PDR

March 14, 2000

MEMORANDUM TO: Cecil O. Croteau Project Manager
Project Directorate I-3
Division of Reactor Projects - I/II

FROM: Ralph Caruso, Chief /RA/
BWR Systems and Nuclear Performance Section
Reactor Systems Branch
Division of Systems Safety and Analysis

SUBJECT: AMENDMENT TO ADJUST AND CAP THE FLOW-BIASED TRIP SETTINGS FOR THE ROD BLOCK MONITOR, THE APRM SCRAM AND THE APRM ROD BLOCK.

Plant: Vermont Yankee Nuclear Station
Licensee: Vermont Yankee Nuclear Power Corporation
License: DPR-28
Docket : 50-271
TAC: MA6152

On September 7, 1999, Vermont Yankee Nuclear Power Corporation submitted an amendment to adjust and cap the trip settings in the technical specification (TS) for the flow-biased rod block monitor, the flow biased APRM scram, and the APRM rod block to reflect an increased core flow (ICF) operation. In an October 25, 1999, supplemental letter, the licensee stated that the ICF operation was implemented in accordance with 10 CFR 50.59. The licensee did not request NRC staff approval of the ICF operation, because all of the Chapter 15 analyses with an ICF of 107 percent complied with the NRC-approved methodologies specified in General Electric Standard Application for Reactor Fuel (GESTAR II).

The staff reviewed the amendment request and found the proposed changes to the TS acceptable.

If you have further questions, please call me at 415-1813.

Attachment:
As stated

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415-2808

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ATTACHMENT

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO AMENDMENT NUMBER????
VERMONT YANKEE NUCLEAR STATION
VERMONT YANKEE POWER CORPORATION
DOCKET No. 50-271

1 INTRODUCTION

On September 7, 1999, as supplemented October 25, 1999, pursuant to 10 CFR 50.90, Vermont Yankee Nuclear Power Corporation (VYNPC) submitted an amendment to modify the Vermont Yankee Nuclear Station (VY) Facility Operating License, DPR-28. The amendment would adjust and cap the flow-biased trip settings in the technical specification (TS) for the rod block monitor (RBM), the flow-biased average power range monitor (APRM) scram, and the APRM rod block to reflect increased core flow (ICF) operation.

In its application, the licensee stated that it had implemented ICF operation at VY under 10 CFR 50.59 after performing mechanical, thermal-hydraulic and reactor physics evaluations to support operating VY with an ICF of 107 percent. In addition, General Electric analyzed the impact of increased core flow operation on VY's reactor core, recirculation system, and reactor internals. The Cycle 20 steady-state core thermal-hydraulic analysis also incorporates the increased core flow operation in the reload analysis. The licensee reviewed VY's TS and found that only the flow-biased RBM, the APRM scram and the APRM rod block TS limiting conditions for operations (LCOs) needed to be updated to reflect ICF operation. The licensee stated that VY was currently operating with flow-biased APRM scram setpoints and APRM rod block setpoints based on the present TS requirements, which are conservative according to the licensee, since the trip settings would be adjusted upward with ICF operation.

ICF is specified as part of the operating flexibility in the NRC-approved General Electric Standard Application for Reactor Fuel (GESTAR II). A licensee can adopt ICF operation under 10 CFR 50.59 if all the required analyses support operation with iCF and the analyses are in compliance with the NRC-approved methodologies specified in the latest revision of GESTAR II. The licensee stated that ICF would allow greater flexibility by eliminating the need to adjust control rods when the control rod patterns are changed and during startups. Core flow changes will compensate for the effects of xenon and fuel burnup. ICF can also be used for cycle extension during end-of-cycle (EOC) when all rods are out.

Tables 3.2.5 and 3.1.1, Figure 2.1-1, and the corresponding Bases sections of the TS specify the required flow-biased trip settings for the RBM, the flow-biased APRM scram, and the APRM rod block. The flow-biased APRM scram prevents exceeding the thermal-mechanical limits in both rated and off-rated conditions. The flow-biased APRM rod block serves as an aid to the operators. It also prevents the core thermal power from being increased above the design levels by inhibiting control rod withdrawals (which may result in high and rapid power peaking). The RBM is assumed to operate in the final safety analysis report's (FSAR's) analysis of Continuous Rod Withdrawal Error during operation in the power range.

2 EVALUATION

The licensee proposed to adjust and cap the flow-biased trip settings for the RBM, APRM scram, and the APRM rod block to reflect operation of VY with an ICF of 107 percent. The following sections describe the licensee's proposed changes, the justifications, and the staff's evaluation:

A. Addition of Clarifying Statement in Figure 2.1-1

In Figure 2.1- 1, "APRM Reference Scram and APRM Rod Block Settings," the licensee wants to add the statement "Setpoints shall be ≤ values shown on the graph." TS Section 2.1 states that the "settings shall be as shown on graph 2.1.1" and the licensee points out that the statement could be interpreted to mean that the trip setting should be strictly the values on the flow-biased APRM scram, and the APRM rod block plot. However, the plot is just a graphical representation of the flow biased APRM scram and rod block equations and the settings are required to be less than or equal to the value represented on the plot.

The APRM flow biased scram and rod block trip settings are specified by the linear equation given below and figure 2.1-1 is only a plot of the trip setpoint equations. The staff finds the proposed statement acceptable.

B. Defining the Maximum APRM Flow Biased Trip Setpoint.

Table 3.1.1, "Reactor Protection System (Scram) Instrument Requirements," gives the trip function settings and item 4 gives the equation that defines the APRM flow -biased upscale trip as ≤ 0.66 (W- ΔW) + 54 percent. The licensee points out that TS 2.1A.1.a states: "For no combination of loop recirculation flow rate and core thermal power shall the APRM flux scram trip setting be allowed to exceed 120 percent of rated thermal power." With an increased core flow of 107 percent, the upscale trip setting equation will yield a higher value than the maximum cap of 120 percent thermal power, the licensee proposed to add, "with a maximum of 120 percent," to Item4 of Table 3.1.1.

The proposed modification spells out the maximum APRM flow-biased upscale trip setting, ensuring the requirements in TS 2.1.A.1.a are adhered to. The staff finds the proposed change prudent and acceptable.

C. Rod Block Monitor Flow-Biased Upscale Trip Setting.

Table 3.2.5, " Control Rod Block Instrumentation," defines the flow-biased upscale and downscale trip settings for the rod block monitor. The upscale trip setting is assumed in the continuous rod withdrawal transient during power, and the TS specifies that the RBM upscale trip setting shall be ≤ 0.66 (W- ΔW) +N, where W is the percent-rated two loop drive flow. The expression ΔW is the difference in the two-loop and single-loop drive flow for the same core flow and must be accounted for during single-loop operation. The variable N is determined in each reload analysis and specified in the core operating limit report (COLR.) The licensee proposes to add the phrased, "with a maximum as defined in the COLR" to Table 3.2.5 under the RBM flow-biased upscale trip setting. The licensee states that "since the variable 'N' value

in the equation is cycle-specific and is a variable defined in the COLR, the clamped value will also be cycle-specific and it is defined in the COLR."

The staff agrees with the licensee that variable N is cycle-specific and defined in the COLR, so that the RBM flow-biased upscale trip setting is also cycle-specific. The COLR also specifies the maximum upscale flow-biased trip setting. The phrase to be added clarifies Table 3.2.5. The staff finds this acceptable.

D. Bases Section 2.1B and Section 3.2

The licensee proposed to change the APRM flow-biased rod block trip setting discussion in Bases Sections 2.1.B (Page 16) and 3.2 (Page 77). The licensee stated that the "current discussion of the APRM Rod Block Trip Setting is ambiguous" and "it implies that the APRM Rod Block Trip setting is assumed in the protection of the fuel integrity safety limit." The licensee asserted that the APRM rod block trip setting is not assumed in any accident or transient analysis; rather, the trip setting stops the reactivity addition before the scram setpoint is reached. The licensee proposes to change the Bases to reflect verbatim the discussions in FSAR Sections 7.7.4.5.2 and 7.5.7.3. According to licensee this will clarify Bases 2.1.B and 3.2. The licensee concludes that the changes are administrative in nature, since only the FSAR discussions will be incorporated into the TS Bases.

10 CFR 50.36 states that "A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the technical specifications." Therefore, licensees can change the Bases of the TS under 10 CFR 50.59. VY seeks to replace a paragraph on the rod block monitor (Insert 2) and the APRM rod block trip setting (Insert 3) on page 77 of Bases Section 3.2. The staff finds insert 2 an improvement on the RBM discussion in the current Basis. The licensee's proposed changes to Bases 2.1B and 3.2 are also acceptable.

3 CONCLUSION

The staff has reviewed the licensee's proposal to revise Table 3.2.5, Table 3.1.1, Figure 2.1-1, and the corresponding Bases 2.1 B and 3.2 of the VY technical specification. The licensee has already implemented an increased core flow of 107 percent after a 10 CFR 50.59 review involving mechanical, thermal-hydraulic, and reactor physics evaluations to support operating VY with an increased core flow. The licensee is changing the APRM flow-biased scram, the APRM flow-biased rod block, and the rod block monitor trip settings to reflect VY's increased core flow operation. Based on the review, the staff approves the proposed changes because:

(1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner;

(2) such activities will be conducted in compliance with the Commission's regulations;

(3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety to the public.

REFERENCE:

1. Vermont Yankee Nuclear Power Corp, Technical Specification Proposed Change No. 218, Enhancements to Support Implementation of Increased Core Flow, July 20,1999 (NRC Document Control Accession No. 9907270197).

2. Vermont Yankee Nuclear Power Corp., Technical Specification Proposed Change No. 218, (Supplemental Information), Enhancements to Support Implementation of Increased Core Flow, October 25,1999.