Technical Specifications Task Force
Improved Standard Technical Specifications Change Traveler

Provide Exception from Entering Mode 4 With No Operable RHR Shutdown Cooling

NUREGs Affected: ☐ 1430 ☐ 1431 ☐ 1432 ☑ 1433 ☑ 1434 ☐ 2194

Classification: 1) Technical Change
Recommended for CLIIP?: Yes

Correction or Improvement: Improvement
NRC Fee Status: Not Exempt

Benefit: Prevents Unnecessary Actions
Changes Marked on ISTS Rev 4.0

PWROG RISD & PA (if applicable): None

See attached.

Revision History

OG Revision 0 Revision Status: Active

Revision Proposed by: Hatch

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 21-May-20

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 15-Jun-20

TSTF Review Information

TSTF Received Date: 15-Jun-20 Date Distributed for Review 15-Jun-20

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 29-Jun-20

Affected Technical Specifications

Action 3.4.8.A	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
Action 3.4.8.A Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
Action 3.4.8.B	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
Action 3.4.8.B Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
Action 3.4.8.C	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
	Change Description: New Action	

Action 3.4.8.C	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
	Change Description: Renamed E	
Action 3.4.8.C Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
	Change Description: New Action	
Action 3.4.8.C Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
	Change Description: Renamed E	
Action 3.4.8.D	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
	Change Description: New Action	
Action 3.4.8.D Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
	Change Description: New Action	
Action 3.4.9.A	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
Action 3.4.9.A Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
Action 3.4.9.B	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
Action 3.4.9.B Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
Action 3.4.9.C	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
	Change Description: Renamed E	
Action 3.4.9.C	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
	Change Description: New Action	
Action 3.4.9.C Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
	Change Description: New Action	
Action 3.4.9.C Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
	Change Description: Renamed E	
Action 3.4.9.D	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
	Change Description: New Action	
Action 3.4.9.D Bases	RHR Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
	Change Description: New Action	

1. SUMMARY DESCRIPTION

The proposed change provides a Technical Specifications (TS) exception to entering Mode 4 if both required Residual Heat Removal (RHR) shutdown cooling subsystems are inoperable. The proposed change modifies NUREG-1433, "Standard Technical Specifications, General Electric BWR/4 Plants," and NUREG-1434, "Standard Technical Specifications, General Electric BWR/6 Plants."[1]

2. DETAILED DESCRIPTION

2.1. System Design and Operation

RHR System

The RHR System consists of at least two redundant subsystems. Each subsystem contains at least one motor driven pump, a heat exchanger, and associated piping, valves, and instrumentation.

The heat exchanger is cooled by the ultimate heat sink using a safety related cooling system. In NUREG-1433, the safety related cooling system is called the RHR Service Water (RHRSW) system, and in NUREG-1434, it is called the Standby Service Water (SSW) System, but the plant-specific names vary. In this traveler, the name RHRSW System will be used to describe the safety related cooling water system used to transfer heat from the RHR heat exchangers to the ultimate heat sink.

The RHR System is a multipurpose system with up to seven operating modes depending on the plant design:

1. Low Pressure Coolant Injection (LPCI) Mode

   In LPCI mode the RHR System is part of the Emergency Core Cooling System (ECCS) and is used to maintain the reactor pressure vessel (RPV) coolant inventory following a loss of coolant accident (LOCA). The LPCI mode is the normal valve lineup during plant operation and is the only automatically started mode of operation. Both RHR Subsystems in LPCI mode are automatically started based on low reactor water level and high drywell pressure. During LPCI operation, the RHR pumps take water from the suppression pool and discharge to the RPV via the recirculation system discharge piping. If reactor pressure is less than the pump shutoff head, the discharge check valves open to permit flow into the RPV. If reactor pressure is above the shutoff head, the minimum flow valves open to allow sufficient flow to the suppression pool to cool the pumps.

[1] NUREG 1433 is based on the BWR/4 plant design, but is also representative of the BWR/2, BWR/3, and, in this case, BWR/5 designs. NUREG 1434 is based on the BWR/6 plant design.

2. Containment Spray Mode

   The containment spray mode is manually aligned and started by the operator. It is used to condense steam and reduce airborne activity in the primary containment following a LOCA. Water is pumped from the suppression pool through the RHR heat exchanger to the containment spray spargers located in the upper portion of the drywell and the suppression chamber.

3. Suppression Pool Cooling Mode

   Suppression pool cooling is used to maintain suppression pool temperature within limit during normal plant operating conditions and to limit the suppression pool temperature following a LOCA. Water is pumped from the suppression pool through the RHR heat exchanger and back to the suppression pool. The suppression pool cooling mode is manually configured and started by the operator.

   Each RHR pump is interlocked with all of the shutdown cooling and suppression pool valves which can isolate the suction path for that pump. All the valves in at least one flow path must be fully open before that RHR pump can be started. If an RHR pump is running and a valve in its suction path is moved out of the fully open position, the pump is automatically stopped.

4. Shutdown Cooling

   The shutdown cooling mode is placed in operation during a normal reactor shutdown and cooldown to remove decay heat. When reactor temperature and pressure have decreased to sufficiently low values, the RHR System is manually placed in the shutdown cooling mode of operation. This mode is capable of cooling the reactor coolant system to approximately 125°F and maintaining the water below that temperature to accommodate refueling operation. Water is removed from one recirculation loop suction piping, cooled by the RHR heat exchanger, and discharged back to one of the recirculation loop discharge lines.

5. Steam Condensing Mode

   The steam condensing mode is manually aligned to support the Reactor Core Isolation Cooling (RCIC) System to remove decay heat when the main condenser is unavailable. Steam is removed from the high pressure ECCS steam supply line, cooled by the RHR heat exchangers, and pumped back to the RPV by the RCIC System. This mode of operation is not applicable to all BWR plants.

6. Standby Coolant Supply Mode

   The standby coolant supply mode is used for post-accident recovery. The RHR Service Water system is connected to the RHR System and used to fill the primary containment to a level above the reactor core.

7. Fuel Pool Cooling Mode

   The fuel pool cooling mode may be used to augment the heat removal capacity of the Fuel Pool Cooling and Cleanup system if needed.

Decay Heat Removal

Mode 3 (hot shutdown) is defined in Table 1.1-1 of the TS as the reactor mode switch in "Shutdown" and the average reactor coolant temperature > [200]°F, and Mode 4 is defined as the reactor mode switch in "Shutdown" and the average reactor coolant temperature ≤ [200]°F. The transition temperature is plant-specific, but the temperature is close to the boiling point of water.

The BWR design features a number of systems that can remove reactor core decay heat after a shutdown while in Mode 3 by injecting water into the RPV and removing decay heat by conversion of water to steam:

- Power conversion system (e.g., normal feedwater and steaming to the main condenser)
- High Pressure Coolant Injection (HPCI) System – BWR/2, BWR/3, and BWR/4
- Low Pressure Core Spray (LPCS) System
- Low Pressure Coolant Injection (LPCI) System
- Reactor Core Isolation Cooling (RCIC) System
- The RHR System (below the RHR cut-in permissive pressure)
- Control Rod Drive (CRD) System
- High Pressure Core Spray (HPCS) System - BWR/5 and BWR/6

In Mode 4, only the RHR System has the capability to remove a significant amount of decay heat from the reactor because the average reactor coolant temperature is below the boiling point of water. Other methods are available, such as injecting cool water with the CRD System and maintaining water level with the Reactor Water Cleanup System, but their heat removal capability is substantially less than the RHR shutdown cooling subsystems and cannot maintain reactor coolant temperature during periods of high decay heat load.

2.2. Current Technical Specifications Requirements

Not all of the RHR System operating modes are described in the TS. The following TS provide requirements on various RHR System operating modes.

- BWR/4 TS 3.4.8 and BWR/6 TS 3.4.9, "Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown," requires two RHR shutdown cooling subsystems to be operable in Mode 3 when the reactor steam dome pressure is less than the RHR cut-in permissive pressure.

  TSTF-566-A, "Revise Actions for Inoperable RHR Shutdown Cooling Subsystems," approved by the NRC on February 21, 2019, revised the Actions of these TS to permit establishing alternative decay heat removal mechanisms and to remain in Mode 3 when both required RHR shutdown cooling subsystems are inoperable.

- BWR/4 TS 3.4.9 and BWR/6 TS 3.4.10, "Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown," requires two RHR shutdown cooling subsystems to be operable in Mode 4.

- BWR/4 and BWR/6 TS 3.5.1, "ECCS - Operating," requires each LPCI and LPCS subsystem to be operable in Modes 1, 2, and 3. If the required RHR Subsystems in LPCI and LPCS mode are inoperable while in Mode 3, LCO 3.0.3 is entered and the plant must be brought to Mode 4 within 37 hours.

- BWR/4 and BWR/6 TS 3.5.2, "Reactor Pressure Vessel Water Inventory Control," was renamed and revised by TSTF-542, "Reactor Pressure Vessel Water Inventory Control," and requires one ECCS subsystem, which may be an LPCI subsystem, to be operable in Modes 4 and 5 to mitigate an inadvertent draining event.

- BWR/4 and BWR/6 TS 3.6.2.3, "Residual Heat Removal (RHR) Suppression Pool Cooling," requires two RHR suppression pool cooling subsystems to be operable in Modes 1, 2, and 3. If both required RHR Subsystems in suppression pool cooling mode are inoperable in Mode 3, one must be restored within 8 hours or average reactor coolant temperature must be reduced to Mode 4 in the following 36 hours.

- BWR/4 TS 3.6.2.4, "Residual Heat Removal (RHR) Suppression Pool Spray," requires two RHR suppression pool spray subsystems to be operable in Modes 1, 2, and 3. If both required RHR Subsystems in suppression pool spray mode are inoperable in Mode 3, one must be restored within 8 hours. The TS do not require entering Mode 4.

- BWR/4 and BWR/6 TS 3.9.8, "Residual Heat Removal (RHR) - High Water Level," require one RHR shutdown cooling subsystem to be operable in Mode 5 with irradiated fuel in the RPV and the water level ≥ [23] ft above the top of the RPV flange.

- BWR/4 and BWR/6 TS 3.9.9, "Residual Heat Removal (RHR) - Low Water Level," require two RHR shutdown cooling subsystem to be operable in Mode 5 with irradiated fuel in the RPV and the water level ≤ [23] ft above the top of the RPV flange.

In addition, BWR/4 TS 3.7.1, "Residual Heat Removal Service Water (RHRSW) System," and BWR/6 TS 3.7.1, "[Standby Service Water (SSW)] System and [Ultimate Heat Sink (UHS)]," require two RHRSW subsystems or SSW subsystems to be operable to support the RHR System heat exchangers in Modes 1, 2, and 3. If both RHRSW subsystems are inoperable in Mode 3, one subsystem must be restored within 8 hours or the plant must be in Mode 4 within 36 hours. If both SSW subsystems are inoperable in Mode 3, the plant must be in Mode 4 within 36 hours.

2.3. Reason for the Proposed Change

In TSTF-566, the TSTF proposed to delete BWR/4 TS 3.4.8 and BWR/6 TS 3.4.9, Required Action A.3, which required the plant to be in Mode 4 within 24 hours when one or two required RHR shutdown cooling subsystems are inoperable. Reducing reactor coolant temperature to less than the boiling point of water eliminates most of decay heat removal mechanisms. The TSTF proposed that entering Mode 4 should not be dictated by the TS when no RHR shutdown cooling

subsystem is operable. The NRC approved the change because if there are no operable RHR shutdown cooling subsystems and the plant is in a period of high decay heat load, it may not be possible to reduce the reactor coolant system temperature to the Mode 4 entry condition within the Completion Time.

As discussed in Section 2.1, the RHR System can be used in various different operating modes that share many of the same components and, as discussed in Section 2.2, there are multiple TS that provide requirements on the RHR System in its different operating modes. Even though TSTF-566 revised the "RHR Shutdown Cooling System – Hot Shutdown" TS to not require entering Mode 4 with no operable RHR shutdown cooling subsystems, there are other TS that would still require entering Mode 4 for the same condition. For Example:

- BWR/4 and BWR/6 TS 3.5.1, "ECCS – Operating," if two inoperable RHR shutdown cooling subsystems results in two inoperable LPCI subsystems,
- BWR/4 and BWR/6 TS 3.6.2.3, "Residual Heat Removal (RHR) Suppression Pool Cooling," if two inoperable RHR shutdown cooling subsystems results in two inoperable RHR suppression pool cooling subsystems, or
- BWR/4 TS 3.7.1, RHRSW System, if two RHRSW subsystems are inoperable.

Given the design of the system, it is difficult to construct a scenario in which two inoperable RHR shutdown cooling subsystems in Mode 3 would not also render the corresponding LPCI and RHR suppression pool cooling modes inoperable. Therefore, contrary to the intent of TSTF-566, the TS may still require entering Mode 4 with no operable RHR shutdown cooling subsystems.

Should both subsystems of the RHRSW System become inoperable, both required subsystems of the RHR System in the LPCI, RHR shutdown cooling, and RHR suppression pool cooling modes would also be inoperable and would require transition to Mode 4, even though the RHR heat exchangers would not have RHRSW cooling.

Therefore, the TS should be revised to not require transition to Mode 4 with no operable RHR subsystems as it may not be possible to reduce the reactor coolant system temperature to the Mode 4 entry condition within the Completion Time.

2.4. Description of the Proposed Change

The proposed change would provide an exception from TS requirements to enter Mode 4 if the required RHR shutdown cooling subsystems are inoperable. Any TS Required Action directing entry into Mode 4 would be suspended by this proposed change, regardless of whether it is related to RHR shutdown cooling, until at least one RHR shutdown cooling subsystem is restored to operable status. If there is a circumstance that rendered both required LPCI subsystems, both required RHR suppression pool cooling subsystems, or both RHRSW subsystems inoperable but that did not render the RHR shutdown cooling function inoperable, the exception would not apply.

Adoption of this change is dependent on previous adoption of TSTF-566-A, "Revise Actions for Inoperable RHR Shutdown Cooling Subsystems." The attached TS markups have incorporated the changes to BWR/4 TS 3.4.8 and BWR/6 TS 3.4.9 approved in TSTF-566.

The proposed change is implemented as Notes to BWR/4 TS 3.4.8 and BWR/6 TS 3.4.9, "Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown."

- Condition A is revised from, "One or two RHR shutdown cooling subsystems inoperable," to "One [required] RHR shutdown cooling subsystems inoperable." The Action is revised to be applicable to a single inoperable subsystem.

- Condition B, "Required Action and associated Completion Time of Condition A not met," is revised to be applicable to a single inoperable RHR shutdown cooling subsystem.

- A new Condition C is added which is applicable when two [required] RHR shutdown cooling subsystems are inoperable.

    - Required Action C.1 is similar to Required Action A.1 and requires verification of an alternate method of decay heat removal within one hour and every 24 hours thereafter.

- A new Condition D, "Required Action and associated Completion Time of Condition C not met," is added.

    - Proposed Required Action D.1 requires immediate initiation of action to restore an RHR shutdown cooling subsystem to operable status.

    - There is a Note applicable to Required Action D.1 which states, "LCO 3.0.3 and all other LCO Required Actions requiring a MODE change to MODE 4 may be suspended until one RHR shutdown cooling subsystem is restored to OPERABLE status."

- Action C is renumbered Action E with no other changes.

The TS Bases are revised to reflect the changes to the TS. The regulation at Title 10 of the Code of Federal Regulations (10 CFR), Part 50.36, states, "A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the technical specifications." A licensee may make changes to the TS Bases without prior NRC review and approval in accordance with the Technical Specifications Bases Control Program. The proposed TS Bases changes are consistent with the proposed TS changes and provide the purpose for each requirement in the specification consistent with the Commission's Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors, dated July 2, 1993 (58 FR 39132). Therefore, the Bases changes are provided for information and approval of the Bases is not requested.

A model application is attached. The model may be used by licensees desiring to adopt the traveler following NRC approval.

3. TECHNICAL EVALUATION

The purpose of the BWR/4 TS 3.4.8 and BWR/6 TS 3.4.9, "Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown," actions is to provide appropriate remedial measures that must be taken in response to a condition in which one or more required RHR shutdown cooling subsystems are inoperable. As discussed in Section 2.1, when the RCS average water temperature is close to or above the boiling point of water, there are several available mechanisms to remove decay heat from the reactor, such as steaming to the main condenser, the RCIC System, LPCS, LPCI, and the RHR shutdown cooling system (if below the cut-in permissive pressure). However, if the average reactor coolant temperature is significantly below the boiling point of water as in Mode 4, the methods of removing decay heat are substantially reduced. Only the RHR shutdown cooling system, supported by the RHRSW System, can remove high decay heat loads and maintain reactor coolant temperature. At low decay heat loads, a system such as reactor water cleanup can remove decay heat and maintain reactor coolant temperature. Without an operable RHR shutdown cooling subsystem, it is unlikely that, following a reactor shutdown, the average reactor coolant temperature could be reduced to Mode 4 within the Completion Time. Other than the TS, there is no design or other regulatory requirement that a BWR be capable of reducing temperature to Mode 4 with no operable RHR shutdown cooling subsystems.

As described in Section 2.2, several modes of the RHR system are required by TS. While it would be possible to modify the LPCI, RHR suppression pool cooling, and RHRSW System TS to provide an exception when there are no operable RHR shutdown cooling subsystems, that would require describing the RHR shutdown cooling subsystem operability requirements in those TS, which would unnecessarily complicate those TS. A more straightforward approach is to provide a global exception to entering Mode 4 with no operable RHR shutdown cooling subsystems in the RHR shutdown cooling TS. This approach is consistent the pressurized water reactor (PWR) Standard Technical Specifications (STS) on Auxiliary Feedwater (AFW) and Emergency Feedwater (TS 3.7.5 in the Babcock & Wilcox STS (NUREG-1430), Westinghouse STS (NUREG-1431), and Combustion Engineering STS (NUREG-1432)). In the condition for no operable AFW trains in Modes 1, 2, or 3, the Required Action is modified by a Note which states, "LCO 3.0.3 and all other LCO Required Actions requiring MODE changes are suspended until one AFW train is restored to OPERABLE status." The Bases describe the Note as, "all required MODE changes are suspended until one AFW train is restored to OPERABLE status. In this case, LCO 3.0.3 is not applicable because it could force the unit into a less safe condition."

The proposed change is similar to the PWR AFW exception but is more narrowly applied and limited to entry into Mode 4 with no operable RHR shutdown cooling subsystems. The proposed Note modifying new Required Action D.1 indicates that all required MODE changes to MODE 4 may be suspended until one RHR shutdown cooling subsystem is restored to operable status. In this case, LCO 3.0.3 and other Required Actions directing entry into MODE 4 are not applicable

because it could force the unit into a less safe condition in which there are no adequate means to remove decay heat.

The proposed note would not exempt a requirement to transition to Mode 3 but would remove the requirement to transition to Mode 4 with no operable RHR shutdown cooling subsystems. Entry into Mode 4 should not be dictated by the TS when no RHR shutdown cooling subsystem is operable.

When at least one RHR subsystem is restored to OPERABLE status, the Completion Times of LCO 3.0.3 or other Required Actions would resume at the point at which they were suspended.

The addition of the Note is acceptable because the Required Actions would continue to establish appropriate remedial actions to the degraded condition in order to minimize risk. Immediate action to restore an RHR shutdown cooling subsystem to operable status is required when the exception is applied. It is appropriate to allow the restoration of one of the RHR shutdown cooling subsystems before requiring entry into a condition in which that subsystem would be needed and exiting a condition where other sources of cooling are available.

The bracketed word “required” is added to Conditions A and new Condition C to be used for plants that are designed with more than two RHR shutdown cooling subsystems (e.g., Peach Bottom, Dresden, and Brunswick designs include two RHR shutdown cooling subsystems per RHR System loop resulting in four RHR shutdown cooling subsystems.)

Required Action C.1 is similar to Required Action A.1 and preserves the current TS Required Action for two inoperable RHR shutdown cooling subsystems. New Required Action D.1 requires immediate initiation of action to restore at least one inoperable subsystem to operable status and is the appropriate action to pursue, similar to existing Action B.1. Restoring at least one decay heat removal path allows a plant cooldown to continue to Mode 4. The immediate Completion Time reflects the importance of restoring a normal path for heat removal.

Traveler TSTF-566, Revision 0, proposed to delete a Required Action for the plant to be in Mode 4 within 24 hours when two RHR shutdown cooling subsystems are inoperable. The NRC found the change to be acceptable because if there is no operable RHR shutdown cooling subsystem and the plant is in a period of high decay heat load, it may not be possible to reduce the reactor coolant system temperature to the Mode 4 entry condition (typically less than 200 °F) within the Completion Time. The NRC staff also found the deletion of the Required Action acceptable because remaining in Mode 3 allows fission product decay heat and other residual heat from the reactor core to be transferred at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary will not be exceeded.

4. REGULATORY EVALUATION

4.1. Applicable Regulatory Requirements/Criteria

Section IV, "The Commission Policy," of the "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" (58 Federal Register 39132), dated July 22, 1993, states in part:

> The purpose of Technical Specifications is to impose those conditions or limitations upon reactor operation necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety by identifying those features that are of controlling importance to safety and establishing on them certain conditions of operation which cannot be changed without prior Commission approval.
>
> …[T]he Commission will also entertain requests to adopt portions of the improved STS, even if the licensee does not adopt all STS improvements.
>
> …The Commission encourages all licensees who submit Technical Specification related submittals based on this Policy Statement to emphasize human factors principles.
>
> …In accordance with this Policy Statement, improved STS have been developed and will be maintained for [BWR designs]. The Commission encourages licensees to use the improved STS as the basis for plant-specific Technical Specifications.
>
> …[I]t is the Commission intent that the wording and Bases of the improved STS be used … to the extent practicable.

As described in the Commission's "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors," recommendations were made by NRC and industry task groups for new STS that include greater emphasis on human factors principles in order to add clarity and understanding to the text of the STS, and provide improvements to the Bases of STS, which provides the purpose for each requirement in the specification. Improved vendor-specific STS were developed and issued by the NRC in September 1992.

The regulation at Title 10 of the Code of Federal Regulations (10 CFR) Section 50.36(a)(1) requires an applicant for an operating license to include in the application proposed TS in accordance with the requirements of 10 CFR 50.36. The applicant must include in the application a "summary statement of the bases or reasons for such specifications, other than those covering administrative controls…." However, per 10 CFR 50.36(a)(1), these technical specification bases "shall not become part of the technical specifications." The Final Policy Statement provides the following description of the scope and the purpose of the Technical Specification Bases:

> Appropriate Surveillance Requirements and Actions should be retained for each LCO [limiting condition for operation] which remains or is included in the Technical Specifications. Each LCO, Action, and Surveillance Requirement should have supporting Bases. The Bases should at a minimum address the following questions and

cite references to appropriate licensing documentation (e.g., FSAR [final safety analysis report], Topical Report) to support the Bases.

1. What is the justification for the Technical Specification, i.e., which Policy Statement criterion requires it to be in the Technical Specifications?

2. What are the Bases for each LCO, i.e., why was it determined to be the lowest functional capability or performance level for the system or component in question necessary for safe operation of the facility and, what are the reasons for the Applicability of the LCO?

3. What are the Bases for each Action, i.e., why should this remedial action be taken if the associated LCO cannot be met; how does this Action relate to other Actions associated with the LCO; and what justifies continued operation of the system or component at the reduced state from the state specified in the LCO for the allowed time period?

4. What are the Bases for each Safety Limit?

5. What are the Bases for each Surveillance Requirement and Surveillance Frequency; i.e., what specific functional requirement is the surveillance designed to verify? Why is this surveillance necessary at the specified frequency to assure that the system or component function is maintained, that facility operation will be within the Safety Limits, and that the LCO will be met?

Note: In answering these questions the Bases for each number (e.g., Allowable Value, Response Time, Completion Time, Surveillance Frequency), state, condition, and definition (e.g., operability) should be clearly specified. As an example, a number might be based on engineering judgment, past experience, or PSA [probabilistic safety assessment] insights; but this should be clearly stated.

Additionally, 10 CFR 50.36(b) requires:

> Each license authorizing operation of a … utilization facility … will include technical specifications. The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to [10 CFR] 50.34 ["Contents of applications; technical information"]. The Commission may include such additional technical specifications as the Commission finds appropriate.

The categories of items required to be in the TS are provided in 10 CFR 50.36(c). As required by 10 CFR 50.36(c)(2)(i), the TS will include LCOs, which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. Per 10 CFR 50.36(c)(2)(i), when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TS until the condition can be met.

The regulation at 10 CFR 50.36(c)(3) requires TS to include items in the category of SRs, which are requirements relating to test, calibration, or inspection to assure that the necessary quality of

systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met.

Per 10 CFR 50.90, whenever a holder of a license desires to amend the license, application for an amendment must be filed with the Commission, fully describing the changes desired, and following as far as applicable, the form prescribed for original applications.

Per 10 CFR 50.92(a), in determining whether an amendment to a license will be issued to the applicant, the Commission will be guided by the considerations which govern the issuance of initial licenses to the extent applicable and appropriate.

The NRC staff's guidance for the review of TS is in Chapter 16, "Technical Specifications," of NUREG-0800, Revision 3, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (SRP), dated March 2010 (ADAMS Accession No. ML100351425). As described therein, as part of the regulatory standardization effort, the NRC staff has prepared Standard Technical Specifications for each of the light-water reactor nuclear designs.

4.2. Conclusions

In conclusion, based on the considerations discussed above, the proposed revision does not alter the current manner of operation and (1) there is reasonable assurance that the health and safety of the public will not be endangered by continued operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

5. REFERENCES

1. "GE Technology Manual (R-304B)," US Nuclear Regulatory Commission Technical Training Center.

2. TSTF-566-A, Revision 0, "Revise Actions for Inoperable RHR Shutdown Cooling Subsystems," February 21, 2019.

Model Application

[DATE] 10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

PLANT NAME
DOCKET NO. 50-[xxx]
SUBJECT: Application to Revise Technical Specifications to Adopt TSTF-580, "Provide Exception from Entering Mode 4 With No Operable RHR Shutdown Cooling"

Pursuant to 10 CFR 50.90, [LICENSEE] is submitting a request for an amendment to the Technical Specifications (TS) for [PLANT NAME, UNIT NOS.].

[LICENSEE] requests adoption of TSTF-580, "Provide Exception from Entering Mode 4 With No Operable RHR Shutdown Cooling." The proposed change provides a Technical Specifications (TS) exception to entering Mode 4 if both required Residual Heat Removal (RHR) shutdown cooling subsystems are inoperable.

The enclosure provides a description and assessment of the proposed changes. Attachment 1 provides the existing TS pages marked to show the proposed changes. Attachment 2 provides revised (clean) TS pages. Attachment 3 provides the existing TS Bases pages marked to show revised text associated with the proposed TS changes and is provided for information only.

[Licensee] requests that the amendment be reviewed under the Consolidated Line Item Improvement Process (CLIIP). Approval of the proposed amendment is requested within six months of completion of the NRC's acceptance review. Once approved, the amendment shall be implemented within [90] days.

There are no regulatory commitments made in this submittal.

In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated [STATE] Official.

[In accordance with 10 CFR 50.30(b), a license amendment request must be executed in a signed original under oath or affirmation. This can be accomplished by attaching a notarized affidavit confirming the signature authority of the signatory, or by including the following statement in the cover letter: "I declare under penalty of perjury that the foregoing is true and correct. Executed on (date)." The alternative statement is pursuant to 28 USC 1746. It does not require notarization.]

If you should have any questions regarding this submittal, please contact [NAME, TELEPHONE NUMBER].

Sincerely,

[Name, Title]

Enclosure: Description and Assessment

Attachments:
1. Proposed Technical Specification Changes (Mark-Up)
2. Revised Technical Specification Pages
3. Proposed Technical Specification Bases Changes (Mark-Up) – For Information Only

[The attachments are to be provided by the licensee and are not included in the model application.]

cc: NRC Project Manager
NRC Regional Office
NRC Resident Inspector
State Contact

ENCLOSURE

DESCRIPTION AND ASSESSMENT

1.0 DESCRIPTION

[LICENSEE] requests adoption of TSTF-580, "Provide Exception from Entering Mode 4 With No Operable RHR Shutdown Cooling." The proposed change provides a Technical Specifications (TS) exception to entering Mode 4 if both required Residual Heat Removal (RHR) shutdown cooling subsystems are inoperable.

2.0 ASSESSMENT

2.1 Applicability of Safety Evaluation

[LICENSEE] has reviewed the safety evaluation for TSTF-580 provided to the Technical Specifications Task Force in a letter dated [DATE]. This review included a review of the NRC staff's evaluation, as well as the information provided in TSTF-580. [As described herein,] [LICENSEE] has concluded that the justifications presented in TSTF-580 and the safety evaluation prepared by the NRC staff are applicable to [PLANT, UNIT NOS.] and justify this amendment for the incorporation of the changes to the [PLANT] TS.

Adoption of TSTF-566-A, "Revise Actions for Inoperable RHR Shutdown Cooling Subsystems," was approved by the NRC for [PLANT] on [DATE].

2.2 Optional Changes and Variations

[LICENSEE is not proposing any variations from the TS changes described in TSTF-580 or the applicable parts of the NRC staff's safety evaluation dated [DATE].] [LICENSEE is proposing the following variations from the TS changes described in TSTF-580 or the applicable parts of the NRC staff's safety evaluation: describe the variations]

[The [PLANT] TS utilize different [numbering][and][titles] than the Standard Technical Specifications on which TSTF-580 was based. Specifically, [describe differences between the plant-specific TS numbering and/or titles and the TSTF-580 numbering and titles.] These differences are administrative and do not affect the applicability of TSTF-580 to the [PLANT] TS.]

[The [PLANT] TS contain requirements that differ from the Standard Technical Specifications on which TSTF-580 was based but are encompassed in the TSTF-580 justification. [Describe differences and why TSTF-580 is still applicable.]]

3.0 REGULATORY ANALYSIS

3.1 No Significant Hazards Consideration Analysis

[LICENSEE] requests adoption of TSTF-580, "Provide Exception from Entering Mode 4 With No Operable RHR Shutdown Cooling." The proposed change provides a Technical

Specifications (TS) exception to entering Mode 4 if both required Residual Heat Removal (RHR) shutdown cooling subsystems are inoperable.

[LICENSEE] has evaluated if a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The proposed change provides a TS exception to entering Mode 4 if both required RHR shutdown cooling subsystems are inoperable. The RHR System in the shutdown cooling mode performs the important safety function of removing decay heat from the reactor coolant system during shutdown. The RHR System in the shutdown cooling mode is not an initiator of any accident previously evaluated or assumed to mitigate any accident previously evaluated. The design and function of the RHR System are not affected by the proposed change.

   The proposed change would also exempt entering Mode 4 if both required RHR shutdown cooling subsystems are inoperable and other operating modes of the RHR System are inoperable, such as Low Pressure Core Injection (LPCI) and RHR suppression pool cooling, and both subsystems of the support system for the RHR System heat exchangers, the RHR Service Water (RHRSW) System, are inoperable. The TS for those RHR operating modes and the RHRSW System require entering Mode 4 when both required subsystems are inoperable. Those operating modes and systems are not initiators to any accident previously evaluated but are used to mitigate the consequences of an accident previously evaluated. However, the consequences of an accident previously evaluated resulting from remaining in Mode 3 versus Mode 4 when RHR shutdown cooling subsystems are operable are not significantly increased because there would be no dependable method to remove post-accident decay heat in Mode 4 if both required RHR shutdown cooling subsystems are inoperable.

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The proposed change provides a TS exception to entering Mode 4 if both required RHR shutdown cooling subsystems are inoperable. The proposed change does not affect the design function or operation of the RHR System or the RHRSW System. No new equipment is being installed as a result of the proposed change. The proposed change affects the actions taken when both required RHR shutdown cooling subsystems are inoperable, so no new failure mechanisms are created.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The proposed change provides a TS exception to entering Mode 4 if both required RHR shutdown cooling subsystems are inoperable. The proposed change does not change any specific values or controlling parameters that define margin in the design or licensing basis. No safety limits are affected by the proposed change. The proposed change applies when both required RHR shutdown cooling subsystems are inoperable, so no design or safety limits associated with the operation of the RHR System are affected.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, [LICENSEE] concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

3.2 Conclusion

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

4.0 ENVIRONMENTAL EVALUATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

Technical Specifications and Bases Changes

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown

LCO 3.4.8 Two RHR shutdown cooling subsystems shall be OPERABLE, and, with no recirculation pump in operation, at least one RHR shutdown cooling subsystem shall be in operation.

----------NOTES----------

1. Both RHR shutdown cooling subsystems and recirculation pumps may be removed from operation for up to 2 hours per 8 hour period.

2. One RHR shutdown cooling subsystem may be inoperable for up to 2 hours for the performance of Surveillances.

APPLICABILITY: MODE 3, with reactor steam dome pressure < [the RHR cut in permissive pressure].

ACTIONS

----------NOTE----------

Separate Condition entry is allowed for each RHR shutdown cooling subsystem.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One ~~or two~~ [required] RHR shutdown cooling subsystem~~s~~ inoperable.	A.1 Verify an alternate method of decay heat removal is available ~~for each inoperable RHR shutdown cooling subsystem~~.	1 hour AND Once per 24 hours thereafter
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to restore RHR shutdown cooling subsystem~~(s)~~ to OPERABLE status.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Two [required] RHR shutdown cooling subsystems inoperable.	C.1 Verify an alternate method of decay heat removal is available for each inoperable RHR shutdown cooling subsystem.	1 hour AND Once per 24 hours thereafter
D. Required Action and associated Completion Time of Condition C not met.	----------NOTE---------- LCO 3.0.3 and all other LCO Required Actions requiring a MODE change to MODE 4 may be suspended until one RHR shutdown cooling subsystem is restored to OPERABLE status. ---------- D.1 Initiate action to restore one RHR shutdown cooling subsystem to OPERABLE status.	 Immediately
~~E~~C. No RHR shutdown cooling subsystem in operation. AND No recirculation pump in operation.	~~E~~C.1 Initiate action to restore one RHR shutdown cooling subsystem or one recirculation pump to operation. AND ~~E~~C.2 Verify reactor coolant circulation by an alternate method. AND ~~E~~C.3 Monitor reactor coolant temperature and pressure.	Immediately 1 hour from discovery of no reactor coolant circulation AND Once per 12 hours thereafter Once per hour

BASES

ACTIONS (continued)

continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable shutdown cooling subsystems provide appropriate compensatory measures for separate inoperable shutdown cooling subsystems. As such, a Note has been provided that allows separate Condition entry for each inoperable RHR shutdown cooling subsystem.

A.1

With one required RHR shutdown cooling subsystem inoperable for decay heat removal, except as permitted by LCO Note 2, the overall reliability is reduced, however, because a single failure in the OPERABLE subsystem could result in reduced RHR shutdown cooling capability. Therefore, an alternate method of decay heat removal must be provided.

~~With both RHR shutdown cooling subsystems inoperable, an alternate method of decay heat removal must be provided in addition to that provided for the initial RHR shutdown cooling subsystem inoperability. This re-establishes backup decay heat removal capabilities, similar to the requirements of the LCO. The 1 hour Completion Time is based on the decay heat removal function and the probability of a loss of the available decay heat removal capabilities. Furthermore, verification of the functional availability of these alternate method(s) must be reconfirmed every 24 hours thereafter. This will provide assurance of continued heat removal capability.~~

The required cooling capacity of the alternate method should be sufficient to maintain or reduce temperature. Decay heat removal by ambient losses can be considered as, or contributing to, the alternate method capability. Alternate methods that can be used include (but are not limited to) ~~the Spent Fuel Pool Cooling System,~~ the Reactor Water Cleanup System, or an inoperable but functional RHR shutdown cooling subsystem.

B.1

If the required alternate method~~(s)~~ of decay heat removal cannot be verified within one hour, immediate action must be taken to restore the inoperable RHR shutdown cooling subsystem~~(s)~~ to OPERABLE status. The Required Action will restore redundant decay heat removal paths. The immediate Completion Time reflects the importance of maintaining the availability of two paths for heat removal.

BASES

ACTIONS (continued)

C.1

With both [required] RHR shutdown cooling subsystems inoperable, an alternate method of decay heat removal must be provided in addition to that provided for the initial RHR shutdown cooling subsystem inoperability. This re-establishes backup decay heat removal capabilities, similar to the requirements of the LCO. The 1 hour Completion Time is based on the decay heat removal function and the probability of a loss of the available decay heat removal capabilities. Furthermore, verification of the functional availability of these alternate method(s) must be reconfirmed every 24 hours thereafter. This will provide assurance of continued heat removal capability.

The required cooling capacity of the alternate method should be sufficient to maintain or reduce temperature. Decay heat removal by ambient losses can be considered as, or contributing to, the alternate method capability. Alternate methods that can be used include (but are not limited to) the Reactor Water Cleanup System, or an inoperable but functional RHR shutdown cooling subsystem.

D.1

If the required alternate methods of decay heat removal cannot be verified within one hour, immediate action must be taken to restore at least one RHR shutdown cooling subsystem to OPERABLE status. The immediate Completion Time reflects the importance of restoring a method of heat removal.

Required Action D.1 is modified by a Note indicating that all required MODE changes to MODE 4 may be suspended until one RHR shutdown cooling subsystem is restored to OPERABLE status. In this case, LCO 3.0.3 and other Required Actions directing entry into MODE 4 could force the unit into a less safe condition in which there may be no adequate means to remove decay heat. It is more appropriate to allow the restoration of one of the RHR shutdown cooling subsystems before requiring entry into a condition in which that subsystem would be needed and exiting a condition where other sources of cooling are available. When at least one RHR subsystem is restored to OPERABLE status, the Completion Times of LCO 3.0.3 or other Required Actions resume at the point at which they were suspended.

~~CE~~.1, ~~CE~~.2, and ~~CE~~.3

With no RHR shutdown cooling subsystem and no recirculation pump in operation, except as permitted by LCO Note 1, reactor coolant circulation by the RHR shutdown cooling subsystem or recirculation pump must be restored without delay.

Until RHR or recirculation pump operation is re-established, an alternate method of reactor coolant circulation must be placed into service. This will provide the necessary circulation for monitoring coolant temperature. The 1 hour Completion Time is based on the coolant circulation function and is modified such that the 1 hour is applicable separately for each occurrence involving a loss of coolant circulation. Furthermore, verification of the functioning of the alternate method must be reconfirmed every 12 hours thereafter. This will provide assurance of continued temperature monitoring capability.

During the period when the reactor coolant is being circulated by an alternate method (other than by the required RHR shutdown cooling subsystem or recirculation pump), the reactor coolant temperature and pressure must be periodically monitored to ensure proper function of the alternate method. The once per hour Completion Time is deemed appropriate.

SURVEILLANCE REQUIREMENTS

SR 3.4.8.1

This Surveillance verifies that one RHR shutdown cooling subsystem or recirculation pump is in operation and circulating reactor coolant. The required flow rate is determined by the flow rate necessary to provide sufficient decay heat removal capability. [The Frequency of 12 hours is sufficient in view of other visual and audible indications available to the operator for monitoring the RHR subsystem in the control room.

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.9 Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown

LCO 3.4.9 Two RHR shutdown cooling subsystems shall be OPERABLE, and, with no recirculation pump in operation, at least one RHR shutdown cooling subsystem shall be in operation.

----------NOTES----------

1. Both RHR shutdown cooling subsystems and recirculation pumps may be removed from operation for up to 2 hours per 8 hour period.

2. One RHR shutdown cooling subsystem may be inoperable for up to 2 hours for performance of Surveillances.

APPLICABILITY: MODE 3 with reactor steam dome pressure < [the RHR cut in permissive pressure].

ACTIONS

----------NOTE----------

Separate Condition entry is allowed for each RHR shutdown cooling subsystem.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One ~~or two~~ [required] RHR shutdown cooling subsystem~~s~~ inoperable.	A.1 Verify an alternate method of decay heat removal is available ~~for each inoperable RHR shutdown cooling subsystem~~.	1 hour AND Once per 24 hours thereafter
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to restore RHR shutdown cooling subsystem~~(s)~~ to OPERABLE status.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Two [required] RHR shutdown cooling subsystems inoperable.	C.1 Verify an alternate method of decay heat removal is available for each inoperable RHR shutdown cooling subsystem.	1 hour AND Once per 24 hours thereafter
D. Required Action and associated Completion Time of Condition C not met.	----------NOTE---------- LCO 3.0.3 and all other LCO Required Actions requiring a MODE change to MODE 4 may be suspended until one RHR shutdown cooling subsystem is restored to OPERABLE status. ---------- D.1 Initiate action to restore one RHR shutdown cooling subsystem to OPERABLE status.	 Immediately
~~E~~C. No RHR shutdown cooling subsystem in operation. AND No recirculation pump in operation.	~~E~~C.1 Initiate action to restore one RHR shutdown cooling subsystem or one recirculation pump to operation. AND ~~E~~C.2 Verify reactor coolant circulation by an alternate method. AND ~~E~~C.3 Monitor reactor coolant temperature and pressure.	Immediately 1 hour from discovery of no reactor coolant circulation AND Once per 12 hours thereafter Once per hour

BASES

ACTIONS (continued)

inoperable shutdown cooling subsystems provide appropriate compensatory measures for separate inoperable shutdown cooling subsystems. As such, a Note has been provided that allows separate Condition entry for each inoperable RHR shutdown cooling subsystem.

A.1

With one required RHR shutdown cooling subsystem inoperable for decay heat removal, except as permitted by LCO Note 2, the overall reliability is reduced, however, because a single failure in the OPERABLE subsystem could result in reduced RHR shutdown cooling capability. Therefore an alternate method of decay heat removal must be provided.

~~With both RHR shutdown cooling subsystems inoperable, an alternate method of decay heat removal must be provided in addition to that provided for the initial RHR shutdown cooling subsystem inoperability. This re-establishes backup decay heat removal capabilities, similar to the requirements of the LCO. The 1 hour Completion Time is based on the decay heat removal function and the probability of a loss of the available decay heat removal capabilities. Furthermore, verification of the functional availability of these alternate method(s) must be reconfirmed every 24 hours thereafter. This will provide assurance of continued heat removal capability.~~

The required cooling capacity of the alternate method should be sufficient to maintain or reduce temperature. Decay heat removal by ambient losses can be considered as, or contributing to, the alternate method capability. Alternate methods that can be used include (but are not limited to) ~~the Spent Fuel Pool Cooling System,~~ the Reactor Water Cleanup System, or an inoperable but functional RHR shutdown cooling subsystem.

B.1

If the required alternate method~~(s)~~ of decay heat removal cannot be verified within one hour, immediate action must be taken to restore the inoperable RHR shutdown cooling subsystem~~(s)~~ to OPERABLE status. The Required Action will restore redundant decay heat removal paths. The immediate Completion Time reflects the importance of maintaining the availability of two paths for heat removal.

BASES

ACTIONS (continued)

C.1

With both [required] RHR shutdown cooling subsystems inoperable, an alternate method of decay heat removal must be provided in addition to that provided for the initial RHR shutdown cooling subsystem inoperability. This re-establishes backup decay heat removal capabilities, similar to the requirements of the LCO. The 1 hour Completion Time is based on the decay heat removal function and the probability of a loss of the available decay heat removal capabilities. Furthermore, verification of the functional availability of these alternate method(s) must be reconfirmed every 24 hours thereafter. This will provide assurance of continued heat removal capability.

The required cooling capacity of the alternate method should be sufficient to maintain or reduce temperature. Decay heat removal by ambient losses can be considered as, or contributing to, the alternate method capability. Alternate methods that can be used include (but are not limited to) the Reactor Water Cleanup System, or an inoperable but functional RHR shutdown cooling subsystem.

D.1

If the required alternate methods of decay heat removal cannot be verified within one hour, immediate action must be taken to restore at least one RHR shutdown cooling subsystem to OPERABLE status. The immediate Completion Time reflects the importance of restoring a method of heat removal.

Required Action D.1 is modified by a Note indicating that all required MODE changes to MODE 4 may be suspended until one RHR shutdown cooling subsystem is restored to OPERABLE status. In this case, LCO 3.0.3 and other Required Actions directing entry into MODE 4 could force the unit into a less safe condition in which there may be no adequate means to remove decay heat. It is more appropriate to allow the restoration of one of the RHR shutdown cooling subsystems before requiring entry into a condition in which that subsystem would be needed and exiting a condition where other sources of cooling are available. When at least one RHR subsystem is restored to OPERABLE status, the Completion Times of LCO 3.0.3 or other Required Actions resume at the point at which they were suspended.

~~E~~C.1, ~~E~~C.2, and ~~E~~C.3

With no RHR shutdown cooling subsystem and no recirculation pump in operation, except as is permitted by LCO Note 1, reactor coolant circulation by the RHR shutdown cooling subsystem or one recirculation pump must be restored without delay.

Until RHR or recirculation pump operation is re-established, an alternate method of reactor coolant circulation must be placed into service. This will provide the necessary circulation for monitoring coolant temperature. The 1 hour Completion Time is based on the coolant circulation function and is modified such that the 1 hour is applicable separately for each occurrence involving a loss of coolant circulation. Furthermore, verification of the functioning of the alternate method must be reconfirmed every 12 hours thereafter. This will provide assurance of continued temperature monitoring capability.

During the period when the reactor coolant is being circulated by an alternate method (other than by the required RHR shutdown cooling subsystem or recirculation pump), the reactor coolant temperature and pressure must be periodically monitored to ensure proper function of the alternate method. The once per hour Completion Time is deemed appropriate.

SURVEILLANCE REQUIREMENTS

SR 3.4.9.1

This Surveillance verifies that one RHR shutdown cooling subsystem or recirculation pump is in operation and circulating reactor coolant. The required flow rate is determined by the flow rate necessary to provide sufficient decay heat removal capability. [The Frequency of 12 hours is sufficient in view of other visual and audible indications available to the operator for monitoring the RHR subsystem in the control room.

OR

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]