

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

Title: Changes Related to LCO 3.5.8, In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 6

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 A079: IRWST SR Frequency revision
VEGP LAR DOC A081: TS 3.5.8 Condition F revision
VEGP LAR DOC L01: Added SR for valve actuation
VEGP LAR DOC L17: Revisions to Actions and SRs associated with noncondensable 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(1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.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 3.5.8 by changing the IRWST borated water volume from a percent range of < 100% and > 97% to a specific range of $\leq 73,100$ 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)

The Bases for Required Action B.1 and C.1 of TS 3.5.8 is revised for consistency with VEGP LAR DOC L17 changes to Required Action B.1 and C.1 of TS 3.5.8.

The Bases for SR 3.5.8.2 is revised by correcting the word “intitial” to “initial”.

Condition D and SR 3.5.8.2 are revised to delete the periods from “cu. ft.”

Condition D statement is revised by removing the hyphen from “concentra-tion”.

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.

In the “Surveillance Requirements” section of the Bases, under heading “SR 3.5.8.3”, change “...solution volume increase \geq 15,000 gal.” to “...combined volume increase \geq 15,000 gal.” In addition, change the SR 3.5.8.3 “Frequency” from “...solution volume increase \geq 15,000 gal” to “...combined volume increase \geq 15,000 gal”.

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.5.8, In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 6

Changes to the Generic Technical Specifications and Bases:

Condition B of TS 3.5.8 is revised from “Required IRWST injection line inoperable due to presence of noncondensable gases in one high point vent.” to “Required IRWST injection flow path with noncondensable gas volume in one squib valve outlet line pipe stub not within limit.” The Required Action B.1 is revised from “Vent noncondensable gases.” to “Restore noncondensable gas volume in squib valve outlet line pipe stub to within limit.” (DOC L17)

Condition C of TS 3.5.8 is revised from “Required IRWST injection line inoperable due to presence of noncondensable gases in both high point vents.” to “Required IRWST injection flow path with noncondensable gas volume in both squib valve outlet line pipe stubs not within limit.” The Required Action C.1 is revised from “Vent noncondensable gases from one high point vent.” to “Restore noncondensable gas volume in one squib valve outlet line pipe stub to within limit.” (DOC L17)

The first entry statement for Condition D of TS 3.5.8 is revised by deleting the hyphen from “Concentra-tion”. (NRC staff proposed change)

The third entry statement for Condition D of TS 3.5.8 is revised by replacing the IRWST borated water volume specified as a percent with cubic feet. (DOC A078)

Condition D and SR 3.5.8.2 of TS 3.5.8 is revised to correct “cu. ft.” to “cu ft”. (NRC staff proposed change)

The first entry statement for Condition F of TS 3.5.8 is revised by specifying the applicable Conditions. The associated “Actions” section of the Bases is also revised. (DOC A081)

Required Action F.1 of TS 3.5.8 is revised by deleting the requirement to be in MODE 6. (DOC A031)

SR 3.5.8.3 second Frequency is revised by changing the “...solution volume increase of 15,000 gal” to “...solution volume increase of \geq 15,000 gal”. The associated Bases for SR 3.5.8.3 is also revised. (DOC A079)

SR 3.5.8.4 is revised to address the new SR 3.5.6.9 by adding the renumbered SR 3.5.6.11. The associated Bases for SR 3.5.4.8 is also revised. (DOC L01)

The “LCO” section of the Bases of TS 3.5.8 is revised by adding discussion of noncondensable gas accumulation in the injection line high point. (DOC L17)

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)

The Bases for Required Action B.1 and C.1 of TS 3.5.8 is revised by changing “high point vents” to “injection flow path squib valve outlet line pipe stubs”. (NRC staff proposed change)

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 “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”, second paragraph, fourth sentence is revised from “withdrawal of reactivity control assemblies” to “withdrawal of control rods”. (APOG Comment)

The Bases for SR 3.5.8.2 is revised by correcting “intitial” to “initial”. (NRC staff proposed change)

The “Surveillance Requirements” section of the Bases, under heading “SR 3.5.8.3”, is revised from “...solution volume increase \geq 15,000 gal.” to “...combined volume increase \geq 15,000 gal.” In addition, SR 3.5.8.3 “Frequency” is revised from “...solution volume increase \geq 15,000 gal” to “...combined volume increase \geq 15,000 gal”. (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 3.5.8 from "Initiate action to be in MODE 6 with the water level \geq 23 feet above the top of the reactor vessel flange." to "Initiate action to establish water level \geq 23 feet above the top of the reactor vessel flange."

VEGP LAR DOC A078 revises the third entry statement for Condition D of TS 3.5.8 by changing the IRWST borated water volume from a percent range of $< 100\%$ and $> 97\%$ to a specific range of $\leq 73,100$ cu. ft. and $> 70,907$ cu. ft.

VEGP LAR DOC A079 revises the second Frequency for SR 3.5.8.3 from "...solution volume increase of 15,000 gal" to "...solution volume increase of $\geq 15,000$ gal". The associated Bases for SR 3.5.8.3 is also revised.

VEGP LAR DOC A081 revises Condition F of TS 3.5.8 by specifying the Conditions that are applicable to the first entry statement.

VEGP LAR DOC L01 revises SR 3.5.8.4 by adding the renumbered SR 3.5.6.11 to the listing of applicable SRs. Also, the Bases for SR 3.5.8.4 is revised.

VEGP LAR DOC L17 revises Condition B of TS 3.5.8 from "Required IRWST injection line inoperable due to presence of noncondensable gases in one high point vent." to "Required IRWST injection flow path with noncondensable gas volume in one squib valve outlet line pipe stub not within limit." The Required Action B.1 is revised from "Vent noncondensable gases." to "Restore noncondensable gas volume in squib valve outlet line pipe stub to within limit." Condition C of TS 3.5.8 is revised from "Required IRWST injection line inoperable due to presence of noncondensable gases in both high point vents." to "Required IRWST injection flow path with noncondensable gas volume in both squib valve outlet line pipe stubs not within limit." The Required Action C.1 is revised from "Vent noncondensable gases from one high point vent." to "Restore noncondensable 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 3.5.8 enhance TS clarity by deleting the reference to MODE 6 from the Required Action. TS 3.5.8 is applicable only in MODE 6 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 3.5.8 and 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 SR 3.5.8.2.

VEGP LAR DOC A079 changes to the second Frequency for SR 3.5.8.3 clarifies the requirement is also applicable to solution volume increase greater than 15,000 gallons.

VEGP LAR DOC A081 changes to the first entry statement for Condition F of TS 3.5.8 provide clarification by specifying the applicable Conditions.

VEGP LAR DOC L01 change to SR 3.5.8.4 by adding the renumbered SR 3.5.6.11 to the listing of applicable SRs is an editorial change due to changes to TS 3.5.6.

VEGP LAR DOC L17 changes TS 3.5.8 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 3.5.8 Required Action B.1 and C.1 are for consistency with changes made to the associated entry conditions.

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

The Bases for Required Action B.1 and C.1 of TS 3.5.8 is revised by changing “high point vents” to “injection flow path squib valve outlet line pipe stubs”.

The Bases for SR 3.5.8.2 is revised by correcting the word “intitial” to “initial”.

Condition D and SR 3.5.8.2 of TS 3.5.8 is revised to correct “cu. ft.” to “cu ft”.

The first entry statement for Condition D of TS 3.5.8 is revised by deleting the hyphen from “Concentra-tion”.

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”, second paragraph, fourth sentence is revised from “withdrawal of reactivity control assemblies” to “withdrawal of control rods”. (APOG Comment)

The second Frequency for SR 3.5.8.3 and “Surveillance Requirements” section of the Bases, under heading “SR 3.5.8.3”, is revised from “...solution volume increase \geq 15,000 gal” to “...combined volume increase \geq 15,000 gal”. (APOG Comment)

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

The Bases for Required Action B.1 and C.1 of TS 3.5.8 is changed to provide consistency with VEGP LAR DOC L17 changes to Required Action B.1 and C.1. The change is also consistent with VEGP LAR DOC L17 changes to the Bases for Required Action B.1 and C.1 of TS 3.5.7, which are identical to Required Action B.1 and C.1 of TS 3.5.8.

Spelling correction in the Bases for SR 3.5.8.2 is an editorial change.

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.

Removing the hyphen from “Concentra-tion” in the first entry statement for Condition D is an editorial change.

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 “...solution volume increase \geq 15,000 gal” to “...combined volume increase \geq 15,000 gal” is a non-technical change that provides improved clarity, consistency, and operator usability.

VII. GTST Safety Evaluation**Technical Analysis:**

VEGP LAR DOC L17: As stated in the associated Bases for the GTS 3.5.8 Actions, the presence of some noncondensable gases does not mean that the CMT is immediately inoperable, but that gases are collecting and should be vented. TS 3.5.8, Condition B and C are revised for consistency.

GTS 3.5.8, 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 noncondensable 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 noncondensable 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 3.5.8 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

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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 dispositioning TSTF-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 CLIP 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 #295) The SPSB proposed change to correct “cu. ft.” to “cu ft” is part of comment #295.
5. (Internal #330) 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.”

6. (Internal #331) 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 6.”

7. (Internal #332) 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.”

8. (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.”

9. (Internal #334) Editorial change is recommended to the “Surveillance Requirements” section of the Bases, under heading SR 3.5.8.3. These non-technical changes provide improved clarity, consistency, and operator usability. This is resolved by making the suggested change and additional change to the second Frequency for SR 3.5.8.3 as follows:

“...~~solution~~**combined** volume increase \geq 15,000 gal”

NRC Final Approval Date: 12/15/2015

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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).
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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)

3.5.8 In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 6

LCO 3.5.8 The IRWST, with one injection flow path and one containment recirculation flow path, shall be OPERABLE.

APPLICABILITY: MODE 6.

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 noncondensable gases in one high point vent volume in one squib valve outlet line pipe stub not within limit.	B.1 Vent noncondensable gases Restore noncondensable gas volume in squib valve outlet line pipe stub to within limit.	72 hours
C. Required IRWST injection flow path with line inoperable due to presence of noncondensable gases in both high point vents volume in both squib valve outlet line pipe stubs not within limit.	C.1 Vent noncondensable gases from one high point vent Restore noncondensable gas volume in one squib valve outlet line pipe stub to within limit.	8 hours

ACTIONS (continued)

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

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.8.4	For the IRWST and flow paths required to be OPERABLE, the following SRs of Specification 3.5.6, "In-containment Refueling Water Storage Tank (IRWST) Operating" are applicable: SR 3.5.6.3 SR 3.5.6.6 SR 3.5.6.8 SR 3.5.6.10 SR 3.5.6.5 SR 3.5.6.7 SR 3.5.6.9 SR 3.5.6.6 SR 3.5.6.10 SR 3.5.6.7 SR 3.5.6.11	In accordance with applicable SRs

B 3.5 PASSIVE CORE COOLING SYSTEM (PXS)

B 3.5.8 In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 6

BASES

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

**APPLICABLE
SAFETY
ANALYSES**

For MODE 6, 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.

One line with redundant, parallel valves is required to accommodate a single failure (to open) of an isolation valve.

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 supply the required volume of borated water as safety injection for core cooling and reactivity control.

To be considered OPERABLE, the IRWST in combination with the refueling cavity 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 and power removed, and the motor operated sump recirculation isolation valves must be open and OPERABLE. Any cavity leakage should be estimated and made up with borated water such that the volume in the IRWST plus the refueling cavity will meet the IRWST volume requirement. ~~The absence of noncondensable gases in the high point vents is necessary for system OPERABILITY.~~ **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 the gas volume would be expected to increase to a sufficient volume that might potentially challenge the OPERABILITY of passive safety injection flow. Noncondensable gas accumulation in the injection line high point that causes the water**

BASES

LCO (continued)

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 6, the IRWST is an Reactor Coolant System (RCS) injection source of borated water for core cooling and reactivity control.

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 5 are specified in LCO 3.5.7, In-containment Refueling Water Storage Tank (IRWST) - Shutdown, MODE 5.

ACTIONS

A.1

With the required motor operated containment sump isolation valve 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 noncondensable 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 noncondensable gas accumulation, IRWST injection through the affected flow path could be delayed. However, the presence of some noncondensable 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. 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 6. 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

BASES

ACTIONS (continued)

Time is consistent with the time normally applicable to one inoperable train in a two train ECCS system.

C.1

Excessive amounts of noncondensable 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 noncondensable gas accumulation, IRWST injection could be delayed long enough to cause core uncover. However, the presence of some noncondensable 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 noncondensable gases that could interfere with IRWST injection. A Completion Time of 8 hours is permitted for venting noncondensable 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 stubs**~~high point vents~~ is vented, then Condition B will apply to the remaining high point vent with noncondensable gas accumulation.

D.1

If the IRWST and refueling cavity water volume, boron concentration, or temperature are not within limits, the core cooling capability from injection or PRHR HX 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 significant change in boron concentration and is consistent with the long-term cooling analysis performed to justify **probabilistic risk assessment (PRA)** success criteria (Ref. 31), 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

BASES

ACTIONS (continued)

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 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. In MODE 6, action must be immediately initiated to be in MODE 6 with the cavity water level \geq 23 feet above the top of the reactor vessel flange.

The time to RCS boiling is maximized by maximizing the RCS inventory and maintaining RCS temperature as low as practical. With the RCS intact, another means of removing decay heat is available (the PRHR HX). 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~~ **rods assemblies**, and excessive cooling of the RCS. These Actions place the plant in a condition which maximizes the time to IRWST injection, thus providing time for repairs or application of alternative cooling capabilities.

**SURVEILLANCE
REQUIREMENTS**SR 3.5.8.1

The IRWST and refueling cavity borated water temperature must be verified every 24 hours to ensure that the temperature is within the limit assumed in accident analysis. This Frequency is sufficient to identify a temperature change that would approach the limit and has been shown to be acceptable through operating experience.

BASES

SURVEILLANCE REQUIREMENTS (continued)SR 3.5.8.2

Verification every 24 hours that the IRWST and refueling cavity borated water volume is above the required minimum level will ensure that a sufficient ~~initial~~ supply is available for safety injection and floodup volume for recirculation and as the heat sink for PRHR. During shutdown with the refueling cavity flooded with water from the IRWST, the Surveillance requires that the combined volume of borated water in the IRWST and refueling cavity meets the specified limit. Since the IRWST volume is normally stable, and is monitored by redundant main control indication and alarm, a 24 hour Frequency is appropriate.

SR 3.5.8.3

Verification every 31 days that the boron concentration of the IRWST and refueling cavity is greater than the required limit ensures that the reactor will remain subcritical following shutdown events. Since the IRWST volume is large and normally stable, the 31 day Frequency is acceptable, considering additional verifications are required within 6 hours after each ~~solution~~ combined volume increase of \geq 15,000 gal.

SR 3.5.8.4

LCO 3.5.6 Surveillance Requirements and Frequencies of SR 3.5.6.3 and SR 3.5.6.5 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)

3.5.8 In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 6

LCO 3.5.8 The IRWST, with one injection flow path and one containment recirculation flow path, shall be OPERABLE.

APPLICABILITY: MODE 6.

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 noncondensable gas volume in one squib valve outlet line pipe stub not within limit.	B.1 Restore noncondensable gas volume in squib valve outlet line pipe stub to within limit.	72 hours
C. Required IRWST injection flow path with noncondensable gas volume in both squib valve outlet line pipe stubs not within limit.	C.1 Restore noncondensable gas volume in one squib valve outlet line pipe stub to within limit.	8 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>D. IRWST and refueling cavity boron concentration not within limits.</p> <p><u>OR</u></p> <p>IRWST and refueling cavity borated water temperature not within limits.</p> <p><u>OR</u></p> <p>IRWST and refueling cavity borated water volume $\leq 73,100$ cu ft and $> 70,907$ cu ft.</p>	<p>D.1 Restore IRWST to OPERABLE status.</p>	<p>8 hours</p>
<p>E. Required motor operated IRWST isolation valve not fully open.</p> <p><u>OR</u></p> <p>Power is not removed from required motor operated IRWST isolation valve.</p>	<p>E.1 Restore required motor operated IRWST isolation valve to fully open condition with power removed.</p>	<p>1 hour</p>

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Initiate action to establish water level \geq 23 feet above the top of the reactor vessel flange.	Immediately
<u>OR</u>	<u>AND</u>	
LCO not met for reasons other than Condition A, B, C, D, or E.	F.2 Suspend positive reactivity additions.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.5.8.1 Verify the IRWST and refueling cavity water temperature is $<$ 120°F.	24 hours
SR 3.5.8.2 Verify the IRWST and refueling cavity water total borated water volume is $>$ 73,100 cu ft.	24 hours
SR 3.5.8.3 Verify the IRWST and refueling cavity boron concentration is \geq 2600 ppm and \leq 2900 ppm.	31 days <u>AND</u> Once within 6 hours after each combined volume increase of \geq 15,000 gal

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.8.4	For the IRWST and flow paths required to be OPERABLE, the following SRs are applicable: SR 3.5.6.3 SR 3.5.6.8 SR 3.5.6.5 SR 3.5.6.9 SR 3.5.6.6 SR 3.5.6.10 SR 3.5.6.7 SR 3.5.6.11	In accordance with applicable SRs

B 3.5 PASSIVE CORE COOLING SYSTEM (PXS)

B 3.5.8 In-containment Refueling Water Storage Tank (IRWST) – Shutdown, MODE 6

BASES

BACKGROUND	A description of the IRWST is provided in LCO 3.5.6, “In-containment Refueling Water Storage Tank (IRWST) – Operating.”
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APPLICABLE SAFETY ANALYSES	<p>For MODE 6, heat removal is provided by IRWST injection and containment sump recirculation.</p> <p>IRWST injection could be required to mitigate some events by providing RCS inventory makeup.</p> <p>One line with redundant, parallel valves is required to accommodate a single failure (to open) of an isolation valve.</p> <p>The IRWST satisfies Criteria 2 and 3 of 10 CFR 50.36(c)(2)(ii).</p>
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LCO	<p>The IRWST requirements ensure that an adequate supply of borated water is available to supply the required volume of borated water as safety injection for core cooling and reactivity control.</p> <p>To be considered OPERABLE, the IRWST in combination with the refueling cavity 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 and power removed, and the motor operated sump recirculation isolation valves must be open and OPERABLE. Any cavity leakage should be estimated and made up with borated water such that the volume in the IRWST plus the refueling cavity will meet the IRWST volume requirement. 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 the gas volume would be expected to increase to a sufficient volume that might potentially challenge the OPERABILITY of passive safety injection flow. Noncondensable 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).</p>
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BASES

APPLICABILITY In MODE 6, the IRWST is an Reactor Coolant System (RCS) injection source of borated water for core cooling and reactivity control.

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 5 are specified in LCO 3.5.7, In-containment Refueling Water Storage Tank (IRWST) - Shutdown, MODE 5.

ACTIONSA.1

With the required motor operated containment sump isolation valve 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), which can provide 100% of the required flow without a single failure.

B.1

Excessive amounts of noncondensable gases in one of the injection flow path squib valve outlet line pipe stubs 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 noncondensable gas accumulation, IRWST injection through the affected flow path could be delayed. However, the presence of some noncondensable 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. 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 6. 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.

BASES

ACTIONS (continued)C.1

Excessive amounts of noncondensable gases in both of the injection flow path squib valve outlet line pipe stubs 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 noncondensable gas accumulation, IRWST injection could be delayed long enough to cause core uncover. However, the presence of some noncondensable 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 noncondensable gases that could interfere with IRWST injection. A Completion Time of 8 hours is permitted for venting noncondensable 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 stubs is vented, then Condition B will apply to the remaining high point vent with noncondensable gas accumulation.

D.1

If the IRWST and refueling cavity water volume, boron concentration, or temperature are not within limits, the core cooling capability from injection or PRHR HX 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 significant change in boron concentration and is consistent with the long-term cooling analysis performed to justify probabilistic risk assessment (PRA) success criteria (Ref. 1), which assumed multiple 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.

BASES

ACTIONS (continued)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 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. In MODE 6, action must be immediately initiated to be in MODE 6 with the cavity water level ≥ 23 feet above the top of the reactor vessel flange.

The time to RCS boiling is maximized by maximizing the RCS inventory and maintaining RCS temperature as low as practical. With the RCS intact, another means of removing decay heat is available (the PRHR HX). 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 control rods, and excessive cooling of the RCS. These Actions place the plant in a condition which maximizes the time to IRWST injection, thus providing time for repairs or application of alternative cooling capabilities.

**SURVEILLANCE
REQUIREMENTS**SR 3.5.8.1

The IRWST and refueling cavity borated water temperature must be verified every 24 hours to ensure that the temperature is within the limit assumed in accident analysis. This Frequency is sufficient to identify a temperature change that would approach the limit and has been shown to be acceptable through operating experience.

BASES

SURVEILLANCE REQUIREMENTS (continued)SR 3.5.8.2

Verification every 24 hours that the IRWST and refueling cavity borated water volume is above the required minimum level will ensure that a sufficient initial supply is available for safety injection and floodup volume for recirculation and as the heat sink for PRHR. During shutdown with the refueling cavity flooded with water from the IRWST, the Surveillance requires that the combined volume of borated water in the IRWST and refueling cavity meets the specified limit. Since the IRWST volume is normally stable, and is monitored by redundant main control indication and alarm, a 24 hour Frequency is appropriate.

SR 3.5.8.3

Verification every 31 days that the boron concentration of the IRWST and refueling cavity is greater than the required limit ensures that the reactor will remain subcritical following shutdown events. Since the IRWST volume is large and normally stable, the 31 day Frequency is acceptable, considering additional verifications are required within 6 hours after each combined volume increase of $\geq 15,000$ gal.

SR 3.5.8.4

LCO 3.5.6 Surveillance Requirements and Frequencies of SR 3.5.6.3 and SR 3.5.6.5 through SR 3.5.6.11 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

1. FSAR Chapter 19, "Probabilistic Risk Assessment."
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