

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

Title: Changes Related to LCO 3.5.3, Core Makeup Tanks (CMTs) - Shutdown, Reactor Coolant System (RCS) Intact

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-359-A, Rev. 9, Increase Flexibility in MODE Restraints

STS NUREGs Affected:

TSTF-359-A, Rev. 9: NUREG-1430, 1431, 1432, 1433, 1434

NRC Approval Date:

TSTF-359-A, Rev. 9: 12-May-03

TSTF Classification:

TSTF-359-A, Rev. 9: 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 A069: TS 3.5.3 Condition C revision
VEGP LAR DOC A070: TS 3.5.3 Required Action D.1 revision
VEGP LAR DOC A071: TS 3.5.3 revision to Condition associated with water temperature and born concentration
VEGP LAR DOC A072: TS 3.5.3 Condition D entry statement revision
VEGP LAR DOC L01: Added SR for valve actuation

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

This section discusses changes: (1) that were applicable to previous designs, but are not to the current design; (2) that are already incorporated in the GTS; and (3) that are superseded by another change.

TSTF-359-A, Rev. 9 adds the note "LCO 3.0.4b is not applicable to ECCS high head subsystems" to the "Actions" table of Specification 3.5.3. The note is added because the loss of inventory events, due to RHR system misalignments, have been shown to contribute significantly to the risk of Mode 4 operation in shutdown PRA models. To reduce the risks from this event it is important to ensure the appropriate mitigation system is available. This includes the high head safety injection system to supply coolant for inventory control. Based on the difference between the Westinghouse 4-loop PWR design ECCS high head subsystem and the AP1000 Passive Core Cooling System (PXS) Core Makeup Tanks (CMTs), this change is not applicable and therefore is not incorporated into the AP1000 Specification 3.5.3.

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 "...Removal System (RNS)." from a period to a comma.

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.5.3 Core Makeup Tanks (CMTs) – Shutdown, Reactor Coolant System (RCS) Intact

Changes to the Generic Technical Specifications and Bases:

Applicability statement is revised to correct punctuation.

Condition B of TS 3.5.3 is revised from "Required CMT inoperable due to one or more parameters (water temperature, boron concentration) not within limits." to "Required CMT inoperable due to water temperature or boron concentration not within limits." (DOC A071)

Required Action B.1 of TS 3.5.3 is revised from "Restore water temperature or boron concentration to within limits." to "Restore water temperature and boron concentration to within limits." (DOC A071)

Condition C of TS 3.5.3 is revised by adding the word "Condition" before "...A or B." (DOC A069)

Condition D and associated Bases of TS 3.5.3 is revised by deleting the second entry statement "LCO not met for reasons other than A, B, or C." (DOC A072)

Required Action D.1 and associated Bases of TS 3.5.3 is revised from "Initiate action to be in MODE 5 with RCS pressure boundary open and \geq 20% pressurizer level." to "Initiate action to be in MODE 5 with RCS pressure boundary open." (DOC A070)

The Bases for SR 3.5.3.1 is revised by updating the reference "SR 3.5.2.7" to "SR 3.5.2.8". (DOC L01)

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 A069 corrects Condition C of TS 3.5.3 by adding the word "Condition" before "...A or B."

VEGP LAR DOC A070 revises Required Action D.1 and associated Bases of TS 3.5.3 from "Initiate action to be in MODE 5 with RCS pressure boundary open and \geq 20% pressurizer level." to "Initiate action to be in MODE 5 with RCS pressure boundary open."

VEGP LAR DOC A071 revises Condition B entry statement by specifying the parameters not within limits as "water temperature or boron concentration". Required Action B.1 is revised to state that both water temperature and boron concentration need to be restored to within limits.

VEGP LAR DOC A072 revises Condition D and associated Bases by deleting the second entry statement.

VEGP LAR DOC L01 revises Bases for SR 3.5.3.1 by updating the referenced SR from "SR 3.5.2.7" to "SR 3.5.2.8".

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

The VEGP LAR DOC A069 change to Condition C entry statement provides consistency with the writer's guide, TSTF-GG-05-01.

The VEGP LAR DOC A070 change to Required Action D.1 and associated Bases does not change the intent of the Required Action. Once the RCS pressure Boundary is open in MODE 5 the \geq 20% pressurizer level is no longer applicable.

The VEGP LAR DOC A071 change to Condition B entry statement to specify the parameters of water temperature and boron concentration provides clarification. The change to Required Action B.1 to specify both water temperature and boron concentration need to be restored within limits also provides clarification.

VEGP LAR DOC A072 removes the second entry condition of Condition D since it is a duplicate entry condition to Condition C.

The VEGP LAR DOC L01 change to the referenced SRs in the Bases for SR 3.5.3.1 is an editorial change due to the addition of new SR 3.5.2.7 in STS 3.5.2.

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

The Applicability statement is revised by changing the period after "...Removal System (RNS)." to a comma.

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

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

VII. GTST Safety Evaluation

Technical Analysis:

The changes to TS 3.5.3 and associated Bases 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.

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 Friday, May 23, 2014.

NRC Final Approval Date:

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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. 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)
4. TSTF-GG-05-01, "Writer's Guide for Plant-Specific Improved Technical Specifications," June 2005 (ML070660229).
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XI. MARKUP of the Applicable GTS Section 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)

3.5.3 Core Makeup Tanks (CMTs) – Shutdown, Reactor Coolant System (RCS) Intact

LCO 3.5.3 One CMT shall be OPERABLE.

APPLICABILITY: MODE 4 with the RCS cooling provided by the Normal Residual Heat Removal System (RNS);
MODE 5 with the RCS pressure boundary intact.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required CMT inoperable due to one outlet isolation valve inoperable.	A.1 Restore required isolation valve to OPERABLE status.	72 hours
B. Required CMT inoperable due to one of more parameters (water temperature, or boron concentration) not within limits.	B.1 Restore water temperature or and boron concentration to within limits.	72 hours
C. Required CMT inoperable for reasons other than Condition A or B.	C.1 Restore required CMT to OPERABLE status.	8 hours
D. Required Action and associated Completion Time not met. OR LCO not met for reasons other than A, B, or C.	D.1 Initiate action to be in MODE 5 with RCS pressure boundary open and \geq 20% pressurizer level.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.5.3.1 For the CMT required to be OPERABLE, the SRs of Specification 3.5.2, “Core Makeup Tanks (CMTs) – Operating” are applicable.	In accordance with applicable SRs

B 3.5 PASSIVE CORE COOLING SYSTEM (PXS)

B 3.5.3 Core Makeup Tanks (CMTs) – Shutdown, Reactor Coolant System (RCS) Intact

BASES

BACKGROUND	A description of the CMTs is provided in the Bases for LCO 3.5.2, “Core Makeup Tanks – Operating.”
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APPLICABLE SAFETY ANALYSES	<p>When the plant is shutdown with the Reactor Coolant System (RCS) pressure boundary intact, the CMT and Passive Residual Heat Removal (PRHR) are the preferred methods for mitigation of postulated events such as loss of normal decay heat removal capability (either loss of Startup Feedwater or loss of normal residual heat removal system). The CMT and PRHR are preferred because the RCS pressure boundary can remain intact, thus preserving one of the barriers to fission product release. For these events, the PRHR provides the safety related heat removal path. And the CMT maintains RCS inventory control. These events can also be mitigated by In-containment Refueling Water Storage Tank (IRWST) injection; however, the RCS must be depressurized (vented) in order to facilitate IRWST injection.</p>
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Since no loss of coolant accidents (LOCAs) are postulated during MODES 5 and 6, the possibility of a break in the direct vessel injection line is not considered. As a result, only one CMT is required to be available to provide core cooling in response to postulated events. The two parallel CMT outlet isolation valves ensure that injection from one CMT occurs in the event of a single active failure.

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

LCO	<p>This LCO establishes the minimum conditions necessary to ensure that one CMT will be available for RCS inventory control in the event of the loss of normal decay heat removal capability. The two CMT outlet isolation valves must be OPERABLE to ensure that at least one valve will operate, assuming that the other valve is disabled by a single active failure.</p>
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BASES

APPLICABILITY In MODE 4 without steam generator heat removal and in MODE 5 with the RCS pressure boundary intact, one CMT is required to provide borated water to the RCS in the event the non safety related chemical and volume control system makeup pumps are not available to provide RCS inventory control.

The CMT requirements in MODES 1, 2, 3, and 4 are specified in LCO 3.5.2, “Core Makeup Tanks (CMTs) – Operating.”

The CMTs are not required to be OPERABLE while in MODE 5 with the RCS open or in MODE 6 because the RCS is depressurized and borated water can be supplied from the IRWST, if needed.

ACTIONSA.1

With one outlet isolation valve inoperable 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 consistent with times normally applied to an ECCS system which is capable of performing its safety function without a single failure.

B.1

If the water temperature or boron concentration in the CMT is not within limits, it must be returned to within limits within 72 hours. With the temperature above the limit the makeup capability assumed in the safety analysis may not be available. With the boron concentration not within limits, the ability to maintain subcriticality may be degraded.

Because the mechanisms for significantly altering these parameters in the CMT are limited, it is probable that more than the required amount of boron and cooling capacity will be available to meet the conditions assumed in the safety analysis. Therefore, the 72 hour Completion Time is acceptable.

BASES

ACTIONS (continued)C.1

With the required CMT inoperable for reasons other than Condition A or B operation of the CMT may not be available. Action must be taken to restore the inoperable CMT to OPERABLE status within 8 hours. LOCAs are not postulated during the MODEs when this LCO is applicable. The only safety function is to provide LEAKAGE makeup in case normal RCS makeup is unavailable. The 8 hour Completion Time is based on the availability of injection from the IRWST to provide RCS makeup. The ability of the IRWST to provide RCS injection is demonstrated by analysis performed to show that IRWST injection together with ADS venting provides adequate core cooling. Such analysis was performed for the loss of RNS cooling during midloop operations. The analysis was performed in support of the AP1000 PRA (Ref. 2).

D.1

If the Required Action or associated Completion Time of Conditions A, B, or C are not met ~~or the LCO is not met for reasons other than Conditions A through C,~~ action must be initiated, immediately, to place the plant in a MODE where this LCO does not apply. Action must be initiated, immediately, to place the plant in MODE 5 with RCS pressure boundary open ~~and \geq 20% pressurizer level.~~ In this condition, core cooling and RCS makeup are provided by IRWST injection and sump recirculation. Opening of the ADS valves ensures that IRWST injection can occur.

**SURVEILLANCE
REQUIREMENTS**SR 3.5.3.1

The LCO 3.5.2 Surveillance Requirements (SR 3.5.2.1 through 3.5.2.78) are applicable to the CMT required to be OPERABLE. The Frequencies associated with each specified SR are applicable. Refer to the corresponding Bases for LCO 3.5.2 for a discussion of each SR.

BASES

- REFERENCES
1. Section 6.3, "Passive Core Cooling System."
 2. AP1000 PRA.
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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)

3.5.3 Core Makeup Tanks (CMTs) – Shutdown, Reactor Coolant System (RCS) Intact

LCO 3.5.3 One CMT shall be OPERABLE.

APPLICABILITY: MODE 4 with the RCS cooling provided by the Normal Residual Heat Removal System (RNS),
MODE 5 with the RCS pressure boundary intact.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required CMT inoperable due to one outlet isolation valve inoperable.	A.1 Restore required isolation valve to OPERABLE status.	72 hours
B. Required 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. Required CMT inoperable for reasons other than Condition A or B.	C.1 Restore required CMT to OPERABLE status.	8 hours
D. Required Action and associated Completion Time not met.	D.1 Initiate action to be in MODE 5 with RCS pressure boundary open.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.5.3.1 For the CMT required to be OPERABLE, the SRs of Specification 3.5.2, “Core Makeup Tanks (CMTs) – Operating” are applicable.	In accordance with applicable SRs

B 3.5 PASSIVE CORE COOLING SYSTEM (PXS)

B 3.5.3 Core Makeup Tanks (CMTs) – Shutdown, Reactor Coolant System (RCS) Intact

BASES

BACKGROUND	A description of the CMTs is provided in the Bases for LCO 3.5.2, “Core Makeup Tanks – Operating.”
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APPLICABLE SAFETY ANALYSES	<p>When the plant is shutdown with the Reactor Coolant System (RCS) pressure boundary intact, the CMT and Passive Residual Heat Removal (PRHR) are the preferred methods for mitigation of postulated events such as loss of normal decay heat removal capability (either loss of Startup Feedwater or loss of normal residual heat removal system). The CMT and PRHR are preferred because the RCS pressure boundary can remain intact, thus preserving one of the barriers to fission product release. For these events, the PRHR provides the safety related heat removal path. And the CMT maintains RCS inventory control. These events can also be mitigated by In-containment Refueling Water Storage Tank (IRWST) injection; however, the RCS must be depressurized (vented) in order to facilitate IRWST injection.</p>
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CMTs satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO	<p>This LCO establishes the minimum conditions necessary to ensure that one CMT will be available for RCS inventory control in the event of the loss of normal decay heat removal capability. The two CMT outlet isolation valves must be OPERABLE to ensure that at least one valve will operate, assuming that the other valve is disabled by a single active failure.</p>
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BASES

APPLICABILITY In MODE 4 without steam generator heat removal and in MODE 5 with the RCS pressure boundary intact, one CMT is required to provide borated water to the RCS in the event the non safety related chemical and volume control system makeup pumps are not available to provide RCS inventory control.

The CMT requirements in MODES 1, 2, 3, and 4 are specified in LCO 3.5.2, “Core Makeup Tanks (CMTs) – Operating.”

The CMTs are not required to be OPERABLE while in MODE 5 with the RCS open or in MODE 6 because the RCS is depressurized and borated water can be supplied from the IRWST, if needed.

ACTIONSA.1

With one outlet isolation valve inoperable 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 consistent with times normally applied to an ECCS system which is capable of performing its safety function without a single failure.

B.1

If the water temperature or boron concentration in the CMT is not within limits, it must be returned to within limits within 72 hours. With the temperature above the limit the makeup capability assumed in the safety analysis may not be available. With the boron concentration not within limits, the ability to maintain subcriticality may be degraded.

Because the mechanisms for significantly altering these parameters in the CMT are limited, it is probable that more than the required amount of boron and cooling capacity will be available to meet the conditions assumed in the safety analysis. Therefore, the 72 hour Completion Time is acceptable.

BASES

ACTIONS (continued)C.1

With the required CMT inoperable for reasons other than Condition A or B operation of the CMT may not be available. Action must be taken to restore the inoperable CMT to OPERABLE status within 8 hours. LOCAs are not postulated during the MODEs when this LCO is applicable. The only safety function is to provide LEAKAGE makeup in case normal RCS makeup is unavailable. The 8 hour Completion Time is based on the availability of injection from the IRWST to provide RCS makeup. The ability of the IRWST to provide RCS injection is demonstrated by analysis performed to show that IRWST injection together with ADS venting provides adequate core cooling. Such analysis was performed for the loss of RNS cooling during midloop operations. The analysis was performed in support of the AP1000 PRA (Ref. 2).

D.1

If the Required Action or associated Completion Time of Conditions A, B, or C are not met action must be initiated, immediately, to place the plant in a MODE where this LCO does not apply. Action must be initiated, immediately, to place the plant in MODE 5 with RCS pressure boundary open. In this condition, core cooling and RCS makeup are provided by IRWST injection and sump recirculation. Opening of the ADS valves ensures that IRWST injection can occur.

**SURVEILLANCE
REQUIREMENTS**SR 3.5.3.1

The LCO 3.5.2 Surveillance Requirements (SR 3.5.2.1 through 3.5.2.8) are applicable to the CMT required to be OPERABLE. The Frequencies associated with each specified SR are applicable. Refer to the corresponding Bases for LCO 3.5.2 for a discussion of each SR.

BASES

- REFERENCES
1. Section 6.3, "Passive Core Cooling System."
 2. AP1000 PRA.
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