energy harbor

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December 14, 2020
L-20-169

10 CFR 50.90

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

SUBJECT:
Perry Nuclear Power Plant
Docket No. 50-440, License No. NPF-58
Request for Licensing Action to Revise the Technical Specifications

Pursuant to 10 CFR 50.90, Energy Harbor Nuclear Corp. is requesting an amendment to the Perry Nuclear Power Plant Technical Specifications. The proposed license amendment request will revise actions for inoperable residual heat removal shutdown cooling subsystems.

An evaluation of the proposed amendment is enclosed. Energy Harbor Nuclear Corp. is requesting Nuclear Regulatory Commission (NRC) staff approval by December 31, 2021, and an implementation period of 120 days following issuance of the amendment.

There are no regulatory commitments contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Phil H. Lashley, Manager – Fleet Licensing, at (330) 696-7208.

I declare under penalty of perjury that the foregoing is true and correct. Executed on December 14, 2020.

Sincerely,

Rod L. Penfield

Enclosure: Evaluation of Proposed License Amendment

cc: NRC Region III Administrator
NRC Resident Inspector
NRC Project Manager
Branch Chief, Ohio Emergency Management Agency, State of Ohio (NRC Liaison)
Utility Radiological Safety Board

Subject: License Amendment Request to Revise Actions for Inoperable Residual Heat Removal (RHR) Shutdown Cooling Subsystems

Attachments:
1. Proposed Technical Specification Page Markups
2. Technical Specification Bases Page Markups (for information only)

1. SUMMARY DESCRIPTION

The proposed amendment revises the Technical Specifications (TS) actions applicable when a residual heat removal (RHR) shutdown cooling subsystem is inoperable and provides a TS exception to entering Mode 4 if both required RHR shutdown cooling subsystems are inoperable.

Attachment 1 provides the existing TS pages marked to indicate the proposed amendment. Attachment 2 provides the existing TS Bases pages annotated to indicate the proposed changes and is provided for information only.

2. DETAILED DESCRIPTION

2.1. System Design and Operation

The RHR system consists of two redundant, manually controlled shutdown cooling subsystems that provide decay heat removal. Each subsystem consists of one motor-driven pump, a heat exchanger, and associated piping, valves, and instrumentation. The RHR heat exchangers transfer heat to the emergency service water (ESW) system.

The RHR system is a multipurpose system with seven operating modes:

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 subsystem operates in conjunction with the high pressure core spray (HPCS) system and can operate independently or in conjunction with the automatic depressurization system, and the low pressure core spray (LPCS) system to accomplish this objective. LPCI is a low pressure, high flow subsystem that will automatically start flow to the reactor vessel when low reactor vessel water level and high drywell pressure reach their respective setpoints, indicating a LOCA.

2. Containment Spray Mode

   The containment spray mode uses the A and B RHR loops to transfer water from the suppression pool through the RHR heat exchangers to the ring spray headers around the dome of the containment. The spray flow from these headers condenses any steam that may exist in the containment to reduce containment pressure. The water is returned to the suppression pool via drainage. The containment spray mode will be initiated automatically when the drywell and containment pressure reach their respective setpoints and LPCI has be initiated for 10 minutes.

3. Suppression Pool Cooling Mode

   During normal plant operations, the suppression pool water must be kept less than (<) 95 degrees Fahrenheit (°F) to ensure adequate condensation of the steam resulting from a design basis LOCA to prevent over pressurizing the containment. The suppression pool cooling mode is used to maintain proper suppression pool temperature during RCIC or safety relief valve operation, and to reduce suppression pool temperature in accident conditions. Both RHR loops A and B can be used for this mode.

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. Containment Flooding Mode

   In the unlikely event that this mode of operation becomes necessary, two manual emergency service water (ESW) system valves are opened to admit ESW into RHR loop B. Water is directed to the reactor vessel via the RHR B containment shutoff valve and the LPCI B injection valve. Water flows into the reactor vessel through the LPCI coupling and is allowed to drain from the LOCA rupture point to flood the containment.

6. Fuel Pool Supplemental Cooling Mode

   The RHR system can provide supplemental cooling to the spent fuel storage pool if the heat load exceeds the capacity of the fuel pool cooling and cleanup (FPCC) system. This condition occurs when there is spent fuel in the pool (up to 84 percent of full core at maximum heat discharge) and it becomes necessary to make an emergency full core off-load from the unit. The supplemental cooling capacity provided by the RHR system in conjunction with the capacity of the FPCC heat exchangers will prevent the fuel pool water temperature from exceeding 150°F.

7. Testing Modes

   Active components of the RHR system are tested periodically to verify proper operation. The RHR pumps are tested for both operability and flow rate capability. The major RHR system valves are checked for stroke time by manually initiating valve motion from the control room. The operability of the RHR pumps is tested by

establishing a flow path from the suppression pool, through the RHR pump, and back to the suppression pool via the full flow test line. In this line up, the heat exchangers are bypassed, and flow passes through a flow element in the pump discharge piping. This permits verification that the pump can deliver rated flow.

Decay Heat Removal

Irradiated fuel in the shutdown reactor core generates heat during the decay of fission products and increases the temperature of the reactor coolant. This decay heat is removed by the RHR shutdown cooling system in preparation for performing refueling or maintenance operations, or for keeping the reactor in the hot shutdown condition or cold shutdown condition.

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 greater than (>) 200°F, and Mode 4 is defined as the reactor mode switch in "Shutdown" and the average reactor coolant temperature less than or equal to (≤) 200°F.

The boiling water reactor (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:

- steaming to the main condenser
- low pressure core spray (LPCS)
- low pressure coolant injection (LPCI)
- reactor core isolation cooling (RCIC)
- the RHR system (below the RHR cut-in permissive pressure)
- control rod drive (CRD)
- high pressure core spray (HPCS)

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 (RWCU) 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

The following TS requirements are associated with RHR shutdown cooling subsystems:

- 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.

- 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.

- 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 systems 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.

- 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.

- 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 systems in suppression pool cooling mode are inoperable in Mode 3, one must be restored within 12 hours or average reactor coolant temperature must be reduced to Mode 4 in the following 36 hours.

- 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 ≥ 22 feet (ft) 9 inches above the top of the RPV flange.

- 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 < 22 ft 9 inches above the top of the RPV flange.

In addition, TS 3.7.1, "Emergency Service Water (ESW) System – Divisions 1 and 2," require two ESW subsystems to be operable to support the RHR system heat exchangers in Modes 1, 2, and 3. If both ESW subsystems are inoperable in Mode 3, one subsystem must be restored within 12 hours or the plant must be in Mode 4 within 36 hours. If both ESW subsystems are inoperable in Mode 3, the plant must be in Mode 4 within 36 hours.

2.3. Reason for the Proposed Change

The current TS requirements on the RHR shutdown cooling subsystem in Mode 3 are inconsistent with the BWR design.

1. If a required RHR shutdown cooling subsystem is inoperable in Mode 3, 4 or 5, the TSs require an alternate method of decay heat removal to be available for each inoperable RHR shutdown cooling subsystem. The TS Bases state that the required cooling capacity of the alternate method should be ensured by verifying (by

calculation or demonstration) its capability to maintain or reduce temperature. Alternate methods that can be used include (but are not limited to) the RWCU system and the alternate decay heat removal (ADHR) system. However, the RHR shutdown cooling system has a heat rejection capability many times greater than the listed alternatives. Therefore, for periods in which there is high decay heat load, the plant design does not include any system that can satisfy the required action.

2. In Mode 3 or 4, if there is no alternate method of decay heat removal for each inoperable RHR shutdown cooling subsystem, there is no TS Action to follow.
3. If one or more RHR shutdown cooling subsystems are inoperable in Mode 3, the plant must be brought to Mode 4 within 24 hours. However, 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 (RCS) temperature to the Mode 4 entry condition (average reactor coolant temperature ≤ 200°F) within the completion time.
4. In Modes 3, 4 and 5, circumstances may exist where an RHR shutdown cooling system is inoperable (such as from a loss of seismic qualification or nonfunctional support systems), but still meets the TS Bases description of an alternate decay heat removal method. The TS Bases do not list the inoperable RHR shutdown cooling system as an alternate method of decay heat removal.

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 ESW subsystems inoperable but did not render the RHR shutdown cooling function inoperable, the exception would not apply.

2.4. Description of the Proposed Change

The proposed changes would revise TS 3.4.9, “Residual Heat Removal (RHR) Shutdown Cooling System – Hot Shutdown,” and TS 3.4.10, “Residual Heat Removal (RHR) Shutdown Cooling System – Cold Shutdown.” TS Bases B 3.9.8, “Residual Heat Removal (RHR) – High Water Level,” and TS Bases B 3.9.9, “Residual Heat Removal (RHR) – Low Water Level,” markups are also provided to support the TS Bases changes that support the changes in TS 3.4.9 and TS 3.4.10.

2.4.1 Proposed Changes to TS 3.4.9, “Residual Heat Removal (RHR) Shutdown Cooling System – Hot Shutdown”

Required actions for one or two RHR shutdown cooling subsystems inoperable (Condition A) of TS 3.4.9, “Residual Heat Removal (RHR) Shutdown Cooling System – Hot Shutdown,” require the operators to initiate action to restore RHR shutdown cooling subsystem(s) to OPERABLE status (Required Action A.1) immediately, verify an

alternate method of decay heat removal is available for each inoperable RHR shutdown cooling subsystem (Required Action A.2) within 1 hour, and be in Mode 4 (Required Action A.3) within 24 hours.

This change moves Required Action A.1 to new Condition B (as Required Action B.1) and deletes Required Action A.3. It also proposes to add a recurring completion time (CT) to current Required Action A.2 of "once per 24 hours thereafter." Required Action A.2 is renumbered as A.1, since Required Actions A.1 and A.3 are removed from Condition A.

This change also proposes a new Condition B for when the required action and associated CT of Condition A are not met. New Condition B's Required Action B.1 is moved from current Required Action A.1 and requires operators to initiate action to restore RHR shutdown cooling subsystems(s) to OPERABLE status immediately.

Current Required Action A.2 was renumbered A.1 since Required Actions A.1 and A.3 were deleted. Current Condition B and its required actions were renamed E, E.1, E.2, and E.3, respectively since new conditions B, C, and D were added. New Condition C is applicable when two 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.

This change proposes a new Condition D, "Required Action and associated Completion Time of Condition C not met." The proposed Required Action D.1 requires immediate initiation of action to restore an RHR shutdown cooling subsystem to OPERABLE status. A note applicable to Required Action D.1 has been added and 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."

2.4.2 Proposed Changes to TS 3.4.10, "Residual Heat Removal (RHR) Shutdown Cooling System – Cold Shutdown"

Required actions for one or two RHR shutdown cooling subsystems inoperable (Condition A) of TS 3.4.10, "Residual Heat Removal (RHR) Shutdown Cooling System – Cold Shutdown," require the operators to verify an alternate method of decay heat removal is available for each inoperable RHR shutdown cooling subsystem (Required Action A.1) within 1 hour and once per 24 hours thereafter.

This change proposes a new Condition B for when the required action and associated CT of Condition A is not met, which has a required action (new Required Action B.1) for operators to initiate action to restore RHR shutdown cooling subsystems(s) to OPERABLE status immediately.

Current Condition B and its required actions were renamed C, C.1, and C.2, respectively since new Condition B was added. This change also corrects a typographical error regarding the Applicability statement by deleting the comma between Mode 4 and the qualifier. Removal of the comma correctly depicts the singular Applicability statement.

3. TECHNICAL EVALUATION

3.1 Revision of the TS Actions to Restore RHR Shutdown Cooling or Establish an Alternate Method of Decay Heat Removal

The Required Actions for TS 3.4.9 to immediately initiate action to restore the inoperable RHR shutdown cooling subsystem(s) to operable status and verify within one hour that an alternate method of decay heat removal is available for each inoperable RHR shutdown cooling subsystem is reorganized. The revised Action A requires verification within one hour and every 24 hours thereafter that an alternate method of decay heat removal is available.

In TS 3.4.9 and TS 3.4.10, if the required alternate method of decay heat removal for each inoperable RHR shutdown cooling subsystem cannot be verified, the new Action B requires immediate action to restore the inoperable RHR shutdown cooling.

Appendix A of 10 CFR 50, Criterion 34, requires that a system to remove residual heat be provided. Its safety function is to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded. The plant design meets this through a combination of low pressure emergency core cooling systems (ECCS) to maintain RPV level, steam release via the safety/relief valves to the suppression pool, and the suppression pool cooling mode of RHR. However, this configuration is reserved for use in the emergency operating procedures.

When steam dome pressure is above the RHR cut-in permissive pressure, the normal method of removing decay heat is steaming via the steam bypass valves to the main condenser with return to the RPV via the feedwater and condensate booster pumps. Only after reaching the RHR cut-in permissive pressure does the preferred means of removing decay heat become the shutdown cooling mode of RHR.

Due to these other means of decay heat removal, it is not critical that action be taken immediately to restore to operable status one or both RHR shutdown cooling subsystems. The plant design also provides other ways of removing decay heat, such as natural circulation, the spent fuel pool cooling system, and the reactor water cleanup system. The existing one-hour completion time to establish an alternate method of decay heat removal is sufficient to remove decay heat. However, in the unexpected

circumstance that an alternate method is not available, the TS should provide an action to follow.

The reorganization of the actions applies a logical progression and provides a terminal action applicable in all circumstances, as discussed below:

- The first action when an RHR shutdown cooling subsystem is inoperable is to establish an alternate method of decay heat removal. The plant design affords several alternate methods, although not all methods are capable of maintaining or reducing temperature, depending on the decay heat generation rate.

- If an alternate method cannot be established, action must be taken to immediately restore the inoperable RHR shutdown cooling subsystem(s) to OPERABLE status. The completion time "immediately" is defined in Section 1.3 of the TS as, "the Required Action should be pursued without delay and in a controlled manner." This Required Action continues to apply until the inoperable RHR shutdown cooling subsystems are restored to operable status, an alternate decay heat removal method is established, or the Applicability of the specification is exited. Therefore, the Required Action provides an appropriate terminal action for the condition.

3.2 Elimination of Requirement to Enter Mode 4

The purpose of 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. 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 ESW system, can remove high decay heat loads, 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. While it would be possible to modify the LPCI, RHR suppression pool cooling, and ESW system TS to provide an exception when there are no operable RHR shutdown cooling subsystems, the change would unnecessarily complicate those TS. A more straightforward approach is to provide a global exception to entering Mode 4 via addition of a note to the RHR shutdown cooling TS.

The proposed note limits entry into Mode 4 with no operable RHR shutdown cooling subsystems. The proposed note is added to TS 3.4.9, Required Action D.1, and 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." The Bases is revised to state, “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 is not applicable because it 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." 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. Thus, entry into Mode 4 would not be dictated by the TS when no RHR shutdown cooling subsystem is operable.

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.

4. REGULATORY EVALUATION

This proposed amendment to the Perry Nuclear Power Plant (PNPP) Technical Specifications (TS) would:

- Revise Technical Specification (TS) 3.4.9, "Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown," Condition A from, "One or two RHR shutdown cooling subsystems inoperable," to "One RHR shutdown cooling subsystem inoperable." The action is revised to be applicable to a single inoperable subsystem.

- Revise TS 3.4.9, Condition B, "Required Action and associated Completion Time of Condition A not met," to be applicable to a single inoperable RHR shutdown cooling subsystem.

- Revise TS 3.4.9, to add Condition C, which is applicable when two RHR shutdown cooling subsystems are inoperable.

- Revise TS 3.4.9, to add Required Action C.1 to require verification of an alternate method of decay heat removal for each inoperable RHR shutdown cooling subsystem within one hour and every 24 hours thereafter.

- Revise TS 3.4.9, to add Condition D, "Required Action and associated Completion Time of Condition C not met."

- Revise TS 3.4.9, to add Required Action D.1 to require immediate initiation of action to restore an RHR shutdown cooling subsystem to operable status.

- Revise TS 3.4.9, to add 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."

- Revise TS 3.4.9, to renumber Action B as Action E with no other changes.

- Revise TS 3.4.10, "Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown," to delete the applicability to Mode 4 description.

- Revise TS 3.4.10, to add Condition B, which is applicable when one or two RHR shutdown cooling subsystems are inoperable.

- Revise TS 3.4.10, to add Required Action B.1 to require immediate initiation of action to restore RHR shutdown cooling subsystem(s) to operable status.

- Revise TS 3.4.10, to renumber Action B as Action C with no other changes.

4.1 Applicable Regulatory Requirements/Criteria

The following regulatory requirements and criteria were reviewed during development of the proposed license amendment:

- 10 CFR 50, Appendix A, Criterion 34 – “Residual heat removal”
- 10 CFR 50.36, “Technical Specifications”

Energy Harbor Nuclear Corp. has determined that the proposed amendment is consistent with the regulatory requirements and criteria described in the above cited documents.

4.2 Precedent

The NRC approved TSTF-566-A, Revision 0, on February 21, 2019 (Reference 1). This PNPP LAR is similar to TSTF-566-A, Revision 0, but also incorporates TSTF-580, which was submitted for NRC approval on August 7, 2020, (Reference 2).

4.3 No Significant Hazards Consideration Analysis

The proposed amendment revises the technical specification (TS) actions applicable when one or both required residual heat removal (RHR) shutdown cooling subsystem(s) are inoperable and provides an exception to entering Mode 4.

Energy Harbor Nuclear Corp. has evaluated if a significant hazards consideration is involved with the proposed amendment 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 revises the actions to be taken and provides a TS exception to entering Mode 4 when one or both required RHR shutdown cooling subsystem(s) 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 coolant injection (LPCI) and RHR suppression pool cooling, and both subsystems of the support system for the RHR system heat exchangers, the emergency service water (ESW) system, are inoperable. The TS for those RHR operating modes and the ESW 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 revises the actions to be taken when a required RHR shutdown cooling subsystem is inoperable and 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 shutdown cooling subsystems. No new equipment is being installed as a result of the proposed change. The proposed change affects the actions taken when one or 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 revises the actions to be taken when a required RHR shutdown cooling subsystem is inoperable and 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 one or 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, Energy Harbor Nuclear Corp. 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.

4.4 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.

5.0 ENVIRONMENTAL CONSIDERATION

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.

6.0 REFERENCES

1. Final Safety Evaluation of TSTF-566-A, Revision 0, "Revise Actions for Inoperable RHR Shutdown Cooling Subsystems," February 21, 2019 (Accession Number ML19028A287)

2. TSTF-580, Revision 0, “Provide Exception from Entering Mode 4 With No Operable RHR Shutdown Cooling,” (Accession Number ML20181A221)

Attachment 1
L-20-169

Proposed Technical Specification Changes (Mark-Up)
(5 pages follow)

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 less than 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~~ RHR shutdown cooling subsystem~~s~~ inoperable.	~~A.1 Initiate action to restore RHR shutdown cooling subsystem(s) to OPERABLE status.~~ ~~AND~~	~~Immediately~~

~~(continued)~~
(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.12 Verify an alternate method of decay heat removal is available for each inoperable RHR shutdown cooling subsystem. AND A.3 Be in MODE 4.	1 hour AND Once per 24 hours thereafter 24 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to restore RHR shutdown cooling subsystem to OPERABLE status.	Immediately
C. Two 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
EB. No RHR shutdown cooling subsystem in operation. AND	EB.1 Initiate action to restore one RHR shutdown cooling subsystem or one recirculation pump to operation. AND	Immediately

CONDITION	REQUIRED ACTION	COMPLETION TIME
No recirculation pump in operation.	EB.2 Verify reactor coolant circulation by an alternate method.	1 hour from discovery of no reactor coolant circulation AND Once per 12 hours thereafter
	AND	
	EB.3 Monitor reactor coolant temperature and pressure.	Once per hour

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.10 Residual Heat Removal (RHR) Shutdown Cooling System-Cold Shutdown

LCO 3.4.10 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.

3. Both RHR shutdown cooling subsystems and recirculation pumps may be removed from operation during inservice leak and hydrostatic testing.

APPLICABILITY: MODE 4~~,~~ when heat losses to the ambient are not sufficient to maintain average reactor coolant temperature ≤ 200°F.

ACTIONS

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

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two RHR shutdown cooling subsystems 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

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
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
~~C~~B. No RHR shutdown cooling subsystem in operation. AND No recirculation pump in operation.	~~C~~B.1 Verify reactor coolant circulation by an alternate method. AND ~~C~~B.2 Monitor reactor coolant temperature and pressure.	1 hour from discovery of no reactor coolant circulation AND Once per 12 hours thereafter Once per hour

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.10.1	Verify one RHR shutdown cooling subsystem or recirculation pump is operating.	In accordance with the Surveillance Frequency Control Program

Attachment 2
L-20-169

Technical Specification Bases Page Mark-Ups (for information only)
(7 pages follow)

BASES

APPLICABILITY (continued)

The requirements for decay heat removal in MODES 4 and 5 are discussed in LCO 3.4.10, "Residual Heat Removal (RHR) Shutdown Cooling System-Cold Shutdown"; LCO 3.9.8, "Residual Heat Removal (RHR)-High Water Level"; and LCO 3.9.9, "Residual Heat Removal (RHR) - Low Water Level."

ACTIONS

A Note has been provided to modify the ACTIONS related to RHR shutdown cooling subsystems. Section 1.3, Completion Times, specifies once a Condition has been entered, subsequent divisions, subsystems, components or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies Required Actions of the Condition 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~~, A.2, and A.3~~

With one required RHR shutdown cooling subsystem inoperable for decay heat removal, except as permitted by LCO Note 2, ~~the inoperable subsystem must be restored to OPERABLE status without delay. In this condition, the remaining OPERABLE subsystem can provide the necessary decay heat removal. T~~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.

(continued)

BASES

ACTIONS

A.1~~, A.2, and A.3~~ (continued)

~~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.~~

The required cooling capacity of the alternate method should be sufficient ~~ensured by verifying (by calculation or demonstration) its capability~~ to maintain or reduce temperature. Decay heat removal by ambient losses can be considered as 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.~~; pathway(s) to the main condenser in combination with method(s) capable of returning water to the reactor pressure vessel (RPV); or use of Automatic Depressurization System (ADS) Safety/Relief Valve(s) (SRV) to the suppression pool, in combination with method(s) capable of returning water to the RPV and method(s) capable of removing the heat from the containment.~~

~~Per Required Action A.3, the plant is also required to enter Mode 4. This action is required because the alternate methods of decay heat removal may not be as reliable as the RHR shutdown cooling subsystems.~~

B.1

If the required alternate method of decay heat removal cannot be verified within one hour, immediate action must be taken to restore the inoperable RHR shutdown cooling subsystem 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.

C.1

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 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~~B~~.1, E~~B~~.2, and E~~B~~.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 reactor 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.

(continued)

BASES

ACTIONS

~~E~~B.1, ~~E~~B.2, and ~~E~~B.3 (continued)

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

This Surveillance is modified by a Note allowing sufficient time to align the RHR System for shutdown cooling operation after clearing the pressure interlock that isolates the system, or for placing a recirculation pump in operation.

REFERENCES

None.

BASES

ACTIONS

A.1 (continued)

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. ~~Decay heat removal by ambient losses can be considered as contributing to the alternate method capability.~~

The required cooling capacity of the alternate method should be sufficient ~~ensured by verifying (by calculation or demonstration) its capability~~ to maintain or reduce temperature. Decay heat removal by ambient losses can be considered as contributing to the alternate method capability. Alternate methods that can be used include (but are not limited to) the Fuel Pool Cooling and Cleanup System, the Reactor Water Cleanup System, ~~and~~ the Alternate Decay Heat Removal System (ADHR), 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.

C~~B~~.1 and C~~B~~.2

With no RHR shutdown cooling subsystem and no recirculation pump in operation, except as is permitted by LCO Note 1, and 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

BASES

ACTIONS

A.1 (continued)

the RPV flange provides adequate capability to remove decay heat from the reactor core. However, the overall reliability is reduced because loss of water level could result in reduced decay heat removal capability. 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 ensure continued heat removal capability.

The required cooling capacity of the alternate method should be sufficient ~~ensured by verifying (by calculation or demonstration) its capability~~ 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 Fuel Pool Cooling and Cleanup System, the Reactor Water Cleanup System, ~~and~~ the Alternate Decay Heat Removal System (ADHR), or an inoperable but functional RHR shutdown cooling subsystem.

B.1, B.2, B.3, and B.4

If no RHR shutdown cooling subsystem is OPERABLE and an alternate method of decay heat removal is not available in accordance with Required Action A.1, actions shall be taken immediately to suspend operations involving an increase in reactor decay heat load by suspending the loading of irradiated fuel assemblies into the RPV.

Additional actions are required to be initiated immediately to minimize any potential fission product release to the environment. This includes ensuring primary containment is OPERABLE and primary containment isolation capability (i.e., one closed door in each primary containment air lock, and at least one primary containment isolation valve and associated instrumentation are OPERABLE or other acceptable administrative controls to assure isolation capability) in each associated penetration flow path not isolated that is assumed to be isolated to mitigate radioactivity releases. This may be performed as an administrative check, by examining logs or other information to determine whether the components are out of service for maintenance or other reasons. It is not necessary to perform the Surveillances needed to demonstrate the OPERABILITY of the components. If, however, any required component is inoperable, then it must be restored to OPERABLE status. In this case, the Surveillances may need to be performed to restore the

(continued)

BASES

ACTIONS (continued)

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 of the two required RHR shutdown cooling subsystems inoperable, the remaining subsystem is capable of providing the required decay heat removal. However, the overall reliability is reduced. 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 ensure continued heat removal capability.

The required cooling capacity of the alternate method should be sufficient ~~ensured by verifying (by calculation or demonstration) its capability~~ 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 Fuel Pool Cooling and Cleanup System, the Reactor Water Cleanup System, ~~and~~ the Alternate Decay Heat Removal System (ADHR), or an inoperable but functional RHR shutdown cooling subsystem.

B.1, B.2, and B.3

With the required RHR shutdown cooling subsystem(s) inoperable and the required alternate method(s) of decay heat removal not available in accordance with Required Action A.1, additional actions are required to be initiated immediately to minimize any potential fission product release to the environment. This includes ensuring primary containment is OPERABLE and primary containment isolation

(continued)