

July 7, 2005

Mr. Michael Kansler  
President  
Entergy Nuclear Operations, Inc.  
440 Hamilton Avenue  
White Plains, NY 10601

SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION - ISSUANCE OF  
AMENDMENT RE: INTERMEDIATE RANGE MONITOR SURVEILLANCE TEST  
FREQUENCIES (TAC NO. MB9091)

Dear Mr. Kansler:

The Commission has issued the enclosed Amendment No. 225 to Facility Operating License DPR-28 for the Vermont Yankee Nuclear Power Station, in response to your application dated May 21, 2003, as supplemented on July 23, 2003, and March 31, 2005.

The amendment changes the Technical Specifications to extend the surveillance test interval for the reactor protection system (RPS) intermediate range monitor (IRM) functional tests from weekly to 31 days. In addition, the amendment adds instrument check and calibration requirements for the RPS IRM - High Flux function.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

*/RA/*

Richard B. Ennis, Senior Project Manager, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-271

Enclosures: 1. Amendment No. 225 to  
License No. DPR-28  
2. Safety Evaluation

cc w/encls: See next page

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Richard B. Ennis, Senior Project Manager, Section 2  
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Vermont Yankee Nuclear Power Station

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ENTERGY NUCLEAR VERMONT YANKEE, LLC  
AND ENTERGY NUCLEAR OPERATIONS, INC.  
DOCKET NO. 50-271  
VERMONT YANKEE NUCLEAR POWER STATION  
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 225  
License No. DPR-28

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment filed by Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc. (the licensee) dated May 21, 2003, as supplemented on July 23, 2003, and March 31, 2005, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Facility Operating License No. DPR-28 is hereby amended to read as follows:

(B) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 225, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Darrell J. Roberts, Chief, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: July 7, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 225

FACILITY OPERATING LICENSE NO. DPR-28

DOCKET NO. 50-271

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

25  
26  
27  
28  
33a

Insert

25  
26  
27  
28  
33a

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 225 TO FACILITY OPERATING LICENSE NO. DPR-28  
ENTERGY NUCLEAR VERMONT YANKEE, LLC  
AND ENTERGY NUCLEAR OPERATIONS, INC.  
VERMONT YANKEE NUCLEAR POWER STATION  
DOCKET NO. 50-271

1.0 INTRODUCTION

By letter dated May 21, 2003, as supplemented on July 23, 2003, and March 31, 2005, Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc. (Entergy or the licensee) submitted a request to amend the Vermont Yankee Nuclear Power Station (VYNPS) Technical Specifications (TSs). The proposed amendment would change the TSs to extend the surveillance test interval (STI) for the reactor protection system (RPS) intermediate range monitor (IRM) functional tests from weekly to 31 days. In addition, the amendment would add instrument check and calibration requirements for the RPS IRM - High Flux function. Specifically, the licensee proposed the following changes:

- 1) TS Table 4.1.1 would be revised to change the Minimum Frequency for the IRM - High Flux and IRM - Inoperative functional tests from "Before Each Startup & Weekly During Refueling" to "Within 31 days Before Entering STARTUP/HOT STANDBY and Every 31 Days During STARTUP/HOT STANDBY, Every 31 Days During Refueling."
- 2) TS Table 4.1.1 would be revised to add Note 10, pertaining to the IRM - High Flux functional test, which states: "When the IRM - High Flux trip function is required to be operable, an instrument check shall be performed on IRM instrumentation once per day."
- 3) TS Table 4.1.1 would be revised to add Note 11, pertaining to the IRM - High Flux and IRM - Inoperative functional tests, to clarify that the functional test is not required to be performed when entering STARTUP/HOT STANDBY MODE from RUN MODE until 12 hours after entering STARTUP/HOT STANDBY MODE .
- 4) TS Table 4.1.2 would be revised to add a new requirement to calibrate the IRM - High Flux output signal once-per-operating cycle. Note 10 would be added to the table to clarify that neutron detectors are excluded from this calibration. Note 11 would be added to the table to clarify that the calibration is not required to be performed when entering STARTUP/HOT STANDBY MODE from RUN MODE until 12 hours after entering STARTUP/HOT STANDBY MODE.



- 5) Conforming changes would be made to the TS Bases for TS Section 4.1.

The supplements dated July 23, 2003, and March 31, 2005, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on July 8, 2003 (68 FR 40713).

## 2.0 REGULATORY EVALUATION

The construction permit for VYNPS was issued by the Atomic Energy Commission (AEC) on December 11, 1967. The plant was designed and constructed based on the proposed General Design Criteria (GDC) published by the AEC in the *Federal Register* (32 FR 10213) on July 11, 1967 (hereinafter referred to as "draft GDC"). The AEC published the final rule that added Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, "General Design Criteria for Nuclear Power Plants," in the *Federal Register* (36 FR 3255) on February 20, 1971 (hereinafter referred to as "final GDC").

Differences between the draft GDC and final GDC included a consolidation from 70 to 64 criteria. As discussed in the Nuclear Regulatory Commission (NRC or the Commission) Staff Requirements Memorandum for SECY-92-223 dated September 18, 1992 (Agencywide Documents Access and Management System (ADAMS), Accession No. ML003763736), the Commission decided not to apply the final GDC to plants with construction permits issued prior to May 21, 1971. At the time of promulgation of Appendix A to 10 CFR Part 50, the Commission stressed that the final GDC were not new requirements and were promulgated to more clearly articulate the licensing requirements and practice in effect at that time. Each plant licensed before the final GDC were formally adopted had been evaluated on a plant-specific basis, determined to be safe, and licensed by the Commission.

As discussed in Appendix F of the VYNPS Updated Final Safety Analysis Report (UFSAR), the licensees for VYNPS have made changes to the facility over the life of the plant that may have invoked the final GDC. The extent to which the final GDC have been invoked can be found in specific sections of the UFSAR and in other VYNPS design and licensing basis documentation.

Based on a review of UFSAR Section 7.2, "Reactor Protection System," UFSAR Section 7.5, "Neutron Monitoring System," NUREG-0800, "Standard Review Plan," Appendix 7.1-A, "Acceptance Criteria and Guidelines for Instrumentation and Control Systems Important to Safety," and the licensee's letters dated May 21, 2003, July 23, 2003, and March 31, 2005, the NRC staff identified the reliability and testability attributes of final GDC 21 as being applicable to the types of changes proposed by this amendment request. Attachment 2 to Entergy letter BVY 03-90, dated October 1, 2003 (ADAMS Accession No. ML032810447), provides a matrix of the draft GDCs versus the corresponding final GDCs. Based on Attachment 2 of letter BVY 03-90, final GDC 21 corresponds to draft GDCs 19, 20, and 25. Based on the NRC staff's review of the requirements in these draft GDCs, the staff determined that the reliability and testability attributes of final GDC 21 are contained in Draft GDCs 19 and 25 as follows:

- Draft GDC 19, “Protection Systems Reliability,” requires that protection systems be designed for high functional reliability and in-service testability commensurate with the safety functions to be performed.
- Draft GDC 25, “Demonstration of Functional Operability of Protection Systems,” requires means be included for testing protection systems while the reactor is in operation to demonstrate that no failure or loss of redundancy has occurred.

In 10 CFR 50.36, the NRC established its regulatory requirements related to the content of TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following five specific categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation; (3) surveillance requirements; (4) design features; and (5) administrative controls. Paragraph (c)(3) of 10 CFR 50.36, “Surveillance Requirements,” defines surveillance requirements as requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.

The proposed STI extension was evaluated by the licensee based on an analysis of instrument drift using the guidance in Generic Letter (GL) 91-04, “Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle.” While this proposed TS change is not in support of a fuel cycle change (VYNPS operates on an 18-month fuel cycle), the guidance in GL 91-04 can be used to address the effect of increased STIs on instrument drift and safety analysis assumptions.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Background

The primary purpose of surveillance testing is to assure that the tested components will be operable when needed. The risk contribution associated with the STI is mainly due to the possibility that the component will fail between consecutive tests. Testing these components detects failures that may have occurred since the last surveillance, thus limiting the risk due to undetected failures. However, increasing the time between surveillance tests may also have some benefits. Increased STIs may reduce test-induced transients, test-caused failures, equipment wear, and reduce resource requirements for testing. The disadvantage is that the time that a component will be subject to failure (the fault exposure time) increases with an increased STI.

Previous generic studies by General Electric (GE), including topical report NEDC-30851P-A, “Technical Specification Improvement Analysis for BWR [Boiling Water Reactor] Reactor Protection System,” evaluated the relaxation of STIs for certain BWR RPS instrumentation. Using reliability analysis, these studies supported changing the frequency for several surveillance tests from monthly to quarterly and in extending the allowed outage times (AOTs) for many RPS components and functions. As part of the NEDC-30851P-A evaluation, sensitivity studies were performed on RPS trip system fault trees. GE found that for each initiating event the RPS unavailability was relatively insensitive to the change in component failure rates. The impact on RPS failure frequency was also found to be negligible.

In the NRC safety evaluations for NEDC-30851P-A dated July 15, 1987, and January 24, 1988, the staff also concluded that uncertainties in component failure rates do not significantly affect RPS unavailability. The staff also concluded that the estimated increase in RPS unavailability due to the proposed TS changes would result in an insignificant net change in core damage frequency. Therefore, the staff found a quarterly functional test interval acceptable. However, the RPS IRM functions were not explicitly modeled in NEDC-30851P-A. Consequently, NEDC-30851P-A did not propose changes to the existing functional test frequency of the RPS IRM function. The licensee has previously adopted AOT and STI changes for other RPS functions based on NEDC-30851P-A, by Amendment No. 186, dated April 3, 2000.

### 3.2 STIs for IRM Functional Tests and Calibration

The licensee used the guidance in GL 91-04 to evaluate: (1) the proposed extension of the STI for the IRM functional tests from weekly to 31 days in TS Table 4.1.1, and (2) the proposed new requirement in TS Table 4.1.2 to calibrate the IRM - High Flux output signal once-per-operating cycle. In accordance with Enclosure 2 of GL 91-04, the licensee should provide the following information to provide an acceptable basis for increasing the STI for instruments that are used to perform safety functions:

1. Confirm that instrument drift as determined by as-found and as-left calibration data from surveillance and maintenance records have not, except on rare occasions, exceeded acceptable limits for a calibration interval.
2. Confirm that the values of drift for each instrument types (make, model, and range) and applications have been determined with a high probability and a high degree of confidence. Provide a summary of the methodology and assumptions used to determine the rate of instrument drift with time based upon historical plant calibration data.
3. Confirm that the magnitude of instrument drift has been determined with a high probability and a high degree of confidence for a bounding calibration interval of 30 months for each instrument types (make, model number, and range) and application that performs a safety function. Provide a list of the channels by TS section that identifies these instrument applications.
4. Confirm that a comparison of the projected instrument drift errors has been made with the values of drift used in the setpoint analysis. If this results in revised setpoints to accommodate large drift errors, provide proposed TS changes to update trip setpoints. If the drift errors result in a revised safety analysis to support existing setpoints, provide a summary of the updated analysis conclusions to confirm that safety limits and safety analysis assumptions are not exceeded.
5. Confirm that the projected instrument errors caused by drift are acceptable for control of plant parameters to effect a safe shutdown with the associated instrumentation.

6. Confirm that all conditions and assumptions of the setpoint and safety analyses have been checked and are appropriately reflected in the acceptance criteria of plant surveillance procedures for channel checks, channel functional tests, and channel calibrations.
7. Provide a summary description of the program for monitoring and assessing the effects of increased calibration surveillance intervals of instrument drift and its effect on safety.

The licensee has performed a safety assessment of the proposed changes to the STIs in accordance with the GL 91-04 guidance given above. This assessment entailed reviewing the historical maintenance and surveillance test data at the bounding STI limit, performing an evaluation to ensure that a 24-month STI for calibration and a 31-day STI for the functional test would not invalidate any assumptions in the plant licensing basis and the determination that the effect of the STI extension is small. The licensee performed analysis of drift for IRM instrumentation for a 30-month calibration frequency (24-months + 25% allowance tolerance) and determined that drift is less than the value assumed in the VYNPS IRM - High Flux setpoint calculation. Therefore, there was no change to plant surveillance procedures. Also, the licensee did not request any TS changes associated with instrument setpoints or allowable values in this amendment request. Therefore, the staff has not reviewed the instrument setpoint methodology for VYNPS in this safety evaluation. As noted previously, VYNPS currently operates on an 18-month fuel cycle. As such, the licensee's analysis using drift for a 30-month period is conservative.

Licensees' requests to extend STIs are usually based on risk-information. However, the licensee informed the staff that IRMs are used only during startup/shutdown and refueling mode, and are, therefore, not included in the risk model. On that basis, the staff agreed to review the licensee's engineering analysis to demonstrate that the failure of IRMs will not be safety significant. The licensee reviewed the surveillance test history in support of the proposed change and determined that out of 333 IRM functional/calibration tests performed since August 1993, only one failure was observed. This failure affected only one IRM and did not affect the trip function of the IRM, and, therefore, did not have any safety significance.

The licensee has also identified that in the unlikely event that the IRM high-flux trip function loses trip capability in such a manner as to be undetectable, the average power range monitor (APRM) high flux (reduced) trip function will be available to mitigate the continuous control rod withdrawal event. The TSs require that the APRM high-flux (reduced) trip function be operable in the refuel and startup modes and that a functional test of this trip function be performed before each startup and weekly during refueling. Also, TS Table 4.1.2 requires that source range monitors (SRMs) and IRMs be determined to overlap during each startup and that IRMs and APRMs be determined to overlap during each controlled shutdown. Therefore, inoperable IRMs will be detected before neutron flux exceeds the range of the SRMs and before a controlled shutdown by the APRMs.

In addition, other design features and administrative controls (e.g., rod worth minimizer (RWM)) will be available to prevent occurrence of the continuous rod withdrawal event. The RWM will be available over the entire range of the IRMs.

In the refueling mode, the IRMs are not credited for mitigation of any event. However, the IRM high-flux trip is required to be operable to provide protection against unexpected reactivity excursions. Also, the APRM high-flux (reduced) trip is required to be operable in the refuel mode and serves as a backup to the IRM high-flux trip. At least two SRMs are required to be operable during rod withdrawal in the refuel mode, and by design only one rod can be withdrawn at a time. Therefore, operator action will be prompted by diverse indications of neutron flux levels to prevent inadvertent criticality.

Based on the above discussion, the licensee has clearly demonstrated that the VYNPS IRMs have operated reliably and, in the event of IRM failures, backups are available to the operator to take necessary corrective actions. Failure of IRMs will not result in any increase in safety significance.

Based on review of the licensee's submittals, the NRC staff concludes that the licensee has justified the proposed changes consistent with the guidance in GL 91-04. Based on the licensee's analysis of instrument drift and historical reliability of the IRM instrumentation, the NRC staff concludes that there is reasonable assurance that the IRM instrumentation will remain capable of performing its intended functions during the proposed STIs and continue to meet the requirements of 10 CFR 50.36(c)(3) and draft GDCs 19 and 25. Therefore, the staff finds that the proposed extension of the STI for the IRM functional tests from weekly to 31 days in TS Table 4.1.1 and the proposed new TS requirement in TS Table 4.1.2 to calibrate the IRM - High Flux output signal once-per-operating cycle to be acceptable.

### 3.3 Addition of Note 10 to TS Table 4.1.1

The licensee proposed to add a new Note 10 to TS Table 4.1.1 requiring an instrument check for the RPS IRM high-flux trip function. The instrument check function confirms proper operation of IRM instrumentation once-per-day by verifying agreement among different channels of indication. This frequency is consistent with other RPS trip functions listed in Table 4.1.1. This change is more restrictive, and is, therefore, acceptable.

### 3.4 Addition of Note 11 to TS Tables 4.1.1 and 4.1.2

The licensee proposed to add a new Note 11 to TS Table 4.1.1 and a new Note 11 to TS Table 4.1.2. The notes provide clarification that the functional testing and calibration of the IRM instrument channels are not required to be performed when entering the startup/hot standby mode from the run mode until 12 hours after entering the startup/hot standby mode. Testing of these instrument channels cannot be performed in the run mode without utilizing jumpers, lifted leads, or movable links. Use of these devices is not recommended since errors in their use may significantly increase the probability of a reactor transient or event. The 12-hour time period is based on operating experience and is also consistent with the standard technical specifications (STSS). Therefore, the staff finds the proposed change acceptable.

### 3.5 Addition of Note 10 to TS Table 4.1.2

The licensee proposed to add a new Note 10 to TS Table 4.1.2 to clarify that neutron detectors are excluded from calibrations of the RPS IRM - high-flux function. The licensee's justification for this request is that neutron detectors are passive devices with minimal drift and that it is

difficult to simulate a meaningful signal for calibration. This request is also consistent with the STS. The staff finds the proposed change acceptable.

### 3.6 TS Bases Changes

The licensee has also proposed conforming changes to the TS Bases for TS Section 4.1. The NRC staff has no objections to these changes.

### 3.7 Technical Evaluation Conclusion

Based on the considerations in the above Sections 3.2 through 3.5, the NRC staff concludes that the proposed amendment is acceptable.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Vermont State official was notified of the proposed issuance of the amendment. The State official had no comments.

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in amounts, and no significant change in the types of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (68 FR 40713). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: H. Garg  
R. Ennis

Date: July 7, 2005