VERMONT YANKEE
NUCLEAR POWER CORPORATION

185 Old Ferry Road, Brattleboro, VT 05301-7002
(802) 257-5271

August 18, 1999
BVY 99-104

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. 223
Spiral Core Loading Around a Source Range Monitor

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. This proposed change revises the reactor core spiral reloading pattern such that it begins around a Source Range Monitor (SRM). The offloading pattern is the reverse sequence. Although the normal practice for refueling at VY is to perform core "shuffles" versus full offloads and reloads, this change is needed in the event a full core offload and reload is necessitated.

This submittal supersedes, in its entirety, Proposed Change No. 211 to VY Technical Specifications[1].

The VY Technical Specifications currently state: "... the reactor will be spirally reloaded from the center cell outwards, until the core is fully loaded." In response to NRC concerns during the January 1989 refueling for Browns Ferry Unit 2, General Electric (GE) and EPRI issued NSAC 164L, Guidelines for BWR Reactivity Control During Refueling, which recommended modifying the pattern followed for reloading the reactor core. In accordance with the guidance, this revision proposes to change the VY Technical Specifications and the Technical Specifications Bases from the past practice of beginning core loading at the geometric center of the core to the recommended practice of beginning core loading around a single SRM. The GE/EPRI recommendation for the offloading pattern is consistent with the current offloading pattern description in the Technical Specifications; that is, the reverse of the reloading pattern. Since this revision changes the reloading pattern, it also changes the offloading pattern.

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 pages and the Bases pages. Attachment 4 is the retyped Technical Specification and Bases pages.

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

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[1] Letter, VYNPC to USNRC, BVY 99-58, "Technical Specification Proposed Change No. 211 -- Spiral Core Loading Around a Source Range Monitor," dated April 20, 1999.

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.

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

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Robert J. Wanczyk
Director of Safety and Regulatory Affairs

STATE OF VERMONT)
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WINDHAM COUNTY)

Then personally appeared before me, Robert J. Wanczyk, who, being duly sworn, did state that he is Director of Safety and Regulatory Affairs 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 NOTARY PUBLIC WINDHAM COUNTY, VERMONT

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

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Attachment 1

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 223

Spiral Core Loading Around a Source Range Monitor

Supporting Information and Safety Assessment of Proposed Change

INTRODUCTION

The issue of the adequacy of neutron flux monitoring by the Source Range Monitors (SRMs) during core reloading activities was raised by the NRC during the January 1989 refueling for Browns Ferry Unit 2. In response, General Electric Nuclear Energy issued RICSIL No. 039[2], which stated in part:

"The USNRC recently reviewed the refueling practices at a BWR located in the United States during a full core reload following an extended shutdown. The USNRC questioned the adequacy of core neutron flux monitoring during a spiral reloading from the center of the core. Because the Source Range Monitors (SRMs) initially were separated by water from the region of the core in which fuel was being loaded, the SRMs were not effective in monitoring changes in neutron flux as the fuel was being loaded. Following its review, the USNRC concluded that adequate monitoring exists only after sufficient fuel is loaded for the SRMs to be in contact with the fueled region."

Subsequently, GE prepared and EPRI issued NSAC 164L, Guidelines for BWR Reactivity Control During Refueling, dated April 1992[3]. This document summarizes on page 5-12 under the heading "Recommendations", subheading "Neutron Flux Monitoring – Fuel Offload/Reload", section (15):

"Initiate fuel reloading adjacent to an SRM or FLC connected to the SRM circuitry. Offloading sequences should be the reverse of the loading sequences. Loading sequences which bring all four SRMs on scale as soon as practicable are recommended." (Note that "FLC" refers to a fuel loading chamber or "dunking" chamber.)

The BWR/4 Standard Technical Specifications[4] address core reload/offload methodology as it applies to the requirements for SRM instrumentation. Specification 3.3.1.2, Source Range Monitor (SRM) Instrumentation requires two channels of SRM instrumentation in MODE 5, but modifies that requirement with the following Note (b): "Only one SRM channel is required to be OPERABLE during spiral offload or reload when the fueled region includes only that SRM detector." The associated Bases for LCO 3.3.1.2 states: "In MODE 5, during a spiral offload or reload, an SRM outside the fueled region will no longer be required to be OPERABLE, since it is not capable of monitoring neutron flux in the fueled region of the core. Thus, CORE ALTERATIONS are allowed in a quadrant with no OPERABLE SRM in an adjacent quadrant provided the Table 3.3.1.2-1, footnote (b), requirement that the bundles being spiral reloaded or spiral offloaded are all in a single fueled region containing at least one OPERABLE SRM is met. Spiral reloading and offloading encompass reloading or offloading a cell on the edge of a continuous fueled region (the cell can be reloaded or offloaded in any sequence)." Note that the Standard Technical Specifications also refer to "compliance with an approved [spiral] reload sequence" as a requirement for utilizing Special Operations LCO 3.10.6, Multiple Control Rod Withdrawal---Refueling.

The following specific change is proposed to Technical Specification 3.12.E.3.b:

- "..., the reactor will be spirally reloaded from the center cell outwards until the core is fully loaded." is changed to "the reactor will be spirally reloaded around an SRM until the core is fully loaded."

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[2] Rapid Information Communication Services Information Letter, Full Core Reloading Procedures, issued by General Electric February 10, 1989.

[3] NSAC 164L, Guidelines for BWR Reactivity Control During Refueling, prepared by General Electric Company, issued by the Nuclear Safety Analysis Center division of the Electric Power Research Institute, dated April 1992.

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

The Bases for Technical Specification 3.12.E is proposed to be changed to incorporate details of the methodology by replacing the current description with the following:

- "Spiral reloading and unloading encompass reloading or unloading a cell on the edge of a continuous fueled region (the cell can be reloaded or unloaded in any sequence.) The pattern begins (for reloading) and ends (for unloading) around a single SRM. The spiral reloading pattern is the reverse of the unloading pattern, with the exception that two diagonally adjacent bundles, which have previously accumulated exposure in-core, are placed next to each of the four SRMs before the actual spiral reloading begins. The spiral reload can be to either the original configuration or a different configuration."

To achieve the optimum core loading for the cycle, it is sometimes necessary to change the bundles that were initially loaded adjacent to the SRMs as the spiral reload pattern encompasses them. Such bundle changes are a part of the spiral reload pattern. The following purely administrative clarifying change is proposed for Technical Specification 3.12.E.3.b, as well as Technical Specification 3.12.B, Core Monitoring, subsection 4 and the Bases for Technical Specification 3.12.B:

- The words "their designated" are removed from the phrase "two (2) diagonally adjacent fuel assemblies, which have previously accumulated exposure in the reactor, shall be loaded into their designated core positions next to each of the four (4) SRMs to obtain the required 3 cps." This is required prior to beginning spiral reloading of the core. "Their designated" can be interpreted to mean that the bundles initially loaded adjacent to the SRMs to ensure their OPERABILITY must be the bundles that will occupy those core positions for the next cycle. The bundles are simply being used to ensure proper SRM response; it is overly restrictive to disallow changing the bundles that occupy those positions when the spiral reload pattern encompasses the associated SRM.

SAFETY ASSESSMENT

Revising the core reloading and offloading pattern to spiral around an SRM is not a safety concern for the following reasons:

1. NSAC 164L was generated in response to an NRC concern regarding adequate flux monitoring during reload.

2. NSAC 164L assessed the various reload options and recommended the spiral reload around an SRM methodology.

3. Spiral loading around an SRM is consistent with the Standard Technical Specifications.

4. Spiral loading around an SRM is conservative relative to the pattern stipulated by the current Technical Specifications in that it provides better flux monitoring.

5. The design basis accident associated with refueling is the Refueling Accident; i.e., the accidental dropping of a fuel bundle onto the top of the core. There is no assumption as to the core loading pattern in the analysis of this accident.

6. The analyzed abnormal operational transients associated with refueling are: 1) the Control Rod Removal Error During Refueling, and 2) the Fuel Assembly Insertion Error During Refueling. There is no assumption as to the core loading pattern in the analyses of these transients. The Fuel Assembly Insertion Error During Refueling transient involves mislocated and rotated fuel assembly loading errors. However, a change in the approved core loading pattern has no impact on the probability of mislocating or rotating a bundle while following that pattern.

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Attachment 2

Vermont Yankee Nuclear Power Station

Proposed Technical Specification Change No. 223

Spiral Core Loading Around a Source Range Monitor

Determination of No Significant Hazards Consideration

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.

VY has determined that the proposed change to reload the reactor core in a spiral pattern beginning around a Source Range Monitor (SRM) does not involve a significant increase in the probability or consequences of an accident previously evaluated. The design basis accident associated with refueling is the Refueling Accident; i.e., the accidental dropping of a fuel bundle onto the top of the core. There is no assumption as to the core loading pattern in the analysis of this accident. The analyzed abnormal operational transients associated with refueling are: 1) the Control Rod Removal Error During Refueling, and 2) the Fuel Assembly Insertion Error During Refueling. There is no assumption as to the core loading pattern in the analyses of these transients. The Fuel Assembly Insertion Error During Refueling transient involves mislocated and rotated fuel assembly loading errors. However, a change in the approved core loading pattern has no impact on the probability of mislocating or rotating a bundle while following that pattern. Furthermore, the proposed change implements a core loading pattern that provides improved flux monitoring as compared to the pattern prescribed by the current Technical Specifications. When loading the core in accordance with the proposed change, the SRM indication will be indicative of the true flux of the loaded fuel, as the creation of flux traps (moderator filled cavities surrounded on all sides by fuel) is precluded.

The SRMs and the core loading pattern are not initiators of any accident previously evaluated. As such, the subject changes cannot affect the probability of an accident previously evaluated. The core loading pattern is not assumed in the mitigation of any accident. Since the proposed change provides improved flux monitoring by the SRMs, operators will have more accurate indication and SRM automatic trip functions will actuate based on a more accurate indication of flux. As such, any event mitigation function provided by the SRMs is enhanced by this change. Therefore, the associated changes do not involve a significant increase in the 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.

VY has determined that the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated. VY proposes to change the core reloading and offloading patterns to start and stop, respectively, at an SRM versus the geometric center of the core as prescribed by current Technical Specifications. This ensures that flux monitoring instrumentation is always OPERABLE in the fueled region of the vessel. There is no separation of the monitoring device from the fuel by cavities of water as is the case with the pattern prescribed by the current Technical Specifications. As such, flux monitoring is enhanced during core reloading and offloading. This change is conservative relative to the current requirements. Therefore, no new or different kinds of accidents are created.

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.

VY has determined that the proposed change does not involve a significant reduction in a margin of safety. Loading around the geometric center of the core as prescribed by the current Technical Specifications results in cells of moderator separating the fuel from the instrumentation monitoring its flux. This change requires the flux monitoring instrumentation to be in the fueled region, and, in so doing, provides for more accurate monitoring of core flux during core reloading and offloading. As such, the operators will have more accurate indication and SRM automatic trip functions will actuate when the actual flux reaches the trip setpoints. Therefore, this change will not result in a significant reduction in a margin of safety.

Summary No Significant Hazards Consideration

On the basis of the above, VY has determined that operation of the facility in accordance with the proposed change does not involve a significant hazards consideration as defined in 10CFR50.92(c), in that it: (1) does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) does not involve a significant reduction in a margin of safety.

In making this determination, Vermont Yankee has also reviewed the NRC examples of license amendments considered not likely to involve significant hazards considerations as provided in the final adoption of 10CFR50.92 published in the Federal Register, Volume 51, No. 44, dated March 6, 1986.