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December 7, 2000
BVY 00-112

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

Subject: Vermont Yankee Nuclear Power Station
License No. DPR-28 (Docket No. 50-271)
Technical Specification Proposed Change No. 243
LPCI Operability During Hot Shutdown

Pursuant to 10CFR50.90, Vermont Yankee (VY) hereby proposes to amend its Facility Operating License, DPR-28, by incorporating the attached proposed change into the VY Technical Specifications. The proposed change revises TS 3.5.A.1 by adding a "Note" regarding operability of the Low Pressure Coolant Injection (LPCI) system under certain restrictive conditions. The subject change would provide a clarification of system operability that is consistent with industry standards[1] and results in additional flexibility in operations during hot shutdown conditions.

Attachment 1 to this letter contains supporting information and the safety assessment of the proposed change. Attachment 2 contains the determination of no significant hazards consideration. Attachment 3 provides the marked-up version of the current Technical Specification and Bases pages. Attachment 4 is the retyped Technical Specification and Bases pages.

VY has reviewed the proposed Technical Specification change in accordance with 10CFR50.92 and concludes that the proposed change does not involve a significant hazards consideration.

VY has also determined that the proposed change satisfies the criteria for a categorical exclusion in accordance with 10CFR51.22(c)(9) and does not require an environmental review. Therefore, pursuant to 10CFR51.22(b), no environmental impact statement or environmental assessment needs to be prepared for this change.

Upon acceptance of this proposed change by the NRC, VY requests that a license amendment be issued by April 1, 2001 for implementation within 60 days of its effective date. Timely approval is needed to support important, planned activities regarding noble metal chemical addition, which are scheduled for late April 2001.

[1] NUREG 1433, Revision 1, Standard Technical Specifications General Electric Plants, BWR/4, dated April 7, 1995

A001

If you have any questions on this transmittal, please contact Mr. Thomas B. Silko at (802) 258-4146.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Michael A. Balduzzi

Michael A. Balduzzi
Vice President, Operations

STATE OF VERMONT)
)ss
WINDHAM COUNTY)

Then personally appeared before me, Michael A. Balduzzi, who, being duly sworn, did state that he is Vice President, Operations of Vermont Yankee Nuclear Power Corporation, that he is duly authorized to execute and file the foregoing document in the name and on the behalf of Vermont Yankee Nuclear Power Corporation, and that the statements therein are true to the best of his knowledge and belief.

Sally A. Sandstrum

Sally A. Sandstrum, Notary Public
My Commission Expires February 10, 2003

Attachments

cc: USNRC Region 1 Administrator
USNRC Resident Inspector - VYNPS
USNRC Project Manager - VYNPS
Vermont Department of Public Service

Attachment 1

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 243

LPCI Operability During Hot Shutdown

Supporting Information and Safety Assessment of Proposed Change

INTRODUCTION

Purpose

This Proposed Change is needed to support planned activities regarding noble metal chemical addition (NMCA), which are scheduled for late April 2001. Vermont Yankee (VY) had originally planned on injecting noble metals with the recirculation system in operation (the preferred method of mixing during NMCA for most boiling water reactors). However, because prolonged operation of the recirculation system at low pressure may significantly reduce the lifetime of VY's recirculation pump seals, plans are now to inject these chemicals into the reactor vessel with both loops of the residual heat removal (RHR) system operating in the shutdown cooling (SDC) mode to achieve proper mixing. At least one other boiling water reactor has successfully injected noble metals into the reactor in this manner.

The Proposed Change will allow the reactor to remain in a hot shutdown condition with both loops of RHR in SDC during NMCA. Following stabilization in hot shutdown, noble metals will be injected over a nominal 48-hour period in accordance with a test procedure specifically prepared for this purpose.

Description of the Proposed Change

The Proposed Change adds a Note to Technical Specification (TS) 3.5.A.1, clarifying the alignment requirements for the low pressure coolant injection (LPCI) subsystems. The Note allows operation of one or more of the RHR subsystems in the SDC mode during Hot Shutdown, if necessary, and clarifies that the subsystems are still considered OPERABLE for the LPCI mode. Because manual valve positioning, required for this mode of operation, removes the capability of the LPCI subsystems to respond automatically, the subsystems could be considered inoperable without this Note.

Current TS 3.5.A.1 states:

> *Except as specified in Specifications 3.5.A.2 through 3.5.A.4 below and 3.5.H.3 and 3.5.H.4, both Core Spray and the LPCI Subsystems shall be operable whenever irradiated fuel is in the reactor vessel and prior to a reactor startup from the cold shutdown condition.*

The proposed change would add an asterisk (*) after the word "operable" in the above sentence with a corresponding footnote which states:

> **Note: During Hot Shutdown, LPCI subsystems may be considered OPERABLE during alignment and operation for decay heat removal with reactor vessel pressure less than the RHR shutdown cooling permissive pressure, if capable of being manually realigned and not otherwise inoperable.*

The Note acknowledges that under these conditions LPCI may not be capable to automatically inject without operator intervention. However, in this shutdown mode, reactor conditions are close to cold shutdown conditions, and operator action, if necessary, is minimal. These conditions are discussed in greater detail in the following "Safety Assessment." In this transfer from SDC to LPCI, the control room operator would manually realign two valves and restart RHR pumps, if necessary. This would be done with the reactor already shutdown and at relatively low pressure.

Associated changes are also being made to Bases section 3.5.A.

BACKGROUND

The RHR system consists of two independent loops, each having two pumps, associated valves and piping. The primary function of the RHR system is to provide core and containment cooling under normal and accident conditions. There are several operating modes of the RHR system. The two pertinent modes discussed in this evaluation are SDC and LPCI.

SDC is the normal and preferred method for removing sensible heat from the reactor during shutdown. In SDC, reactor coolant is drawn from the 'A' recirculation loop, circulated through a heat exchanger, and returned to the reactor vessel via one of the two recirculation headers. This is done when the reactor has cooled, and pressure has been sufficiently reduced below 150 psig to clear the shutdown cooling interlock. Then, SDC is manually initiated by realigning RHR valves to establish a suction flow path from the recirculation system via RHR suction valves 17 and 18 (which are common to both divisions of RHR) and the RHR 15 valves. LPCI injection valves (i.e., RHR valves 25 and 27) are opened during SDC to complete the return path to the reactor pressure vessel. In this manner, reactor coolant may be drawn from recirculation loop 'A' via RHR pumps, usually passed through a RHR heat exchanger, and returned to the vessel.

RHR SDC has provisions for automatic isolation on low reactor water level, high drywell pressure, or high reactor pressure. A signal indicating one of these conditions will cause the SDC suction valves to close and the pumps to trip on loss of suction path (sensing suction valves are not full open).

If a RHR subsystem is operating in the SDC mode and LPCI injection is necessary, additional operator actions are necessary to realign LPCI suction to the torus and reset any pumps that may be tripped. This realignment, however, can easily be accomplished from the control room.

The LPCI mode of the RHR system consists of two parallel loops (i.e., subsystems). A licensing basis pump flow rate of 7,450 $\pm$ 150 gpm (vessel to vessel) is specified in TS 4.5.A.1.c. Each loop consists of two motor-driven pumps, with the necessary valves and instrumentation, taking suction from the suppression pool (or "torus") and injecting into the core region of the reactor vessel through the reactor recirculation loops. This mode of RHR system operation is designed to restore and maintain reactor vessel water level following a design basis loss of coolant accident (LOCA) such that the core is adequately cooled. LPCI is capable of functioning with a complete loss of offsite power and will automatically initiate when established limits are exceeded. Unlike cold shutdown and refueling conditions, both LPCI pumps are required per subsystem during reactor power operations.

The LPCI subsystems are designed to automatically initiate upon a LOCA signal and may also be manually initiated. Automatic LPCI initiation occurs at low reactor pressure upon low-low reactor vessel water level or high drywell pressure.

Comparison to Standard Technical Specifications (STS)

Unlike Standard Technical Specifications (STS), VY TS 3.5 does not contain an explicit provision allowing LPCI subsystems to be considered operable when entering SDC during Hot Shutdown conditions. Many other BWRs now have this allowance specified in TS. Prior to STS, it was the practice of some BWRs to not enter a Limiting Condition for Operation (LCO) action when initiating

SDC since this is a normal operating evolution. With the advent of STS, this practice was made explicit and approved by NRC through changes to Technical Specifications.

This proposed change is consistent with "Standard Technical Specifications General Electric Plants, BWR/4," dated April 7, 1995[1]. STS Surveillance Requirement (SR) 3.5.2.1 contains a Note that is very similar to the Note proposed herein for VY TS 3.5.A.1. Since the Note is used to determine system operability, it is VY's determination that the subject Note is better incorporated into an LCO than a SR. This application is not unique[2].

Updated Final Safety Analysis Report (FSAR)

The LPCI system is described in VY FSAR sections 4.8.5.3 and 6.4.4, and the RHR SDC mode is discussed in FSAR section 4.8.5.1. Section 6.5 provides a discussion on emergency core cooling system (ECCS) performance under assumed loss-of-coolant accident conditions. In addition, FSAR section 7.4 provides information on ECCS instrumentation, and section 14.6.3 provides details on ECCS performance under loss-of-coolant accident considerations.

SAFETY ASSESSMENT

Ensuring that the irradiated fuel in the reactor vessel remains flooded is an essential consideration under all conditions and operating modes. Whenever the reactor is above 212°F, fewer activities which have the potential for inadvertently lowering reactor pressure vessel water level typically occur than during cold shutdown or refueling conditions. Recognizing industry experience with SDC events that have inadvertently led to lowered reactor water levels, particular controls apply to operations with a potential for draining the reactor vessel.

SDC evolutions are performed when reactor water level is well above elevations at which SDC would isolate or LPCI initiation signal would occur. A low reactor water level isolation signal (i.e., $\geq$ 127" above the top of the enriched fuel) while in SDC may indicate an RPV draindown problem. Because SDC could be the cause of the reduction in reactor water level, automatic vessel isolation is the first and most appropriate conservative action. The equipment interlocks that provide vessel isolation are designed to prevent draindown when in SDC.

The RHR SDC mode cannot be initiated until reactor pressure has been reduced to clear the shutdown cooling permissive interlock (i.e., $100 \leq p \leq 150$ psig). Typically, reactor pressure is maintained less than 100 psig prior to initiating SDC to prevent an inadvertent isolation. Furthermore, in this condition, stresses in reactor coolant piping are much lower than during normal operating conditions, making the probability of a postulated double ended guillotine pipe break remote (i.e., the LOCA scenario).

With reactor conditions above 212°F, in accordance with Technical Specifications, other plant systems, such as core spray, would normally be available for injecting coolant. Under these conditions with RHR aligned to SDC, two core spray pumps are normally available for level recovery. For long

[1] NUREG 1433, Revision 1, Standard Technical Specifications General Electric Plants, BWR/4, dated April 7, 1995

[2] Commonwealth Edison Company, "Request for Technical Specifications Changes for Dresden Nuclear Power Station, Units 2 and 3, LaSalle County Station, Units 1 and 2, and Quad Cities Nuclear Power Station, Units 1 and 2, to Convert to Improved Standard Technical Specifications," March 3, 2000. The particular application is for LaSalle 1 and 2 LCO 3.5.1.

term cooling (i.e., more than 10 minutes after the postulated break of the largest pipe), LOCA analyses[3] have shown that one core spray pump is adequate to maintain inventory and provide decay heat removal. In addition, other safety functions and modes of RHR operation, such as containment spray and suppression pool cooling, will continue to be available.

At VY each RHR loop consists of two pumps, one heat exchanger, and the piping and valves necessary to support the various modes of operation of the system. The LPCI mode of RHR is designed to automatically initiate on low-low reactor vessel water level or high drywell pressure (in accordance with TS Table 3.2.1 trip settings $\geq$ 82.5" above the top of the enriched fuel and $\leq$ 2.5 psig, respectively) to pump water into the reactor vessel to cool the core. The design basis accidents for which the LPCI mode is designed would begin at high reactor power and pressure, with significant reactor vessel inventory loss occurring before the vessel pressure would be low enough for the RHR pumps to inject water into the vessel.

The RHR shutdown cooling (SDC) function, on the other hand, is designed to be manually initiated to remove decay heat from the reactor core after the reactor is already in a shutdown condition. The RHR system cannot be placed in the SDC mode until the reactor has been cooled down and depressurized below a pressure permissive. The RHR shutdown cooling permissive pressure is set in accordance with TS Table 3.2.1 (i.e., $100 \leq p \leq 150$ psig) to protect RHR suction piping from over-pressurization. Therefore, when the RHR system is in the SDC mode of operation, reactor system pressure and core decay heat levels are significantly lower than the values assumed in the design of the LPCI system.

With the RHR system aligned to SDC, the system is not capable of automatically realigning to the LPCI mode if called upon. In the SDC mode, the torus suction valve for that loop will be shut and operator action will be required to open the valve to allow operation of the loop in the LPCI mode.

When an RHR loop is operating in the SDC mode, the loop is designed to isolate automatically upon sensing what may be an off-normal condition—low reactor water level signal (i.e., $\geq$ 127" above the top of the enriched fuel), high drywell pressure ($\leq$ 2.5 psig), or high reactor pressure ($100 \leq p \leq 150$ psig). If the system isolates, the following will occur without operator intervention:

- The common SDC suction valves (i.e., RHR valves 17 and 18) will automatically close [closing times are less than 30 seconds];
- The LPCI injection valves (i.e., RHR valves 25 and 27) will remain open in both loops; and
- The pumps operating in the SDC mode will trip on loss of suction (sensed by valve position).

Under these circumstances, if LPCI injection were necessary, the following operator action would readily be taken from within the control room:

- Close SDC suction valve (i.e., RHR valve 15) and open Torus suction valve (i.e., RHR valve 13) [Note: These two valves are interlocked such that only one of the two can be opened at any one time. For this alignment, these valves have nominal opening and closing times in the range of 80 to 110 seconds.], and
- Re-position RHR pump start switch, if pump remains tripped from loss of suction.

[3] NEDO 20566-P, "General Electric Company Analytical Model for Loss-of-Coolant Analysis in Accordance with 10CFR50 Appendix K" (November 1975)

Summary

In summary, the proposed, revised requirements of TS 3.5.A.1 provide operational flexibility by allowing the reactor to enter a normal and anticipated mode for heat removal during hot shutdown. Entering a LCO should not be necessary for normal activities using systems as designed. At relatively low pressures and temperatures with the reactor shutdown (control rods inserted), operator manual action to realign two valves and, perhaps, restart a pump should be sufficient to meet the LPCI function.

Little time would be required to realign LPCI, and all of these actions would be performed at the control room panel for RHR. Because (1) the operator actions required are limited in number and are all performed at the control room panel after reactor shutdown (control rods inserted); (2) the probability of an event requiring LPCI is low during SDC; and (3) the core spray system should be available, if needed, it is considered acceptable to have the RHR subsystems aligned for decay heat removal as proposed.

This change does not affect the operability of other safety systems, such as core spray, from being able to meet their intended safety functions. With the reactor in hot shutdown, at relatively low pressure and temperature, control rods inserted, it is reasonable to assume that the remaining complement of low pressure ECCS subsystems would provide the required cooling, thereby allowing operation of RHR in the SDC mode. Even without full, automatic LPCI injection capability, under the defined conditions, manual actions can easily and promptly be taken to realign LPCI, if necessary.

Although no specific analysis of this condition has been performed, the allowance provided by the Note being added to TS 3.5.A.1 is acceptable because (1) re-establishing LPCI for operation only entails the repositioning of valves and resetting of pumps (if tripped); and (2) the energy requiring dissipation in Hot Shutdown, below 150 psig, is considerably less than that at 100% power with normal operating temperature and pressure. Further, because of the low probability of an event requiring ECCS initiation during shutdown cooling, it is considered appropriate to have the subsystems aligned for decay heat removal.

This proposed change is also consistent with industry practice and NRC TS standards.

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Attachment 2

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 243

LPCI Operability During Hot Shutdown

Determination of No Significant Hazards Consideration

Determination of No Significant Hazards Consideration

Description of amendment request:

This proposed change adds a Note to Technical Specification (TS) 3.5.A.1.

This proposed change revises the operability requirements of the Residual Heat Removal (RHR) system in fulfilling the Low Pressure Coolant Injection (LPCI) function in accordance with Technical Specifications (TS) Limiting Condition for Operation (LCO) 3.5.A.1. A Note is added to establish that the LPCI subsystems may be considered operable when the RHR system is aligned for shutdown cooling (SDC) under certain limiting conditions. The proposed change is only applicable to the plant in a hot shutdown condition.

Basis for no significant hazards determination:

Pursuant to 10CFR50.92, Vermont Yankee (VY) has reviewed the proposed change and concludes that the change does not involve a significant hazards consideration since the proposed change satisfies the criteria in 10CFR50.92(c).

1. The operation of Vermont Yankee Nuclear Power Station in accordance with the proposed amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated.

   The LPCI system is not assumed to be the initiator of any previously analyzed event. Its function is in mitigating and thereby limiting consequences of analyzed events. With this proposed change LPCI is still capable of being manually realigned, if needed, to mitigate the consequences of accidents. The allowance provided by this change is only applicable for the reactor in a shutdown condition with reactor pressure less than the RHR shutdown cooling permissive setpoint. Thus, the reactor heat load is much less than assumed for design basis loss of coolant accidents occurring at full power. Furthermore, other emergency core cooling systems are still required to be operable.

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

2. The operation of Vermont Yankee Nuclear Power Station in accordance with the proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated.

   The proposed change does not involve any physical alteration of the plant or introduce new modes of operation. There is no change in plant operation that involves failure modes other than those previously evaluated.

   The methods governing plant operation and testing remain consistent with current safety analysis assumptions. Therefore, the proposed change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The operation of Vermont Yankee Nuclear Power Station in accordance with the proposed amendment will not involve a significant reduction in a margin of safety.

The proposed change has no impact on any safety analysis assumption. The clarifying Note being added to Technical Specification 3.5.A.1 allows the decay heat removal function to be available without immediate shutdown requirements for inoperable LPCI subsystems being imposed. This is recognition that the amount of time to realign the RHR system from the decay heat removal function has no significant impact on the margin of safety associated with establishing LPCI injection, because the heat loads under these conditions are far less than assumed in the safety analysis.

Placing the reactor in SDC during hot shutdown is a normal and preferred method for removing sensible heat from the reactor. In addition, the change does not alter the availability of other safety systems and the ability to meet their safety functions. The additional flexibility, to allow LPCI subsystems to be considered operable during SDC below the RHR shutdown cooling permissive pressure and without entering a shutdown LCO will not significantly reduce margins of safety since the reactor is in hot shutdown with all control rods inserted, reactor pressure is less than the RHR shutdown cooling permissive pressure, and other ECCS systems should be capable of providing the required cooling, thereby allowing operation of RHR SDC when necessary. Thus, the margins of safety for such situations are maintained.

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

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BVY 00-112

Attachment 3

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 243

LPCI Operability During Hot Shutdown

Marked-up Version of the Current Technical Specifications

3.5 LIMITING CONDITION FOR OPERATION

3.5 CORE AND CONTAINMENT COOLING SYSTEMS

Applicability:

Applies to the operational status of the Emergency Cooling Subsystems.

Objective:

To assure adequate cooling capability for heat removal in the event of a loss-of-coolant accident or isolation from the normal reactor heat sink.

Specification:

A. Core Spray and Low Pressure Coolant Injection

1. Except as specified in Specifications 3.5.A.2 through 3.5.A.4 below and 3.5.H.3 and 3.5.H.4, both Core Spray and the LPCI Subsystems shall be operable whenever irradiated fuel is in the reactor vessel and prior to a reactor startup from the cold shutdown condition.

*

<ADD>

*Note: During Hot Shutdown, LPCI subsystems may be considered OPERABLE during alignment and operation for decay heat removal with reactor vessel pressure less than the RHR shutdown cooling permissive pressure, if capable of being manually realigned and not otherwise inoperable.

4.5 SURVEILLANCE REQUIREMENT

4.5 CORE AND CONTAINMENT COOLING SYSTEMS

Applicability:

Applied to periodic testing of the emergency cooling subsystems.

Objective:

To verify the operability of the core containment cooling subsystems.

Specification:

A. Core Spray and Low Pressure Cooling Injection

Surveillance of the Core Spray and LPCI Subsystems shall be performed as follows:

1. General Testing

Item	Frequency
a. Simulated Automatic Actuation Test	Each refueling outage
b. Operability testing of pumps and valves shall be in accordance with Specification 4.6.E.	
c. Flow Rate Test-Core Spray pumps shall deliver at least 3000 gpm (torus to torus) against a system head of 120 psig. Each LPCI pump shall deliver 7450 ± 150 gpm (vessel to vessel).	Each refueling outage

BASES:

3.5 CORE AND CONTAINMENT COOLANT SYSTEMS

A. Core Spray Cooling System and Low Pressure Coolant Injection System

This Specification assures that adequate standby cooling capability is available whenever irradiated fuel is in the Reactor Vessel.

Based on the loss-of-coolant analyses, the Core Spray and LPCI Systems provide sufficient cooling to the core to dissipate the energy associated with the loss-of-coolant accident and to limit the accident-caused core conditions as specified in 10CFR50, Appendix K. The analyses consider appropriate combinations of the two Core Spray Subsystems and the two LPCI Subsystems associated with various break locations and equipment availability in accordance with required single failure assumptions. (Each LPCI Subsystem consists of the LPCI pumps, the recirculation pump discharge valve, and the LPCI injection valve which combine to inject torus water into a recirculation loop.)

The LPCI System is designed to provide emergency cooling to the core by flooding in the event of a loss-of-coolant accident. This system is completely independent of the Core Spray System; however, it does function in combination with the Core Spray System to prevent excessive fuel clad temperature. The LPCI and the Core Spray Systems provide adequate cooling for break areas up to and including the double-ended recirculation line break without assistance from the high pressure emergency Core Cooling Subsystems.

<INSERT>

The intent of these specifications is to prevent startup from the cold condition without all associated equipment being operable. However, during operation, certain components may be out of service for the specified allowable repair times. Assurance that the systems will perform their intended function is obtained from the results of the pump and valve testing performed in accordance with ASME Section XI requirements referenced in Specification 4.6.E. Whenever one redundant system is inoperable, the potential for extended operation with two subsystems inoperable is reduced by requiring that the redundant subsystem be tested within 24 hours.

B. and C. Containment Spray Cooling Capability and RHR Service Water System

The containment heat removal portion of the RHR System is provided to remove heat energy from the containment in the event of a loss-of-coolant accident. For the flow specified, the containment long-term pressure is limited to less than 5 psig and, therefore, the flow is more than ample to provide the required heat removal capability. Reference: Section 14.6.3.3.2 FSAR.

Each Containment Cooling Subsystem consists of two RHR service water pumps, 1 heat exchanger, and 2 RHR (LPCI) pumps. Either set of equipment is capable of performing the containment cooling function. In fact, an analysis in Section 14.6 of the FSAR shows that one subsystem consisting of 1 RHR service water pump, 1 heat exchanger, and 1 RHR pump has sufficient capacity to perform the cooling function. Assurance that the systems will perform their intended function is obtained from the results of the pump and valve testing performed in accordance with ASME Section XI requirements referenced in Specification 4.6.E. Whenever one redundant system is inoperable, the potential for extended operation with two subsystems inoperable is reduced by requiring that the redundant subsystem be tested within 24 hours.

INSERT

Specification 3.5.A.1 is modified by a Note that allows LPCI subsystems to be considered OPERABLE during alignment and operation for decay heat removal with reactor pressure less than the RHR shutdown cooling permissive pressure, if capable of being manually realigned (remote) to the LPCI mode and not otherwise inoperable. This allows operation in the RHR shutdown cooling mode during Hot Shutdown, if necessary.

Attachment 4

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 243

LPCI Operability During Hot Shutdown

Retyped Technical Specification Pages

Listing of Affected Technical Specifications Pages

Replace the Vermont Yankee Nuclear Power Station Technical Specifications pages listed below with the revised pages. The revised pages contain vertical lines in the margin indicating the areas of change.

Remove	Insert
99	99
110	110

3.5 LIMITING CONDITION FOR OPERATIONS

3.5 CORE AND CONTAINMENT COOLING SYSTEMS

Applicability:

Applies to the operational status of the Emergency Cooling Subsystems.

Objective:

To assure adequate cooling capability for heat removal in the event of a loss-of-coolant accident or isolation from the normal reactor heat sink.

Specification:

A. Core Spray and Low Pressure Coolant Injection

1. Except as specified in Specifications 3.5.A.2 through 3.5.A.4 below and 3.5.H.3 and 3.5.H.4, both Core Spray and the LPCI Subsystems shall be operable* whenever irradiated fuel is in the reactor vessel and prior to a reactor startup from the cold shutdown condition.

*Note: During Hot Shutdown, LPCI subsystems may be considered OPERABLE during alignment and operation for decay heat removal with reactor vessel pressure less than the RHR shutdown cooling permissive pressure, if capable of being manually realigned and not otherwise inoperable.

4.5 SURVEILLANCE REQUIREMENT

4.5 CORE AND CONTAINMENT COOLING SYSTEMS

Applicability:

Applied to periodic testing of the emergency cooling subsystems.

Objective:

To verify the operability of the core containment cooling subsystems.

Specification:

A. Core Spray and Low Pressure Cooling Injection

Surveillance of the Core Spray and LPCI Subsystems shall be performed as follows.

1. General Testing

Item	Frequency
a. Simulated Automatic Actuation Test	Each refueling outage
b. Operability testing of pumps and valves shall be in accordance with Specification 4.6.E.	
c. Flow Rate Test-Core Spray pumps shall deliver at least 3000 gpm (torus to torus) against a system head of 120 psig. Each LPCI pump shall deliver 7450 ± 150 gpm (vessel to vessel).	Each refueling outage

BASES:

3.5 CORE AND CONTAINMENT COOLANT SYSTEMS

A. Core Spray Cooling System and Low Pressure Coolant Injection System

This Specification assures that adequate standby cooling capability is available whenever irradiated fuel is in the Reactor Vessel.

Based on the loss-of-coolant analyses, the Core Spray and LPCI Systems provide sufficient cooling to the core to dissipate the energy associated with the loss-of-coolant accident and to limit the accident-caused core conditions as specified in 10CFR50, Appendix K. The analyses consider appropriate combinations of the two Core Spray Subsystems and the two LPCI Subsystems associated with various break locations and equipment availability in accordance with required single failure assumptions. (Each LPCI Subsystem consists of the LPCI pumps, the recirculation pump discharge valve, and the LPCI injection valve which combine to inject torus water into a recirculation loop.)

The LPCI System is designed to provide emergency cooling to the core by flooding in the event of a loss-of-coolant accident. This system is completely independent of the Core Spray System; however, it does function in combination with the Core Spray System to prevent excessive fuel clad temperature. The LPCI and the Core Spray Systems provide adequate cooling for break areas up to and including the double-ended recirculation line break without assistance from the high pressure emergency Core Cooling Subsystems.

Specification 3.5.A.1 is modified by a Note that allows LPCI subsystems to be considered OPERABLE during alignment and operation for decay heat removal with reactor pressure less than the RHR shutdown cooling permissive pressure, if capable of being manually realigned (remote) to the LPCI mode and not otherwise inoperable. This allows operation in the RHR shutdown cooling mode during Hot Shutdown, if necessary.

The intent of these specifications is to prevent startup from the cold condition without all associated equipment being operable. However, during operation, certain components may be out of service for the specified allowable repair times. Assurance that the systems will perform their intended function is obtained from the results of the pump and valve testing performed in accordance with ASME Section XI requirements referenced in Specification 4.6.E. Whenever one redundant system is inoperable, the potential for extended operation with two subsystems inoperable is reduced by requiring that the redundant subsystem be tested within 24 hours.

B. and C. Containment Spray Cooling Capability and RHR Service Water System

The containment heat removal portion of the RHR System is provided to remove heat energy from the containment in the event of a loss-of-coolant accident. For the flow specified, the containment long-term pressure is limited to less than 5 psig and, therefore, the flow is more than ample to provide the required heat removal capability. Reference: Section 14.6.3.3.2 FSAR.

Each Containment Cooling Subsystem consists of two RHR service water pumps, 1 heat exchanger, and 2 RHR (LPCI) pumps. Either set of equipment is capable of performing the containment cooling function. In fact, an analysis in Section 14.6 of the FSAR shows that one subsystem consisting of 1 RHR service water pump, 1 heat exchanger, and 1 RHR pump has sufficient capacity to perform the cooling function. Assurance that the systems will perform their intended function is obtained from the results of the pump and valve testing performed in accordance with ASME Section XI requirements referenced in Specification 4.6.E. Whenever one redundant system is inoperable, the potential for extended operation with two subsystems inoperable is reduced by requiring that the redundant subsystem be tested within 24 hours.