

April 27, 2000

Mr. Samuel L. Newton  
Vice President, Operations  
Vermont Yankee Nuclear Power Corporation  
185 Old Ferry Road  
P.O. Box 7002  
Brattleboro, Vermont 05302-7002

SUBJECT: NRC INSPECTION REPORT 05000271/2000-002

Dear Mr. Newton:

On April 1, 2000, the NRC completed an inspection at your Vermont Yankee (VY) facility. The enclosed report presents the results of that inspection.

During the five weeks covered by this inspection period, the overall conduct of activities at Vermont Yankee was characterized by safe plant operations.

Based on the results of this inspection, we have determined that a Severity Level IV violation of NRC requirements occurred. This violation involved the failure to perform a 50.59 safety evaluation for use of new digital components. This violation is being treated as a Non-Cited violation (NCV), consistent with Section VII.B.1.a of the Enforcement Policy (NUREG 1600, November 1999). If you contest the violation, or the severity level, you should provide a written response within 30 days of the date of this inspection report, with the bases for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, Region I, the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001, and the NRC Resident Inspector at the Vermont Yankee facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practices," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Sincerely,

**/RA/**

Clifford J. Anderson, Chief  
Projects Branch 5  
Division of Reactor Projects

Docket No. 050000271  
License No. DPR-28

Enclosure: NRC Inspection Report 05000271/2000-002

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REGION I

|              |   |
|--------------|---|
| Docket No.   | 05000271  |
| Licensee No. | DPR-28  |
| Report No.   | 05000271/2000-002   |
| Licensee:    | Vermont Yankee Nuclear Power Corporation  |
| Facility:    | Vermont Yankee Nuclear Power Station  |
| Location:    | Vernon, Vermont   |
| Dates:       | February 28 - April 1, 2000   |
| Inspectors:  | Brian J. McDermott, Senior Resident Inspector<br>Edward C. Knutson, Resident Inspector<br>George W. Morris, Reactor Inspector |
| Approved by: | Clifford J. Anderson, Chief<br>Projects Branch 5<br>Division of Reactor Projects  |

## EXECUTIVE SUMMARY

### Vermont Yankee Nuclear Power Station NRC Inspection Report 05000271/2000-002

This inspection included aspects of licensee operations, engineering, and maintenance. The report covers a five week period of routine resident inspector activities.

#### Operations

- Operator knowledge of the current status of plant systems was confirmed accurate during routine tours of the control room and plant areas.(Section 01.1)
- A sample review of work orders and Event Reports found that the basis for operability of degraded equipment was adequately evaluated and documented. (Section O1.1)

#### Maintenance

- Routine surveillance activities observed during this inspection period were appropriately performed and demonstrated equipment operability. Following the completion of surveillance testing, operators returned the equipment to its proper standby alignment. (Section M1.1)
- VY took appropriate measures to address component and system operability following an indicated failure of a high pressure coolant injection system valve during an in-service test. Following instrumentation troubleshooting, the valve was verified to be operating properly. (Section M1.2)
- Service water system operability was appropriately addressed following identification of an inoperable traveling screen backwash valve. The condition did not affect service water system operability and the degraded valve operator was repaired within a reasonable period of time. (Section M1.3)
- Two equipment failures were reviewed to assess VY's Maintenance Rule (10CFR 50.65) implementation. The reactor building closed cooling water and the reactor recirculation systems were verified to be in VY's Maintenance Rule Program, and VY had established reasonable performance criteria. The two equipment failures reviewed during this inspection did not result in the subject systems exceeding any performance criteria. (Section M2.1)

#### Engineering

- VY personnel identified that safety evaluations required by 10 CFR 50.59 were not performed for replacement micro-processor based relays. Additionally, the NRC found that VY's initial operability determination was inadequate because it did not address identical components that had already been installed in safety-related 4 kV switchgear. A subsequent revision to the operability determination provided a reasonable basis for operability pending completion of the required safety evaluations. This failure to perform a required safety evaluation is considered a Severity Level IV violation and is being treated as a Non-Cited Violation, consistent with Section VII.B.1.a of the NRC

## Executive Summary (cont'd)

Enforcement Policy. This violation was entered in VY's corrective action process as Event Report 2000-0421. (Section E1.1)

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## ATTACHMENTS

Attachment 1 - List of Acronyms Used

Attachment 2 - Items Opened, Closed, or Discussed

## Report Details

### Summary of Plant Status

Throughout most of the inspection period, the Vermont Yankee (VY) plant was operated at 100% power.

## I. Operations

### **O1 Conduct of Operations<sup>1</sup>**

#### **O1.1 Observation of Routine Plant Operations (71707)**

The inspectors routinely toured the control room and plant areas to assess the conduct of activities, verify safety system alignments, and verify compliance with Technical Specification (TS) requirements. Equipment deficiencies identified in control room logs were reviewed, and discussed with shift supervision, to evaluate both the equipment condition discussed and the licensee's initial response to the issue.

No problems were identified with the status of plant safety systems during routine tours of the control room and plant areas. A sample review of work orders and Event Reports found that the basis for operability of degraded equipment was adequately evaluated and documented.

## II. Maintenance

### **M1 Conduct of Maintenance**

#### **M1.1 Surveillance Observations**

##### **a. Inspection Scope (61726, 62707)**

The inspector observed portions of surveillance activities to verify proper calibration of test instrumentation, use of approved procedures, conformance to Limiting Conditions for Operations (LCOs). Following the completion of maintenance and surveillance activities, the inspector verified that safety systems were returned to their appropriate standby alignments.

##### **b. Observations and Findings**

The inspector observed portions of the in-plant work and reviewed work documents associated with the following activities:

- High Pressure Coolant Injection (HPCI) System Quarterly Surveillance, observed March 7
- Reactor Core Isolation (RCIC) System Quarterly Surveillance, observed March 7

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<sup>1</sup>Topical headings such as O1, M8, etc., are used in accordance with the NRC standardized reactor inspection report outline. Individual reports are not expected to address all outline topics.



- "A" Emergency Diesel Generator (EDG) Monthly Surveillance, observed March 21
- "B" (EDG) Monthly Surveillance, observed March 22

c. Conclusions

Routine surveillance activities observed during this inspection period were appropriately performed and demonstrated equipment operability. Following the completion of surveillance testing, operators returned the equipment to its proper standby alignment.

M1.2 In-service Test Failure of a HPCI System Check Valve

a. Inspection Scope (61726)

During a HPCI quarterly surveillance, a turbine exhaust drain pot check valve (V23-56) failed its in-service test acceptance criteria and the valve was declared inoperable. The inspector reviewed VY's response to this issue.

b. Observations and Findings

As a part of the quarterly HPCI system surveillance, turbine exhaust drain pot check valve, V23-56, operation is monitored to satisfy its in-service test (IST) program requirement. Verification of a partial stroke open is obtained by observing that the exhaust drain pot high level alarm does not come in during turbine operation. During the March 7 test, the alarm came in shortly after the HPCI turbine was started, and remained in alarm for the duration of the run. All other acceptance criteria for the HPCI system surveillance test were met.

V23-56 was declared inoperable in accordance with the IST program, however, VY determined that the HPCI system remained operable. Although not required by Technical Specifications, VY imposed a 30-day administrative limit for resolving the issue. This problem was entered into VY's corrective action program as Event Report 2000-0349. The inspector reviewed the associated operability determination and concluded that system operability had been appropriately addressed.

The turbine exhaust drain pot high level alarm circuit was tested and was found to be functioning properly. Based on this result, and the physical configuration and operating characteristics of the system, VY determined that the most probable cause of the problem was that the level instrument detector had hung up during the HPCI run, and subsequently had freed up. HPCI was again tested on March 13, and the turbine exhaust drain operated normally (that is, the high level alarm was not received, which verified that V23-56 had opened). V23-56 was subsequently declared operable.

c. Conclusions

VY took appropriate measures to address component and system operability following an indicated failure of a high pressure coolant injection system valve during an in-service test. Following instrumentation troubleshooting, the valve was verified to be operating properly.

**M1.3** Failure of a Service Water System Traveling Screen Backwash Valve

a. Inspection Scope (61726)

While placing one of the service water (SW) system traveling screens in service, operators noted that the associated backwash valve, SW-FCV-17E, was operating slowly. Subsequent testing on March 16 verified that the valve was closing more slowly than required by its in-service test program criteria. The inspector reviewed VY's response to this issue.

b. Observations and Findings

SW-FCV-17E was declared inoperable on March 16. VY engineering analyzed the effect of SW flow diversion that would result if the valve were to fail open. VY determined that the SW system remained capable of performing all design functions even if the valve failed open. Although the SW system remained operable, VY entered an administrative 30-day LCO for the valve being inoperable. This issue was entered in VY's corrective action program as ER 00-0427.

Troubleshooting identified that the solenoid operator was the cause of the slow operation (as opposed to a problem with the valve's internal components). The solenoid operator was rebuilt and the valve tested satisfactorily. SW-FCV-17E was declared operable on April 11.

c. Conclusions

Service water system operability was appropriately addressed following identification of an inoperable traveling screen backwash valve. The condition did not affect service water system operability and the degraded valve operator was repaired within a reasonable period of time.

**M2** **Maintenance and Material Condition of Facilities and Equipment**

**M2.1** Maintenance Rule Implementation for Component Failures

a. Inspection Scope (62707)

The inspector reviewed two equipment failures during this period to assess VY's implementation of administrative programs designed to meet the requirements of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants."

- On March 28, an automatic start of the standby lube oil pump for the "B" Reactor Recirculation Motor-Generator (MG) system occurred after one of the running lube oil pumps tripped (ER 2000-0484).
- On March 29, VY discovered that the discharge check valve for the "A" Reactor Building Closed Cooling Water (RBCCW) pump was not fully closed as expected while the "A" RBCCW Pump was idle in standby and the "B" RBCCW Pump was in service (ER 2000-0503).

These equipment failures were compared to their respective system's maintenance rule functions described in VY's Maintenance Rule Program document "10CFR50.65 Maintenance Rule Scoping Basis," Attachment 1.

b. Observations and Findings

The two reactor recirculation system trains are monitored under VY's Maintenance Rule Program as "Recirc Train A" and "Recirc Train B" under the nuclear boiler system and performance criteria have been established for system reliability. VY preliminarily concluded that the MG lube oil pump trip on March 28 was not a Maintenance Rule Functional Failure (MRFF), and the inspector confirmed that this determination was consistent with the Maintenance Rule Scoping Basis document.

The RBCCW system is monitored under VY's Maintenance Rule Program and performance criteria have been established for reliability and unavailability. The inspector found that the stuck open check valve, RBCCW-45A, would likely effect the ability of the "B" RBCCW train to perform the in-scope functions listed in the Maintenance Rule Scoping Basis document. VY's assessment of this failure was not initially available for review, since the ER Screening Committee had not identified the ER for review as a potential maintenance rule issue. Although the screening committee missed the potential MRFF, the system engineer's development of the quarterly System Health Report would have provided an additional opportunity for VY to identify this issue. VY captured the missed screening as a separate ER in their corrective action program. There currently are no MRFFs for the RBCCW system, therefore even if this event is ultimately classified as a MRFF, no performance criteria would be exceeded.

c. Conclusions

Two equipment failures were reviewed to assess VY's Maintenance Rule (10 CFR 50.65) implementation. The reactor building closed cooling water and the reactor recirculation systems were verified to be in VY's Maintenance Rule Program, and VY had established reasonable performance criteria. The two equipment failures reviewed during this inspection did not result in the subject systems exceeding any performance criteria.

## **M8 Miscellaneous Maintenance Issues**

### **M8.1 (Closed) URI 05000271/2000-001-02: Notice of Enforcement Discretion (NOED) For MSIV Partial Closure Test**

On March 9, 2000, the NRC issued Amendment Number 185 to Facility Operating Licence DPR-28 for the Vermont Yankee Nuclear Power Station. This amendment deletes the Technical Specification surveillance requirement to exercise the main steam isolation valves twice weekly by partial closure and subsequent re-opening. VY's implementation of this TS change on March 21 resolved the need for the NOED granted by the Office of Nuclear Reactor Regulation on February 10, 2000.

This unresolved item was opened to track NRC review for violations that may have led to VY's need for enforcement discretion. The problem affecting the partial closure test function for MSIV-80C appears to be the result a degraded component that will not effect the valve's safety function. VY committed to performing a root cause determination for this failure (when the affected components become available) in LER 05000271/2000-001-00. VY has no recent history of similar problems and the inspector's review of the circumstances surrounding the need for this NOED found no violations of NRC requirements. This issue is closed.

### **III. Engineering**

#### **E1 Conduct of Engineering**

##### **E1.1 Equivalency Evaluation for Micro-Processor Based Replacement Components**

###### **a. Inspection Scope**

The inspector reviewed two Equivalency Evaluations that approved the use of micro-processor based overcurrent relays to replace the original electro-mechanical overcurrent relays used in all safety related 4 kV circuit breakers at VY.

###### **b. Observations and Findings**

Maintenance Department personnel initiated a work order to replace the original 4 kV switchgear overcurrent relays as an upgrade of the original aging electro-mechanical relays. The request for replacement components was processed by Procurement Engineering using the Equivalency Evaluation (EE) process.

The NRC staff's position regarding safety evaluations for digital modifications was communicated in Generic Letter (GL) 95-02, "Use of NUMARC/EPRI Report TR-102348, 'Guideline on Licensing Digital Upgrades,' in Determining the Acceptability of Performing Analog-to-Digital Replacements under 50.59." The GL endorsed, with clarifications, the industry developed guidance. One clarification involved the staff's position that 10 CFR 50.59 evaluations must focus on the digital components, rather than at the system level. VY procedure AP 6002, Revision 7, "Preparing 50.59 Evaluations," Screening Form 6002.02, question 18, required consideration of the concerns expressed in NRC Generic Letter (GL) 95-02. However, the inspector found that neither the procedure text nor its references provided any specific guidance. VY's 50.59 screening evaluation for the digital components focused on the system level response when assessing whether "a possibility for an accident or malfunction of a

different type than any evaluated previously in the safety analysis report may be created."

The inspector determined that the 10 CFR 50.59(a)1 screening performed by VY in conjunction with EE 1022 and EE 1158 was inadequate because it did not result in a full safety evaluation as required by 10 CFR 50.59(a)2, on the basis that the digital modification could create a malfunction of a different type than any previously evaluated in the safety analysis report. This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1.a of the NRC Enforcement Policy (NUREG 1600, November 1999). This violation was entered in VY's corrective action process as ER 2000-0421. **(NCV 05000271/2000-002-01: Inadequate 50.59 Screening for Digital Modification)**

The inspector identified that the initial operability assessment for ER 2000-0421, presented to VY's ER Screening Committee on March 15, 2000, failed to recognize that the digital relays had already been installed in most safety-related 4 kV breakers. However, a revised operability determination presented on March 16, 2000, provided a reasonable basis for operability while the licensee reviewed the engineering process used to approve the replacement relays.

c. Conclusions

VY personnel identified that safety evaluations required by 10 CFR 50.59 were not performed for replacement micro-processor based relays, in that replacement micro-processor based relays were approved for use in safety-related applications without evaluating the potential for new failure modes. Additionally, the NRC found that VY's initial operability determination was inadequate because it did not address identical components that had already been installed in safety-related 4 kV switchgear. A subsequent revision to the operability determination provided a reasonable basis for operability pending completion of the required safety evaluations.

This failure to perform a required safety evaluation is considered a Severity Level IV violation and is being treated as a Non-Cited Violation, consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation was entered in VY's corrective action process as ER 2000-0421.

## V. Management Meetings

### X1 Exit Meeting Summary

The resident inspectors met with licensee representatives periodically throughout the inspection and following the conclusion of the inspection on April 26, 2000. At this meeting, the purpose and scope of the inspection was reviewed, and the preliminary findings were presented. The licensee acknowledged the preliminary inspection findings.

The inspector asked the licensee whether any material examined during the inspection should be considered proprietary. No proprietary information was identified.

LIST OF ACRONYMS USED

|      |                                      |
|------|--------------------------------------|
| CFR  | Code of Federal Regulation           |
| CR   | control room                         |
| EDG  | emergency diesel generator           |
| ER   | Event Report                         |
| GL   | Generic Letter                       |
| HPCI | high pressure coolant injection      |
| LCO  | Limiting Condition for Operation     |
| LER  | Licensee Event ReportLPCI            |
| NCV  | Non-Cited Violation                  |
| NRC  | Nuclear Regulatory Commission        |
| NRR  | Office of Nuclear Reactor Regulation |
| QA   | Quality Assurance                    |
| RCIC | Reactor Core Isolation               |
| TS   | Technical Specifications             |
| URI  | unresolved item                      |
| VY   | Vermont Yankee                       |

ITEMS OPENED, CLOSED, OR DISCUSSED

**OPENED**

None

**CLOSED**

URI 05000271/2000-001-02: Notice of Enforcement Discretion (NOED) For MSIV Partial  
Closure Test (page 5)

**NON-CITED VIOLATIONS**

NCV 05000271/2000-002-01: Inadequate 50.59 Screening for Digital Modification (page  
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