Advanced Passive 1000 (AP1000)
Generic Technical Specification Traveler (GTST)

Title: Changes Related to LCO 3.5.7, In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 5

I. Technical Specifications Task Force (TSTF) Travelers, Approved Since Revision 2 of STS NUREG-1431, and Used to Develop this GTST

TSTF Number and Title:

TSTF-425, Rev. 3,	Relocate Surveillance Frequencies to Licensee Control - RITSTF Initiative 5b
TSTF-523, Rev. 2,	Generic Letter 2008-01, Managing Gas Accumulation

STS NUREGs Affected:

TSTF-425, Rev. 3:	NUREG-1430, 1431, 1432, 1433, 1434
TSTF-523, Rev. 2:	NUREG-1430, 1431, 1432, 1433, 1434

NRC Approval Date:

TSTF-425, Rev. 3:	06-Jul-09
TSTF-523, Rev. 2:	23-Dec-13

TSTF Classification:

TSTF-425, Rev. 3:	Technical Change
TSTF-523, Rev. 2:	Technical Change

II. Reference Combined License (RCOL) Standard Departures (Std. Dep.), RCOL COL Items, and RCOL Plant-Specific Technical Specifications (PTS) Changes Used to Develop this GTST

RCOL Std. Dep. Number and Title:

None

RCOL COL Item Number and Title:

None

RCOL PTS Change Number and Title:

VEGP LAR DOC A031: Required Action revision for Condition with single MODE applicability
VEGP LAR DOC A078: Borated water volume designation revision
VEGP LAR DOC A080: TS 3.5.7 Condition F revision
VEGP LAR DOC L17: Revisions to Actions and SRs associated with noncondensible gases

III. Comments on Relations Among TSTFs, RCOL Std. Dep., RCOL COL Items, and RCOL PTS Changes

This section discusses the considered changes that are: (1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.

TSTF-425 is deferred for future consideration.

TSTF-523, Rev. 1 is not applicable to the GTS. The issues of gas accumulation have been addressed by GTS Rev.19.

VEGP LAR DOC A078 revises the third entry statement for Condition D of TS 3.5.7 by changing the IRWST borated water volume from a percent range of < 100% and > 97% to a specific range of ≤ 73,100 cu. ft. and > 70,907 cu. ft.. A proposed additional change corrects “cu. ft.” to “cu ft”.

IV. Additional Changes Proposed as Part of this GTST (modifications proposed by NRC staff and/or clear editorial changes or deviations identified by preparer of GTST)

Condition D is revised to delete the periods from “cu. ft.”

In the “Actions” section of the Bases, under the heading D.1 “(Ref. 3)” is corrected to “(Ref. 1)” and a reference to the FSAR Chapter 19 PRA is added to the “References” section of the Bases.

APOG Recommended Changes to Improve the Bases

An editorial change is made to the “Actions” section of the Bases, under heading “A.1”. The change clarifies and corrects the first use of the acronym “ECCS” by using the full phrase “emergency core cooling system” and deleting “system” after “ECCS”.

An editorial change is made to the “Actions” section of the Bases, under heading “B.1”. The change corrects the first use of the acronym “DVI” by using the full phrase “direct vessel injection”.

An editorial change is made to the “Actions” section of the Bases, under heading “D.1”. The change corrects the first use of the acronym “PRA” by using the full phrase “probabilistic risk assessment” and “DBAs” by using the full phrase “design basis accidents”. The change also clarifies the assumed number of failed boron injection sources (CMTs and Accumulators).

Revise the “Actions” section of the Bases, under heading “F.1 and F.2” statement “withdrawal of reactivity control assemblies” to “withdrawal of control rods” for editorial improvement and consistency with other TS Bases discussions.

An editorial change is made to the “Surveillance Requirements” section of the Bases, under heading “SR 3.5.7.1”. The change clarifies “(SR 3.5.6.1 through 3.5.6.11)” to “(SR 3.5.6.1 through SR 3.5.6.11)”.

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.5.7, In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 5

Changes to the Generic Technical Specifications and Bases:

Condition B of TS 3.5.7 is revised from “Required IRWST injection line inoperable due to presence of noncondensible gases in one high point vent.” to “Required IRWST injection flow path with noncondensible gas volume in one squib valve outlet line pipe stub not within limit.” The Required Action B.1 is revised from “Vent noncondensible gases.” to “Restore noncondensible gas volume in squib valve outlet line pipe stub to within limit.” The associated “Actions” section of the Bases is also revised. (DOC L17)

Condition C of TS 3.5.7 is revised from “Required IRWST injection line inoperable due to presence of noncondensible gases in both high point vents.” to “Required IRWST injection flow path with noncondensible gas volume in both squib valve outlet line pipe stubs not within limit.” The Required Action C.1 is revised from “Vent noncondensible gases from one high point vent.” to “Restore noncondensible gas volume in one squib valve outlet line pipe stub to within limit.” The associated “Actions” section of the Bases is also revised. (DOC L17)

The third entry statement for Condition D of TS 3.5.7 is revised by replacing the IRWST borated water volume specified as a percent with cubic feet. (DOC A078)

Condition D of TS 3.5.7 is revised to correct “cu. ft.” to “cu ft”. (NRC staff proposed change)

The first entry statement for Condition F of TS 3.5.7 is revised by specifying the applicable Conditions. The associated “Actions” section of the Bases is also revised. (DOC A080)

Required Action F.1 of TS 3.5.7 is revised by deleting the requirement to be in MODE 5. (DOC A031)

The “LCO” section of the Bases of TS 3.5.7 is revised by adding discussion of noncondensible gas accumulation in the injection line high point. (DOC L17)

The SRs of TS 3.5.6 referenced in the “Surveillance Requirements” section of the Bases for TS 3.5.7 are revised. (DOC L01)

In the “Actions” section of the Bases, under the heading D.1 “(Ref. 3)” is corrected to “(Ref. 1)” and a reference to the FSAR Chapter 19 PRA is added to the “References” section of the Bases. (NRC staff proposed change)

In the “Actions” section of the Bases, under heading “A.1” the last sentence is revised by changing “ECCS system” to “emergency core cooling system (ECCS)”. (APOG Comment)

In the “Actions” section of the Bases, under heading “B.1” use of the acronym “DVI” is changed to “direct vessel injection (DVI)”. (APOG Comment)

In the “Actions” section of the Bases, under heading “D.1” the fourth sentence is revised by changing “PRA” to “probabilistic risk assessment (PRA)” and clarifying the assumed number of

failed boron injection sources (CMTs and Accumulators). Under heading “D.1” the last sentence is revised by changing “DBAs” to “design basis accidents (DBAs)”. (APOG Comment)

In the “Actions” section of the Bases, under heading “F.1 and F.2” the last sentence is revised from “withdrawal of reactivity control assemblies” to “withdrawal of control rods”. (APOG Comment)

In the “Surveillance Requirements” section of the Bases, under heading “SR 3.5.7.1” the fourth sentence is revised from “...(SR 3.5.6.1 through 3.5.6.11)...” to “...(SR 3.5.6.1 through SR 3.5.6.11)...” (APOG Comment)

VI. Traveler Information

Description of TSTF changes:

None

Rationale for TSTF changes:

None

Description of changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes:

VEGP LAR DOC A031 revises Required Action F.1 of TS 3.5.7 from “Initiate action to be in MODE 5 with the Reactor Coolant System (RCS) pressure boundary intact and ≥ 20% pressurizer level.” to “Initiate action to establish ≥ 20% pressurizer level with the Reactor Coolant System (RCS) pressure boundary intact.”

VEGP LAR DOC A078 revises the third entry statement for Condition D of TS 3.5.7 by changing the IRWST borated water volume from a percent range of < 100% and > 97% to a specific range of ≤ 73,100 cu. ft. and > 70,907 cu. ft.

VEGP LAR DOC A080 revises Condition F of TS 3.5.7 by specifying the Conditions that are applicable to the first entry statement.

VEGP LAR DOC L17 revises Condition B of TS 3.5.7 from “Required IRWST injection line inoperable due to presence of noncondensible gases in one high point vent.” to “Required IRWST injection flow path with noncondensible gas volume in one squib valve outlet line pipe stub not within limit.” The Required Action B.1 is revised from “Vent noncondensible gases.” to “Restore noncondensible gas volume in squib valve outlet line pipe stub to within limit.” Condition C of TS 3.5.7 is revised from “Required IRWST injection line inoperable due to presence of noncondensible gases in both high point vents.” to “Required IRWST injection flow path with noncondensible gas volume in both squib valve outlet line pipe stubs not within limit.” The Required Action C.1 is revised from “Vent noncondensible gases from one high point vent.” to “Restore noncondensible gas volume in one squib valve outlet line pipe stub to within limit.” The associated “Actions” section of the Bases is also revised.

Rationale for changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes:

VEGP LAR DOC A031 changes to Required Action F.1 of TS 3.5.7 enhance TS clarity by deleting the reference to MODE 5 from the Required Action. TS 3.5.7 is applicable only in MODE 5 and is not necessary to refer to that mode in the associated Required Actions.

VEGP LAR DOC A078 changes to the third entry statement for Condition D of TS 3.5.7 provides clarity by changing the IRWST borated water volume in units of cubic feet. Changing the volume unit of measure to cubic feet aligns with the applicable SR in TS 3.5.6, which is SR 3.5.6.2. SR 3.5.7.1 refers to applicable SRs of TS 3.5.6.

VEGP LAR DOC A080 changes to the first entry statement for Condition F of TS 3.5.7 provide clarification by specifying the applicable Conditions.

VEGP LAR DOC L17 changes TS 3.5.7 Condition B and C entry statements and “LCO” section of the Bases for consistency with “LCO” section of the Bases of TS 3.5.6. The changes to TS 3.5.7 Required Action B.1 and C.1 are for consistency with changes made to the associated Conditions.

Description of additional changes proposed by NRC staff/preparer of GTST:

Condition D of TS 3.5.7 is revised to correct “cu. ft.” to “cu ft”.

In the “Actions” section of the Bases, under the heading D.1 “(Ref. 3)” is corrected to “(Ref. 1)” and a reference to the FSAR Chapter 19 PRA is added to the “References” section of the Bases.

The phrase “ECCS system” is clarified and corrected to “emergency core cooling system (ECCS)” in the “Actions” section of the Bases, under heading “A.1”. (APOG Comment)

The first use of acronym “DVI” is corrected to “direct vessel injection (DVI)” in the “Actions” section of the Bases, under heading “B.1”. (APOG Comment)

The acronym “PRA” is corrected to include the phrase “probabilistic risk assessment” before “(PRA)” and “DBAs” is corrected to include the phrase “design basis accidents” before “(DBAs)” in the “Actions” section of the Bases, under heading “D.1”. In addition, the assumed number of failed boron injection sources (CMTs and Accumulators) is clarified in the “Actions” section of the Bases, under heading “D.1”. (APOG Comment)

In the “Actions” section of the Bases, under heading “F.1 and F.2” the last sentence is revised from “withdrawal of reactivity control assemblies” to “withdrawal of control rods”. (APOG Comment)

In the “Surveillance Requirements” section of the Bases, under heading “SR 3.5.7.1” the fourth sentence is revised from “...(SR 3.5.6.1 through 3.5.6.11)...” to “...(SR 3.5.6.1 through SR 3.5.6.11)...” (APOG Comment)

Rationale for additional changes proposed by NRC staff/preparer of GTST:

Changing “cu. ft.” to “cu ft” is an editorial correction. The change is in accordance with section 3.3.4.d of writer's guide TST-GG-05-01.

Correcting “(Ref. 3)” to “(Ref. 1)” under the heading D.1 and adding the appropriate reference to the “References” section of the Bases are editorial changes.

The change from “ECCS system” to “emergency core cooling system (ECCS)” is an editorial clarification and the correction is in conformance with TSTF-GG-05-01, section 3.2.2.a.

The change from “DVI” to “direct vessel injection (DVI)” is an editorial correction in conformance with TSTF-GG-05-01, section 3.2.2.a.

The change from “PRA” to “probabilistic risk assessment (PRA)” and “DBAs” to “design basis accidents (DBAs)’ are editorial correction in conformance with TSTF-GG-05-01, section 3.2.2.a and the change to the discussion of the assumed number of failed boron injection sources (CMTs and Accumulators) is an editorial clarification.

The change from “reactivity control assemblies” to “control rods” in the “Actions” section of the Bases is for editorial improvement and consistency with other TS Bases discussions.

The change from “...(SR 3.5.6.1 through 3.5.6.11)...” to “...(SR 3.5.6.1 through SR 3.5.6.11)...” in the “Surveillance Requirements” section of the Bases is for editorial clarity.

VII. GTST Safety Evaluation

Technical Analysis:

VEGP LAR DOC L17: As stated in the associated Bases for the GTS 3.5.7 Actions, the presence of some noncondensible gases does not mean that the CMT is immediately inoperable, but that gases are collecting and should be vented. GTS 3.5.7, Condition B and C are revised for consistency.

GTS 3.5.7, Required Action B.1 and C.1 are revised to replace a specific method of restoration with a more general action to restore the parameter, in this case noncondensible gas volume, to within its limit. This change is made for consistency with the revised entry conditions associated with the Required Action. Only the specific method is deleted from the action. The associated Bases, both GTS and revised, describe an appropriate method for restoration. The revised Action continues to provide assurance that operation with a noncondensible gas volume that can affect the associated flow path is allowed for only a limited period of time. These changes are designated as less restrictive because the specific method of restoration is deleted and replaced with a more general requirement to restore within the limit.

Other Changes: The remaining changes are editorial, clarifying, grammatical, or otherwise considered administrative. These changes do not affect the technical content, but improve the readability, implementation, and understanding of the requirements, and are therefore acceptable.

Having found that this GTST's proposed changes to the GTS and Bases are acceptable, the NRC staff concludes that AP1000 STS Subsection 3.5.7 is an acceptable model Specification for the AP1000 standard reactor design.

References to Previous NRC Safety Evaluation Reports (SERs):

None

VIII. Review Information

Evaluator Comments:

None

Steve Short
Pacific Northwest National Laboratory
509-375-2868
steve.short@pnnl.gov

Review Information:

Availability for public review and comment on Revision 0 of this traveler approved by NRC staff on 5/23/2014.

APOG Comments (Ref. 7) and Resolutions:

1. (Internal #2) Approved TSTF-523 is not dispositioned in the material provided to support the GTSTs. Include TSTF-523 in the reference disposition tables, as "TSTF deferred for future consideration." This is resolved by dispositioningTSTF-523, Rev. 1 as not applicable to the GTS and stating that the concerns of the TSTF have been addressed by GTS Rev.19.

2. (Internal #6) The GTST sections often repeat VEGP LAR DOCs, which reference "existing" and "current" requirements. The inclusion in the GTST of references to "existing" and "current," are not always valid in the context of the GTS. Each occurrence of "existing" and "current" should be revised to be clear and specific to GTS, MTS, or VEGP COL TS (or other), as appropriate. This is resolved by making the APOG recommended changes to the GTST.

3. (Internal #13) The NRC approval of TSTF-425, and model safety evaluation provided in the CLIIP for TSTF-425, are generically applicable to any design's Technical Specifications. As such, the replacement of certain Frequencies with a Surveillance Frequency Control Program should be included in the GTST for AP1000 STS NUREG.

   However, implementation in the AP1000 STS should not reflect optional (i.e., bracketed) material showing retention of fixed Surveillance Frequencies where relocation to a Surveillance Frequency Control Program is acceptable. Since each represented AP1000 Utility is committed to maintaining standardization, there is no rationale for an AP1000 STS that includes bracketed options.

   Consistent with TSTF-425 criteria, replace applicable Surveillance Frequencies with "In accordance with the Surveillance Frequency control Program" and add that Program as new AP1000 STS Specification 5.5.15.

   NRC Staff disagreed with implementing TSTF-425 in the initial version of the STS. Although the APOG thinks the analysis supporting this traveler is general enough to be applicable to AP1000, staff thinks an AP1000-specific proposal from APOG is needed to identify any GTS SRs that should be excluded. Also, with the adoption of a Surveillance Frequency Control Program (SFCP) in the AP1000 STS, bracketed Frequencies, which

provide a choice between the GTS Frequency and the SFCP Frequency, are needed because the NRC will use the AP1000 STS as a reference, and to be consistent with NUREG-1431, Rev. 4. APOG was requested to consider proposing an AP1000 version of TSTF-425 for a subsequent revision of the STS.

4. (Internal #320 and #323) The inserted text in Condition C should refer to plural "stubs": i.e., "…volume in both squib valve outlet line pipe stubs not within limit," instead of "…volume in both squib valve outlet line pipe stub not within limit". Make "stub" plural in Condition C text. This is resolved by making the APOG recommended correction. This corrects the text to match VEGP LAR DOC L17 changes.

5. (Internal #321 and #324)Text inserted in third entry condition of Condition D states "…≤ 73,100 cu. ft. > 70,907 cu. ft." The statement is missing "and". Revise third entry condition to state "IRWST borated water volume ≤ 73,100 cu. ft. and > 70,907 cu. ft." This is resolved by making the APOG recommended correction. This corrects the text to match VEGP LAR DOC A078 changes. In addition, the SPSB suggest correcting "cu. ft." to "cu ft". Correcting "cu. ft." to "cu ft" is also related to APOG comment #295.

6. (Internal #322) Condition B, 4th line: Need a space between "gas" and "volume" Condition C, 4th line: Need a space between "gas" and "volume". Add a space between "gas" and "volume". This is resolved by making the APOG recommended correction. This corrects the add text to match VEGP LAR DOC A17 changes.

7. (Internal #325) APOG recommends making the editorial changes in the "Actions" section of the Bases, under heading "A.1". These non-technical changes provide improved clarity, consistency, and operator usability. This is resolved by making the suggested changes and adding a comma after "(ECCS)" as follows:

   "The 72 hour Completion Time is consistent with times normally applied to **a** degraded two train **emergency core cooling system (**ECCS**),** ~~systems~~ which can provide 100% of the required flow without a single failure."

8. (Internal #326) APOG recommends making the editorial changes in the "Actions" section of the Bases, under heading "B.1". These non-technical changes provide improved clarity, consistency, and operator usability. This is resolved by making the suggested changes as follows:

   "A **direct vessel injection (**DVI**)** line break is not postulated in MODE 5."

9. (Internal #327) Editorial change is recommended to the "Actions" section of the Bases, under heading "D.1". These non-technical changes provide improved clarity, consistency, and operator usability. This is resolved by making the suggested changes and additional changes to the assumed multiple failures of the boron injection sources statement as follows:

   "…This limit prevents a significant change in boron concentration and is consistent with the long-term cooling analysis performed to justify **probabilistic risk assessment (**PRA**)** success criteria (Ref. 3), which assumed multiple failures with as many as **three of the four boron injection sources (two CMTs and two Accumulators)**~~3 CMTs/Accum~~ not injecting.…The 8-hour Completion Time is acceptable, considering that the IRWST will be fully capable of performing its assumed safety function in response to **design basis accidents (**DBAs**)** with slight deviations in these parameters."

10. (Internal #328) Revise various TS Bases stating “withdrawal of reactivity control assemblies” to “withdrawal of control rods” for editorial improvement and consistency with other TS Bases discussions. This is resolved by making the suggested changes in the “Actions” section of the Bases, under heading “F.1 and F.2” as follows:

    “Sources of positive reactivity addition include boron dilution, withdrawal of ~~reactivity~~ control ~~assemblies~~**rods**, and excessive cooling of the RCS.”

11. (Internal #329) Editorial change for clarity is made for consistency with the TS requirement(s) being discussed in the TS Bases. This is resolved by making the suggested change in the “Surveillance Requirements” section of the Bases, under heading “SR 3.5.7.1” as follows:

    “The LCO 3.5.6 Surveillance Requirements and Frequencies (SR 3.5.6.1 through **SR** 3.5.6.11) are applicable …”

NRC Final Approval Date: 12/15/2015

NRC Contact:

Derek Scully
United States Nuclear Regulatory Commission
301-415-6972
Derek.Scully@nrc.gov

IX. Evaluator Comments for Consideration in Finalizing Technical Specifications and Bases

None

X. References Used in GTST

1. AP1000 DCD, Revision 19, Section 16, “Technical Specifications,” June 2011 (ML11171A500).

2. Southern Nuclear Operating Company, Vogtle Electric Generating Plant, Units 3 and 4, Technical Specifications Upgrade License Amendment Request, February 24, 2011 (ML12065A057).

3. TSTF-GG-05-01, “Writer's Guide for Plant-Specific Improved Technical Specifications,” June 2005 (ML070660229).

4. Southern Nuclear Operating Company, Vogtle Electric Generating Plant, Units 3 and 4, Response to Request for Additional Information Letter No. 01 Related to License Amendment Request LAR-12-002, ND-12-2015, October 04, 2012 (ML12286A363 and ML12286A360).

5. NRC Safety Evaluation (SE) for Amendment No. 13 to Combined License (COL) No. NPF-91 for Vogtle Electric Generating Plant (VEGP) Unit 3, and Amendment No. 13 to COL No. NPF-92 for VEGP Unit 4, September 9, 2013, ADAMS Package Accession No. ML13238A337, which contains:

ML13238A355	Cover Letter - Issuance of License Amendment No. 13 for Vogtle Units 3 and 4 (LAR 12-002).
ML13238A359	Enclosure 1 - Amendment No. 13 to COL No. NPF-91
ML13239A256	Enclosure 2 - Amendment No. 13 to COL No. NPF-92
ML13239A284	Enclosure 3 - Revised plant-specific TS pages (Attachment to Amendment No. 13)
ML13239A287	Enclosure 4 - Safety Evaluation (SE), and Attachment 1 - Acronyms
ML13239A288	SE Attachment 2 - Table A - Administrative Changes
ML13239A319	SE Attachment 3 - Table M - More Restrictive Changes
ML13239A333	SE Attachment 4 - Table R - Relocated Specifications
ML13239A331	SE Attachment 5 - Table D - Detail Removed Changes
ML13239A316	SE Attachment 6 - Table L - Less Restrictive Changes

The following documents were subsequently issued to correct an administrative error in Enclosure 3:

ML13277A616	Letter - Correction To The Attachment (Replacement Pages) - Vogtle Electric Generating Plant Units 3 and 4-Issuance of Amendment Re: Technical Specifications Upgrade (LAR 12-002) (TAC No. RP9402)
ML13277A637	Enclosure 3 - Revised plant-specific TS pages (Attachment to Amendment No. 13) (corrected)

6. RAI Letter No. 01 Related to License Amendment Request (LAR) 12-002 for the Vogtle Electric Generating Plant Units 3 and 4 Combined Licenses, September 7, 2012 (ML12251A355).

7. APOG-2014-008, APOG (AP1000 Utilities) Comments on AP1000 Standardized Technical Specifications (STS) Generic Technical Specification Travelers (GTSTs), Docket ID NRC-2014-0147, September 22, 2014 (ML 14265A493).

XI. MARKUP of the Applicable GTS Subsection for Preparation of the STS NUREG

The entire section of the Specifications and the Bases associated with this GTST is presented next.

Changes to the Specifications and Bases are denoted as follows: Deleted portions are marked in strikethrough red font, and inserted portions in bold blue font.

3.5 PASSIVE CORE COOLING SYSTEM (PXS)

3.5.7 In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 5

LCO 3.5.7 The IRWST, with one injection flow path and one containment recirculation flow path, shall be OPERABLE.

APPLICABILITY: MODE 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required motor operated containment recirculation isolation valve not fully open.	A.1 Open required motor operated containment recirculation isolation valve.	72 hours
B. Required IRWST injection **flow path with**~~line inoperable due to presence of~~ noncondensible gas~~es in one high point vent~~ **volume in one squib valve outlet line pipe stub not within limit**.	B.1 **Restore noncondensible gas volume in squib valve outlet line pipe stub to within limit**~~Vent noncondensible gases~~.	72 hours
C. Required IRWST injection **flow path with**~~line inoperable due to presence of~~ noncondensible gas~~es in both high point ventsvent~~ **volume in both squib valve outlet line pipe stubs not within limit**.	C.1 **Restore noncondensible gas volume in one squib valve outlet line pipe stub to within limit**~~Vent noncondensible gases from one high point vent~~.	8 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. IRWST boron concentration not within limits. OR IRWST borated water temperature not within limits. OR IRWST borated water volume **≤ 73,100 cu~~.~~ ft~~.~~ and > 70,907 cu~~.~~ ft~~.~~** ~~< 100% and > 97% of limit~~.	D.1 Restore IRWST to OPERABLE status.	8 hours
E. Required motor operated IRWST isolation valve not fully open. OR Power is not removed from required motor operated IRWST isolation valve.	E.1 Restore required motor operated IRWST isolation valve to fully open condition with power removed.	1 hour

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and associated Completion Time **of Condition A, B, C, D, or E** not met. OR LCO not met for reasons other than Condition A, B, C, D, or E.	F.1 Initiate action to **establish ≥ 20% pressurizer level with the**~~be in MODE 5 with the~~ Reactor Coolant System (RCS) pressure boundary intact~~ and ≥ 20% pressurizer level~~. AND F.2 Suspend positive reactivity additions.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.7.1	For the IRWST and flow paths required to be OPERABLE, the SRs of Specification 3.5.6, “In-containment Refueling Water Storage Tank (IRWST) – Operating,” are applicable.	In accordance with applicable SRs

B 3.5 PASSIVE CORE COOLING SYSTEM (PXS)

B 3.5.7 In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 5

BASES

BACKGROUND

A description of the IRWST is provided in LCO 3.5.6, “In-containment Refueling Water Storage Tank – Operating.”

APPLICABLE SAFETY ANALYSES

For postulated shutdown events in MODE 5 with the Reactor Coolant System (RCS) pressure boundary intact, the primary protection is Passive Residual Heat Removal (PRHR), where the IRWST serves as the initial heat sink for the PRHR heat exchanger (PRHR HX). For events in MODE 5 with the RCS pressure boundary open, PRHR is not available and RCS heat removal is provided by IRWST injection and containment sump recirculation.

IRWST injection could be required to mitigate some events by providing RCS inventory makeup.

No loss of coolant accidents (LOCAs) are postulated during plant operation in MODE 5; therefore, the rupture of the direct vessel injection line (DVI) is not assumed. Since the DVI rupture is not assumed, only one train of IRWST injection and recirculation flow paths is required to mitigation postulated events, assuming a single failure.

The IRWST satisfies Criteria 2 and 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The IRWST requirements ensure that an adequate supply of borated water is available to act as a heat sink for PRHR and to supply the required volume of borated water as safety injection for core cooling and reactivity control.

To be considered OPERABLE, the IRWST must meet the water volume, boron concentration, and temperature limits defined in the Surveillance Requirements, and one path of injection and recirculation must be OPERABLE (the motor operated injection isolation valve must be open with power removed, and the motor operated sump recirculation isolation valves must be open). **OPERABILITY is not expected to be challenged due to small gas accumulations in the high point, and rapid gas accumulations are not expected during plant operation. However, a relatively small gas volume was incorporated into the design for alerting operators to provide sufficient time to initiate**

BASES

LCO (continued)

venting operations before the gas volume would be expected to increase to a sufficient volume that might potentially challenge the OPERABILITY of passive safety injection flow. Noncondensible gas accumulation in the injection line high point that causes the water level to drop below the sensor will require operator action to investigate the cause of the gas accumulation and to vent the associated high point(s). ~~The absence of noncondensible gases in the high point vents is necessary for system OPERABILITY.~~

APPLICABILITY

In MODE 5 with the RCS pressure boundary intact or with the RCS open with pressurizer level ≥ 20%, the IRWST is an RCS injection source of borated water for core cooling and reactivity control. Additionally, in MODE 5 with the RCS pressure boundary intact, the IRWST provides the heat sink for PRHR.

The requirements for the IRWST in MODES 1, 2, 3, and 4 are specified in LCO 3.5.6, In-containment Refueling Water Storage Tank (IRWST) - Operating. The requirements for the IRWST in MODE 6 are specified in LCO 3.5.8, In-containment Refueling Water Storage Tank (IRWST) - Shutdown, MODE 6.

ACTIONS

A.1

If a motor operated containment sump isolation valve in the required sump recirculation flow path is not fully open, the valve must be fully opened within 72 hours. The 72 hour Completion Time is consistent with times normally applied to **a** degraded two train **emergency core cooling system (**ECCS**),** ~~systems~~ which can provide 100% of the required flow without a single failure.

B.1

Excessive amounts of noncondensible gases in one of the **injection flow path squib valve outlet line pipe stubs**~~high point vents~~ in the required IRWST injection line may interfere with the passive injection of IRWST water into the reactor vessel from the associated parallel flow path in the affected injection line. Analyses have shown that with enough noncondensible gas accumulation, IRWST injection through the affected flow path could be delayed. However, the presence of some noncondensible gases does not mean that the IRWST injection capability

ACTIONS (continued)

is immediately inoperable, but that gases are collecting and should be vented. Venting of these gases requires containment entry to manually operate the vent valves. In this Condition the parallel flow path in the affected injection line is capable of providing 100% of the required injection. A **direct vessel injection (**DVI**)** line break is not postulated in MODE 5. A Completion Time of 72 hours is acceptable**,** since the IRWST is capable of performing the safety function without a single failure of the remaining parallel isolation valve. In addition, the 72-hour Completion Time is consistent with the time normally applicable to one inoperable train in a two train ECCS system.

C.1

Excessive amounts of noncondensible gases in both of the **injection flow path squib valve outlet line pipe stubs**~~high point vents~~ in the required IRWST injection line may interfere with the passive injection of IRWST water into the reactor vessel from the affected injection line. Analyses have shown that with enough noncondensible gas accumulation, IRWST injection could be delayed long enough to cause core uncover. However, the presence of some noncondensible gases does not mean that the IRWST injection capability is immediately inoperable, but that gases are collecting and should be vented. Venting of these gases requires containment entry to manually operate the vent valves. Considering the slow rate of gas accumulation, venting within 8 hours should normally prevent accumulation of amounts of noncondensible gases that could interfere with IRWST injection. A Completion Time of 8 hours is permitted for venting noncondensible gases and is acceptable**,** since the injection capability is not significantly affected. If only one of the affected **injection flow path squib valve outlet line pipe stub**~~high point vents~~ is vented, then Condition B will apply to the remaining high point vent with noncondensible gas accumulation.

D.1

If the IRWST water volume, boron concentration, or temperature are not within limits, the core cooling capability from injection or PRHR heat transfer and the reactivity benefit of injection assumed in safety analyses may not be available. Due to the large volume of the IRWST, online monitoring of volume and temperature, and frequent surveillances, the deviation of these parameters is expected to be minor. The allowable deviation of the water volume is limited to 3%. This limit prevents a

ACTIONS (continued)

significant change in boron concentration and is consistent with the long-term cooling analysis performed to justify **probabilistic risk assessment (**PRA**)** success criteria (Ref. ~~3~~**1**), which assumed multiple failures with as many as **three of the four boron injection sources (two CMTs and two Accumulators)**~~3 CMTs/Accum~~ not injecting. This analysis shows that there is significant margin with respect to the water supplies that support containment recirculation operation. The 8-hour Completion Time is acceptable, considering that the IRWST will be fully capable of performing its assumed safety function in response to **design basis accidents (**DBAs**)** with slight deviations in these parameters.

E.1

If the required motor operated IRWST isolation valve is not fully open or valve power is not removed, injection flow from the IRWST may be less than assumed in the safety analysis. In this situation, the valve must be restored to fully open with valve power removed in 1 hour. This Completion Time is acceptable based on risk considerations.

F.1 and F.2

If the IRWST cannot be returned to OPERABLE status within the associated Completion Times **of Condition A, B, C, D, or E,** or the LCO is not met for reasons other than Conditions A, B, C, D, or E, the plant must be placed in a condition in which the probability and consequences of an event are minimized to the extent possible. This is done by immediately initiating action to place the plant in MODE 5 with the RCS intact with ≥ 20% pressurizer level. The time to RCS boiling is maximized by maintaining RCS inventory at ≥ 20% pressurizer level and maintaining RCS temperature as low as practical. With the RCS intact, the availability of the PRHR HX is maintained. Additionally, action to suspend positive reactivity additions is required to ensure that the SDM is maintained. Sources of positive reactivity addition include boron dilution, withdrawal of ~~reactivity~~ control ~~assemblies~~**rods**, and excessive cooling of the RCS.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.7.1

The LCO 3.5.6 Surveillance Requirements and Frequencies (SR 3.5.6.1 through **SR** 3.5.6.**11**~~10~~) are applicable to the IRWST and the flow paths required to be OPERABLE. Refer to the corresponding Bases for LCO 3.5.6 for a discussion of each SR.

REFERENCES ~~None.~~**1. FSAR Chapter 19, "Probabilistic Risk Assessment."**

XII. Applicable STS Subsection After Incorporation of this GTST's Modifications

The entire subsection of the Specifications and the Bases associated with this GTST, following incorporation of the modifications, is presented next.

3.5 PASSIVE CORE COOLING SYSTEM (PXS)

3.5.7 In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 5

LCO 3.5.7 The IRWST, with one injection flow path and one containment recirculation flow path, shall be OPERABLE.

APPLICABILITY: MODE 5.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required motor operated containment recirculation isolation valve not fully open.	A.1 Open required motor operated containment recirculation isolation valve.	72 hours
B. Required IRWST injection flow path with noncondensible gas volume in one squib valve outlet line pipe stub not within limit.	B.1 Restore noncondensible gas volume in squib valve outlet line pipe stub to within limit.	72 hours
C. Required IRWST injection flow path with noncondensible gas volume in both squib valve outlet line pipe stubs not within limit.	C.1 Restore noncondensible gas volume in one squib valve outlet line pipe stub to within limit.	8 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. IRWST boron concentration not within limits. OR IRWST borated water temperature not within limits. OR IRWST borated water volume ≤ 73,100 cu ft and > 70,907 cu ft.	D.1 Restore IRWST to OPERABLE status.	8 hours
E. Required motor operated IRWST isolation valve not fully open. OR Power is not removed from required motor operated IRWST isolation valve.	E.1 Restore required motor operated IRWST isolation valve to fully open condition with power removed.	1 hour
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met. OR LCO not met for reasons other than Condition A, B, C, D, or E.	F.1 Initiate action to establish ≥ 20% pressurizer level with the Reactor Coolant System (RCS) pressure boundary intact. AND F.2 Suspend positive reactivity additions.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.7.1	For the IRWST and flow paths required to be OPERABLE, the SRs of Specification 3.5.6, “In-containment Refueling Water Storage Tank (IRWST) – Operating,” are applicable.	In accordance with applicable SRs

B 3.5 PASSIVE CORE COOLING SYSTEM (PXS)

B 3.5.7 In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 5

BASES

BACKGROUND

A description of the IRWST is provided in LCO 3.5.6, “In-containment Refueling Water Storage Tank – Operating.”

APPLICABLE SAFETY ANALYSES

For postulated shutdown events in MODE 5 with the Reactor Coolant System (RCS) pressure boundary intact, the primary protection is Passive Residual Heat Removal (PRHR), where the IRWST serves as the initial heat sink for the PRHR heat exchanger (PRHR HX). For events in MODE 5 with the RCS pressure boundary open, PRHR is not available and RCS heat removal is provided by IRWST injection and containment sump recirculation.

IRWST injection could be required to mitigate some events by providing RCS inventory makeup.

No loss of coolant accidents (LOCAs) are postulated during plant operation in MODE 5; therefore, the rupture of the direct vessel injection line (DVI) is not assumed. Since the DVI rupture is not assumed, only one train of IRWST injection and recirculation flow paths is required to mitigation postulated events, assuming a single failure.

The IRWST satisfies Criteria 2 and 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The IRWST requirements ensure that an adequate supply of borated water is available to act as a heat sink for PRHR and to supply the required volume of borated water as safety injection for core cooling and reactivity control.

To be considered OPERABLE, the IRWST must meet the water volume, boron concentration, and temperature limits defined in the Surveillance Requirements, and one path of injection and recirculation must be OPERABLE (the motor operated injection isolation valve must be open with power removed, and the motor operated sump recirculation isolation valves must be open). OPERABILITY is not expected to be challenged due to small gas accumulations in the high point, and rapid gas accumulations are not expected during plant operation. However, a relatively small gas volume was incorporated into the design for alerting operators to provide sufficient time to initiate venting operations before

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LCO (continued)

the gas volume would be expected to increase to a sufficient volume that might potentially challenge the OPERABILITY of passive safety injection flow. Noncondensible gas accumulation in the injection line high point that causes the water level to drop below the sensor will require operator action to investigate the cause of the gas accumulation and to vent the associated high point(s).

APPLICABILITY

In MODE 5 with the RCS pressure boundary intact or with the RCS open with pressurizer level ≥ 20%, the IRWST is an RCS injection source of borated water for core cooling and reactivity control. Additionally, in MODE 5 with the RCS pressure boundary intact, the IRWST provides the heat sink for PRHR.

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ACTIONS (continued)

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ACTIONS (continued)

failures with as many as three of the four boron injection sources (two CMTs and two Accumulators) not injecting. This analysis shows that there is significant margin with respect to the water supplies that support containment recirculation operation. The 8-hour Completion Time is acceptable, considering that the IRWST will be fully capable of performing its assumed safety function in response to design basis accidents (DBAs) with slight deviations in these parameters.

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BASES

REFERENCES

1. FSAR Chapter 19, “Probabilistic Risk Assessment.”