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August 10, 2000
BVY 00-70

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. 235
ECCS Requirements During Cold Shutdown and Refueling

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 (TS). The proposed change revises TS 3.5.H.3 and 3.5.H.4. The subject Specifications establish operability requirements to ensure that adequate reactor coolant inventory and sufficient heat removal capability exist during cold shutdown and refueling conditions.

Through this change, TS Limiting Condition for Operation (LCO) applicability is expanded, and operational flexibility is improved. The changes in LCO applicability provide completeness to the TS by comprehensively addressing the modes of operation under the defined conditions. Operational flexibility is increased by allowing an additional combination of redundant systems/subsystems to satisfy functional requirements, while maintaining existing margins of safety.

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.

A001

Upon acceptance of this proposed change by the NRC, VY requests that a license amendment be issued by January 31, 2001 for implementation within 60 days of its effective date.

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

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Samuel L. Newton
Vice President, Operations

STATE OF VERMONT)
)ss
WINDHAM COUNTY)

Then personally appeared before me, Samuel L. Newton, 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.

Thomas B. Silko, 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. 235

ECCS Requirements During Cold Shutdown and Refueling

Supporting Information and Safety Assessment of Proposed Change

INTRODUCTION

Purpose

This proposed change revises the operability requirements of Technical Specifications (TS) 3.5.H.3 and 3.5.H.4 for low pressure emergency core cooling systems (ECCS) and associated diesel generators during cold shutdown and refueling conditions. TS 3.5.H.3 currently permits all core and containment cooling subsystems to be inoperable for the defined conditions, and TS 3.5.H.4 currently provides certain operability requirements when irradiated fuel is in the reactor vessel and the reactor is in the refueling condition. This proposed TS change provides expanded applicability and clarifies these provisions. In addition, this change provides increased operational flexibility during refueling outages, which should result in improvements in outage safety, work control, and outage duration while maintaining existing margins of safety.

Description of the Proposed Change

Current TS 3.5.H.3 states:

> *When irradiated fuel is in the reactor vessel and the reactor is in the cold shutdown condition, all Core and Containment Cooling Subsystems may be inoperable provided no work is permitted which has the potential for draining the reactor vessel.*

Current TS 3.5.H.4 states:

> *When irradiated fuel is in the reactor vessel and the reactor is in the refueling condition, both LPCI subsystems, or both Core Spray systems, or one diesel generator may be inoperable provided that a source of water of greater than 300,000 gal. is available to the operable core cooling subsystem.*

Specifically addressed in these Specifications are the inoperability of the containment cooling, low pressure ECCS injection/spray systems (i.e., low pressure coolant injection (LPCI) and core spray), and the standby diesel generators.

Implicit in TS 3.5.H.4 is the understanding that with inoperable equipment of one type, the remaining subsystems of different types will be operable. No consideration is given to a combination of operable ECCS subsystems of different types. In general, current TS 3.5.H.4 provides for the inoperability of certain safety systems/subsystems when irradiated fuel is in the vessel and the reactor is in the refueling condition.

The proposed change revises TS 3.5.H.3 to the following:

> *When irradiated fuel is in the reactor vessel and the reactor is in either a refueling or cold shutdown condition, all Core and Containment Cooling subsystems may be inoperable provided no work is permitted which has the potential for draining the reactor vessel.*

The proposed change also revises TS 3.5.H.4 to the following:

> *When irradiated fuel is in the reactor vessel, operations with a potential for draining the reactor vessel are in progress, and the reactor is in either a cold shutdown or refueling condition, two low pressure ECCS injection/spray subsystems and one diesel generator associated with one of the ECCS subsystems shall be operable.*

There are several aspects to these changed Specifications, although the primary focus is to ensure adequate reactor coolant inventory during refueling and cold shutdown conditions. This safety objective is unchanged and continues to be supported by the proposed change.

For clarification and completeness purposes, application of these operational requirements is being applied to the two conditions when "operations with a potential for draining the reactor vessel" (OPDRV) are in progress and when there are no OPDRVs. TS 3.5.H.3 will address the circumstances of no OPDRVs during cold shutdown and refueling, and TS 3.5.H.4 will address the circumstances of OPDRVs during cold shutdown and refueling conditions. This revised terminology adds specificity as to the intent of these Specifications and minimizes the potential for confusion.

TS 3.5.H.4 is being restructured to specifically state the <u>operability</u> requirements, rather than <u>inoperability</u> allowances and inferred requirements. By restating the TS in this manner, ambiguity and potential confusion will be reduced.

As an alternative, a third combination of two low pressure ECCS subsystems is being added to TS 3.5.H.4 to satisfy the operability requirements regarding the reflood function during cold shutdown and refueling operations. As proposed, the revised TS may be satisfied through the operability of any of the following three combinations of low pressure ECCS injection/spray subsystems (and one associated emergency power supply):

- Two low pressure coolant injection subsystems;
- Two core spray subsystems; or
- One low pressure coolant injection subsystem and one core spray subsystem.

Considered administrative in nature, excessive details (i.e., "source of water greater than 300,000 gallons") are being relocated to the TS Bases, since they are not necessary for inclusion in TS. The details regarding the 300,000 gallon source of water are being removed from TS 3.5.H.4 and relocated in the Bases for TS 3.5.H.

In summary, current TS 3.5.H.3 and 3.5.H.4 are being revised to add completeness and clarity to the applicability of these requirements and also to modify unnecessarily restrictive provisions regarding the combination of redundant safety systems required to be operable. In addition to the revised TS, conforming changes are being made to the associated Bases for TS 3.5.H. The Bases change elaborates on the purpose, meaning, and application of the subject TS.

BACKGROUND

Current Technical Specifications

TS 3.5.H.3 provides for the removal from service of all core and containment cooling subsystems when the reactor is in cold shutdown and there are no OPDRVs. During cold shutdown the energy in the reactor core is significantly decreased and the low heat generation rate places the reactor in a safer condition. If all activities having a potential for inadvertently draining the reactor vessel are halted, there is no significant safety need for operation of core and containment cooling subsystems under these conditions.

TS 3.5.H.4 provides requirements for minimum core cooling system availability during refueling conditions. This Specification is intended to ensure that adequate core flooding capability exists when refueling.

Current TS 3.5.H.4 is applicable when irradiated fuel is in the reactor vessel and the reactor is in the refueling condition. When applicable, this TS requires the availability of a source of water greater than 300,000 gallons and provides that the following equipment may be inoperable:

- Both LPCI subsystems, or
- Both core spray systems, or
- One diesel generator

The amount of time allowed for such equipment to be inoperable is unlimited since sufficient cooling system capability is maintained considering a single active failure of the remaining systems.

Core and Containment Cooling Systems

TS 3.5 provides requirements for operation of core and containment cooling systems.

The low pressure coolant injection (LPCI) mode of the residual heat removal (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 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 loss of coolant accident 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.

In this mode, each subsystem requires one pump, associated valves and piping, and attendant instrumentation and power supplies, such that divisional separation is attained. Only a single LPCI pump is required per subsystem to fulfill the reactor pressure vessel reflood function during refueling operations. A single LPCI pump has a larger injection capacity in relation to a core spray subsystem.

The core spray (CS) system is designed to deliver water spray onto the top of the fuel assemblies following a design basis event or accident. A licensing basis pump flow rate of at least 3,000 gpm (torus to torus) against a system head of 120 psi is specified in TS 4.5.A.1.c. As is LPCI, core spray is a low pressure emergency core cooling system (ECCS) and consists of two independent, redundant loops.

Each loop consists of a 100% capacity motor-driven pump, associated piping, valves, and instrumentation required to perform the CS safety functions. The CS system pumps water from the suppression pool into the reactor vessel, discharging via spargers situated above the fuel. The CS system may be aligned to pump water from the condensate storage tank (CST) during reactor vessel injection testing and for flooding the reactor when the plant is shutdown.

The CS and LPCI systems are automatically initiated on a loss-of-coolant (LOCA) signal and may also be manually initiated. During refueling operations, automatic initiation would occur on low reactor vessel water level, or an operator could manually control injection/spray to maintain vessel level.

Containment cooling systems consist of drywell and suppression chamber spray and suppression pool cooling. These systems are only required post-LOCA and do not provide any safety function during cold shutdown or refueling conditions. In the suppression pool cooling mode of operation, the residual heat removal (RHR) system takes suction from the suppression pool and pumps the water through the RHR heat exchangers where cooling takes place by transferring heat to service water. The cooled fluid is then discharged back to the suppression pool, completing a closed loop. Similarly, the RHR system can provide spray water into the primary containment (drywell and suppression chamber free volume) as an augmented means of removing energy from the containment following a design basis LOCA. Containment spray controls containment temperatures and pressures within design limits.

Comparison to Standard Technical Specifications (STS)

This proposed change is consistent with "Standard Technical Specifications General Electric Plants, BWR/4," dated April 7, 1995[1]. STS Limiting Condition for Operation 3.5.2 specifies that "two low pressure ECCS injection/spray subsystems shall be OPERABLE" in Modes 4 and 5, with an exception provided. With less than the required number of operable subsystems, STS LCO 3.5.2 requires suspension of OPDRVs.

Updated Final Safety Analysis Report (FSAR)

The core spray system is described in VY FSAR section 6.4.3, and the low pressure coolant injection system in sections 4.8.5.3 and 6.4.4. Section 6.5 provides a discussion on 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.

The containment cooling subsystem of the residual heat removal system is discussed in FSAR sections 1.6.2.12 and 4.8.5.2.

SAFETY ASSESSMENT

Ensuring that the irradiated fuel in the reactor vessel remains flooded is an essential consideration during cold shutdown and refueling operations. Recognizing that a potential for inadvertently draining the reactor pressure vessel may exist while conducting certain activities conducted during outages,

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

requirements for maintaining adequate coolant inventory and sufficient heat removal capability using low pressure ECCS injection/spray subsystems are included in TS.

TS 3.5.H.3

It is permissible, based upon the low heat load and other methods available to remove the residual heat, to disable all core and containment cooling systems for maintenance if the reactor is in a refueling or cold shutdown condition and there are no operations with a potential for draining the reactor vessel (OPDRV). Absent an OPDRV, ECCS availability would not be needed during cold shutdown and refueling conditions. The addition of "refueling conditions" to the applicability does not change shutdown risk already applicable to a "cold shutdown condition." Since the purpose for requiring ECCS capability during refueling and cold shutdown conditions is to provide core reflood capability in the unlikely event of an inadvertent vessel draindown, ECCS operability is not necessary when OPDRVs are not in progress.

The expanded applicability of TS 3.5.H.3 to "refueling conditions" also applies to the availability of containment cooling systems. Since containment cooling systems serve no safety function during refueling conditions, such systems are not required to be operable.

TS 3.5.H.4

The intent of TS 3.5.H.4 is to establish operability requirements for low pressure ECCS (and associated emergency power supplies) during refueling operations when operations having the potential for inadvertently draining the reactor vessel are in progress. By having a source of vessel reflood capability available, coolant inventory makeup can be provided in the event of an unintended draindown. The proposed change expands the applicability of TS 3.5.H.4 to include a "cold shutdown condition." The potential for inadvertent vessel draindown during the cold shutdown condition with OPDRVs is comparable to the potential during refueling conditions with OPDRVs in progress. Therefore, for completeness, the applicability of TS 3.5.H.4 is being expanded to include the cold shutdown condition.

The low pressure ECCS injection/spray subsystems provide a method of reflooding the reactor pressure vessel to maintain coolant inventory and provide heat removal capability. This specification ensures that this function is met with a single low pressure ECCS injection/spray subsystem, assuming a failure of one subsystem. If OPDRVs are in progress with irradiated fuel in the reactor vessel, operability of low pressure ECCS injection/spray subsystems is required to ensure capability to maintain adequate reactor vessel water level in the event of inadvertent reduction in reactor coolant inventory. Specific to VY, in the refueling condition, at least 300,000 gallons of makeup water is required to be available to assure core flooding capability.

The details regarding the 300,000 gallon source of water for reflood capability are being removed from TS 3.5.H.4 and relocated in the Bases of TS 3.5.H. In order to be operable in this mode, the low pressure ECCS injection/spray systems must have an adequate source of water available. The TS definition of OPERABLE provides sufficient assurance that the system can perform its required safety function, including the availability of a source of water. These relocated details on quantity of available water are not required to be in the TS to provide adequate protection of the public health and safety. This is consistent with the criteria of 10CFR50.36 for inclusion in TS. Changes to TS Bases are controlled by the provisions of 10CFR50.59 to preclude changes, which might involve an unreviewed safety question.

ECCS performance is evaluated for the entire spectrum of break sizes for a postulated loss of coolant accident (LOCA). Since only one low pressure ECCS injection/spray subsystem is required for long term cooling, post LOCA, it is reasonable to assume, based on engineering judgement, that during cold shutdown or refueling operations, one low pressure ECCS injection/spray subsystem can maintain adequate reactor vessel water level. To provide redundancy, a minimum of two low pressure ECCS injection/spray subsystems is required to be operable when there are OPDRVs in progress. In this condition, the remaining operable subsystem can provide sufficient vessel flooding capability to recover from an unintended vessel draindown event, assuming a failure of one subsystem.

Under current TS 3.5.H.4, a minimum of two subsystems of a single ECCS system are required to be operable for the defined condition. If a failure of one subsystem is assumed, one low pressure ECCS injection/spray pump (i.e., either core spray or LPCI) is available to satisfy this function. Assuming a failure of one subsystem under the revised TS results in an equivalent availability of a single ECCS subsystem. Therefore, from a safety perspective under assumed hypothetical considerations, the revised TS provides a capability equivalent to the current TS.

The low pressure ECCS injection/spray subsystems consist of two core spray and two LPCI subsystems. Each core spray subsystem requires one motor driven pump, piping, and valves to transfer water from the suppression pool or condensate storage tank to the reactor pressure vessel (RPV). In addition, during cold shutdown and refueling conditions, each LPCI subsystem requires one motor driven pump, piping, and valves to transfer water from the suppression pool to the RPV. Under these conditions, only a single LPCI pump is required per subsystem because of the larger injection capacity in relation to a core spray subsystem. One LPCI subsystem may be aligned for decay heat removal and considered operable for the ECCS function, if it can be manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. Low pressure and low temperature conditions exist during cold shutdown and refueling conditions, thus providing sufficient time to manually align and initiate LPCI subsystem operation to provide coolant injection prior to postulated fuel uncovery.

The requirement for operable diesel generators is modified to provide greater flexibility during refueling operations. With the plant in a cold condition (i.e., $\leq$ 212° F), the risk potential is significantly reduced. This is reflected in the reduced ECCS operability requirements. VY has conservatively required operability of an emergency power supply under such conditions to protect against any unexpected loss of normal power. However, one operable diesel generator supplying backup power to one of the operable low pressure ECCS injection/spray subsystems is adequate protection in this regard. Even assuming a loss of offsite power, the operable diesel generator, powering an operable ECCS subsystem, will continue to provide adequate core reflood capability. The proposed revision to TS 3.5.H.4 will continue to satisfy the intended safety function with a loss of normal power since one ECCS pump powered by one diesel generator provides sufficient pumping capacity. To require the availability of both diesel generators during cold shutdown or refueling conditions is overly conservative and beyond normal requirements to satisfy the basic safety objective.

Summary

In summary, the revised requirements of TS 3.5.H.3 and 3.5.H.4 provide operational flexibility for allowable equipment out of service during cold shutdown and refueling conditions while providing the same level of protection afforded by the current specifications. The resultant revised TS also provides clarity and reduces the potential for confusion.

Attachment 2

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 235

ECCS Requirements During Cold Shutdown and Refueling

Determination of No Significant Hazards Consideration

Determination of No Significant Hazards Consideration

Description of amendment request:

This proposed change revises Technical Specification (TS) 3.5.H.3 and 3.5.H.4 related to low pressure ECCS injection/spray subsystem operability during cold shutdown and refueling conditions. Two circumstances are considered: (1) when no operations with the potential for draining the reactor vessel (OPDRV) are in progress (addressed in TS 3.5.H.3), and (2) when OPDRVs are in progress (addressed in TS 3.5.H.4).

This change provides completeness in the TS for the defined conditions and also provides for the operation of an alternative combination of low pressure ECCS injection/spray subsystems to ensure adequate coolant inventory and sufficient heat removal capability for the irradiated fuel during cold shutdown and refueling conditions when OPDRVs are in progress. This additional combination of subsystems provides equivalent core reflood capability while providing certain flexibility in conducting surveillance and maintenance activities during refueling outages. Other minor changes to the subject TS are administrative in nature and do not alter the ability to meet functional requirements or the intent of the current TS.

The proposed change is only applicable to the plant in a cold shutdown or refueling 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.

   No changes are being made to plant design or method of operation. This change only affects the plant in a cold shutdown or refueling condition and will not alter the basic operation of process variables, structures, systems, or components as described in the safety analyses. No new equipment is introduced.

   The proposed change does not affect the ability of low pressure ECCS injection/spray systems to perform their required safety functions. The essential safety function of providing water to reflood the reactor vessel following an inadvertent vessel draindown is maintained. There is no physical or operational change being made which would alter the sequence of events, plant response, or conclusions of existing safety analyses.

   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 plant equipment and does not change the method by which any safety-related system performs its function. As such, no new or different types of equipment will be installed, and the basic operation of installed equipment is unchanged. 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.

During refueling and cold shutdown conditions with operations having the potential for draining the reactor vessel (OPDRV) in progress, any one ECCS injection/spray subsystems is adequate to reflood the reactor vessel in the event of an inadvertent draindown. Since the proposed change provides an equivalent means for achieving this safety function, there is no reduction in reflood capability. The additional flexibility, to maintain a combination of one core spray subsystem and one LPCI subsystem (provided by this change), is equivalent to the safety margin provided by the existing TS since a single active failure affecting one subsystem results in the same remaining capability of one ECCS subsystem.

Since the changed TS provides equivalent low pressure ECCS injection/spray capability and protection from loss of coolant inventory, the risk of an inadvertent draindown event are unchanged, thus preserving previously existing margins of safety.

For circumstances involving no OPDRVs during refueling and cold shutdown conditions, no ECCS or containment cooling equipment is required to meet safety objectives. 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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Attachment 3

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 235

ECCS Requirements During Cold Shutdown and Refueling

Marked-up Version of the Current Technical Specifications

3.5 LIMITING CONDITION FOR OPERATION

3. If the requirements of either Specification 3.5.G or Specification 4.5.G.1.c cannot be met, an orderly shutdown shall be initiated and the reactor pressure shall be reduced to ≤ 150 psig within 24 hours.

H. Minimum Core and Containment Cooling System Availability

1. During any period when one of the emergency diesel generators is inoperable, continued reactor operation is permissible only during the succeeding seven days, provided that all of the LPCI, Core Spray and Containment Cooling Subsystems connecting to the operable diesel generator shall be operable. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the cold shutdown condition within 24 hours.

2. Any combination of inoperable components in the Core and Containment Cooling Systems shall not defeat the capability of the remaining operable components to fulfill the core and containment cooling functions.

3. When irradiated fuel is in the reactor vessel and the reactor is in ~~the~~ [either a refueling or] cold shutdown condition, all Core and Containment Cooling Subsystems may be inoperable provided no work is permitted which has the potential for draining the reactor vessel.

4.5 SURVEILLANCE REQUIREMENT

d. The RCIC System shall deliver at least 400 gpm at normal reactor operating pressure when recirculating to the Condensate Storage Tank.

H. Minimum Core and Containment Cooling System Availability

1. When one of the emergency diesel generators is made or found to be inoperable, the remaining diesel generator shall have been or shall be demonstrated to be operable within 24 hours.

3.5 LIMITING CONDITION FOR OPERATION

4. When irradiated fuel is in the reactor vessel and the reactor is in the refueling condition, both LPCI subsystems, or both Core Spray systems, or one diesel generator may be inoperable provided that a source of water of greater than 300,000 gal. is available to the operable core cooling subsystem.

When irradiated fuel is in the reactor vessel, operations with a potential for draining the reactor vessel are in progress, and the reactor is in either a cold shutdown or refueling condition, two low pressure ECCS injection/spray subsystems and one diesel generator associated with one of the ECCS subsystems shall be operable.

I. Maintenance of Filled Discharge Pipe

Whenever core spray subsystems, LPCI subsystem, HPCI, or RCIC are required to be operable, the discharge piping from the pump discharge of these systems to the last block valve shall be filled.

4.5 SURVEILLANCE REQUIREMENT

I. Maintenance of Filled Discharge Pipe

The following surveillance requirements shall be adhered to to assure that the discharge piping of the core spray subsystems, LPCI subsystem, HPCI and RCIC are filled:

1. Every month and prior to the testing of the LPCI subsystem and core spray subsystem, the discharge piping of these systems shall be vented from the high point and water flow observed.

2. Following any period where the LPCI subsystem or core spray subsystems have not been required to be operable, the discharge piping of the inoperable system shall be vented from the high point prior to the return of the system to service.

3. Whenever the HPCI or RCIC system is lined up to take suction from the torus, the discharge piping of the HPCI and RCIC shall be vented from the high point of the system and water flow observed on a monthly basis.

BASES: 3.5 (Cont'd)

SSW pump, SSW valve, etc.), then reactor operation is limited to 15 days provided that during this time both the normal and emergency power supplies for the remaining operable equipment are also operable, in addition to demonstrating the operability of all remaining active components of the SSW system which perform a safety function and the alternate cooling tower fan.

If the SSW System would not be capable of performing its safety function for any reason, even without assuming a worst case single active failure, then the reactor must be placed in the cold shutdown condition within 24 hours.

E. High Pressure Coolant Injection System

The High Pressure Coolant Injection System (HPCIs) is provided to adequately cool the core for all pipe breaks smaller than those for which the LPCI or Core Spray Cooling Subsystems can protect the core.

The HPCIs meets this requirement without the use of outside power. For the pipe breaks for which the HPCIs is intended to function the core never uncovers and is continuously cooled; thus, no clad damage occurs and clad temperatures remain near normal throughout the transient. Reference: Subsection 6.5.2.2 of the FSAR.

F. Automatic Depressurization System

The Automatic Depressurization System (ADS) consists of the four safety-relief valves and serves as a backup to the High Pressure Coolant Injection System (HPCI). ADS is designed to provide depressurization of the reactor coolant system during a small break loss-of-coolant accident if HPCI fails or is unable to maintain sufficient reactor water level. Since HPCI operability is required above 150 psig, ADS operability is also required above this pressure.

ADS operation reduces the reactor pressure to within the operating pressure range of the low pressure coolant injection and core spray systems, so that these systems can provide reactor coolant inventory makeup.

G. Reactor Core Isolation Cooling System

The Reactor Core Isolation Cooling System (RCIC) is provided to maintain the water inventory of the reactor vessel in the event of a main steam line isolation and complete loss of outside power without the use of the emergency core cooling systems. The RCIC meets this requirement. Reference Section 14.5.4.4 FSAR. The HPCIS provides an incidental backup to the RCIC system such that in the event the RCIC should be inoperable no loss of function would occur if the HPCIS is operable.

H. Minimum Core and Containment Cooling System Availability

(insert)

The core cooling and the containment cooling subsystems provide a method of transferring the residual heat following a shutdown or accident to a heat sink. Based on analyses, this specification assures that adequate cooling capacity is available by precluding any combination of inoperable components from fulfilling the core and containment cooling function. It is permissible, based upon the low heat load and other methods available to remove the residual heat, to disable all core and containment cooling systems for maintenance if the reactor is cold and shutdown and there is

BASES: 3.5 (Cont'd)

no potential for draining the reactor vessel. However, if refueling operations are in progress, one coolant injection system, one diesel and a residual of at least 300,000 gallons is required to assure core flooding capability.

I. Maintenance of Filled Discharge Pipe

Full discharge lines are required when the core spray subsystems, LPCI subsystems, HPCI and RCIC are required to be operable to preclude the possibility of damage to the discharge piping due to water hammer action upon a pump start.

(Insert as a replacement for entire, current Bases 3.5.H)

Bases 3.5.H. <u>Minimum Core and Containment Cooling System Availability</u>

The core cooling and containment cooling subsystems provide a method of transferring the residual heat following a shutdown or accident to a heat sink. Based on analyses, this specification assures that the core and containment cooling function is maintained with any combination of allowed inoperable components.

Operability of low pressure ECCS injection/spray subsystems is required during cold shutdown and refueling conditions to ensure adequate coolant inventory and sufficient heat removal capability for the irradiated fuel in the core in case of inadvertent draindown of the vessel. It is permissible, based upon the low heat load and other methods available to remove the residual heat, to disable all core and containment cooling systems for maintenance if the reactor is in cold shutdown or refueling and there are no operations with a potential for draining the reactor vessel (OPDRV). However, if OPDRVs are in progress with irradiated fuel in the reactor vessel, operability of low pressure ECCS injection/spray subsystems is required to ensure capability to maintain adequate reactor vessel water level in the event of an inadvertent vessel draindown. In this condition, at least 300,000 gallons of makeup water must be available to assure core flooding capability. In addition, only one diesel generator associated with one of the ECCS injection/spray subsystems is required to be operable in this condition since, upon loss of normal power supply, one ECCS subsystem is sufficient to meet this function.

ECCS performance is evaluated for the entire spectrum of break sizes for a postulated loss of coolant accident (LOCA). Since only one low pressure ECCS injection/spray subsystem is required for long term cooling, post LOCA, it is reasonable to assume, based on engineering judgement, that during cold shutdown or refueling conditions, one low pressure ECCS injection/spray subsystem can maintain adequate reactor vessel water level. To provide redundancy, a minimum of two low pressure ECCS injection/spray subsystems are required to be operable in a cold shutdown or refueling condition when there are OPDRVs.

The low pressure ECCS injection/spray subsystems consist of two core spray (CS) and two low pressure coolant injection (LPCI) subsystems. During cold shutdown and refueling conditions, each CS subsystem requires one motor driven pump, piping, and valves to transfer water from the suppression pool or condensate storage tank to the reactor pressure vessel (RPV). Also, during cold shutdown and refueling conditions, each LPCI subsystem requires one motor driven pump, piping, and valves to transfer water from the suppression pool to the RPV. Under these conditions, only a single LPCI pump is required per subsystem because of the larger injection capacity in relation to a CS subsystem. One LPCI subsystem may be aligned for decay heat removal and considered operable for the ECCS function, if it can be manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. Because of low pressure and low temperature conditions during cold shutdown and refueling, sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncovery.

Attachment 4

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 235

ECCS Requirements During Cold Shutdown and Refueling

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
108	108
109	109
111a	111a
112	112

3.5 LIMITING CONDITION FOR OPERATION

3. If the requirements of either Specification 3.5.G or Specification 4.5.G.1.c cannot be met, an orderly shutdown shall be initiated and the reactor pressure shall be reduced to ≤ 150 psig within 24 hours.

H. Minimum Core and Containment Cooling System Availability

1. During any period when one of the emergency diesel generators is inoperable, continued reactor operation is permissible only during the succeeding seven days, provided that all of the LPCI, Core Spray and Containment Cooling Subsystems connecting to the operable diesel generator shall be operable. If this requirement cannot be met, an orderly shutdown shall be initiated and the reactor shall be in the cold shutdown condition within 24 hours.

2. Any combination of inoperable components in the Core and Containment Cooling Systems shall not defeat the capability of the remaining operable components to fulfill the core and containment cooling functions.

3. When irradiated fuel is in the reactor vessel and the reactor is in either a refueling or cold shutdown condition, all Core and Containment Cooling Subsystems may be inoperable provided no work is permitted which has the potential for draining the reactor vessel.

4.5 SURVEILLANCE REQUIREMENT

c. The RCIC System shall deliver at least 400 gpm at normal reactor operating pressure when recirculating to the Condensate Storage Tank.

H. Minimum Core and Containment Cooling System Availability

1. When one of the emergency diesel generators is made or found to be inoperable, the remaining diesel generator shall have been or shall be demonstrated to be operable within 24 hours.

3.5 LIMITING CONDITION FOR OPERATION

4. When irradiated fuel is in the reactor vessel, operations with a potential for draining the reactor vessel are in progress, and the reactor is in either a cold shutdown or refueling condition, two low pressure ECCS injection/spray subsystems and one diesel generator associated with one of the ECCS subsystems shall be operable.

I. <u>Maintenance of Filled Discharge Pipe</u>

Whenever core spray subsystems, LPCI subsystem, HPCI, or RCIC are required to be operable, the discharge piping from the pump discharge of these systems to the last block valve shall be filled.

4.5 SURVEILLANCE REQUIREMENT

I. <u>Maintenance of Filled Discharge Pipe</u>

The following surveillance requirements shall be adhered to to assure that the discharge piping of the core spray subsystems, LPCI subsystem, HPCI and RCIC are filled:

1. Every month and prior to the testing of the LPCI subsystem and core spray subsystem, the discharge piping of these systems shall be vented from the high point and water flow observed.

2. Following any period where the LPCI subsystem or core spray subsystems have not been required to be operable, the discharge piping of the inoperable system shall be vented from the high point prior to the return of the system to service.

3. Whenever the HPCI or RCIC system is lined up to take suction from the torus, the discharge piping of the HPCI and RCIC shall be vented from the high point of the system and water flow observed on a monthly basis.

BASES: 3.5 (Cont'd)

SSW pump, SSW valve, etc.), then reactor operation is limited to 15 days provided that during this time both the normal and emergency power supplies for the remaining operable equipment are also operable, in addition to demonstrating the operability of all remaining active components of the SSW system which perform a safety function and the alternate cooling tower fan.

If the SSW System would not be capable of performing its safety function for any reason, even without assuming a worst case single active failure, then the reactor must be placed in the cold shutdown condition within 24 hours.

E. High Pressure Coolant Injection System

The High Pressure Coolant Injection System (HPCIs) is provided to adequately cool the core for all pipe breaks smaller than those for which the LPCI or Core Spray Cooling Subsystems can protect the core.

The HPCIs meets this requirement without the use of outside power. For the pipe breaks for which the HPCIs is intended to function the core never uncovers and is continuously cooled; thus, no clad damage occurs and clad temperatures remain near normal throughout the transient. Reference: Subsection 6.5.2.2 of the FSAR.

F. Automatic Depressurization System

The Automatic Depressurization System (ADS) consists of the four safety-relief valves and serves as a backup to the High Pressure Coolant Injection System (HPCI). ADS is designed to provide depressurization of the reactor coolant system during a small break loss-of-coolant accident if HPCI fails or is unable to maintain sufficient reactor water level. Since HPCI operability is required above 150 psig, ADS operability is also required above this pressure.

ADS operation reduces the reactor pressure to within the operating pressure range of the low pressure coolant injection and core spray systems, so that these systems can provide reactor coolant inventory makeup.

G. Reactor Core Isolation Cooling System

The Reactor Core Isolation Cooling System (RCIC) is provided to maintain the water inventory of the reactor vessel in the event of a main steam line isolation and complete loss of outside power without the use of the emergency core cooling systems. The RCIC meets this requirement. Reference Section 14.5.4.4 FSAR. The HPCIS provides an incidental backup to the RCIC system such that in the event the RCIC should be inoperable no loss of function would occur if the HPCIS is operable.

H. Minimum Core and Containment Cooling System Availability

The core cooling and containment cooling subsystems provide a method of transferring the residual heat following a shutdown or accident to a heat sink. Based on analyses, this specification assures that the core and containment cooling function is maintained with any combination of allowed inoperable components.

BASES: 3.5 (Cont'd)

Operability of low pressure ECCS injection/spray subsystems is required during cold shutdown and refueling conditions to ensure adequate coolant inventory and sufficient heat removal capability for the irradiated fuel in the core in case of inadvertent draindown of the vessel. It is permissible, based upon the low heat load and other methods available to remove the residual heat, to disable all core and containment cooling systems for maintenance if the reactor is in cold shutdown or refueling and there are no operations with a potential for draining the reactor vessel (OPDRV). However, if OPDRVs are in progress with irradiated fuel in the reactor vessel, operability of low pressure ECCS injection/spray subsystems is required to ensure capability to maintain adequate reactor vessel water level in the event of an inadvertent vessel draindown. In this condition, at least 300,000 gallons of makeup water must be available to assure core flooding capability. In addition, only one diesel generator associated with one of the ECCS injection/spray subsystems is required to be operable in this condition since, upon loss of normal power supply, one ECCS subsystem is sufficient to meet this function.

ECCS performance is evaluated for the entire spectrum of break sizes for a postulated loss of coolant accident (LOCA). Since only one low pressure ECCS injection/spray subsystem is required for long term cooling, post LOCA, it is reasonable to assume, based on engineering judgement, that during cold shutdown or refueling conditions, one low pressure ECCS injection/spray subsystem can maintain adequate reactor vessel water level. To provide redundancy, a minimum of two low pressure ECCS injection/spray subsystems are required to be operable in a cold shutdown or refueling condition when there are OPDRVs.

The low pressure ECCS injection/spray subsystems consist of two core spray (CS) and two low pressure coolant injection (LPCI) subsystems. During cold shutdown and refueling conditions, each CS subsystem requires one motor driven pump, piping, and valves to transfer water from the suppression pool or condensate storage tank to the reactor pressure vessel (RPV). Also, during cold shutdown and refueling conditions, each LPCI subsystem requires one motor driven pump, piping, and valves to transfer water from the suppression pool to the RPV. Under these conditions, only a single LPCI pump is required per subsystem because of the larger injection capacity in relation to a CS subsystem. One LPCI subsystem may be aligned for decay heat removal and considered operable for the ECCS function, if it can be manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. Because of low pressure and low temperature conditions during cold shutdown and refueling, sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncovery.

I. Maintenance of Filled Discharge Pipe

Full discharge lines are required when the core spray subsystems, LPCI subsystems, HPCI and RCIC are required to be operable to preclude the possibility of damage to the discharge piping due to water hammer action upon a pump start.