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

Title: Changes Related to LCO 3.5.2, Core Makeup Tanks (CMTs) - Operating

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-479-A, Rev. 0,	Changes to Reflect Revision of 10 CFR 50.55a
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-479-A, Rev. 0:	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-479-A, Rev. 0:	06-Dec-05
TSTF-523, Rev. 2:	23-Dec-13

TSTF Classification:

TSTF-425, Rev. 3:	Technical Change
TSTF-479-A, Rev. 0:	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 A027:	SR editorial change for clarification
VEGP LAR DOC A052:	TS 3.5.2 Condition F revision
VEGP LAR DOC A066:	TS 3.5.2 Condition C and E Completion Time revision
VEGP LAR DOC A067:	TS 3.5.2 revision to Conditions associated with water temperature and born concentration
VEGP LAR DOC A068:	TS 3.5.2 Condition E statement and Condition F second statement revision
VEGP LAR DOC L01:	Added SR for valve actuation
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(1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.

Applicable changes in TSTF-479-A have already been incorporated into the AP1000 GTS (DCD Revision 19). TSTF-479-A changes the reference to “ASME Boiler and Pressure Vessel Code” to “ASME OM Code” in the Inservice Testing Program. The AP1000 GTS (DCD Revision 19) includes theses changes in Specification 5.5.3, Inservice Testing Program.

TSTF-479-A also removes reference to “Section XI” of the ASME Code from NUREG-1431 bases for SR 3.5.2.4, which is for testing of the Emergency Core Cooling System (ECCS) pumps. The AP1000 SR 3.5.2.6 does refer to the Inservice Testing Program for the Frequency of the SR, but the Bases for SR 3.5.2.6 does not specifically refer to the ASME Code. The AP1000 SR 3.5.2.6 is for verifying that redundant outlet isolation valves for the Core Makeup Tank (CMT) are OPERABLE. Based on the differences of the bases discussion between NUREG-1431 SR 3.5.2.4 and AP1000 SR 3.5.2.6, these TSTF-479-A changes are not applicable and therefore are not incorporated into AP1000 Specification 3.5.2.

TSTF-425, Rev. 3, 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.

The additional edits to address APOG comments (Internal #302) deletes a change related to VEGP LAR DOC A066. In the “Actions” section of the Bases, under heading “E.1” the parenthetical statement “...(provided that concurrent entry into Condition B of LCO 3.5.1 has not occurred)...” is deleted. The word “concurrent” in the parentheses was added by VEGP LAR DOC A066.

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)

Applicability statement is revised to correct the punctuation after “MODES 1, 2, and 3.” from a period to a comma.

Bases for SR 3.5.2.3 are revised by changing “can not” to “cannot”.

SR 3.5.2.2 is revised to delete the periods from “cu. ft.”.

In the “References” section of the Bases, the title for FSAR Chapter 15 is corrected from “Accident Analysis” to “Accident Analyses.”

APOG Recommended Changes to Improve the Bases

Throughout the Bases, references to Sections and Chapters of the FSAR do not include the “FSAR” modifier. Since these Section and Chapter references are to an external document, it is appropriate to include the acronym “FSAR” to modify “Section” and “Chapter” in references to the FSAR throughout the Bases. (DOC A003)

Editorial changes are made to the Bases by inserting the word “break” when specifying a specific type of LOCA. These non-technical changes provide improved clarity, consistency, and operator usability.

An editorial clarification is made to the “LCO” section of the Bases. The change clarifies that multiple parameters need to be met for the CMTs to perform their assumed safety analysis functions.

An editorial clarification is made to the “LCO” section of the Bases. The change more clearly recognizes the boration as well as the liquid volume.

An editorial clarification is made to the “Applicability” section of the Bases. The change clarifies the LCO applicability for the different Modes.

An editorial change is made to the “Actions” section of the Bases, under heading “A.1”. The change clarifies the basis for a Completion Time of 72 hours.

An editorial change is made to the “Actions” section of the Bases, under heading “D.1”. The editorial change revises “not” to “not”.

An editorial change is made to the “Actions” section of the Bases, under heading “E.1”. The change clarifies when the remaining CMT is not sufficient for DBAs and clarifies the basis of the 8 hour Completion Time.

An editorial change is made to the “Actions” section of the Bases, under heading “F.1 and F.2”. The editorial clarification changes the word “Conditions” to “Condition”.

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.5.2, Core Makeup Tanks (CMTs) – Operating

Changes to the Generic Technical Specifications and Bases:

Applicability statement is revised to correct punctuation. (NRC staff proposed change)

Condition B of TS 3.5.2 is revised from “One CMT inoperable due to one or more parameters (water temperature, boron concentration) not within limits.” to “One CMT inoperable due to water temperature or boron concentration not within limits.” (DOC A067)

Required Action B.1 and C.1 of TS 3.5.2 are revised from “Restore water temperature or boron concentration...” to “Restore water temperature and boron concentration...” (DOC A067)

Required Action C.1 Completion Time and the associated bases are revised. The first Completion Time is revised from “8 hours if Condition B of LCO 3.5.1 has not been entered” to “8 hours”, the logical connector is changed from an “OR” to an “AND”, and the second Completion Time is revised from “1 hour if Condition B of LCO 3.5.1 has been entered” to “1 hour from discovery of LCO 3.5.2 Condition C entry concurrent with LCO 3.5.1 Condition B entry.” In addition, the order of the Completion Times is changed. (DOC A066)

Condition D of TS 3.5.2 is revised from “One CMT inoperable due to presence of non-condensible gases in one high point vent.” to “One CMT inlet line with noncondensible gas volume not within limit.” (DOC L17)

Required Action D.1 is revised from “Vent noncondensible gases.” to “Restore CMT inlet line noncondensible gas volume to within limit.” (DOC L17)

Condition E of TS 3.5.2 and associated bases is revised by deleting Condition C from the entry statement. (DOC A068)

Required Action E.1 Completion Time and the associated bases are revised. The first Completion Time is revised from “8 hours if Condition B of LCO 3.5.1 has not been entered” to “8 hours”, the logical connector is changed from an “OR” to an “AND”, and the second Completion Time is revised from “1 hour if Condition B of LCO 3.5.1 has been entered” to “1 hour from discovery of LCO 3.5.2 Condition E entry concurrent with LCO 3.5.1 Condition B entry.” In addition, the order of the Completion Times is changed. (DOC A066)

First entry statement for Condition F of TS 3.5.2 is revised by specifying “Condition A, B, C, D, or E” in the statement. (DOC A052)

Second entry statement for Condition F of TS 3.5.2 is revised from “LCO not met for reasons other than A, B, C, D, or E.” to “Two CMTs inoperable for reasons other than Condition C.” (DOC A068)

SR 3.5.2.2 is revised to correct “cu. ft.” to “cu ft”. (NRC staff proposed change)

SR 3.5.2.6 is changed from “Verify each CMT outlet isolation valve is OPERABLE by stroking it open.” to “Verify each CMT outlet isolation valve strokes open.” (DOC A027)

L01-modified TS (MTS) SR 3.5.2.7 is added and the GTS SR 3.5.2.7 is renumbered as SR 3.5.2.8. The associated bases are also revised. (DOC L01)

In the “LCO” section of the Bases the first paragraph is revised to clarify that multiple parameters need to be met for the CMTs to perform their assumed safety analysis functions. (APOG Comment)

In the “LCO” section of the Bases the second paragraph is revised to more clearly recognize the boration as well as the liquid volume. (APOG Comment)

In the “Applicability” section of the Bases, the first sentence of the first paragraph is revised to clarify LCO applicability for the different Modes. (APOG Comment)

In the “Actions” section of the Bases, under the heading “A.1” the last sentence is revised to clarify the bases for a Completion Time of 72 hours. (APOG Comment)

In the “Actions” section of the Bases, under heading “D.1” the underline is removed from the word “not”. (APOG Comment)

In the “Actions” section of the Bases, under heading “E.1” the first paragraph is revised to clarify when the remaining CMT is not sufficient for DBAs and clarify the basis of the 8 hour Completion Time. (APOG Comment)

In the “Actions” section of the Bases, under heading “F.1 and F.2” the word “Conditions” in the first sentence is changed to “Condition”. (APOG Comment)

The Bases is revised by inserting the word “break” when specifying a specific type of LOCA. (APOG Comment)

The Bases for SR 3.5.2.3 is revised by correcting the “can not” to “cannot”. (NRC staff proposed change)

The acronym “FSAR” is added to modify “Section” and “Chapter” in references to the FSAR throughout the Bases. (DOC A003) (APOG Comment)

In the “References” section of the Bases, the title for FSAR Chapter 15 is corrected from “Accident Analysis” to “Accident Analyses.” (NRC staff proposed change)

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 A027 revises SR 3.5.2.6 by replacing the phrase “is OPERABLE by stroking it” with “strokes”. The SR is changed from “Verify each CMT outlet isolation valve is OPERABLE by stroking it open.” to “Verify each CMT outlet isolation valve strokes open.”

VEGP LAR DOC A052 revises the first entry statement for Condition F by specifying that the condition is applicable when Required Action and associated Completion Time “of Condition A, B, C, D, or E” not met.

VEGP LAR DOC A066 revises the first Required Action C.1 Completion Time of 8 hours by deleting the caveat that the Completion Time applies if Condition B of LCO 3.5.1 has not been entered. The logical connector is changed from an “OR” to an “AND”, and the second Completion Time of is revised to state “1 hour from discovery of LCO 3.5.2 Condition C entry concurrent with LCO 3.5.1 Condition B entry.” In addition, the order of the Completion Times is changed to be consistent with the writer's guide. The associated “Actions” section of the bases is also revised.

VEGP LAR DOC A066 revises the first Required Action E.1 Completion Time of 8 hours by deleting the caveat that the Completion Time applies if Condition B of LCO 3.5.1 has not been entered. The logical connector is changed from an “OR” to an “AND”, and the second Completion Time of is revised to state “1 hour from discovery of LCO 3.5.2 Condition E entry concurrent with LCO 3.5.1 Condition B entry.” In addition, the order of the Completion Times is changed to be consistent with the writer’s guide. The associated “Actions” section of the bases is also revised.

VEGP LAR DOC A067 revises Condition B entry statement by specifying the parameters not within limits as “water temperature or boron concentration”. The Required Action for B.1 and C.1 are revised to state that both water temperature and boron concentration need to be restored to within limits.

VEGP LAR DOC A068 revises Condition E by deleting Condition C from the entry statement and the second entry statement for Condition F is revised to apply if two CMTs are inoperable for reasons other than Condition C. The associated “Actions” section of the bases is also revised.

VEGP LAR DOC L01 adds a new SR 3.5.2.7 for actuating each CMT outlet isolation valve on an actual or simulated actuation signal, with a Frequency of 24 months. The associated “Surveillance Requirements” section of the bases is also revised.

VEGP LAR DOC L17 revises the Condition D entry statement to change an inoperable CMT from presence of noncondensible gas in one high point vent to noncondensible gas volume not within limit in one CMT inlet line. Required Action D.1 is revised to reflect the change to the revised Condition D entry statement.

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

VEGP LAR DOC A052 change to the first entry statement of Condition F clarifies the statement by specifying the applicable Conditions.

VEGP LAR DOC A066 changes to Required Action C.1 and E.1 Completion Times provides clarity to the statement. Specifically changing the logical connector from an "OR" to an "AND" removes any implication that either Completion Time could be followed.

VEGP LAR DOC A067 changes to Condition B entry statement to specify the parameters of water temperature and boron concentration and the changes to Required Actions B.1 and C.1 provide clarification.

VEGP LAR DOC A068 changes to Condition E and Condition F entry statements clarify the difference between one CMT inoperable for reasons other than Condition A, B, or D and two CMTs inoperable for reasons other than Condition C.

VEGP LAR DOC L01 addition of a new SR to TS 3.5.2 is due to deletion of SR 3.3.2.7. The equivalent requirement is included in the new SR for TS 3.5.2 with the same 24 month Frequency as the deleted SR 3.3.2.7.

VEGP LAR DOC L17 changes align Condition D entry statement and Required Action D.1 with the intent of the LCO as described in the Bases.

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

The Applicability statement is revised by changing the period after "MODES 1, 2, and 3." to a comma.

The Bases for SR 3.5.2.3 is revised by changing the "can not" to "cannot".

SR 3.5.2.2 is revised to correct "cu. ft." to "cu ft".

In the "References" section of the Bases, the title for FSAR Chapter 15 is corrected from "Accident Analysis" to "Accident Analyses."

Editorial changes are made throughout Bases by inserting the word "break" when specifying a specific type of LOCA. (APOG Comment)

The acronym "FSAR" is added to modify "Section" and "Chapter" in references to the FSAR throughout the Bases. (DOC A003) (APOG Comment)

Revise the first sentence of the first paragraph in the "LCO" section of the Bases to clarify that multiple parameters need to be met for the CMTs to perform their assumed safety analysis functions. (APOG Comment)

Revise the first sentence of the second paragraph in the “LCO” section of the Bases to more clearly recognizes the boration as well as the liquid volume. (APOG Comment)

Revise the first sentence of the first paragraph in the “Applicability” section of the Bases to clarify LCO applicability for the different Modes. (APOG Comment)

Revise the last sentence in the “Actions” section of the Bases, under heading “A.1” to clarify the bases for a Completion Time of 72 hours. (APOG Comment)

Remove the underline from the word “not” in the “Actions” section of the Bases, in the first paragraph under heading “D.1”. (APOG Comment)

Revise the first paragraph in the “Actions” section of the Bases, under heading “E.1” to clarify when the remaining CMT is not sufficient for DBAs and clarify the basis of the 8 hour Completion Time. (APOG Comment)

Change the word “Conditions” to “Condition” in the “Actions” section of the Bases, in the first sentence under heading “F.1 and F.2”. (APOG Comment)

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

The change to the Applicability statement is a correction to the punctuation.

The change to the Bases for SR 3.5.2.3 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.

Correcting the title for FSAR Chapter 15 from “Accident Analysis” to “Accident Analyses” is an editorial change.

The changes throughout Bases by inserting the word “break” when specifying a specific type of LOCA are non-technical changes that provide improved clarity, consistency, and operator usability.

Since Bases references to FSAR Sections and Chapters are to an external document, it is appropriate to include the “FSAR” modifier.

The revisions to the first sentence of the first paragraph in the “LCO” section of the Bases is an editorial clarification.

The revisions to the first sentence of the second paragraph in the “LCO” section of the Bases is an editorial clarification.

The revisions to the first sentence of the first paragraph in the “Applicability” section of the Bases is an editorial clarification.

The revision to the last sentence in the “Actions” section of the Bases, under heading “A.1” is an editorial clarification.

The revision to the first paragraph in the “Actions” section of the Bases, under heading “D.1” is an editorial formatting change.

The revision to the first paragraph in the “Actions” section of the Bases, under heading “E.1” is an editorial formatting change.

The revision to the first sentence in the “Actions” section of the Bases, under heading “F.1 and F.2” is an editorial clarification.

VII. GTST Safety Evaluation

Technical Analysis:

VEGP LAR DOC L01: GTS 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation,” SR 3.3.2.7 (“Perform ACTUATION DEVICE TEST”) and SR 3.3.2.8 (“Perform ACTUATION DEVICE TEST for squib valves”) are deleted from GTS 3.3.2 and Table 3.3.2-1, Function 26, ESF Actuation. The equivalent requirement (using phrasing generally consistent with NUREG-1431) is included in individual Specifications for the actuated devices with the same 24 month Frequency as the deleted SRs. The new SR added to GTS 3.5.2 is due to deletion of SR 3.3.2.7. The equivalent requirement is included in the new SR for GTS 3.5.2 and the same 24 month Frequency as the deleted SR 3.3.2.7.

In accordance with the defined term, an actuation device test is a test of the actuated equipment. As discussed in the Bases for SR 3.3.2.7, performance of an actuation device test demonstrates that the actuated device responds to a simulated actuation signal. As such, Surveillances associated with the testing of the actuated equipment should be addressed in the actuated equipment Specifications, where failures of the surveillance would lead to entering the Actions for the inoperable actuated equipment. Currently, the only Surveillances that utilize this defined term are in GTS 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation;” as SRs 3.3.2.7, 3.3.2.8, and 3.3.2.9. GTS SRs 3.3.2.7 and 3.3.2.8 provide the actuation device test for Engineered Safety Features (ESF) that are actuated by GTS Table 3.3.2-1, Function 26. As such, failures of SRs 3.3.2.7 and 3.3.2.8 (i.e., failures in the actuated equipment) would inappropriately result in applying the Actions of LCO 3.3.2 for Function 26. This is inconsistent with the intent of applying Actions specific to the equipment inoperability. Therefore, SRs 3.3.2.7 and 3.3.2.8 are deleted from GTS 3.3.2 and Table 3.3.2-1, Function 26, ESF Actuation. In conjunction with this deletion, each Specification for ESF actuated equipment is provided with Surveillance(s) that appropriately address the testing of the actuated devices consistent with these SRs and the definition being removed.

The effect of moving the requirement for the actuated device test from GTS 3.3.2 to the individual equipment Specifications is for less restrictive actions when the device is inoperable. As an SR associated with TS 3.3.2, Table 3.3.2-1, Function 26 for Modes 1, 2, 3, and 4, would impose a 6 hour restoration (GTS 3.3.2 Action D) prior to a required plant shutdown (GTS 3.3.2 Action O). GTS 3.5.2 with added SR 3.5.2.7 to address actuation device testing has a 72-hour restoration allowance.

VEGP LAR DOC L17: As stated in the associated Bases for the GTS 3.5.2 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. In addition, the associated LCO Bases for TS 3.5.2 state that 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 natural circulation flow. The language of GTS 3.5.2, Condition D is not consistent with the intent of the LCO, as described in the Bases. Therefore, the Condition is revised for consistency with the LCO as described in the associated Bases.

GTS 3.5.2, Required Action D.1 is 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 3.5.2 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 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 #3) Throughout the Bases, references to Sections and Chapters of the FSAR do not include the "FSAR" modifier. Since these Section and Chapter references are to an external document, it is appropriate (DOC A003) to include the "FSAR" modifier. This is resolved by adding the FSAR modifier to every FSAR reference in the Bases.

3. (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.

4. (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.

5. (Internal #294) APOG recommends inserting “break” before “LOCA” in the Bases to provide improved clarity, consistency, and operator usability. This is resolved by making the recommended changes to the Bases of Subsection 3.5.2, as appropriate.

6. (Internal #295) The NRC staff proposed change to replace “cu. ft.” with “cu ft” is part of comment #295.

7. (Internal #296) Section “Description of changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes” does not describe changes to Required Action E.1 Completion Time, which is discussed in VEGP LAR DOC A066.

   Revise to include description similar to that provided for Required Action C.1 Completion Time. The changes to Required Action E.1 Completion Time based on DOC A066 are added to GTST Section VI, under heading “Description of changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes”

8. (Internal #297) APOG recommends revising the first paragraph in the “LCO” section of the Bases to clarify that multiple parameters need to be met for the CMTs to perform their assumed safety analysis functions. This is resolved by making the recommended changes and additional edits to the first sentence of the first paragraph as follows:

   > “This LCO establishes the ~~minimum~~ **limits on CMT parameters and** conditions **on CMT components** necessary to ensure that **the**~~sufficient~~ CMT flow **assumed in the safety analyses** will be available~~ to meet the initial conditions assumed in the safety analyses~~.”

9. (Internal #298) APOG recommends revising the second paragraph to delete “the volume of” and change “flow” to “borated water” to more clearly recognize the boration as well as the liquid volume. This is resolved by making the recommended changes to the first sentence of the second paragraph as follows:

   > “~~The volume of e~~**E**ach CMT represents 100% of the total injected ~~flow~~ **borated water** assumed in LOCA analysis.”

10. (Internal #299) APOG recommends revising the first sentence of the first paragraph in the “Applicability” section of the Bases. These non-technical changes provide improved clarity, consistency, and operator usability. This is resolved by making the recommended changes as follows:

    > “In MODES 1, 2, **and** 3, and **in MODE** 4 when the RCS is not being cooled by the Normal Residual Heat Removal System (RNS) the CMTs are required to be OPERABLE to provide borated water for RCS inventory makeup and reactivity control following a design basis event and subsequent cooldown.”

11. (Internal #300) APOG recommends revising the last sentence 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 recommended changes as follows:

    "A Completion Time of 72 hours is acceptable for **a** two train **emergency core cooling system (**ECCS**),** ~~system~~ which ~~are~~**is** capable of performing ~~their~~**its** safety function without a single failure."

12. (Internal #301) APOG recommends removing the underline from the word "not" in the first paragraph in 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 recommended change.

13. (Internal #302) APOG recommends making a clarification to the first paragraph in the "Actions" section of the Bases, under heading "E.1". These non-technical changes provide improved clarity, consistency, and operator usability. This is resolved by making the recommended changes, along with other clarifying changes, as follows:

    "The remaining CMT is sufficient for DBAs except for **a** LOCA **with a break** in the OPERABLE ~~CMTs~~ **CMT's direct vessel injection (DVI)** ~~DVI~~ line. The 8 hour Completion Time is based on the required availability of ~~injection from~~ the accumulators ~~(provided that~~ **concurrent** ~~entry into Condition B of LCO 3.5.1 has not occurred)~~ to provide ~~SI~~ **safety** injection **(that is, concurrent entry into Condition B of LCO 3.5.1 has not occurred)**....This analysis provides a high confidence that with the unavailability of one CMT, the core can be cooled following **any DBA** ~~design bases accidents~~."

14. (Internal #303) APOG recommends making an editorial clarification to the first sentence in the "Actions" section of the Bases, under heading "F.1 and F.2". The editorial change provides clarity. This is resolved by making the recommended change.

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. 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).

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

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)

3.5.2 Core Makeup Tanks (CMTs) – Operating

LCO 3.5.2 Both CMTs shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3~~.~~**,**
MODE 4 with the Reactor Coolant System (RCS) not being cooled by the Normal Residual Heat Removal System (RNS).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CMT inoperable due to one CMT outlet isolation valve inoperable.	A.1 Restore outlet isolation valve to OPERABLE status.	72 hours
B. One CMT inoperable due to ~~one or more parameters (~~water temperature~~,~~ **or** boron concentration~~)~~ not within limits.	B.1 Restore water temperature ~~or~~**and** boron concentration to within limits.	72 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Two CMTs inoperable due to water temperature or boron concentration not within limits.	C.1 Restore water temperature ~~or~~**and** boron concentration to within limits for one CMT.	~~8 hours if Condition B of LCO 3.5.1 has not been entered~~ ~~OR~~ 1 hour **from discovery of LCO 3.5.2 Condition C entry concurrent with LCO 3.5.1 Condition B entry**~~if Condition B of LCO 3.5.1 has been entered~~ **AND** **8 hours**
D. One CMT **inlet line with**~~inoperable due to presence of~~ non-condensible gas~~es~~ **volume not within limit**~~in one high point vent~~.	D.1 ~~Vent noncondensible gases~~**Restore CMT inlet line noncondensible gas volume to within limit**.	24 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. One CMT inoperable for reasons other than Condition A, B, ~~C,~~ or D.	E.1 Restore CMT to OPERABLE status.	~~8 hours if Condition B of LCO 3.5.1 has not been entered~~ ~~OR~~ 1 hour **from discovery of LCO 3.5.2 Condition E entry concurrent with LCO 3.5.1 Condition B entry**~~if Condition B of LCO 3.5.1 has been entered~~ **AND** **8 hours**
F. Required Action and associated Completion Time **of Condition A, B, C, D, or E** not met. OR ~~LCO not met~~**Two CMTs inoperable** for reasons other than **Condition** ~~A, B,~~ C~~, D, or E~~.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify the temperature of the borated water in each CMT is < 120°F.	24 hours
SR 3.5.2.2	Verify the borated water volume in each CMT is ≥ 2500 cu~~.~~ ft.	7 days
SR 3.5.2.3	Verify each CMT inlet isolation valve is fully open.	12 hours
SR 3.5.2.4	Verify the volume of noncondensible gases in each CMT inlet line has not caused the high point water level to drop below the sensor.	24 hours
SR 3.5.2.5	Verify the boron concentration in each CMT is ≥ 3400 ppm, and ≤ 3700 ppm.	7 days
SR 3.5.2.6	Verify each CMT outlet isolation valve **strokes**~~is OPERABLE by stroking it~~ open.	In accordance with the Inservice Testing Program
SR 3.5.2.7	**Verify each CMT outlet isolation valve actuates to the open position on an actual or simulated actuation signal.**	**24 months**
SR 3.5.2.~~7~~**8**	Verify system flow performance of each CMT in accordance with the System Level OPERABILITY Testing Program.	10 years

B 3.5 PASSIVE CORE COOLING SYSTEM (PXS)

B 3.5.2 Core Makeup Tanks (CMTs) – Operating

BASES

BACKGROUND

Two redundant CMTs provide sufficient borated water to assure Reactor Coolant System (RCS) reactivity and inventory control for all design basis accidents (DBAs), including both loss of coolant accident (LOCA) events and non-LOCA events (Ref. 1).

The CMTs are cylindrical tanks with hemispherical upper and lower heads. They are made of carbon steel and clad on the internal surfaces with stainless steel. They are located in containment at an elevation slightly above the reactor coolant loops. Each tank is full of borated water at > 3400 ppm. During normal operation, the CMTs are maintained at RCS pressure through a normally open pressure balance line from the cold leg.

The outlet line from each CMT is connected to one of two direct vessel injection lines, which provides an injection path for the water supplied by the CMT. The outlet line from each CMT is isolated by parallel, normally closed, fail open valves. Upon receipt of a safeguards actuation signal, these four valves open to align the CMTs to the RCS.

The CMTs will inject to the RCS as inventory is lost and steam or reactor coolant is supplied to the CMT to displace the water that is injected. Steam or reactor coolant is provided to the CMT through the cold leg balance line, depending upon the specific event that has occurred. The inlet line from the cold leg is sized for LOCA events, where the cold legs become voided and higher CMT injection flows are required.

The injection line from each CMT contains a flow tuning orifice that is used to provide a mechanism for the field adjustment of the injection line resistance. The orifice is used to establish the required flow rates for the associated plant conditions assumed in the CMT design. The CMT flow is based on providing injection for a minimum of 20 minutes after CMT actuation.

The CMT size and injection capability are selected to provide adequate RCS boration and safety injection for the limiting DBA. One CMT is adequate for this function during a small break LOCA where one CMT completely spills via the pipe break (Ref. 2). The ~~Probabilistic Risk Assessment~~ **probabilistic risk assessment** (PRA) (Ref. 3)

BASES

BACKGROUND (continued)

shows that none of the CMTs are required for small **break** LOCAs, assuming that at least one accumulator is available.

APPLICABLE SAFETY ANALYSES

The CMTs are assumed to be OPERABLE to provide emergency boration and core makeup when the Chemical and Volume Control System (CVS) is inoperable, and to mitigate the consequences of any DBA which requires the safety injection of borated water (Ref. 2).

Following a non-LOCA event such as a steam line break, the RCS experiences a decrease in temperature and pressure due to an increase in energy removal by the secondary system. The cooldown results in a reduction of the core SHUTDOWN MARGIN due to the negative moderator temperature coefficient, with a potential for return to power. The actuation of the CMTs following this event provides injection of borated water to mitigate the reactivity transient and ensure the core remains shut down.

In the case of a steam generator tube rupture (SGTR), CMT injection provides borated water to compensate for RCS LEAKAGE.

In the case of an RCS leak of 10 gallons per minute, the CMTs can delay depressurization for at least 10 hours, providing makeup to the RCS and remain able to provide the borated water to compensate for RCS shrinkage and to assure the RCS boration for a safe shutdown.

In the case of a LOCA, the CMTs provide a relatively large makeup flow rate for approximately 20 minutes, in conjunction with the accumulators to provide the initial core cooling.

CMTs satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO establishes the ~~minimum~~**limits on CMT parameters and** conditions **on CMT components** necessary to ensure that ~~sufficient~~**the** CMT flow **assumed in the safety analyses** will be available ~~to meet the initial conditions assumed in the safety analyses~~. 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

BASES

LCO (continued)

to a sufficient volume that might potentially challenge the OPERABILITY of natural circulation flow. Therefore, noncondensible gas accumulation in the inlet 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 volume of e~~**E**ach CMT represents 100% of the total injected ~~flow~~**borated water** assumed in LOCA analysis. If the injection line from a single CMT to the vessel breaks, no single active failure on the other CMT will prevent the injection of borated water into the vessel. Thus the assumptions of the LOCA analysis will be satisfied.

For non-LOCA analysis, two CMTs are assumed. Note that for non-LOCA analysis, the accident cannot disable a CMT.

APPLICABILITY

In MODES 1, 2, **and** 3, and **in MODE** 4 when the RCS is not being cooled by the Normal Residual Heat Removal System (RNS) the CMTs are required to be OPERABLE to provide borated water for RCS inventory makeup and reactivity control following a design basis event and subsequent cooldown.

The CMT requirements in MODE 5 with the RCS pressure boundary intact are specified in LCO 3.5.3, “Core Makeup Tanks (CMTs) - Shutdown, RCS Intact.”

The CMTs are not required to be OPERABLE while in MODE 5 with the RCS pressure boundary open or in MODE 6 because the RCS is depressurized and borated water can be supplied from the In-containment Refueling Water Storage Tank (IRWST), if needed.

In the unlikely event of a total loss of AC power sources, coupled with an inoperable Passive Residual Heat Removal Heat Exchanger (PRHR HX) (beyond DBA), the CMTs may be used in a feed and bleed sequence to remove heat from the RCS.

BASES

ACTIONS

A.1

With one outlet isolation valve inoperable on one CMT, action must be taken to restore the valve. In this Condition, the CMT is capable of performing its safety function, provided a single failure of the remaining parallel isolation valve does not occur. A Completion Time of 72 hours is acceptable for **a** two train **emergency core cooling system (**ECCS**)** ~~systems~~ which ~~are~~**is** capable of performing ~~their~~**its** safety function without a single failure.

B.1

If the water temperature or boron concentration of one CMT is not within limits, it must be returned to within limits within 72 hours. The deviations in these parameters are expected to be slight, considering the frequent surveillances and control room monitors. With the temperature above the limit, the full core cooling capability assumed in the safety analysis may not be available. With the boron concentration not within limits, the ability to maintain subcriticality following a DBA may be degraded. However, because only one of two CMTs is inoperable, and the deviations of these parameters are expected to be slight, it is probable that more than a required amount of boron and cooling capability will be available to meet the conditions assumed in the safety analysis.

Since the CMTs are redundant, safety class components, the 72 hour Completion Time is consistent with the times normally allowed for this type of component.

C.1

With two CMTs inoperable due to water temperature or boron concentration, at least one CMT must be restored to within limits in 8 hours. The deviations in these parameters are expected to be slight, considering the frequent surveillances and control room monitors. A Completion Time of 8 hours is considered reasonable since the CMTs are expected to be capable of performing their safety function with slight deviations in these parameters and the accumulators are required to be available for LOCA mitigation (i.e., **concurrent** entry into Condition B of LCO 3.5.1 has not occurred). The effectiveness of accumulator injection is demonstrated in analysis performed to justify PRA success criteria (Ref. 3). The analysis contained in this reference shows that for a small **break** LOCA, the injection from one accumulator without any CMT injection supports adequate core cooling. This analysis provides a high confidence that with the unavailability of two CMTs due to water

ACTIONS (continued)

temperature or boron concentration deviations, the core can be cooled following design bases accidents.

~~The~~**If LCO 3.5.1 Condition B is entered concurrent with this Condition, then a 1 hour Completion Time from discovery of LCO 3.5.2 Condition C entry concurrent with LCO 3.5.1 Condition B entry also applies. This** 1 hour Completion Time~~, in the case with simultaneous entry into Condition B of LCO 3.5.1,~~ requires very prompt actions to restore either the CMT or the accumulator **(per LCO 3.5.1 Condition B)** to OPERABLE status. This Completion Time is considered reasonable because of the low probability of simultaneously entering these multiple PXS Conditions and the very small likelihood of a LOCA occurring at the same time.

D.1

Excessive amounts of noncondensible gases in a CMT inlet line may interfere with the natural circulation flow (hot water from the RCS through the balance line into the CMT and cold water from the CMT through the direct vessel injection line into the vessel) assumed in the safety analyses for some transients. For CMT injection following a LOCA (steam will enter the CMT through the balance line, displacing the CMT water), gases in the CMT inlet line are ~~not~~**not** detrimental to the CMT function. The presence of some noncondensible gases does not mean that the CMT natural circulation capability is immediately inoperable, but that gases are collecting and should be vented.

The level sensor location has been selected to permit additional gas accumulation prior to significantly affecting the natural circulation flow so that adequate time may be provided to permit containment entry for venting the gas. Anticipated noncondensible gas accumulation in this piping segment is expected to be relatively slow.

The venting of these gases requires containment entry to manually operate the vent valves. A Completion Time of 24 hours is permitted for venting noncondensible gases and is acceptable, since, for the transients, the natural circulation capability of one CMT is adequate to ensure mitigation assuming less conservative analysis assumptions regarding stuck rods and core characteristics.

BASES

ACTIONS (continued)

E.1

With one CMT inoperable for reasons other than Condition A, B, ~~C,~~**or** D, operation of the CMT may not be available. Action must be taken to restore the inoperable CMT to OPERABLE status within 8 hours. The remaining CMT is sufficient for DBAs except for **a** LOCA **with a break** in the OPERABLE CMT**'s direct vessel injection (**DVI**)** line. The 8 hour Completion Time is based on the required availability of ~~injection from~~ the accumulators ~~(provided that concurrent entry into Condition B of LCO 3.5.1 has not occurred)~~ to provide ~~SI~~**safety** injection **(that is, concurrent entry into Condition B of LCO 3.5.1 has not occurred)**. The effectiveness of accumulator injection is demonstrated in analysis performed to justify PRA success criteria (Ref. 3). The analysis contained in this reference shows that for a small **break** LOCA, the injection from one accumulator without any CMT supports adequate core cooling. This analysis provides a high confidence that with the unavailability of one CMT, the core can be cooled following ~~design bases accidents~~**any DBA**.

~~The~~**If LCO 3.5.1 Condition B is entered concurrent with this Condition, then a 1 hour Completion Time from discovery of LCO 3.5.2 Condition E entry concurrent with LCO 3.5.1 Condition B entry also applies. This** 1 hour Completion Time~~, in the case with simultaneous entry into Condition B of LCO 3.5.1,~~ requires very prompt actions to restore either the CMT or the accumulator **(per LCO 3.5.1 Condition B)** to OPERABLE status. This Completion Time is considered reasonable because of the low probability of simultaneously entering these multiple PXS Conditions and the very small likelihood of a LOCA occurring at the same time.

F.1 and F.2

If the Required Action or associated Completion Time of Condition A, B, C, D, or E are not met or ~~the LCO is not met~~**two CMTs are inoperable** for reasons other than Condition~~s~~ **C**~~A through E~~, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.1 and SR 3.5.2.2

Verification every 24 hours and 7 days that the temperature and the volume, respectively, of the borated water in each CMT is within limits ensures that when a CMT is needed to inject water into the RCS, the injected water temperature and volume will be within the limits assumed in the accident analysis. The 24 hour Frequency is adequate, based on the fact that no mechanism exists to rapidly change the temperature of a large tank of water such as a CMT. These parameters are normally monitored in the control room by indication and alarms. Also, there are provisions for monitoring the temperature of the inlet and outlet lines to detect in-leakage which may affect the CMT water temperature.

SR 3.5.2.3

Each CMT inlet isolation valve must be verified to be fully open each 12 hours. Frequent verification is considered to be important, since a CMT **cannot**~~can not~~ perform its safety function, if the valve is closed. Control room instrumentation is normally available for this verification.

SR 3.5.2.4

Verification that excessive amounts of noncondensible gases have not caused the water level to drop below the sensor in the inlet line is required every 24 hours. The inlet line of each CMT has a vertical section of pipe which serves as a high point collection point for noncondensible gases. Control room indication of the water level in the high point collection point is available to verify that noncondensible gases have collected to the extent that the water level is depressed below the allowable level. The thermal dispersion sensor locations on the vertical pipe sections have been selected to permit additional gas accumulation before injection flow is significantly affected so that adequate time may be provided to permit containment entry for venting the gas.

The 24 hour Frequency is based on the expected low rate of gas accumulation and the availability of control room indication.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.2.5

Verification every 7 days that the boron concentration in each CMT is within the required limits ensures that the reactivity control from each CMT, assumed in the safety analysis, will be available as required. The 7 day Frequency is adequate to promptly identify changes which could occur from mechanisms such as in-leakage.

SR 3.5.2.6

Verification that the redundant outlet isolation valves are OPERABLE by stroking the valves open ensures that each CMT will function as designed when these valves are actuated. Prior to opening the outlet isolation valves, the inlet isolation valve should be closed temporarily. Closing the inlet isolation valve ensures that the CMT contents will not be diluted or heated by flow from the RCS. Upon completion of the test, the inlet isolation valves must be opened. The Surveillance Frequency references the inservice testing requirements.

SR 3.5.2.7

This SR verifies that CMT outlet isolation valve actuates to the correct position on an actual or simulated actuation signal. The ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function. The Frequency of 24 months is based on the need to perform this surveillance during periods in which the plant is shutdown for refueling to prevent any upsets of plant operation.

SR 3.5.2.~~7~~8

This SR requires performance of a system performance test of each CMT to verify flow capabilities. The system performance test demonstrates that the CMT injection line resistance assumed in DBA analyses is maintained. Although the likelihood that system performance would degrade with time is low, it is considered prudent to periodically verify system performance. The System Level Operability Testing Program provides specific test requirements and acceptance criteria.

BASES

REFERENCES

1. **FSAR** Section 6.3, “Passive Core Cooling System.”
2. **FSAR** Chapter 15, “Accident Analys~~i~~es.”
3. ~~AP1000 PRA~~**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)

3.5.2 Core Makeup Tanks (CMTs) – Operating

LCO 3.5.2 Both CMTs shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 with the Reactor Coolant System (RCS) not being cooled by the Normal Residual Heat Removal System (RNS).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CMT inoperable due to one CMT outlet isolation valve inoperable.	A.1 Restore outlet isolation valve to OPERABLE status.	72 hours
B. One CMT inoperable due to water temperature or boron concentration not within limits.	B.1 Restore water temperature and boron concentration to within limits.	72 hours
C. Two CMTs inoperable due to water temperature or boron concentration not within limits.	C.1 Restore water temperature and boron concentration to within limits for one CMT.	1 hour from discovery of LCO 3.5.2 Condition C entry concurrent with LCO 3.5.1 Condition B entry AND 8 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One CMT inlet line with noncondensible gas volume not within limit.	D.1 Restore CMT inlet line noncondensible gas volume to within limit.	24 hours
E. One CMT inoperable for reasons other than Condition A, B, or D.	E.1 Restore CMT to OPERABLE status.	1 hour from discovery of LCO 3.5.2 Condition E entry concurrent with LCO 3.5.1 Condition B entry AND 8 hours
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met. OR Two CMTs inoperable for reasons other than Condition C.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify the temperature of the borated water in each CMT is < 120°F.	24 hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.2	Verify the borated water volume in each CMT is ≥ 2500 cu ft.	7 days
SR 3.5.2.3	Verify each CMT inlet isolation valve is fully open.	12 hours
SR 3.5.2.4	Verify the volume of noncondensible gases in each CMT inlet line has not caused the high point water level to drop below the sensor.	24 hours
SR 3.5.2.5	Verify the boron concentration in each CMT is ≥ 3400 ppm, and ≤ 3700 ppm.	7 days
SR 3.5.2.6	Verify each CMT outlet isolation valve strokes open.	In accordance with the Inservice Testing Program
SR 3.5.2.7	Verify each CMT outlet isolation valve actuates to the open position on an actual or simulated actuation signal.	24 months
SR 3.5.2.8	Verify system flow performance of each CMT in accordance with the System Level OPERABILITY Testing Program.	10 years

B 3.5 PASSIVE CORE COOLING SYSTEM (PXS)

B 3.5.2 Core Makeup Tanks (CMTs) – Operating

BASES

BACKGROUND

Two redundant CMTs provide sufficient borated water to assure Reactor Coolant System (RCS) reactivity and inventory control for all design basis accidents (DBAs), including both loss of coolant accident (LOCA) events and non-LOCA events (Ref. 1).

The CMTs are cylindrical tanks with hemispherical upper and lower heads. They are made of carbon steel and clad on the internal surfaces with stainless steel. They are located in containment at an elevation slightly above the reactor coolant loops. Each tank is full of borated water at > 3400 ppm. During normal operation, the CMTs are maintained at RCS pressure through a normally open pressure balance line from the cold leg.

The outlet line from each CMT is connected to one of two direct vessel injection lines, which provides an injection path for the water supplied by the CMT. The outlet line from each CMT is isolated by parallel, normally closed, fail open valves. Upon receipt of a safeguards actuation signal, these four valves open to align the CMTs to the RCS.

The CMTs will inject to the RCS as inventory is lost and steam or reactor coolant is supplied to the CMT to displace the water that is injected. Steam or reactor coolant is provided to the CMT through the cold leg balance line, depending upon the specific event that has occurred. The inlet line from the cold leg is sized for LOCA events, where the cold legs become voided and higher CMT injection flows are required.

The injection line from each CMT contains a flow tuning orifice that is used to provide a mechanism for the field adjustment of the injection line resistance. The orifice is used to establish the required flow rates for the associated plant conditions assumed in the CMT design. The CMT flow is based on providing injection for a minimum of 20 minutes after CMT actuation.

The CMT size and injection capability are selected to provide adequate RCS boration and safety injection for the limiting DBA. One CMT is adequate for this function during a small break LOCA where one CMT completely spills via the pipe break (Ref. 2). The probabilistic risk assessment (PRA) (Ref. 3) shows that none of the CMTs are

BASES

BACKGROUND (continued)

required for small break LOCAs, assuming that at least one accumulator is available.

APPLICABLE SAFETY ANALYSES

The CMTs are assumed to be OPERABLE to provide emergency boration and core makeup when the Chemical and Volume Control System (CVS) is inoperable, and to mitigate the consequences of any DBA which requires the safety injection of borated water (Ref. 2).

Following a non-LOCA event such as a steam line break, the RCS experiences a decrease in temperature and pressure due to an increase in energy removal by the secondary system. The cooldown results in a reduction of the core SHUTDOWN MARGIN due to the negative moderator temperature coefficient, with a potential for return to power. The actuation of the CMTs following this event provides injection of borated water to mitigate the reactivity transient and ensure the core remains shut down.

In the case of a steam generator tube rupture (SGTR), CMT injection provides borated water to compensate for RCS LEAKAGE.

In the case of an RCS leak of 10 gallons per minute, the CMTs can delay depressurization for at least 10 hours, providing makeup to the RCS and remain able to provide the borated water to compensate for RCS shrinkage and to assure the RCS boration for a safe shutdown.

In the case of a LOCA, the CMTs provide a relatively large makeup flow rate for approximately 20 minutes, in conjunction with the accumulators to provide the initial core cooling.

CMTs satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO establishes the limits on CMT parameters and conditions on CMT components necessary to ensure that the CMT flow assumed in the safety analyses will be available. 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 natural circulation flow.

BASES

LCO (continued)

Therefore, noncondensible gas accumulation in the inlet 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).

Each CMT represents 100% of the total injected borated water assumed in LOCA analysis. If the injection line from a single CMT to the vessel breaks, no single active failure on the other CMT will prevent the injection of borated water into the vessel. Thus the assumptions of the LOCA analysis will be satisfied.

For non-LOCA analysis, two CMTs are assumed. Note that for non-LOCA analysis, the accident cannot disable a CMT.

APPLICABILITY

In MODES 1, 2, and 3, and in MODE 4 when the RCS is not being cooled by the Normal Residual Heat Removal System (RNS) the CMTs are required to be OPERABLE to provide borated water for RCS inventory makeup and reactivity control following a design basis event and subsequent cooldown.

The CMT requirements in MODE 5 with the RCS pressure boundary intact are specified in LCO 3.5.3, “Core Makeup Tanks (CMTs) - Shutdown, RCS Intact.”

The CMTs are not required to be OPERABLE while in MODE 5 with the RCS pressure boundary open or in MODE 6 because the RCS is depressurized and borated water can be supplied from the In-containment Refueling Water Storage Tank (IRWST), if needed.

In the unlikely event of a total loss of AC power sources, coupled with an inoperable Passive Residual Heat Removal Heat Exchanger (PRHR HX) (beyond DBA), the CMTs may be used in a feed and bleed sequence to remove heat from the RCS.

BASES

ACTIONS

A.1

With one outlet isolation valve inoperable on one CMT, action must be taken to restore the valve. In this Condition, the CMT is capable of performing its safety function, provided a single failure of the remaining parallel isolation valve does not occur. A Completion Time of 72 hours is acceptable for a two train emergency core cooling system (ECCS) which is capable of performing its safety function without a single failure.

B.1

If the water temperature or boron concentration of one CMT is not within limits, it must be returned to within limits within 72 hours. The deviations in these parameters are expected to be slight, considering the frequent surveillances and control room monitors. With the temperature above the limit, the full core cooling capability assumed in the safety analysis may not be available. With the boron concentration not within limits, the ability to maintain subcriticality following a DBA may be degraded. However, because only one of two CMTs is inoperable, and the deviations of these parameters are expected to be slight, it is probable that more than a required amount of boron and cooling capability will be available to meet the conditions assumed in the safety analysis.

Since the CMTs are redundant, safety class components, the 72 hour Completion Time is consistent with the times normally allowed for this type of component.

C.1

With two CMTs inoperable due to water temperature or boron concentration, at least one CMT must be restored to within limits in 8 hours. The deviations in these parameters are expected to be slight, considering the frequent surveillances and control room monitors. A Completion Time of 8 hours is considered reasonable since the CMTs are expected to be capable of performing their safety function with slight deviations in these parameters and the accumulators are required to be available for LOCA mitigation (i.e., concurrent entry into Condition B of LCO 3.5.1 has not occurred). The effectiveness of accumulator injection is demonstrated in analysis performed to justify PRA success criteria (Ref. 3). The analysis contained in this reference shows that for a small break LOCA, the injection from one accumulator without any CMT injection supports adequate core cooling. This analysis provides a high confidence that with the unavailability of two CMTs due to water

ACTIONS (continued)

temperature or boron concentration deviations, the core can be cooled following design bases accidents.

If LCO 3.5.1 Condition B is entered concurrent with this Condition, then a 1 hour Completion Time from discovery of LCO 3.5.2 Condition C entry concurrent with LCO 3.5.1 Condition B entry also applies. This 1 hour Completion Time requires very prompt actions to restore either the CMT or the accumulator (per LCO 3.5.1 Condition B) to OPERABLE status. This Completion Time is considered reasonable because of the low probability of simultaneously entering these multiple PXS Conditions and the very small likelihood of a LOCA occurring at the same time.

D.1

Excessive amounts of noncondensible gases in a CMT inlet line may interfere with the natural circulation flow (hot water from the RCS through the balance line into the CMT and cold water from the CMT through the direct vessel injection line into the vessel) assumed in the safety analyses for some transients. For CMT injection following a LOCA (steam will enter the CMT through the balance line, displacing the CMT water), gases in the CMT inlet line are not detrimental to the CMT function. The presence of some noncondensible gases does not mean that the CMT natural circulation capability is immediately inoperable, but that gases are collecting and should be vented.

The level sensor location has been selected to permit additional gas accumulation prior to significantly affecting the natural circulation flow so that adequate time may be provided to permit containment entry for venting the gas. Anticipated noncondensible gas accumulation in this piping segment is expected to be relatively slow.

The venting of these gases requires containment entry to manually operate the vent valves. A Completion Time of 24 hours is permitted for venting noncondensible gases and is acceptable, since, for the transients, the natural circulation capability of one CMT is adequate to ensure mitigation assuming less conservative analysis assumptions regarding stuck rods and core characteristics.

BASES

ACTIONS (continued)

E.1

With one CMT inoperable for reasons other than Condition A, B, or D, operation of the CMT may not be available. Action must be taken to restore the inoperable CMT to OPERABLE status within 8 hours. The remaining CMT is sufficient for DBAs except for a LOCA with a break in the OPERABLE CMT's direct vessel injection (DVI) line. The 8 hour Completion Time is based on the required availability of the accumulators to provide safety injection (that is, concurrent entry into Condition B of LCO 3.5.1 has not occurred). The effectiveness of accumulator injection is demonstrated in analysis performed to justify PRA success criteria (Ref. 3). The analysis contained in this reference shows that for a small break LOCA, the injection from one accumulator without any CMT supports adequate core cooling. This analysis provides a high confidence that with the unavailability of one CMT, the core can be cooled following any DBA.

If LCO 3.5.1 Condition B is entered concurrent with this Condition, then a 1 hour Completion Time from discovery of LCO 3.5.2 Condition E entry concurrent with LCO 3.5.1 Condition B entry also applies. This 1 hour Completion Time requires very prompt actions to restore either the CMT or the accumulator (per LCO 3.5.1 Condition B) to OPERABLE status. This Completion Time is considered reasonable because of the low probability of simultaneously entering these multiple PXS Conditions and the very small likelihood of a LOCA occurring at the same time.

F.1 and F.2

If the Required Action or associated Completion Time of Condition A, B, C, D, or E are not met or two CMTs are inoperable for reasons other than Condition C, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.5.2.1 and SR 3.5.2.2

Verification every 24 hours and 7 days that the temperature and the volume, respectively, of the borated water in each CMT is within limits ensures that when a CMT is needed to inject water into the RCS, the injected water temperature and volume will be within the limits assumed in the accident analysis. The 24 hour Frequency is adequate, based on the fact that no mechanism exists to rapidly change the temperature of a large tank of water such as a CMT. These parameters are normally monitored in the control room by indication and alarms. Also, there are provisions for monitoring the temperature of the inlet and outlet lines to detect in-leakage which may affect the CMT water temperature.

SR 3.5.2.3

Each CMT inlet isolation valve must be verified to be fully open each 12 hours. Frequent verification is considered to be important, since a CMT cannot perform its safety function, if the valve is closed. Control room instrumentation is normally available for this verification.

SR 3.5.2.4

Verification that excessive amounts of noncondensible gases have not caused the water level to drop below the sensor in the inlet line is required every 24 hours. The inlet line of each CMT has a vertical section of pipe which serves as a high point collection point for noncondensible gases. Control room indication of the water level in the high point collection point is available to verify that noncondensible gases have collected to the extent that the water level is depressed below the allowable level. The thermal dispersion sensor locations on the vertical pipe sections have been selected to permit additional gas accumulation before injection flow is significantly affected so that adequate time may be provided to permit containment entry for venting the gas.

The 24 hour Frequency is based on the expected low rate of gas accumulation and the availability of control room indication.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.2.5

Verification every 7 days that the boron concentration in each CMT is within the required limits ensures that the reactivity control from each CMT, assumed in the safety analysis, will be available as required. The 7 day Frequency is adequate to promptly identify changes which could occur from mechanisms such as in-leakage.

SR 3.5.2.6

Verification that the redundant outlet isolation valves are OPERABLE by stroking the valves open ensures that each CMT will function as designed when these valves are actuated. Prior to opening the outlet isolation valves, the inlet isolation valve should be closed temporarily. Closing the inlet isolation valve ensures that the CMT contents will not be diluted or heated by flow from the RCS. Upon completion of the test, the inlet isolation valves must be opened. The Surveillance Frequency references the inservice testing requirements.

SR 3.5.2.7

This SR verifies that CMT outlet isolation valve actuates to the correct position on an actual or simulated actuation signal. The ACTUATION LOGIC TEST overlaps this Surveillance to provide complete testing of the assumed safety function. The Frequency of 24 months is based on the need to perform this surveillance during periods in which the plant is shutdown for refueling to prevent any upsets of plant operation.

SR 3.5.2.8

This SR requires performance of a system performance test of each CMT to verify flow capabilities. The system performance test demonstrates that the CMT injection line resistance assumed in DBA analyses is maintained. Although the likelihood that system performance would degrade with time is low, it is considered prudent to periodically verify system performance. The System Level Operability Testing Program provides specific test requirements and acceptance criteria.

BASES

REFERENCES

1. FSAR Section 6.3, “Passive Core Cooling System.”

2. FSAR Chapter 15, “Accident Analyses.”

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