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

Title: Changes Related to LCO 3.6.6, Passive Containment Cooling System (PCS) - 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-439-A, Rev. 2, Eliminate Second Completion Times Limiting Time From Discovery of Failure To Meet an LCO.
TSTF-440-A, Rev. 0, Eliminate Bases Requirement for Performing a System Walkdown.
TSTF-479-A, Rev. 0, Changes to Reflect Revision of 10 CFR 50.55a

STS NUREGs Affected:

TSTF-439-A, Rev. 2: NUREG-1430, 1431, 1432, 1433, 1434
TSTF-440-A, Rev. 0: NUREG-1430, 1431, 1432
TSTF-479-A, Rev. 0: NUREG-1430, 1431, 1432, 1433, 1434

NRC Approval Date:

TSTF-439-A, Rev. 2: 01-Dec-05
TSTF-440-A, Rev. 0: 11-Oct-02
TSTF-479-A, Rev. 0: 06-Dec-05

TSTF Classification:

TSTF-439-A, Rev. 2: Technical Change
TSTF-440-A, Rev. 0: Bases Only Change
TSTF-479-A, Rev. 0: 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 A085: TS 3.6.6 Condition D revision
VEGP LAR DOC A086: TS 3.6.6 Required Action B.1 revision
VEGP LAR DOC A087: TS 3.6.6 Condition C revision
VEGP LAR DOC M13: Combined TS 3.6.6 and TS 3.6.7
VEGP LAR DOC M14: SR 3.6.6.1 and SR 3.6.6.3 revision
VEGP LAR DOC D06: TS 3.6.6 LCO statement revision
VEGP LAR DOC L14: TS 3.6.6 Applicability statement revision

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to previous designs, but are not to the current design; (2) that are already incorporated in the GTS; and (3) that are superseded by another change.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-439-A, Rev. 2 removes the second Completion Times from Required Actions A.1 and C.1 of the Westinghouse Owners Group (WOG) Specification 3.6.6A. The second Completion Time for Required Actions A.1 and C.1 precludes entry into and out of the ACTIONS for an indefinite period of time without meeting the LCO. The Required Actions for AP1000 Specification 3.6.6 does not include Required Actions that require a second Completion Time to preclude entry into and out of the ACTIONS for an indefinite period of time without meeting the LCO. The changes to WOG Specification 3.6.6A are not applicable and therefore are not incorporated into the AP1000 Specification 3.6.6.

TSTF-479-A has 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 Section 5.5.3, Inservice Testing Program. TSTF-479-A removes reference to "Section XI" of the ASME Code from NUREG-1431 bases for Surveillance Requirement (SR) 3.6.6A.4, which is for testing of the containment spray pumps. The containment cooling system for the AP1000 is a passive design. The AP1000 Specification 3.6.6, Passive Containment Cooling System, does not include SRs that require testing of pumps or have Frequencies that refer to the Inservice Testing Program. The bases for the AP1000 Specification 3.6.6 does not refer to the ASME Code. Based on the differences of the bases discussion between NUREG-1431 and AP1000, TSTF-479-A changes are not incorporated into the AP1000 Specification 3.6.6.

VEGP LAR DOC M13 revises TS 3.6.6 to incorporate TS 3.6.7 and deletes the current TS 3.6.7. Changes applicable to TS 3.6.7 are incorporated into TS 3.6.6. Changes VEGP LAR DOC A086, VEGP LAR DOC A087, and VEGP LAR DOC D06 are applicable to both TS 3.6.7 and TS 3.6.6. Change VEGP LAR DOC L14 is applicable to TS 3.6.7 and is incorporated into TS 3.6.6 as part of change VEGP LAR DOC M13. Due to the change described above, current TS 3.6.8, current TS 3.6.9, and current TS 3.6.10 are renumbered as TS 3.6.7, TS 3.6.8, and TS 3.6.9, respectively.

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

The Bases for Surveillance Requirement (SR) 3.6.6.3 is revised to align with TSTF-440-A changes. The statement "control room instrumentation or" is also deleted from the sentence "Rather, it involves verification, through control room instrumentation or a system walkdown, that valves capable of potentially being mispositioned are in the correct position." as part of the TSTF-440-A changes.

V. Applicability

Affected Generic Technical Specifications and Bases:

Section 3.6.6 Passive Containment Cooling System (PCS) - Operating

Changes to the Generic Technical Specifications and Bases:

TS 3.6.6 header subsection name is revised from "PCS - Operating" to "PCS". (DOC M13)

TS 3.6.6 title is revised from "Passive Containment Cooling System (PCS) - Operating" to "Passive Containment Cooling System (PCS)". (DOC M13)

LCO 3.6.6 is revised from "The passive containment cooling system shall be OPERABLE, with all three water flow paths OPERABLE." to "The passive containment cooling system shall be OPERABLE." (DOC D06)

TS 3.6.6 "Applicability" statement is revised to include MODES 5 and 6. (DOC M13 and L14)

Required Action B.1 is revised to indicate one flow path is restored to OPERABLE status. (DOC A086)

Condition C is revised by removing the specific parameters in parentheses. (DOC A087)

The first condition of Condition D and associated Bases is revised to specifically identify which Condition and MODE. (DOC M13)

The second condition of Condition D and associated Bases is revised to add the word "Condition" and specify the MODE. (DOC M13 and A085)

New Condition E and associated Bases is added. (DOC M13)

New Condition F and associated Bases is added. (DOC M13)

SR 3.6.6.1 Frequency and associated Bases is revised to just 24 hours. The "7 days" and conditions for when the Frequency is required to be 24 hours is deleted. (DOC M14)

SR 3.6.6.3 and associated Bases is revised to identify manual valves are verified to be in the correct position if not locked, sealed, or otherwise secured in position. (DOC M14)

The "Applicable Safety Analyses" section of the Bases is revised to include discussion of shutdown. (DOC M13)

The "Applicability" section of the Bases is revised to include OPERABILITY of the PCS is MODE 5 or 6 and delete the paragraph that references LCO 3.6.7 for requirements in MODES 5 or 6. (DOC M13)

The Bases for SR 3.6.6.3 is revised by TSTF-440-A. The specified actions required to verify valve alignment have been removed.

The Bases for SR 3.6.6.3 is revised to align with TSTF-440-A changes. The statement "control room instrumentation or" is also deleted from the sentence "Rather, it involves verification, through control room instrumentation or a system walkdown, that valves capable of potentially being mispositioned are in the correct position." (proposed additional change)

VI. Traveler Information

Description of TSTF changes:

TSTF-440-A revises the Bases to remove specific requirements to perform a system walkdown when verifying that a flow path is isolated or that valves are in the correct position. The change deletes the specified action of a system walkdown to verify valve alignment from SR 3.6.6.3 of the Bases for Specification 3.6.6. This changes along with the proposed additional change deletes the phrase ", through control room instrumentation or a system walkdown,".

Rationale for TSTF changes:

TSTF-440-A: Deleting the specified action to verify valve alignment, aligns the Bases of this specification with other specifications. Other similar Actions and Surveillances which require verification that a flow path is isolated or that valves are in the correct position do not specify in the Bases how this verification must be accomplished.

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

VEGP LAR DOC A085 adds the word "Conditions" to specify that the phrase "A, B, or C" in Condition D refers to Conditions A, B, or C.

VEGP LAR DOC A086 revises Required Action B.1 to clarify only one flow path is required to be restored within 72 hours.

VEGP LAR DOC A087 revises Condition C by removing the parenthetical statement "(temperature and volume)".

VEGP LAR DOC M13 revises TS 3.6.6 to incorporate TS 3.6.7 and deletes TS 3.6.7. The Applicability for TS 3.6.6 is revised to include a new Applicability of "MODES 5 and 6 with the reactor decay heat > 6.0 MWt." TS 3.6.6 Condition D, first Condition, is revised to include the phrases "of Condition A, B, or C," and "in MODE 1, 2, 3, or 4." TS 3.6.6 Condition D, second Condition, is revised to include the phrase "in MODE 1, 2, 3, or 4." TS 3.6.6 Actions E and F are added.

VEGP LAR DOC M14 revises SR 3.6.6.1 deleting the 7 day Frequency and conditions for when the Frequency is required to be 24 hours. The Frequency for SR 3.6.6.1 is revised to 24 hours. SR 3.6.6.3 is revised to include verification that each passive containment cooling system manual valve in each flow path that is not locked, sealed, or otherwise secured in position, is in the correct position.

VEGP LAR DOC D06 revises the LCO 3.6.6 statement from "The passive containment cooling system shall be OPERABLE, with all three water flow paths OPERABLE." to "The passive containment cooling system shall be OPERABLE."

VEGP LAR DOC L14 revises TS 3.6.7 "Applicability" statement for MODE 5 and 6 by deleting the word "calculated". This change is included in TS 3.6.6 due to incorporation of VEGP LAR DOC M13, which combines TS 3.6.6 and TS 3.6.7 into a new TS 3.6.6.

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

VEGP LAR DOC A085 change to add the word "Conditions" clarifies that Condition D is referring to Conditions A, B, or C in the condition statement.

VEGP LAR DOC A086 change to clarify only one flow path is required to be restored provides consistency with the associated Bases. Also, Action A provides the requirements when one passive containment cooling water flow path is inoperable.

VEGP LAR DOC A087 change to remove "(temperature and volume)" from Condition C removes overuse of parenthesis. The specified parameters for the water storage tank, temperature and volume, are addressed in SR 3.6.6.1 and SR 3.6.6.2. This change is also consistent with TSTF-GG-05-01 guidance to avoid overuse of parenthesis.

VEGP LAR DOC M13 change to incorporate TS 3.6.7 into TS 3.6.6 results in a more restrictive TS since it eliminates the separate restoration times when in Mode 5 or 6. Also, TS 3.6.6 and TS 3.6.7 have identical LCO statements.

VEGP LAR DOC M14 change to revise SR 3.6.6.1 Frequency to 24 hours eliminates the current Frequency of every 7 days and 24 hours if the water storage tank temperature is verified to be ≤ 50°F or ≥ 100°F. Revising the Frequency to 24 hours eliminates unnecessary tracking complexity. The change of adding manual valves to SR 3.6.6.3 ensures that any valve that could possibly be in the incorrect position to be periodically checked.

VEGP LAR DOC D06 change to the LCO 3.6.6 statement removes unnecessary information. The statement "with all three water flow paths OPERABLE" is not necessary since the "LCO" section of the Bases states that "three water flow paths must be OPERABLE."

VEGP LAR DOC L14 change to the TS "Applicability" statement removes information not required to be included in the TS to properly interpret the applicability requirement. The TS "Applicability" statement is revised by deleting the word "calculated".

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

Based on the TSTF-440-A change, it is proposed to delete the specified action to verify valve alignment through control room instrumentation in the Bases for SR 3.6.6.3. With the TSTF-440-A change and additional change, the following sentence is changed from "Rather, it involves verification, through control room instrumentation or a system walkdown, that valves capable of potentially being mispositioned are in the correct position." to "Rather, it involves verification that valves capable of potentially being mispositioned are in the correct position."

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

Deleting the specified action to verify valve alignment through control room instrumentation follows the intent of TSTF-440-A. Removing the specified actions to verify valve alignment restores flexibility in performance of the actions to meet SR 3.6.6.3.

VII. GTST Safety Evaluation

Technical Analysis:

TSTF-440-A: The Technical Specification contains many Surveillances and Required Actions which require periodic verification of the alignment or isolation of a system. Specification 3.6.6 states that a system walkdown must be performed. This level of detail eliminates flexibility in performance of the actions. While a system walkdown may still be utilized to meet the requirement, other methods, such as the use of remote valve position indication, will still meet the intent of the Specifications without unintended consequences, such as increased personnel dose.

To align the Bases for SR 3.6.6.3 with TSTF-440-A changes, the statement of using control room instrumentation to verify valve alignment is deleted. This level of detail eliminates flexibility in performance of the actions. While control room instrumentation may still be utilized to meet the requirement, other methods will still meet the intent of the Specifications without unintended consequences, such as increased personnel dose.

VEGP LAR DOC M13: Current TS 3.6.6, Passive Containment Cooling System (PCS) - Operating and current TS 3.6.7, Passive Containment Cooling System (PCS) - Shutdown have the identical LCO statements. Thus, the two Specifications are combined into a single Specification. For Shutdown the "Applicability" statement is revised to include MODES 5 and 6 with the reactor decay heat > 6.0 MWt. Current TS 3.6.7 Actions A, B, and C are identical to current TS 3.6.6 Actions A, B, and C. Current TS 3.6.6 Condition D, is revised to specify the applicable Conditions and Modes by including the phrases "of Condition A, B, or C," and "in MODE 1, 2, 3, or 4." TS 3.6.6 Condition D, second Condition, is revised to specify the applicable Modes by including the phrase "in MODE 1, 2, 3, or 4." Action D of current TS 3.6.7 is separated into two individual Actions E and F in TS 3.6.6. The Surveillance Requirements for current TS 3.6.7 refers to the TS 3.6.6 SRs as being applicable. Combining the current TS 3.6.6 and TS 3.6.7 into a single new TS 3.6.6 is more restrictive due to the elimination of the separate restoration times when in Mode 5 or 6. This potential reduction in restoration time is acceptable, since the Passive Containment Cooling System has already been inoperable for at least 72 hours prior to entering Mode 5.

VEGP LAR DOC M14: Revising the Frequency of SR 3.6.6.1 to 24 hours eliminates the current Frequency of every 7 days and 24 hours if the water storage tank temperature is verified to be ≤ 50°F or ≥ 100°F. Revising the Frequency to just a 24 hour Frequency eliminates unnecessary tracking complexity. Therefore, this change is acceptable, since it requires plant personnel to more frequently document performance of the SR.

SR 3.6.6.3 ensures that the proper flow paths exist for passive containment cooling system operation. This verification currently does not require manual valves in the flow path to be verified. Adding manual valves to the SR ensures that any valve that could possibly be in the incorrect position to be periodically checked. This change is acceptable since it requires additional valves that could impact the flow paths to be periodically verified in their correct position, and is consistent with similar Surveillances for system valve lineup verifications.

VEGP LAR DOC D06: Revising LCO 3.6.6 statement removes details that are not necessary. Removing the statement "with all three water flow paths OPERABLE" from the LCO 3.6.6 statement is acceptable because this type of information is not necessary to be included in the TS in order to provide adequate protection of public health and safety. Also, the "LCO" section of the Bases states that "three water flow paths must be OPERABLE." LCO 3.6.6 continues to require the PCS to be Operable, and SR 3.6.6.3 continues to require verification to ensure that the proper flow paths exist for passive containment cooling system operation.

VEGP LAR DOC L14: The revision to the TS "Applicability" statement deletes the word "calculated". The word "calculated" is not required to be included in the TS to properly interpret the applicability requirement. Specifying the reactor decay heat > 6.0 MWt is calculated is not necessary to be included in the TS to provide adequate protection of public health and safety. The TS retains the necessary requirements to ensure the required structures, systems, and components are operable.

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

VIII. Review Information

Evaluator Comments:

STS (NUREG-1431) 3.6.6A is equivalent to AP1000 GTS 3.6.6. NUREG-1431 SR 3.6.6A.1 is equivalent to AP1000 SR 3.6.6.3.

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Review Information:

Availability for public review and comment on Revision 0 of this traveler approved by NRC staff on Tuesday, June 03, 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. 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

3.6.6 Passive Containment Cooling System (PCS) ~~- Operating~~

LCO 3.6.6 The passive containment cooling system shall be OPERABLE~~, with all three water flow paths OPERABLE~~.

APPLICABILITY: MODES 1, 2, 3, and 4~~.~~**,**
MODES 5 and 6 with the reactor decay heat > 6.0 MWt.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One passive containment cooling water flow path inoperable.	A.1	Restore flow path to OPERABLE status.	7 days
B. Two passive containment cooling water flow paths inoperable.	B.1	Restore **one** flow path~~s~~ to OPERABLE status.	72 hours
C. One or more water storage tank parameters ~~(temperature and volume)~~ not within limits.	C.1	Restore water storage tank to OPERABLE status.	8 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time **of Condition A, B, or C** not met **in MODE 1, 2, 3, or, 4**. OR LCO not met for reasons other than **Condition** A, B, or C **in MODE 1, 2, 3, or 4**.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 84 hours
E. Required Action and associated Completion time of Condition A, B, or C not met in MODE 5. **OR** **LCO not met for reasons other than Condition A, B, or C in MODE 5.**	**E.1 Initiate action to establish pressurizer level ≥ 20% with the Reactor Coolant System (RCS) pressure boundary intact.** **AND** **E.2 Suspend positive reactivity additions.**	**Immediately** **Immediately**
F. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 6. **OR** **LCO not met for reasons other than Condition A, B, or C in MODE 6.**	**F.1 Initiate action to establish water level ≥ 23 ft above the top of the reactor vessel flange.** **AND** **F.2 Suspend positive reactivity additions.**	**Immediately** **Immediately**

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.6.1	Verify the water storage tank temperature ≥ 40°F and ≤ 120°F.	~~7 days~~ ~~AND~~ 24 hours~~ when water storage tank temperature is verified ≤ 50°F or ≥ 100°F~~
SR 3.6.6.2	Verify the water storage tank volume ≥ 756,700 gallons.	7 days
SR 3.6.6.3	Verify each passive containment cooling system **manual**, power operated, and automatic valve in each flow path that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.6.6.4	Verify each passive containment cooling system automatic valve in each flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	24 months
SR 3.6.6.5	Verify the air flow path from the shield building annulus inlet to the exit is unobstructed and, that all air baffle sections are in place.	24 months
SR 3.6.6.6	Verify passive containment cooling system flow and water coverage performance in accordance with the System Level OPERABILITY Testing Program.	At first refueling <u>AND</u> 10 years

B 3.6 CONTAINMENT SYSTEMS

B 3.6.6 Passive Containment Cooling System (PCS) ~~- Operating~~

BASES

BACKGROUND

The PCS provides containment cooling to limit post accident pressure and temperature in containment to less than the design values. Reduction of containment pressure reduces the release of fission product radioactivity from containment to the environment, in the event of a Design Basis Accident (DBA). The Passive Containment Cooling System is designed to meet the requirements of 10 CFR 50 Appendix A GDC 38 “Containment Heat Removal” and GDC 40 “Testing of Containment Heat Removal Systems” (Ref. 1).

The PCS consists of a 800,000 gal (nominal) cooling water tank, four headered tank discharge lines with flow restricting orifices, and two separate full capacity discharge flow paths to the containment vessel with 3 sets of isolation valves, each capable of meeting the design bases. Algae growth is not expected within the Passive Containment Cooling Water Storage Tank (PCCWST); however, to assure water clarity is maintained, a prevailing concentration of hydrogen peroxide is maintained at 50 ppm. The recirculation pumps and heater provide freeze protection for the passive containment cooling water storage tank. However, OPERABILITY of the tank is assured by compliance with the temperature limits specified in SR 3.6.6.1 and not by the recirculation pumps and heater. In addition to the recirculation pumps and heater, the PCS water storage tank temperature can be maintained within limits by the ambient temperature, the large thermal inertia of the tank, or heat from other sources. The PCS valve room temperature must not be below freezing for an extended period to assure the water flow path to the containment shell is available. The isolation valves on each flow path are powered from a separate Division.

Upon actuation of the isolation valves, gravity flow of water from the cooling water tank (contained in the shield building structure above the containment) onto the upper portion of the containment shell reduces the containment pressure and temperature following a DBA. The flow of water to the containment shell surface is initially established to assure that the required short term containment cooling requirements following the postulated worst case LOCA are achieved. As the decay heat from the core becomes less with time, the water flow to the containment shell is reduced in three steps. The change in flow rate is attained without

BASES

BACKGROUND (continued)

active components in the system and is dependent only on the decreasing water level in the elevated storage tank. In order to ensure the containment surface is adequately and effectively wetted, the water is introduced at the center of the containment dome and flows outward. Weirs are placed on the dome surface to distribute the water and ensure effective wetting of the dome and vertical sides of the containment shell. The monitoring of the containment surface through the Reliability Assurance Program (RAP) and the Inservice Testing Program assures containment surface does not unacceptably degrade containment heat removal performance. During the initial test program, the containment coverage will be measured at the base of the upper annulus in addition to the coverage at the spring line for the full flow case and a lower flow case with PCS recirculation pumps delivering to the containment shell. These benchmark values at the base of the upper annulus will be used to develop acceptance criteria for technical specifications. Contamination can be removed by PCS actuation and by using coating vendor cleaning procedures.

The path for the natural circulation of air is from the air intakes in the shield building, down the outside of the baffle, up along the containment shell to the top, center exit in the shield building and is always open. The drains in the upper annulus region must be clear to prevent water from blocking the air flow path. Heat is removed from within the containment utilizing the steel containment shell as the heat transfer surface combining conductive heat transfer to the water film, convective heat transfer from the water film to the air, radiative heat transfer from the film to the air baffle, and mass transfer (evaporation) of the water film into the air. As the air heats up and water evaporates into the air, it becomes less dense than the cooler air in the air inlet annulus. This differential causes an increase in the natural circulation of the air upward along the containment surface, with heated air/water vapor exiting the top/center of the shield building. Additional system design details are provided in Reference 3.

The PCS is actuated either automatically, by a containment High-2 pressure signal, or manually. Automatic actuation opens the cooling water tank discharge valves, allowing gravity flow of the cooling water onto the containment shell. The manual containment cooling actuation consists of four momentary controls, if two associated controls are operated simultaneously, actuation will occur in all divisions. The discharge continues for at least three days.

BASES

BACKGROUND (continued)

The PCS is designed to limit post-accident pressure and temperature in containment to less than the design values. Reduction of containment pressure reduces the release of fission product radioactivity from containment to the environment, in the event of a DBA.

The PCS is an ESF system and is designed to ensure that the heat removal capability required during the post accident period can be attained.

APPLICABLE SAFETY ANALYSES

The Passive Containment Cooling System limits the temperature and pressure that could be experienced following a DBA. The limiting DBAs considered are the loss of coolant accident (LOCA) and the steam line break (SLB). The LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure and temperature transients. No DBAs are assumed to occur simultaneously or consecutively. The postulated DBAs are analyzed with regard to containment ESF system, assuming the loss of one Class 1E Engineered Safety Features Actuation Cabinet (ESFAC) Division, which is the worst case single active failure and results in one PCS flow path being inoperable.

The analyses and evaluations assume a unit specific power level of 3400 MWt, one passive containment cooling train operating, and initial (pre-accident) containment conditions of 120°F and 1.0 psig. The analyses also assume a response time delayed initiation to provide conservative peak calculated containment pressure and temperature responses.

For certain aspects of transient accident analyses, maximizing the calculated containment pressure is not conservative. In particular, the effectiveness of the Passive Core Cooling System during the core reflood phase of a LOCA analysis increases with increasing containment backpressure. For these calculations, the containment backpressure is calculated in a manner designed to conservatively minimize, rather than maximize, the calculated transient containment pressures in accordance with 10 CFR 50, Appendix K (Ref. 2).

Containment cooling system performance for post accident conditions is given in Reference 3. The result of the analysis is that each train can provide 100% of the required peak cooling capacity during the post accident condition.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The modeled Passive Containment Cooling System actuation response time from the containment analysis is based upon a response time associated with exceeding the containment High-2 pressure setpoint to opening of isolation valves.

The PCS limits the temperature and pressure that could be experienced during shutdown following a loss of decay heat removal. For shutdown events, the Reactor Coolant System (RCS) sensible and decay heat removal requirements are reduced as compared to heat removal requirements for MODE 1, 2, 3, or 4 events. Therefore, the shutdown containment heat removal requirements are bounded by analyses of MODES 1, 2, 3, and 4 events.

The Passive Containment Cooling System satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

During a DBA, one passive containment cooling water flow path is required to maintain the containment peak pressure and temperature below the design limits (Ref. 3). To ensure that this requirement is met, two passive containment cooling water flow paths are provided.

Therefore, in the event of an accident, at least one flow path operates, assuming the worst case single active failure occurs. A third PCS flow path is provided for protection against multiple failure scenarios modeled in the PRA. To ensure that these requirements are met, three PCS water flow paths must be OPERABLE.

The PCS includes a cooling water tank, valves, piping, instruments and controls to ensure an OPERABLE flow path capable of delivering water from the cooling water tank upon an actuation signal. An OPERABLE flow path consists of a normally closed valve capable of automatically opening in series with a normally open valve. For the two flow paths containing air-operated valves, it is preferred because of PRA insights that these valves be normally closed.

The PCS cooling water storage tank ensures that an adequate supply of water is available to cool and depressurize the containment in the event of a Design Basis Accident (DBA). To be considered OPERABLE, the

BASES

LCO (continued)

PCS cooling water storage tank must meet the water volume and temperature limits established in the SRs. To be considered OPERABLE, the air flow path from the shield building annulus inlet to the exit must be unobstructed, with unobstructed upper annulus safety-related drains providing a path for containment cooling water runoff to preclude blockage of the air flow path.

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment and an increase in containment pressure and temperature requiring the operation of the PCS.

~~During shutdown the PCS may be required to remove heat from containment. The requirements in MODES 5 and 6 are specified in LCO 3.6.7, Passive Containment Cooling System (PCS) - Shutdown.~~
OPERABILITY of the PCS is required in either MODE 5 or 6 with the reactor decay heat (normally determined by calculation) greater than 6 MWt for heat removal in the event of a loss of nonsafety decay heat removal capabilities. With the decay heat at or below 6.0 MWt, the decay heat can be removed from containment with air cooling alone. Confirmation of decay heat levels may be determined consistent with the assumptions and analysis basis of ANS 1979 plus 2 sigma or via an energy balance of the reactor coolant system.

ACTIONS

A.1

With one passive containment cooling water flow path inoperable, the affected flow path must be restored within 7 days. In this degraded condition, the remaining flow paths are capable of providing greater than 100% of the heat removal needs after an accident, even considering the worst single failure. The 7 day Completion Time was chosen in light of the remaining heat removal capability and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

B.1

With two passive containment cooling water flow paths inoperable, at least one affected flow path must be restored to OPERABLE status within 72 hours. In this degraded condition, the remaining flow path is capable of providing greater than 100% of the heat removal needs after an accident. The 72 hour Completion Time was chosen in light of the remaining heat removal capability and the low probability of DBA occurring during this period.

C.1

If the cooling water tank is inoperable, it must be restored to OPERABLE status within 8 hours. The tank may be declared inoperable due to low water level or temperature out of limits. The 8 hour Completion Time is reasonable based on the remaining heat removal capability of the system and the availability of cooling water from alternate sources.

D.1 and D.2

If any of the Required Actions and associated Completion Times are not met **in MODE 1, 2, 3, or 4**, or if the LCO is not met for reasons other than Condition A, B, or C **when in MODE 1, 2, 3, or 4**, 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 84 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. The extended interval to reach MODE 5 allows additional time and is reasonable when considering that the driving force for a release of radioactive material from the Reactor Coolant System is reduced in MODE 3.

E.1 and E.2

Action must be initiated if any of the Required Actions and associated Completion Times of Condition A, B, or C are not met in MODE 5, or if the LCO is not met for reasons other than Condition A, B, or C when in MODE 5. With the RCS pressure boundary open and/or pressurizer level < 20%, action must be initiated,

ACTIONS (continued)

immediately, to increase the RCS level to a pressurizer level ≥ 20% and to close the RCS so that the Passive Residual Heat Removal Heat Exchanger (PRHR HX) operation is available. In this case, the time to RCS boiling is maximized by maximizing the RCS inventory and maintaining RCS temperature as low as practical. 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. These Actions place the plant in a condition which maximize the time to actuation of the Passive Containment Cooling System, thus providing time for repairs or application of alternative cooling capabilities.

<u>F.1 and F.2</u>

Action must be initiated if any of the Required Actions and associated Completion Times of Condition A, B, or C are not met in MODE 6, or if the LCO is not met for reasons other than Condition A, B, or C when in MODE 6. Action must be initiated, immediately, to increase the refueling cavity water level ≥ 23 feet above the top of the reactor vessel flange. In this case, the time to RCS boiling is maximized by maximizing the RCS inventory and maintaining RCS temperature as low as practical. 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. These Actions place the plant in a condition which maximize the time to actuation of the Passive Containment Cooling System, thus providing time for repairs or application of alternative cooling capabilities.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.6.1

This surveillance requires verification that the cooling water temperature is within the limits assumed in the accident analyses. The ~~7-day~~**24 hour** Frequency is adequate to identify a temperature change that would approach the temperature limits since the tank is large and temperature variations are slow.

~~The surveillance Frequency is increased to 24 hours in the event that the tank temperature approaches its limits; i.e., once temperature increases either to ≥ 100°F, or decreases to ≤ 50°F. Since the maximum tank temperature variation during the normal surveillance Frequency of 7 days is only about 1°F, the tank temperature cannot exceed its limits before the increased surveillance Frequency takes effect.~~

SR 3.6.6.2

Verification that the cooling water volume is above the required minimum ensures that a sufficient supply is available for containment cooling. Since the cooling water volume is normally stable and low level is indicated by a main control room alarm, a 7 day Frequency is appropriate and has been shown to be acceptable in similar applications.

SR 3.6.6.3

Verifying the correct alignment of **manual,** power operated, and automatic valves, excluding check valves, in the Passive Containment Cooling System provides assurance that the proper flow paths exist for system operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these were verified to be in the correct positions prior to being secured. This SR does not require any testing or valve manipulation. Rather, it involves verification~~, through control room instrumentation or a system walkdown,~~ that valves capable of potentially being mispositioned are in the correct position. The 31 day Frequency is appropriate because the valves are operated under administrative control, and an improper valve position would only affect a single flow path. This Frequency has been shown to be acceptable through operating experience.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.6.4

This SR requires verification that each automatic isolation valve actuates to its correct position upon receipt of an actual or simulated actuation signal. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillances were performed with the reactor at power. The 24 month Frequency is also acceptable based on consideration of the design reliability (and confirmed by operating experience) of the equipment. Operating experience has shown that these components usually pass the Surveillances when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.6.6.5

Periodic inspections of the PCS air flow path from the shield building annulus inlet to the exit ensure that it is unobstructed, the baffle plates are properly installed, and the upper annulus safety-related drains are unobstructed. Although there are no anticipated mechanisms which would cause air flow path or annulus drain obstruction and the effect of a missing air baffle section is small, it is considered prudent to verify this capability every 24 months. Additionally, the 24 month Frequency is based on the desire to perform this Surveillance under conditions that apply during a plant outage, on the need to have access to the locations, and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency has been found to be sufficient to detect abnormal degradation in similar situations.

SR 3.6.6.6

This SR requires performance of a Passive Containment Cooling System test to verify system flow and water coverage capabilities. The system performance test demonstrates that the containment cooling capability assumed in accident analyses is maintained by verifying the flow rates via each standpipe and measurement of containment wetting coverage.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The System Level Operability Testing Program provides specific test requirements and acceptance criteria. Although the likelihood that system performance would degrade with time is low, it is considered prudent to periodically verify system performance. The first refueling and 10 year Frequency is based on the ability of the more frequent surveillances to verify the OPERABILITY of the active components and features which could degrade with time.

REFERENCES

1. 10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants."

2. 10 CFR 50, Appendix K, "ECCS Evaluation Models."

3. Chapter 6.2, "Containment Systems."

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

3.6.6 Passive Containment Cooling System (PCS)

LCO 3.6.6 The passive containment cooling system shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4,
MODES 5 and 6 with the reactor decay heat > 6.0 MWt.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One passive containment cooling water flow path inoperable.	A.1 Restore flow path to OPERABLE status.	7 days
B. Two passive containment cooling water flow paths inoperable.	B.1 Restore one flow path to OPERABLE status.	72 hours
C. One or more water storage tank parameters not within limits.	C.1 Restore water storage tank to OPERABLE status.	8 hours
D. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 1, 2, 3, or, 4. <u>OR</u> LCO not met for reasons other than Condition A, B, or C in MODE 1, 2, 3, or 4.	D.1 Be in MODE 3. <u>AND</u> D.2 Be in MODE 5.	6 hours 84 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
E. Required Action and associated Completion time of Condition A, B, or C not met in MODE 5. <u>OR</u> LCO not met for reasons other than Condition A, B, or C in MODE 5.	E.1	Initiate action to establish pressurizer level ≥ 20% with the Reactor Coolant System (RCS) pressure boundary intact.	Immediately
	<u>AND</u>		
	E.2	Suspend positive reactivity additions.	Immediately
F. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 6. <u>OR</u> LCO not met for reasons other than Condition A, B, or C in MODE 6.	F.1	Initiate action to establish water level ≥ 23 ft above the top of the reactor vessel flange.	Immediately
	<u>AND</u>		
	F.2	Suspend positive reactivity additions.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.6.1	Verify the water storage tank temperature ≥ 40°F and ≤ 120°F.	24 hours
SR 3.6.6.2	Verify the water storage tank volume ≥ 756,700 gallons.	7 days

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.6.3	Verify each passive containment cooling system manual, power operated, and automatic valve in each flow path that is not locked, sealed, or otherwise secured in position, is in the correct position.	31 days
SR 3.6.6.4	Verify each passive containment cooling system automatic valve in each flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	24 months
SR 3.6.6.5	Verify the air flow path from the shield building annulus inlet to the exit is unobstructed and, that all air baffle sections are in place.	24 months
SR 3.6.6.6	Verify passive containment cooling system flow and water coverage performance in accordance with the System Level OPERABILITY Testing Program.	At first refueling <u>AND</u> 10 years

B 3.6 CONTAINMENT SYSTEMS

B 3.6.6 Passive Containment Cooling System (PCS)

BASES

BACKGROUND

The PCS provides containment cooling to limit post accident pressure and temperature in containment to less than the design values. Reduction of containment pressure reduces the release of fission product radioactivity from containment to the environment, in the event of a Design Basis Accident (DBA). The Passive Containment Cooling System is designed to meet the requirements of 10 CFR 50 Appendix A GDC 38 “Containment Heat Removal” and GDC 40 “Testing of Containment Heat Removal Systems” (Ref. 1).

The PCS consists of a 800,000 gal (nominal) cooling water tank, four headered tank discharge lines with flow restricting orifices, and two separate full capacity discharge flow paths to the containment vessel with 3 sets of isolation valves, each capable of meeting the design bases. Algae growth is not expected within the Passive Containment Cooling Water Storage Tank (PCCWST); however, to assure water clarity is maintained, a prevailing concentration of hydrogen peroxide is maintained at 50 ppm. The recirculation pumps and heater provide freeze protection for the passive containment cooling water storage tank. However, OPERABILITY of the tank is assured by compliance with the temperature limits specified in SR 3.6.6.1 and not by the recirculation pumps and heater. In addition to the recirculation pumps and heater, the PCS water storage tank temperature can be maintained within limits by the ambient temperature, the large thermal inertia of the tank, or heat from other sources. The PCS valve room temperature must not be below freezing for an extended period to assure the water flow path to the containment shell is available. The isolation valves on each flow path are powered from a separate Division.

Upon actuation of the isolation valves, gravity flow of water from the cooling water tank (contained in the shield building structure above the containment) onto the upper portion of the containment shell reduces the containment pressure and temperature following a DBA. The flow of water to the containment shell surface is initially established to assure that the required short term containment cooling requirements following the postulated worst case LOCA are achieved. As the decay heat from the core becomes less with time, the water flow to the containment shell is reduced in three steps. The change in flow rate is attained without

BASES

BACKGROUND (continued)

active components in the system and is dependent only on the decreasing water level in the elevated storage tank. In order to ensure the containment surface is adequately and effectively wetted, the water is introduced at the center of the containment dome and flows outward. Weirs are placed on the dome surface to distribute the water and ensure effective wetting of the dome and vertical sides of the containment shell. The monitoring of the containment surface through the Reliability Assurance Program (RAP) and the Inservice Testing Program assures containment surface does not unacceptably degrade containment heat removal performance. During the initial test program, the containment coverage will be measured at the base of the upper annulus in addition to the coverage at the spring line for the full flow case and a lower flow case with PCS recirculation pumps delivering to the containment shell. These benchmark values at the base of the upper annulus will be used to develop acceptance criteria for technical specifications. Contamination can be removed by PCS actuation and by using coating vendor cleaning procedures.

The path for the natural circulation of air is from the air intakes in the shield building, down the outside of the baffle, up along the containment shell to the top, center exit in the shield building and is always open. The drains in the upper annulus region must be clear to prevent water from blocking the air flow path. Heat is removed from within the containment utilizing the steel containment shell as the heat transfer surface combining conductive heat transfer to the water film, convective heat transfer from the water film to the air, radiative heat transfer from the film to the air baffle, and mass transfer (evaporation) of the water film into the air. As the air heats up and water evaporates into the air, it becomes less dense than the cooler air in the air inlet annulus. This differential causes an increase in the natural circulation of the air upward along the containment surface, with heated air/water vapor exiting the top/center of the shield building. Additional system design details are provided in Reference 3.

The PCS is actuated either automatically, by a containment High-2 pressure signal, or manually. Automatic actuation opens the cooling water tank discharge valves, allowing gravity flow of the cooling water onto the containment shell. The manual containment cooling actuation consists of four momentary controls, if two associated controls are operated simultaneously, actuation will occur in all divisions. The discharge continues for at least three days.

BASES

BACKGROUND (continued)

The PCS is designed to limit post-accident pressure and temperature in containment to less than the design values. Reduction of containment pressure reduces the release of fission product radioactivity from containment to the environment, in the event of a DBA.

The PCS is an ESF system and is designed to ensure that the heat removal capability required during the post accident period can be attained.

APPLICABLE SAFETY ANALYSES

The Passive Containment Cooling System limits the temperature and pressure that could be experienced following a DBA. The limiting DBAs considered are the loss of coolant accident (LOCA) and the steam line break (SLB). The LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure and temperature transients. No DBAs are assumed to occur simultaneously or consecutively. The postulated DBAs are analyzed with regard to containment ESF system, assuming the loss of one Class 1E Engineered Safety Features Actuation Cabinet (ESFAC) Division, which is the worst case single active failure and results in one PCS flow path being inoperable.

The analyses and evaluations assume a unit specific power level of 3400 MWt, one passive containment cooling train operating, and initial (pre-accident) containment conditions of 120°F and 1.0 psig. The analyses also assume a response time delayed initiation to provide conservative peak calculated containment pressure and temperature responses.

For certain aspects of transient accident analyses, maximizing the calculated containment pressure is not conservative. In particular, the effectiveness of the Passive Core Cooling System during the core reflood phase of a LOCA analysis increases with increasing containment backpressure. For these calculations, the containment backpressure is calculated in a manner designed to conservatively minimize, rather than maximize, the calculated transient containment pressures in accordance with 10 CFR 50, Appendix K (Ref. 2).

Containment cooling system performance for post accident conditions is given in Reference 3. The result of the analysis is that each train can provide 100% of the required peak cooling capacity during the post accident condition.

BASES

APPLICABLE SAFETY ANALYSES (continued)

The modeled Passive Containment Cooling System actuation response time from the containment analysis is based upon a response time associated with exceeding the containment High-2 pressure setpoint to opening of isolation valves.

The PCS limits the temperature and pressure that could be experienced during shutdown following a loss of decay heat removal. For shutdown events, the Reactor Coolant System (RCS) sensible and decay heat removal requirements are reduced as compared to heat removal requirements for MODE 1, 2, 3, or 4 events. Therefore, the shutdown containment heat removal requirements are bounded by analyses of MODES 1, 2, 3, and 4 events.

The Passive Containment Cooling System satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

During a DBA, one passive containment cooling water flow path is required to maintain the containment peak pressure and temperature below the design limits (Ref. 3). To ensure that this requirement is met, two passive containment cooling water flow paths are provided.

Therefore, in the event of an accident, at least one flow path operates, assuming the worst case single active failure occurs. A third PCS flow path is provided for protection against multiple failure scenarios modeled in the PRA. To ensure that these requirements are met, three PCS water flow paths must be OPERABLE.

The PCS includes a cooling water tank, valves, piping, instruments and controls to ensure an OPERABLE flow path capable of delivering water from the cooling water tank upon an actuation signal. An OPERABLE flow path consists of a normally closed valve capable of automatically opening in series with a normally open valve. For the two flow paths containing air-operated valves, it is preferred because of PRA insights that these valves be normally closed.

The PCS cooling water storage tank ensures that an adequate supply of water is available to cool and depressurize the containment in the event of a Design Basis Accident (DBA). To be considered OPERABLE, the PCS cooling water storage tank must meet the water volume and

BASES

LCO (continued)

temperature limits established in the SRs. To be considered OPERABLE, the air flow path from the shield building annulus inlet to the exit must be unobstructed, with unobstructed upper annulus safety-related drains providing a path for containment cooling water runoff to preclude blockage of the air flow path.

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment and an increase in containment pressure and temperature requiring the operation of the PCS.

OPERABILITY of the PCS is required in either MODE 5 or 6 with the reactor decay heat (normally determined by calculation) greater than 6 MWt for heat removal in the event of a loss of nonsafety decay heat removal capabilities. With the decay heat at or below 6.0 MWt, the decay heat can be removed from containment with air cooling alone. Confirmation of decay heat levels may be determined consistent with the assumptions and analysis basis of ANS 1979 plus 2 sigma or via an energy balance of the reactor coolant system.

ACTIONS

A.1

With one passive containment cooling water flow path inoperable, the affected flow path must be restored within 7 days. In this degraded condition, the remaining flow paths are capable of providing greater than 100% of the heat removal needs after an accident, even considering the worst single failure. The 7 day Completion Time was chosen in light of the remaining heat removal capability and the low probability of a DBA occurring during this period.

B.1

With two passive containment cooling water flow paths inoperable, at least one affected flow path must be restored to OPERABLE status within 72 hours. In this degraded condition, the remaining flow path is capable of providing greater than 100% of the heat removal needs after an accident. The 72 hour Completion Time was chosen in light of the remaining heat removal capability and the low probability of DBA occurring during this period.

BASES

ACTIONS (continued)

C.1

If the cooling water tank is inoperable, it must be restored to OPERABLE status within 8 hours. The tank may be declared inoperable due to low water level or temperature out of limits. The 8 hour Completion Time is reasonable based on the remaining heat removal capability of the system and the availability of cooling water from alternate sources.

D.1 and D.2

If any of the Required Actions and associated Completion Times are not met in MODE 1, 2, 3, or 4, or if the LCO is not met for reasons other than Condition A, B, or C when in MODE 1, 2, 3, or 4, 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 84 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. The extended interval to reach MODE 5 allows additional time and is reasonable when considering that the driving force for a release of radioactive material from the Reactor Coolant System is reduced in MODE 3.

E.1 and E.2

Action must be initiated if any of the Required Actions and associated Completion Times of Condition A, B, or C are not met in MODE 5, or if the LCO is not met for reasons other than Condition A, B, or C when in MODE 5. With the RCS pressure boundary open and/or pressurizer level < 20%, action must be initiated, immediately, to increase the RCS level to a pressurizer level ≥ 20% and to close the RCS so that the Passive Residual Heat Removal Heat Exchanger (PRHR HX) operation is available. In this case, the time to RCS boiling is maximized by maximizing the RCS inventory and maintaining RCS temperature as low as practical. 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. These Actions place the plant in a condition which maximize the time to actuation of the Passive Containment Cooling System, thus providing time for repairs or application of alternative cooling capabilities.

BASES

ACTIONS (continued)

F.1 and F.2

Action must be initiated if any of the Required Actions and associated Completion Times of Condition A, B, or C are not met in MODE 6, or if the LCO is not met for reasons other than Condition A, B, or C when in MODE 6. Action must be initiated, immediately, to increase the refueling cavity water level ≥ 23 feet above the top of the reactor vessel flange. In this case, the time to RCS boiling is maximized by maximizing the RCS inventory and maintaining RCS temperature as low as practical. 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. These Actions place the plant in a condition which maximize the time to actuation of the Passive Containment Cooling System, thus providing time for repairs or application of alternative cooling capabilities.

SURVEILLANCE REQUIREMENTS

SR 3.6.6.1

This surveillance requires verification that the cooling water temperature is within the limits assumed in the accident analyses. The 24 hour Frequency is adequate to identify a temperature change that would approach the temperature limits since the tank is large and temperature variations are slow.

SR 3.6.6.2

Verification that the cooling water volume is above the required minimum ensures that a sufficient supply is available for containment cooling. Since the cooling water volume is normally stable and low level is indicated by a main control room alarm, a 7 day Frequency is appropriate and has been shown to be acceptable in similar applications.

SR 3.6.6.3

Verifying the correct alignment of manual, power operated, and automatic valves, excluding check valves, in the Passive Containment Cooling System provides assurance that the proper flow paths exist for system operation. This SR does not apply to valves that are locked, sealed, or

BASES

SURVEILLANCE REQUIREMENTS (continued)

otherwise secured in position since these were verified to be in the correct positions prior to being secured. This SR does not require any testing or valve manipulation. Rather, it involves verification that valves capable of potentially being mispositioned are in the correct position. The 31 day Frequency is appropriate because the valves are operated under administrative control, and an improper valve position would only affect a single flow path. This Frequency has been shown to be acceptable through operating experience.

SR 3.6.6.4

This SR requires verification that each automatic isolation valve actuates to its correct position upon receipt of an actual or simulated actuation signal. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls. The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillances were performed with the reactor at power. The 24 month Frequency is also acceptable based on consideration of the design reliability (and confirmed by operating experience) of the equipment. Operating experience has shown that these components usually pass the Surveillances when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.6.6.5

Periodic inspections of the PCS air flow path from the shield building annulus inlet to the exit ensure that it is unobstructed, the baffle plates are properly installed, and the upper annulus safety-related drains are unobstructed. Although there are no anticipated mechanisms which would cause air flow path or annulus drain obstruction and the effect of a missing air baffle section is small, it is considered prudent to verify this capability every 24 months. Additionally, the 24 month Frequency is based on the desire to perform this Surveillance under conditions that apply during a plant outage, on the need to have access to the locations, and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency has been found to be sufficient to detect abnormal degradation in similar situations.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.6.6

This SR requires performance of a Passive Containment Cooling System test to verify system flow and water coverage capabilities. The system performance test demonstrates that the containment cooling capability assumed in accident analyses is maintained by verifying the flow rates via each standpipe and measurement of containment wetting coverage. The System Level Operability Testing Program provides specific test requirements and acceptance criteria. Although the likelihood that system performance would degrade with time is low, it is considered prudent to periodically verify system performance. The first refueling and 10 year Frequency is based on the ability of the more frequent surveillances to verify the OPERABILITY of the active components and features which could degrade with time.

REFERENCES

1. 10 CFR 50, Appendix A, “General Design Criteria for Nuclear Power Plants.”

2. 10 CFR 50, Appendix K, “ECCS Evaluation Models.”

3. Chapter 6.2, “Containment Systems.”