

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

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**Title: Changes Related to LCO 3.6.8, Containment Penetrations**

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**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:**

None

**STS NUREGs Affected:**

Not Applicable

**NRC Approval Date:**

Not Applicable

**TSTF Classification:**

Not Applicable

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**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:**

VEGP COL Item B3.6.8: Figure B 3.6.8-1, removal of brackets

**RCOL PTS Change Number and Title:**

VEGP LAR DOC A031: TS 3.6.8 Required Action B revision

VEGP LAR DOC A038: SR 3.6.8.2 clarification revision

VEGP LAR DOC A052: TS 3.6.8 Condition B revision

VEGP LAR DOC A088: SR 3.6.8.2 revision

VEGP LAR DOC M13: Combined TS 3.6.6 and TS 3.6.7

VEGP LAR DOC D07: TS 3.6.8 LCO statement revision

VEGP LAR DOC L18: TS 3.6.8 LCO statement revision and deletion of SR 3.6.8.3

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**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to previous designs, but are not to the current design; (2) that are already incorporated in the GTS; and (3) that are superseded by another change.

In the bases discussion of Actions B.1.1, B.1.2, and B.2, the term “reactor” is replaced with “refueling” to be consistent with the original text prior to changes under VEGP LAR DOC A031.

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**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)**

In the bases discussion of Actions B.1.1, B.1.2, and B.2, the term “reactor” is replaced with “refueling”.

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## V. Applicability

### **Affected Generic Technical Specifications and Bases:**

Section 3.6.8 Containment Penetrations

### **Changes to the Generic Technical Specifications and Bases:**

TS 3.6.8 is renumbered as TS 3.6.7. (DOC M13)

TS 3.6.8 "LCO" statement and associated bases is revised to remove clarifying detail "clear of obstructions". (DOC D07)

TS 3.6.8 "LCO" statement and associated bases for containment atmosphere to the outside atmosphere is revised. (DOC L18)

Condition B is revised to clarify that the Action and associated Completion Time not met is of Condition A. (DOC A052)

Required Action B.1.1 and B.1.2 and associated bases are revised for clarification. (DOC A031)

SR 3.6.8.2 is revised by deleting the word "that" and changing the word "install" to "close" from the SR statement. (DOC A038 and DOC A088)

SR 3.6.8.3 and the associated bases is deleted. (DOC L18)

The "Background" section of the bases is revised by deleting "AP1000" from the discussion of overdraining the RCS. (VEGP LAR change)

The Action A.1 of the "Actions" section of the bases is revised to clarify the bases for restoring containment penetrations to required status when one or more containment penetrations not required status. (DOC L18)

The "Actions" section of the bases is revised to correct an editorial error; the term "reactor" is replaced with "refueling."

Bases for SR 3.6.8.1 is revised to remove clarifying detail "clear of obstructions" and adds for purge and exhaust penetration may be verified closed or capable of being closed prior to steaming into the containment. (DOC D07 and DOC L18)

Figure B 3.6.8-1 in the bases is revised by removing brackets from the figure. (COL Item B3.6.8)

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**VI. Traveler Information****Description of TSTF changes:**

None

**Rationale for TSTF changes:**

None

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

VEGP LAR DOC A031 revises Required Action B.1.1 and B.1.2. Required Action B.1.1 is revised from "If in MODE 5, initiate action to be in MODE 5 with the Reactor Coolant System (RCS) pressure boundary intact and  $\geq 20\%$  pressurizer level" to "If in MODE 5, initiate action to establish  $\geq 20\%$  pressurizer level with the Reactor Coolant System (RCS) pressure boundary intact." Required Action B.1.2 is revised from "If in MODE 6, initiate action to be in MODE 6 with the water level  $\geq 23$  feet above the top of the reactor vessel flange," to "If in MODE 6, initiate action to establish water level  $\geq 23$  feet above the top of the reactor vessel flange." Action B.1.1, B.1.2, and B.2 of the "Actions" section of the bases is revised to be consistent with changes made to Required Action B.1.1 and B.1.2.

VEGP LAR DOC A038 deletes the word "that" from SR 3.6.8.2.

VEGP LAR DOC A052 revises the first entry condition of Condition B by specifying "Condition A" in the statement.

VEGP LAR DOC A088 revises SR 3.6.8.2 statement "hardware, tools, equipment and power source necessary to install the equipment hatch are available." by replacing "install" with "close". SR 3.6.8.2 in the "Surveillance Requirements" section of the bases is revised to be consistent with changes to SR 3.6.8.2.

VEGP LAR DOC M13 renumbers TS 3.6.8 to TS 3.6.7.

VEGP LAR DOC D07 revises LCO 3.6.8.a, b, and c by deleting the statement "clear of obstructions". The "LCO" section of the bases is also revised to reflect these changes.

VEGP LAR DOC L18 revises LCO 3.6.8.d.1 and the last paragraph of the "Background" section of the bases by adding the statement "prior to steaming into the containment" and LCO 3.6.8.d.2 is deleted. The "LCO" section of the bases is also revised to reflect these changes. Action A.1 of the "Actions" section of the bases is revised from ", including the containment isolation function not capable of actuation when automatic isolation valves are open," to ", including the containment isolation capability when automatic isolation valves are open,". SR 3.6.8.1 in the "Surveillance Requirements" section of the bases is revised to be consistent with changes to LCO 3.6.8.d and adding the statement "Alternately, purge and exhaust penetrations may be verified closed or capable of being closed prior to steaming into the containment, which will limit loss of the cooling water inventory from containment."

VEGP LAR changes the "Background" section of the bases by deleting "AP1000" from the discussion of overdraining the RCS.

VEGP COL Item B3.8.6 removes the brackets from Figure B 3.6.8-1 in the Bases.

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

VEGP LAR DOC A031 changes to Required Action B.1.1 and B.1.2 clarifies the Required Action statement by removing unnecessary reference to the Mode.

VEGP LAR DOC A038 deletes the word "that" from SR 3.6.8.2, which is consistent with guidance provided in TSTF-GG-05-01.

VEGP LAR DOC A052 Changes to the first entry condition of Condition B clarifies the statement by specifying the applicable Condition.

VEGP LAR DOC A088 revises SR 3.6.8.2 statement "hardware, tools, equipment and power source necessary to install the equipment hatch are available." by replacing "install" with "close". SR 3.6.8.2 in the "Surveillance Requirements" section of the bases is revised to be consistent with changes to SR 3.6.8.2.

VEGP LAR DOC M13 deletes TS 3.6.7 and subsequent sections are renumbered.

VEGP LAR DOC D07 changes to LCO 3.6.8.a, b, and c removes an unnecessary statement "clear of obstructions". The LCO continues to require the equipment hatches, air lock doors, and containment spare penetrations to be closed prior to steaming into the containment.

VEGP LAR DOC L18 changes to LCO 3.6.8.d remove requirements for Operable containment isolation signals in Modes 5 and 6. The only Containment Isolation Signals required by current TS 3.3.2 in Modes 5 and 6 are the manual initiation functions. There are no automatic isolation functions required.

VEGP LAR changes the "Background" section of the bases by deleting "AP1000" is editorial. Referencing the type of reactor is not necessary in discussing how the risk of overdraining the RCS has been significantly reduced.

VEGP COL Item B3.8.6 removes brackets from Figure B 3.6.8-1 since the figure is for illustration only and should not have been bracketed. VEGP COL Item B3.6.8 (see Reference 2), removal of the Reviewer's Note in B3.6.8 was in error by the applicant. Instead this item was meant to remove the brackets from Figure B 3.6.8-1.

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

In the bases discussion of Actions B.1.1, B.1.2, and B.2, the term "reactor" is replaced with "refueling".

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

The term "refueling" is consistent with the original text prior to changes under VEGP LAR DOC A031.

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## VII. GTST Safety Evaluation

### Technical Analysis:

VEGP LAR DOC D07: Current LCO 3.6.8.a, b, and c require the equipment hatches, air lock doors, and containment spare penetrations to be in the correct condition. This includes an allowance to have the penetrations open, provided they can be closed prior to steaming into the containment. The revised TS LCO continues to require the equipment hatches, air lock doors, and containment spare penetrations to be in the correct condition, and capable of being closed in time. The removal of the statement "clear of obstructions" from current LCO 3.6.8.a, b, and c is acceptable because this type of information is not necessary to be included in the TS to provide adequate protection of public health and safety.

The specific statement concerning "clear of obstructions" is not necessary since the LCO continues to require the equipment hatches, air lock doors, and containment spare penetrations to be closed prior to steaming into the containment. "Obstructions" are allowed such that they would not hamper closure time. The proposed TS retain the necessary requirements to ensure the components can be closed prior to steaming into the containment. The "clear of obstructions such that" clarification is cited in the Bases. This change is acceptable because these types of details are adequately controlled in the TS Bases.

VEGP LAR DOC L18: Current TS LCO 3.6.8.d provides the requirements for each penetration providing direct access from the containment atmosphere to the outside atmosphere. The penetrations covered by this LCO requirement are those providing direct access to the outside atmosphere, which includes the containment air filter supply and exhaust penetrations, and the vent and purge valves and the vacuum relief valves. The only Containment Isolation Signals required by current TS 3.3.2 in Modes 5 and 6 are the manual initiation functions. There are no automatic isolation functions required. Thus, LCO 3.6.8.d.2 is currently requiring the associated valves to be capable of closing from a Manual signal only.

For postulated shutdown events in Modes 5 and 6, RCS heat removal is provided by either passive residual heat removal (PRHR) or IRWST injection and containment sump recirculation. To support RCS heat removal, containment closure is required to limit the loss of the cooling water inventory from containment. Current LCO 3.6.8.a, b, and c provide the requirements for the equipment hatches, air locks doors, and containment spare penetrations. All three of these requirements allow the associated penetration to be open, provided that it is capable of being closed prior to steaming into the containment. This capability is not reliant on any remote closure signals or automatic features. Manual closure capability is acceptable. The equipment hatches and personnel air locks have openings that are much larger than the containment air filter supply and exhaust penetrations. Closing these larger penetrations may involve more protracted procedures to affect manual closure than would be for the containment air filter supply and exhaust penetrations. Therefore, it is acceptable to allow the purge valve penetrations to be open, provided they can be closed prior to steaming into the containment. This allows all four major penetration flow paths to be controlled in a similar manner. Current SR 3.6.8.3 is deleted, consistent with this change. Current SR 3.6.8.1 is adequate for ensuring the requirements of LCO 3.6.8.d.2, if being used to comply with the LCO, are verified on a periodic basis.

This change is less restrictive since the proposed LCO would remove requirements for operable containment isolation signals in Modes 5 and 6, allowing manual operator action to affect any required isolation. The design provisions for instrumented closure signals are unaffected. However, provided the appropriate closure timing capability is provided commensurate with the

timing necessary to achieve the closure prior to steaming into the containment, this change will not adversely impact public health and safety.

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.

**References to Previous NRC Safety Evaluation Reports (SERs):**

None

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**VIII. Review Information**

**Evaluator Comments:**

The AP1000 GTS 3.6.8 is for Containment Penetrations and is APPLICABLE in MODES 5 and 6. There is no equivalent Specifications in NUREG-1430 or NUREG-1431.

The markup to remove the brackets from figure B 3.6.8-1 was manually done in the Word document.

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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

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**X. References Used in GTST**

1. AP1000 DCD, Revision 19, Section 16, "Technical Specifications," June 2011 (ML11171A500).
2. Vogtle Electric Generating Plant (VEGP), Units 3 & 4 COL Application, Part 4, Technical Specifications, Revision 3 (ML11180A102).
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 (ML070660229).
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).

**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.

## 3.6 CONTAINMENT SYSTEMS

## 3.6.87 Containment Penetrations

LCO 3.6.87

The containment penetrations shall be in the following status:

- a. The equipment hatches closed and held in place by four bolts or, if open, ~~clear of obstructions such that the hatches~~ can be closed prior to steaming into the containment.
- b. One door in each air lock closed or, if open, ~~the containment air locks shall be clear of obstructions such that they~~ can be closed prior to steaming into the containment.
- c. The containment spare penetrations, if open, ~~shall be clear of obstructions such that the penetrations~~ can be closed prior to steaming into the containment.
- d. Each penetration providing direct access from the containment atmosphere to the outside atmosphere ~~either, if open, can be~~
  1. ~~closed by a manual or automatic isolation valve, blind flange, or equivalent, or~~ **prior to steaming into the containment.**
  2. ~~capable of being closed by an OPERABLE Containment Isolation signal.~~

APPLICABILITY: MODES 5 and 6.

## ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more containment penetrations not in required status.	A.1 Restore containment penetrations to required status.	1 hour

## ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met.  <u>OR</u>  LCO not met for reasons other than Condition A.	B.1.1 If in MODE 5, initiate action to <del>be in MODE 5</del> establish <b>≥ 20% pressurizer level</b> with the Reactor Coolant System (RCS) pressure boundary intact <del>and ≥ 20% pressurizer level.</del>	Immediately
	<u>OR</u>  B.1.2 If in MODE 6, initiate action to <del>be in MODE 6 with the</del> establish water level ≥ 23 feet above the top of the reactor vessel flange.	Immediately
	<u>AND</u>  B.2 Suspend positive reactivity additions.	Immediately

## SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.6.87.1 Verify each required containment penetration is in the required status.	7 days

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.6.87.2</p> <p>-----NOTE----- Only required to be met for an open equipment hatch. -----</p> <p>Verify <del>that</del> the hardware, tools, equipment and power source necessary to <del>install</del>close the equipment hatch are available.</p>	<p>Prior to hatch removal</p> <p><u>AND</u></p> <p>7 days</p>
<p>SR 3.6.8.3</p> <p>----- NOTE -----</p> <p><del>Not required to be met for automatic isolation valve(s) in penetrations closed to comply with LCO 3.6.8.d.1.</del></p> <p><del>Verify one automatic isolation valve in each open penetration providing direct access from the containment atmosphere to the outside atmosphere actuates to the isolation position on an actual or simulated actuation signal.</del></p>	<p>24 months</p>

## B 3.6 CONTAINMENT SYSTEMS

## B 3.6.87 Containment Penetrations

## BASES

## BACKGROUND

Containment closure capability is required during shutdown operations when there is fuel inside containment. Containment closure is required to maintain within containment the cooling water inventory. Due to the large volume of the In-Containment Refueling Water Storage Tank (IRWST) and the reduced sensible heat during shutdown, the loss of some of the water inventory can be accepted. Further, accident analyses have shown that containment closure capability is not required to meet offsite dose requirements. Therefore, containment does not need to be leak tight as required for MODES 1 through 4.

In MODES 5 and 6, the LCO requirements are referred to as “containment closure” rather than “containment OPERABILITY.” Containment closure means that all potential escape paths are closed or capable of being closed. Since there is no requirement for containment leak tightness, compliance with the Appendix J leakage criteria and tests are not required.

In MODES 5 and 6, there is no potential for steam release into the containment immediately following an accident. Pressurization of the containment could only occur after heatup of the IRWST due to Passive Residual Heat Removal Heat Exchanger (PRHR HX) operation (MODE 5 with RCS intact) or after heatup of the RCS with direct venting to the containment (MODE 5 with reduced RCS inventory or MODE 6 with the refueling cavity not fully flooded) or after heatup of the RCS and refueling cavity (MODE 6 with refueling cavity fully flooded). The time from loss of normal cooling until steam release to the containment for four representative sets of plant conditions is shown in Figure B 3.6.87-1 as a function of time after shutdown. Because local manual action may be required to achieve containment closure it is assumed that the containment hatches, air locks and penetrations must be closed prior to steaming into containment.

Figure B 3.6.87-1 provides allowable closure times for four representative sets of plant conditions. The time to steaming is dependent on various plant parameters (RCS temperature, IRWST temperature, etc.) and plant configuration (RCS Pressure Boundary Intact, RCS Open, etc.). Therefore, the actual representation of the time to steaming may be

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**BASES**

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**BACKGROUND (continued)**

different than that provided in Figure B 3.6.87-1. In determining the minimum time to steaming, conservative assumptions regarding core decay heat, RCS configuration, and initial RCS inventory are used to minimize the calculated time to steaming. The curves are based on the core decay heat prior to refueling so that closure times are longer following the core reload.

As presented in Tables 54-1 and 54-4 of Reference 2, the most risk significant events during shutdown are events that lead to a loss of Normal Residual Heat Removal System (RNS) cooling. Of these, the limiting events that lead to steaming to containment are the loss of shutdown cooling events, specifically:

- Loss of decay heat removal during drained conditions due to a failure of component cooling water or service water system;
- Loss-of-offsite power during drained conditions; and
- Loss of decay heat removal during drained conditions due to failure of the normal residual heat removal system.

These events are further discussed in Section 19.59.5 of Reference 1. Time to steaming is dependent on the postulated RCS configuration (intact versus open), and is based on the response of the plant considering features such as the operation of the 4th stage Automatic Depressurization System (ADS) valves if necessary, status of the upper internals, status of refueling cavity, etc. Conservative assumptions regarding these features are made in the determination of the minimum time to steaming. The time assumed in the PRA to close the penetrations before steaming to containment included 15 minutes for the diagnosis and decision-making time, in addition to the time required to physically complete the closure action.

The risk of overdraining the RCS has been significantly reduced ~~in the AP1000~~ due to the automatic protection features associated with the hot leg level instruments which isolate letdown on low hot leg water level. Overdraining the RCS is no longer a significant contributor to core damage, as shown in Table 54-4 of Reference 2.

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**BASES**

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**BACKGROUND (continued)**

The assumptions used in determining the required closure time for the various containment openings should be conservative, and should be consistent with the plant operating procedures, staffing levels, and status of the containment openings. The evaluation should consider the ability to close the containment for the limiting loss of shutdown cooling event, and considering the possibility of a station blackout. In determining if containment can be closed within the time permitted to containment closure specified in Figure B 3.6.87 -1, the time to close containment penetrations must include both the diagnosis and decision-making time and the time required to physically complete the closure action.

Containment should be closed during the initial mid-loop period for a refueling since the time permitted to containment closure is shorter than the time to diagnose and make a decision that closure is needed following an event. The need to close containment for the mid-loop period following a refueling must be evaluated since decay heat varies with the time after shutdown and the impact of the partial core replacement with new fuel. It is expected that containment will be closed for activities where drain-down is planned, such as the RCS drain-down from no-load pressurizer level for the initial mid-loop period during a refueling. Containment is not expected to be closed for minor, unplanned RCS volume transients, such as a short-term inventory where the pressurizer level may be reduced, but not emptied, and where recovery actions are within the time to containment closure.

The containment equipment hatches, which are part of the containment pressure boundary, provide a means for moving large equipment and components into and out of containment. If closed, the equipment hatch must be held in place by at least four bolts. Good engineering practice dictates that bolts required by this LCO be approximately equally spaced. Alternatively, if open, each equipment hatch can be installed using a dedicated set of hardware, tools and equipment. A self-contained power source is provided to drive each hoist while lowering the hatch into position. Large equipment and components may be moved through the hatches as long as they can be removed and the hatch closed prior to steaming into the containment.

The design of the equipment hatch is such that the four bolts would only be needed to support the hatch in place and provide adequate strength to support the hatch dead weight and associated loads. The hatch is

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**BASES**

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**BACKGROUND (continued)**

installed on the inside containment and is held in place against a matching flange surface with mating bolt pattern by the bolts. Once the dead weight is supported, any pressure (greater than atmospheric) within containment will serve to exert closure force on the hatch toward the mating flange surface serving to reduce stresses on bolts. Therefore the determination of the number of bolts is limited to the quantity required to support the hatch itself and not related to any potential containment pressure.

The containment air locks, which are also part of the containment pressure boundary, provide a means for personnel access during MODES 1, 2, 3, and 4 unit operation in accordance with LCO 3.6.2, "Containment Air Locks." Each air lock has a door at both ends. The doors are normally interlocked to prevent simultaneous opening when containment OPERABILITY is required. During periods of unit shutdown when containment closure is required, the door interlock mechanism may be disabled, allowing both doors of an air lock to remain open for extended periods when frequent containment entry is necessary. Temporary equipment connections (e.g., power or communications cables) are permitted as long as they can be removed to allow containment closure prior to steaming into the containment.

Containment spare penetrations which also provide a part of the containment boundary provide for temporary support services (electrical, I&C, air, and water supplies) during MODES 5 and 6. Each penetration is flanged and normally closed. During periods of plant shutdown, temporary support systems may be routed through the penetrations; temporary equipment connections (e.g., power or communications cables) are permitted as long as they can be removed to allow containment closure prior to steaming into the containment. The spare penetrations must be closed or, if open, capable of closure prior to steaming to containment.

Containment penetrations, including purge system flow paths, that provide direct access from containment atmosphere to outside atmosphere must be isolated or capable of being isolated **prior to steaming into the containment** on at least one side. Isolation may be achieved by an OPERABLE automatic isolation valve, or by a manual isolation valve, blind flange, or equivalent. Equivalent isolation methods must be approved and may include use of a material that can provide a

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BASES

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## BACKGROUND (continued)

temporary barrier for the containment penetrations. The equivalent isolation barrier must be capable of maintaining containment isolation at the containment design pressure of 59 psig (Ref. 1).

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APPLICABLE  
SAFETY  
ANALYSES

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For postulated shutdown events in MODES 5 and 6, RCS heat removal is provided by either passive residual heat removal (PRHR) or IRWST injection and containment sump recirculation. To support RCS heat removal, containment closure is required to limit the loss of the cooling water inventory from containment (Ref. 1).

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

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LCO

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This LCO limits the loss of cooling water inventory in containment to assure continued coolant inventory by limiting the potential escape paths for water released within containment. Penetrations closed in accordance with these requirements are not required to be leak tight.

The LCO requires any penetration providing direct access from the containment atmosphere to the outside atmosphere to be closed or capable of being closed prior to steaming into the containment. The equipment hatches may be open; however, the hatches shall be clear of obstructions such that capability to close the hatch within the indicated time period is maintained. The hardware, tools, equipment and power sources necessary to install the hatches shall be available when the hatch is open. Both doors in each containment air lock may be open; however, the air locks shall be clear of obstructions such that the capability to close at least one door within the indicated time period is maintained. Alternatively, one door in an air lock may be closed. Containment spare penetrations may be open; however, the penetrations shall be **clear of obstructions such that the penetrations are** capable of being closed within the indicated time period. Direct access penetrations shall be closed by at least one manual or automatic isolation valve, blind flange or equivalent, or capable of being closed by at least one valve actuated by a containment isolation signal. If direct access penetrations are open, **then they must be capable of being closed prior to steaming into the containment.** ~~OPERABILITY of the containment isolation instrumentation is required for the open penetrations by LCO 3.3.2, Function 3.a, Containment Isolation, Manual~~

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BASES

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## LCO (continued)

~~Initiation. An OPERABLE Containment Isolation Function includes LCO 3.3.2, Function 19.b, Containment Air Filtration System Isolation, Containment Isolation.~~ Figure B 3.6.87-1 provides the acceptable required closure times for various representative MODES and conditions.

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APPLICABILITY

The containment penetration requirements are applicable during conditions for which the primary safety related core cooling and boration capabilities are provided by IRWST or injection or PRHR - MODES 5 and 6. The capability to close containment is required to ensure that the cooling water inventory is not lost in the event of an accident.

In MODES 1, 2, 3, and 4, containment penetration requirements are addressed by LCO 3.6.1.

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ACTIONSA.1

If the containment equipment hatches, air locks, or any containment penetration that provides direct access from the containment atmosphere to the outside atmosphere is not in the required status, including the containment isolation ~~function not capable of actuation~~ **capability** when automatic isolation valves are open, the penetration(s) must be restored to the required status within 1 hour.

B.1.1, B.1.2, and B.2

If Required Action A.1 is not completed within 1 hour or the LCO is not met for reasons other than Condition A, action must be taken to minimize the probability and consequences of an accident.

In MODE 5, action must be initiated, immediately, to ~~be in MODE 5~~ **with establish** a pressurizer level  $\geq 20\%$  ~~and to close~~ **with** the RCS **intact** so that the PRHR HX operation is available. In MODE 6, action must be initiated, immediately, to ~~be in MODE 6 with the refueling~~ **increase the reactor refueling** cavity water level  $\geq 23$  feet above the top of the reactor vessel flange. The time to RCS steaming to containment is maximized by maximizing RCS inventory, and allowing PRHR HX operation. Additionally, action to suspend positive reactivity additions is required to ensure that the SDM is maintained. Sources of positive reactivity addition include boron dilution, withdrawal of reactivity control assemblies, and excessive cooling of the RCS.

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BASES

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SURVEILLANCE  
REQUIREMENTSSR 3.6.87.1

This Surveillance demonstrates that each of the containment penetrations required to be in its closed position is in that position. **For any open purge and exhaust valves, ~~The Surveillance on the open purge and exhaust valves~~ this SR** will demonstrate that the valves are not blocked from closing. Also **if the purge and/or exhaust valves are open and relying on automatic closure, ~~the~~ this** Surveillance will demonstrate that each valve operator has motive power, which will ensure that each valve is capable of being closed by an **OPERABLE** automatic containment purge and exhaust isolation signal **prior to steaming into containment. Alternately, purge and exhaust penetrations may be verified closed or capable of being closed prior to steaming into the containment, which will limit loss of the cooling water inventory from containment.** Open containment spare penetrations shall be verified capable of being closed prior to steaming **into the** containment by removal of obstructions and installation of the flange or by other closure means which will limit loss of the cooling water inventory from containment.

The Surveillance is performed every 7 days. The Surveillance interval is selected to ensure that the required penetration status is maintained during shutdown inspections, testing, and maintenance.

SR 3.6.87.2

Each of the two equipment hatches is provided with a set of hardware, tools, equipment, and self-contained power source for moving the hatch from its storage location and installing it in the opening. The required set of hardware and tools shall be visually inspected to ensure that they can perform the required functions. The equipment and power source shall be inspected and/or operated as necessary to verify that the hatch can be **installed closed properly**. The power source shall be verified as containing sufficient energy to install the hatch from the storage location.

The 7 day Frequency is adequate considering that the hardware, tools, equipment, and power sources are dedicated to the associated equipment hatch and not used for any other functions.

The SR is modified by a Note which only requires that the surveillance be met for an open equipment hatch. If the equipment hatch is installed in position, then the availability of the means to install the hatch is not required.

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**BASES**

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**SURVEILLANCE REQUIREMENTS (continued)**~~SR 3.6.8.3~~

~~This Surveillance demonstrates that at least one valve in each open penetration actuates to its isolation position on manual initiation or on an actual or simulated containment isolation signal. The 24 month Frequency maintains consistency with other similar valve testing requirements. The OPERABILITY requirements for the Containment Isolation function are specified in LCO 3.3.2.~~

~~The SR is modified by a Note stating that this Surveillance is not required to be met for valves in isolated penetrations. The LCO provides the option to close penetrations in lieu of requiring automatic actuation capability.~~

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**REFERENCES**

1. DCD Chapter 19.
  2. AP1000 Probabilistic Risk Assessment.
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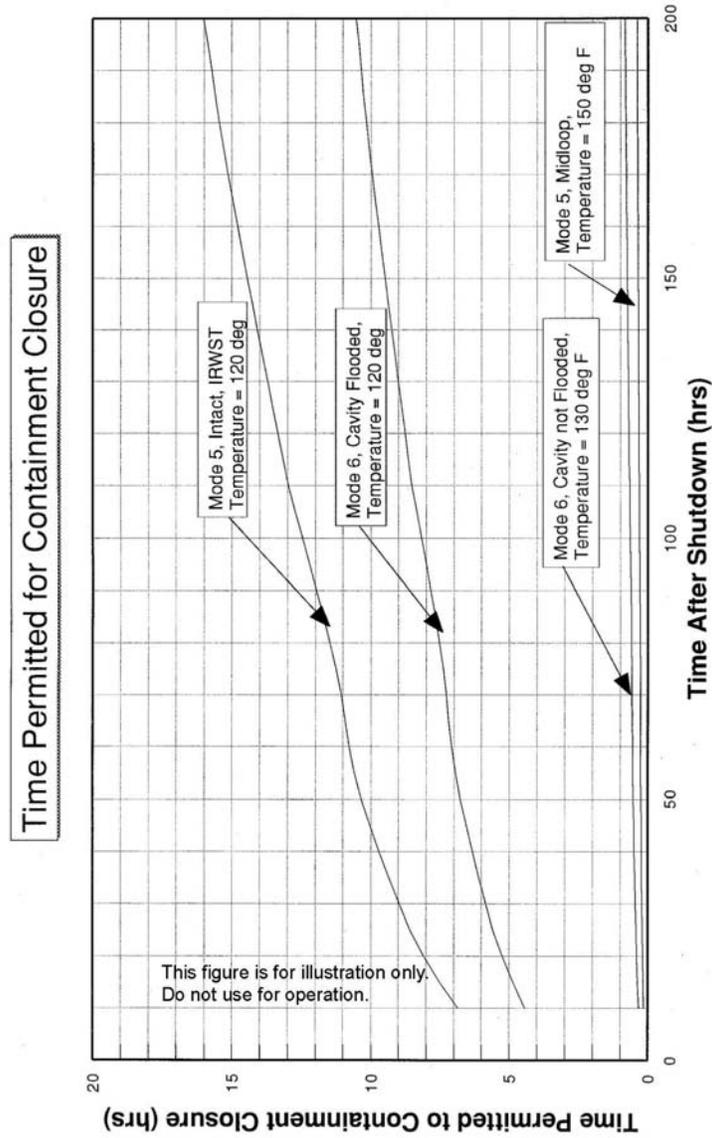


Figure B 3.6.87-1 (page 1 of 1)  
Time Prior to Coolant Inventory Boiling

**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.

## 3.6 CONTAINMENT SYSTEMS

## 3.6.7 Containment Penetrations

- LCO 3.6.7      The containment penetrations shall be in the following status:
- a. The equipment hatches closed and held in place by four bolts or, if open, can be closed prior to steaming into the containment.
  - b. One door in each air lock closed or, if open, can be closed prior to steaming into the containment.
  - c. The containment spare penetrations, if open, can be closed prior to steaming into the containment.
  - d. Each penetration providing direct access from the containment atmosphere to the outside atmosphere, if open, can be closed by a manual or automatic isolation valve, blind flange, or equivalent prior to steaming into the containment.

APPLICABILITY:      MODES 5 and 6.

## ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more containment penetrations not in required status.	A.1 Restore containment penetrations to required status.	1 hour



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## B 3.6 CONTAINMENT SYSTEMS

### B 3.6.7 Containment Penetrations

#### BASES

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**BACKGROUND** Containment closure capability is required during shutdown operations when there is fuel inside containment. Containment closure is required to maintain within containment the cooling water inventory. Due to the large volume of the In-Containment Refueling Water Storage Tank (IRWST) and the reduced sensible heat during shutdown, the loss of some of the water inventory can be accepted. Further, accident analyses have shown that containment closure capability is not required to meet offsite dose requirements. Therefore, containment does not need to be leak tight as required for MODES 1 through 4.

In MODES 5 and 6, the LCO requirements are referred to as “containment closure” rather than “containment OPERABILITY.” Containment closure means that all potential escape paths are closed or capable of being closed. Since there is no requirement for containment leak tightness, compliance with the Appendix J leakage criteria and tests are not required.

In MODES 5 and 6, there is no potential for steam release into the containment immediately following an accident. Pressurization of the containment could only occur after heatup of the IRWST due to Passive Residual Heat Removal Heat Exchanger (PRHR HX) operation (MODE 5 with RCS intact) or after heatup of the RCS with direct venting to the containment (MODE 5 with reduced RCS inventory or MODE 6 with the refueling cavity not fully flooded) or after heatup of the RCS and refueling cavity (MODE 6 with refueling cavity fully flooded). The time from loss of normal cooling until steam release to the containment for four representative sets of plant conditions is shown in Figure B 3.6.7-1 as a function of time after shutdown. Because local manual action may be required to achieve containment closure it is assumed that the containment hatches, air locks and penetrations must be closed prior to steaming into containment.

Figure B 3.6.7-1 provides allowable closure times for four representative sets of plant conditions. The time to steaming is dependent on various plant parameters (RCS temperature, IRWST temperature, etc.) and plant configuration (RCS Pressure Boundary Intact, RCS Open, etc.). Therefore, the actual representation of the time to steaming may be

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**BASES**

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**BACKGROUND (continued)**

different than that provided in Figure B 3.6.7-1. In determining the minimum time to steaming, conservative assumptions regarding core decay heat, RCS configuration, and initial RCS inventory are used to minimize the calculated time to steaming. The curves are based on the core decay heat prior to refueling so that closure times are longer following the core reload.

As presented in Tables 54-1 and 54-4 of Reference 2, the most risk significant events during shutdown are events that lead to a loss of Normal Residual Heat Removal System (RNS) cooling. Of these, the limiting events that lead to steaming to containment are the loss of shutdown cooling events, specifically:

- Loss of decay heat removal during drained conditions due to a failure of component cooling water or service water system;
- Loss-of-offsite power during drained conditions; and
- Loss of decay heat removal during drained conditions due to failure of the normal residual heat removal system.

These events are further discussed in Section 19.59.5 of Reference 1. Time to steaming is dependent on the postulated RCS configuration (intact versus open), and is based on the response of the plant considering features such as the operation of the 4th stage Automatic Depressurization System (ADS) valves if necessary, status of the upper internals, status of refueling cavity, etc. Conservative assumptions regarding these features are made in the determination of the minimum time to steaming. The time assumed in the PRA to close the penetrations before steaming to containment included 15 minutes for the diagnosis and decision-making time, in addition to the time required to physically complete the closure action.

The risk of overdraining the RCS has been significantly reduced due to the automatic protection features associated with the hot leg level instruments which isolate letdown on low hot leg water level. Overdraining the RCS is no longer a significant contributor to core damage, as shown in Table 54-4 of Reference 2.

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**BASES**

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**BACKGROUND (continued)**

The assumptions used in determining the required closure time for the various containment openings should be conservative, and should be consistent with the plant operating procedures, staffing levels, and status of the containment openings. The evaluation should consider the ability to close the containment for the limiting loss of shutdown cooling event, and considering the possibility of a station blackout. In determining if containment can be closed within the time permitted to containment closure specified in Figure B 3.6.7 -1, the time to close containment penetrations must include both the diagnosis and decision-making time and the time required to physically complete the closure action.

Containment should be closed during the initial mid-loop period for a refueling since the time permitted to containment closure is shorter than the time to diagnose and make a decision that closure is needed following an event. The need to close containment for the mid-loop period following a refueling must be evaluated since decay heat varies with the time after shutdown and the impact of the partial core replacement with new fuel. It is expected that containment will be closed for activities where drain-down is planned, such as the RCS drain-down from no-load pressurizer level for the initial mid-loop period during a refueling. Containment is not expected to be closed for minor, unplanned RCS volume transients, such as a short-term inventory where the pressurizer level may be reduced, but not emptied, and where recovery actions are within the time to containment closure.

The containment equipment hatches, which are part of the containment pressure boundary, provide a means for moving large equipment and components into and out of containment. If closed, the equipment hatch must be held in place by at least four bolts. Good engineering practice dictates that bolts required by this LCO be approximately equally spaced. Alternatively, if open, each equipment hatch can be installed using a dedicated set of hardware, tools and equipment. A self-contained power source is provided to drive each hoist while lowering the hatch into position. Large equipment and components may be moved through the hatches as long as they can be removed and the hatch closed prior to steaming into the containment.

The design of the equipment hatch is such that the four bolts would only be needed to support the hatch in place and provide adequate strength to support the hatch dead weight and associated loads. The hatch is

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**BASES**

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**BACKGROUND (continued)**

installed on the inside containment and is held in place against a matching flange surface with mating bolt pattern by the bolts. Once the dead weight is supported, any pressure (greater than atmospheric) within containment will serve to exert closure force on the hatch toward the mating flange surface serving to reduce stresses on bolts. Therefore the determination of the number of bolts is limited to the quantity required to support the hatch itself and not related to any potential containment pressure.

The containment air locks, which are also part of the containment pressure boundary, provide a means for personnel access during MODES 1, 2, 3, and 4 unit operation in accordance with LCO 3.6.2, "Containment Air Locks." Each air lock has a door at both ends. The doors are normally interlocked to prevent simultaneous opening when containment OPERABILITY is required. During periods of unit shutdown when containment closure is required, the door interlock mechanism may be disabled, allowing both doors of an air lock to remain open for extended periods when frequent containment entry is necessary. Temporary equipment connections (e.g., power or communications cables) are permitted as long as they can be removed to allow containment closure prior to steaming into the containment.

Containment spare penetrations which also provide a part of the containment boundary provide for temporary support services (electrical, I&C, air, and water supplies) during MODES 5 and 6. Each penetration is flanged and normally closed. During periods of plant shutdown, temporary support systems may be routed through the penetrations; temporary equipment connections (e.g., power or communications cables) are permitted as long as they can be removed to allow containment closure prior to steaming into the containment. The spare penetrations must be closed or, if open, capable of closure prior to steaming to containment.

Containment penetrations, including purge system flow paths, that provide direct access from containment atmosphere to outside atmosphere must be isolated or capable of being isolated prior to steaming into the containment on at least one side. Isolation may be achieved by an OPERABLE automatic isolation valve, or by a manual isolation valve, blind flange, or equivalent. Equivalent isolation methods must be approved and may include use of a material that can provide a

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**BASES**

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**BACKGROUND (continued)**

temporary barrier for the containment penetrations. The equivalent isolation barrier must be capable of maintaining containment isolation at the containment design pressure of 59 psig (Ref. 1).

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**APPLICABLE  
SAFETY  
ANALYSES**

For postulated shutdown events in MODES 5 and 6, RCS heat removal is provided by either passive residual heat removal (PRHR) or IRWST injection and containment sump recirculation. To support RCS heat removal, containment closure is required to limit the loss of the cooling water inventory from containment (Ref. 1).

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

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**LCO**

This LCO limits the loss of cooling water inventory in containment to assure continued coolant inventory by limiting the potential escape paths for water released within containment. Penetrations closed in accordance with these requirements are not required to be leak tight.

The LCO requires any penetration providing direct access from the containment atmosphere to the outside atmosphere to be closed or capable of being closed prior to steaming into the containment. The equipment hatches may be open; however, the hatches shall be clear of obstructions such that capability to close the hatch within the indicated time period is maintained. The hardware, tools, equipment and power sources necessary to install the hatches shall be available when the hatch is open. Both doors in each containment air lock may be open; however, the air locks shall be clear of obstructions such that the capability to close at least one door within the indicated time period is maintained. Alternatively, one door in an air lock may be closed. Containment spare penetrations may be open; however, the penetrations shall be clear of obstructions such that the penetrations are capable of being closed within the indicated time period. Direct access penetrations shall be closed by at least one manual or automatic isolation valve, blind flange or equivalent, or capable of being closed by at least one valve actuated by a containment isolation signal. If direct access penetrations are open, then they must be capable of being closed prior to steaming into the containment. Figure B 3.6.7-1 provides the acceptable required closure times for various representative MODES and conditions.

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**BASES**

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**APPLICABILITY**      The containment penetration requirements are applicable during conditions for which the primary safety related core cooling and boration capabilities are provided by IRWST or injection or PRHR - MODES 5 and 6. The capability to close containment is required to ensure that the cooling water inventory is not lost in the event of an accident.

In MODES 1, 2, 3, and 4, containment penetration requirements are addressed by LCO 3.6.1.

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**ACTIONS**A.1

If the containment equipment hatches, air locks, or any containment penetration that provides direct access from the containment atmosphere to the outside atmosphere is not in the required status, including the containment isolation capability when automatic isolation valves are open, the penetration(s) must be restored to the required status within 1 hour.

B.1.1, B.1.2, and B.2

If Required Action A.1 is not completed within 1 hour or the LCO is not met for reasons other than Condition A, action must be taken to minimize the probability and consequences of an accident.

In MODE 5, action must be initiated, immediately, to establish a pressurizer level  $\geq 20\%$  with the RCS intact so that the PRHR HX operation is available. In MODE 6, action must be initiated, immediately, to increase the refueling cavity water level  $\geq 23$  feet above the top of the reactor vessel flange. The time to RCS steaming to containment is maximized by maximizing RCS inventory, and allowing PRHR HX operation. Additionally, action to suspend positive reactivity additions is required to ensure that the SDM is maintained. Sources of positive reactivity addition include boron dilution, withdrawal of reactivity control assemblies, and excessive cooling of the RCS.

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**BASES**

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**SURVEILLANCE  
REQUIREMENTS**SR 3.6.7.1

This Surveillance demonstrates that each of the containment penetrations required to be in its closed position is in that position. For any open purge and exhaust valves, this SR will demonstrate that the valves are not blocked from closing. Also if the purge and/or exhaust valves are open and relying on automatic closure, this Surveillance will demonstrate that each valve operator has motive power, which will ensure that each valve is capable of being closed by an automatic containment purge and exhaust isolation signal prior to steaming into containment. Alternately, purge and exhaust penetrations may be verified closed or capable of being closed prior to steaming into the containment, which will limit loss of the cooling water inventory from containment. Open containment spare penetrations shall be verified capable of being closed prior to steaming into the containment by removal of obstructions and installation of the flange or by other closure means which will limit loss of the cooling water inventory from containment.

The Surveillance is performed every 7 days. The Surveillance interval is selected to ensure that the required penetration status is maintained during shutdown inspections, testing, and maintenance.

SR 3.6.7.2

Each of the two equipment hatches is provided with a set of hardware, tools, equipment, and self-contained power source for moving the hatch from its storage location and installing it in the opening. The required set of hardware and tools shall be visually inspected to ensure that they can perform the required functions. The equipment and power source shall be inspected and/or operated as necessary to verify that the hatch can be closed properly. The power source shall be verified as containing sufficient energy to install the hatch from the storage location.

The 7 day Frequency is adequate considering that the hardware, tools, equipment, and power sources are dedicated to the associated equipment hatch and not used for any other functions.

The SR is modified by a Note which only requires that the surveillance be met for an open equipment hatch. If the equipment hatch is installed in position, then the availability of the means to install the hatch is not required.

BASES

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REFERENCES

1. DCD Chapter 19.
  2. AP1000 Probabilistic Risk Assessment.
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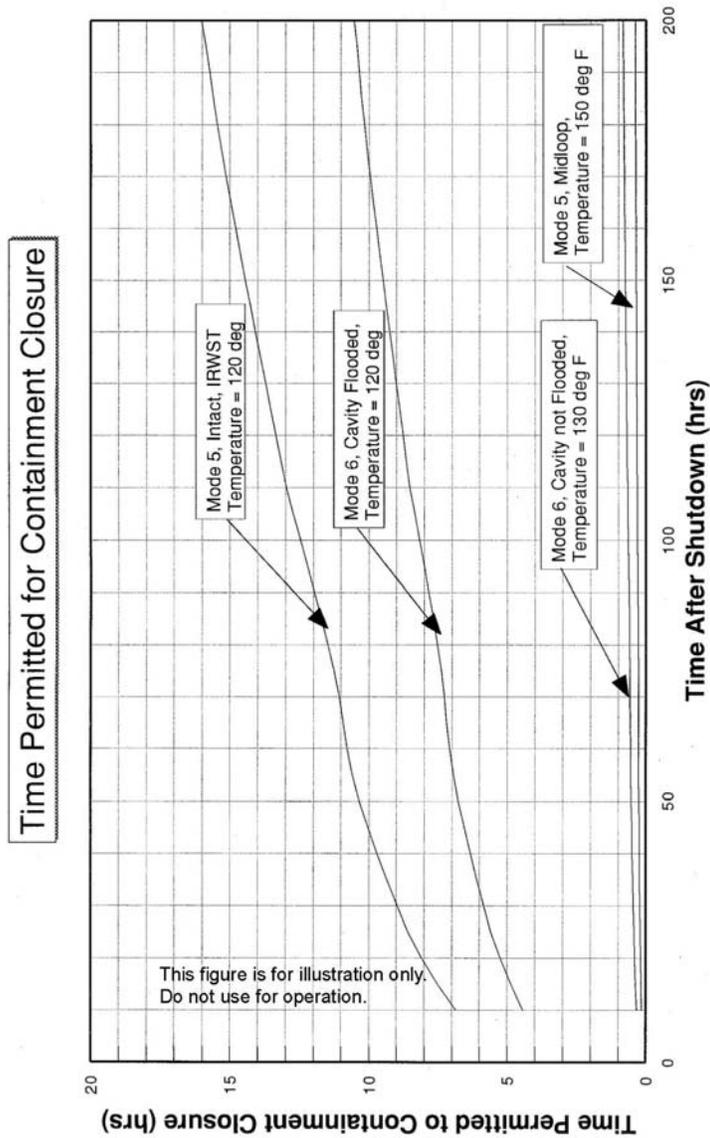


Figure B 3.6.7-1 (page 1 of 1)  
Time Prior to Coolant Inventory Boiling