

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during the performance of SRs, and to preclude deenergizing a

(continued)