

May 3, 2004

Mr. Jay K. Thayer  
Site Vice President  
Entergy Nuclear Operations, Inc.  
Vermont Yankee Nuclear Power Station  
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Brattleboro, VT 05302-0500

SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION - NRC INTEGRATED  
INSPECTION REPORT 05000271/2004002

Dear Mr. Thayer:

On March 31, 2004, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Vermont Yankee Nuclear Power Station (VY). The enclosed report documents the inspection findings which were discussed on April 9, 2004, with you and members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents one finding of very low safety significance (Green) which was also determined to involve a violation of NRC requirements. Because of the very low safety significance and because the finding was entered into your corrective actions program, the NRC is treating it as a non-cited violation (NCV), consistent with Section VI.A of the NRC's Enforcement Policy. If you contest this non-cited violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, D.C. 20555-0001; with copies to the Regional Administrator Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Vermont Yankee Nuclear Power Station.

Since the terrorist attacks on September 11, 2001, NRC has issued five Orders and several threat advisories to licensees of commercial power reactors to strengthen licensee capabilities, improve security force readiness, and enhance controls over access authorization. In addition to applicable baseline inspections, the NRC issued Temporary Instruction (TI) 2515/148, "Inspection of Nuclear Reactor Safeguards Interim Compensatory Measures," and its subsequent revision, to audit and inspect licensee implementation of the interim compensatory measures required by order. Phase 1 of TI 2515/148 was completed at all commercial nuclear power plants during calendar year (CY) '02, and the remaining inspection activities for Vermont Yankee were completed in CY '03. The NRC will continue to monitor overall safeguards and security controls at Vermont Yankee.

Jay K. Thayer

2

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

***/RA/***

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

Docket No. 50-271  
License No. DPR-28

Enclosure: Inspection Report 05000271/2004002  
w/Attachment: Supplemental Information

Docket No. 50-271  
License No. DPR-28

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Jay K. Thayer

4

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**U.S. NUCLEAR REGULATORY COMMISSION**

REGION I

Docket No. 50-271

Licensee No. DPR-28

Report No. 05000271/2004002

Licensee: Entergy Nuclear Vermont Yankee, LLC

Facility: Vermont Yankee Nuclear Power Station

Location: 320 Governor Hunt Road  
Vernon, Vermont  
05354-9766

Dates: January 1, 2004 - March 31, 2004

Inspectors: David L. Pelton, Senior Resident Inspector  
Beth E. Sienel, Resident Inspector  
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Dana Caron, Physical Security Inspector

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

## SUMMARY OF FINDINGS

IR 05000271/2004002; 01/01/04 - 03/31/04; Vermont Yankee Nuclear Power Station; Event Followup.

This report covered a 13-week period of baseline inspection conducted by resident inspectors. Additionally, announced inspections were performed by regional inspectors in the areas of radiation protection, emergency planning, and security. One Green non-cited violation (NCV) was identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

### A. NRC- Identified and Self-Revealing Findings

#### Cornerstone: Initiating Events

(Green) A self-revealing non-cited violation (NCV) of 10 CFR 50 Criterion XVI was identified because Entergy did not promptly identify a condition adverse to quality. Specifically, in April 2000, following the identification that packing on a reactor core isolation cooling system valve failed because the Vermont Yankee procedure, OP 5281, for installing the valve packing was inadequate, Entergy performed a limited review of other instances in which procedure OP 5281 had been used to install valve packing. As a result, Entergy did not identify that maintenance personnel had improperly installed packing on a reactor head vent isolation valve using procedure OP 5281 in November 1999. In September 2003 the valve packing failed and developed a packing leak that required the reactor to be shutdown.

The finding is greater than minor since it is associated with the Equipment Performance attribute of the Initiating Events Cornerstone and because it affects the cornerstone objective. The inspectors conducted an SDP Phase 2 evaluation of the risk significance of the performance deficiency and determined that the finding is of very low safety significance (Green). The inspectors applied the SDP worksheet for Transients (TRANS) and determined that there were no accident sequences with a risk significance less than eight as indicated on the counting rule worksheet. Additionally, all mitigating capabilities described on the SDP Phase 2 Worksheet for TRANS core damage sequences were maintained.

## Summary of Findings (cont'd)

The inspectors determined that a contributing cause of this finding is related to the cross-cutting area of Problem Identification and Resolution. Station personnel did not perform an adequate "assessment of similar conditions," as required by Entergy's correction action procedures, following the identification that an inadequate procedure resulted in the improper installation of packing in a reactor core isolation cooling system valve in April 2000. As a result, Entergy did not identify the extent of improperly packed valves and did not identify a condition adverse to quality associated with the improperly installed packing on a reactor head vent isolation valve. (Section 4OA3.1)

### B. Licensee Identified Findings

None.

## REPORT DETAILS

### Summary of Plant Status

Vermont Yankee Nuclear Power Station entered the inspection period at or near full power and with the exception of minor power reductions for control rod pattern adjustments and turbine valve testing, continued at or near full power for the remainder of the inspection period.

#### 1. REACTOR SAFETY

##### **Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity**

#### 1R01 Adverse Weather Protection (71111.01)

##### 1. Readiness for Seasonal Susceptibilities

###### a. Inspection Scope (one sample)

The inspectors reviewed measures established by Entergy for ensuring cold weather availability and operability of the alternate cooling system (ACS). The inspectors performed walk-downs of the various portions of the ACS including station cooling towers and the residual heat removal service water (RHRSW) system. The inspectors compared the current system alignment and operation to the requirements of OP 2196, "Preparations for Cold Weather Operations"; OP 3127, "Natural Phenomena"; OP 2180, "Circulating Water/Cooling Tower Operation"; and Technical Specifications (TS). Additionally, the inspectors reviewed condition reports (CRs) related to cold weather operation of the ACS to ensure problems regarding the ACS and cold weather were properly addressed for resolution.

###### b. Findings

No findings of significance were identified.

##### 2. Readiness for Impending Adverse Weather Conditions

###### a. Inspection Scope (one sample)

On January 10, the inspectors reviewed actions taken by Entergy due to the severe cold weather (ambient outside temperature of -15 degrees) in the vicinity of the plant. The inspectors reviewed procedure OP 3127, "Natural Phenomena," Appendix D, "Extreme Low Temperature Walkdown Check List" to ensure required plant walk-downs were being completed. The inspectors performed independent walk-downs of systems listed in procedure OP 3127 including high pressure coolant injection (HPCI), reactor core isolation cooling (RCIC), emergency diesel generator (EDGs), and the instrument air (IA) system to determine the impact of severe cold weather on these systems.

###### b. Findings

Enclosure



No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

a. Inspection Scope (three samples)

The inspectors performed three partial system walk-downs of risk significant systems to verify system alignment and to identify any discrepancies that could impact system operability. Observed plant conditions were compared to the standby alignment of equipment specified in Entergy's system operating procedures. The inspectors also observed valve positions, the availability of power supplies, and the general condition of selected components to verify there were no obvious deficiencies. The inspectors verified the alignment of the following systems:

- The RCIC system during planned maintenance on the HPCI system on February 22, 2003;
- The "A" train of the standby gas treatment (SBGT) system during planned maintenance on the "B" train of SBGT coincident with other, planned instrument calibrations on March 8, 2004;
- The "A" and "B" EDGs during planned 115 and 345 KV breaker failure testing on March 17, 2004.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

1. Annual Plant Fire Drill Inspection (71111.05A)

a. Inspection Scope (one sample)

On January 13, the inspectors observed the performance of a fire drill involving a simulated breaker fire within the East switchgear room coincident with a simulated injured individual in the same room. The inspectors evaluated the readiness of the fire brigade against the drill objective acceptance criteria established within the drill scenario including:

- Donning of protective clothing;
- Use of self-contained breathing apparatus (SCBA) equipment;
- Fire brigade control of the effected area;
- Use and availability of fire fighting equipment; and
- Communications between the fire brigade, the main control room, and security personnel.

The inspectors also observed debriefing activities between the drill evaluators and the fire brigade to ensure lessons learned were fed back to fire brigade members.

b. Findings

No findings of significance were identified.

2. Routine Fire Area Inspections (71111.05Q)

a. Inspection Scope (nine samples)

The inspectors identified nine fire areas and zones important to plant risk based on a review of Entergy's Safe Shutdown Capability Analysis for Vermont Yankee and the Individual Plant Examination External Events (IPEEE). Additional plant areas were selected based on their increased significance due to on-going plant maintenance. The inspectors toured these plant areas important to safety in order to verify the suitability of Entergy's control of transient combustibles and ignition sources, and to evaluate the material condition and operational status of fire protection systems, equipment, and barriers. In addition, the inspectors discussed attributes of several of the areas with the fire protection engineer. The following nine fire areas (FAs) and fire zones (FZs) were inspected:

- East switchgear room (FA-4);
- West switchgear room (FA-5);
- Cable vault (FZ-2);
- Battery room (FZ-3);
- "A" EDG room (FA-8);
- "B" EDG room (FA-9);
- Control room (FZ-1);
- Main and auxiliary transformers (no specific fire designation); and
- Start-up transformer (no specific fire designation).

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope (one sample)

The inspectors reviewed Entergy's established flood protection barriers and procedures for coping with internal flooding in the RCIC rooms including Vermont Yankee Off-Normal Procedure (ON) 3148, "Loss of Service Water"; and ON 3158, "Reactor Building High Area Temperature/Water Level. The inspectors reviewed internal flooding information contained in Entergy's IPEEE, in the updated final safety analysis report (UFSAR), and in the Internal Flooding Design Basis Document (DBD) as it related to the

RCIC system. Finally, the inspectors performed walk-downs of flood vulnerable portions of the RCIC rooms to ensure equipment and structures needed to mitigate an internal flooding event were as described in the IPEEE and the DBD. Additionally, the inspectors reviewed CRs related to internal flooding and the RCIC rooms to ensure identified problems were properly addressed for resolution.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification (71111.11Q)

a. Inspection Scope (one sample)

On March 18, the inspectors observed simulator training for one operating crew to assess the performance of the licensed operators and the ability of Entergy's Training and Operating Department staff to evaluate licensed operator performance. The training was conducted in accordance with portions of licensed operator requalification training guide LOR-23-901 and included operator response to hypothetical equipment failures related to modifications to be made during the refueling outage this spring.

The inspectors evaluated the crew's performance in the areas of:

- clarity and formality of communications;
- ability to take timely actions;
- prioritization, interpretation, and verification of alarms;
- procedure use;
- control board manipulations;
- oversight and direction from supervisors; and
- group dynamics.

Crew performance in these areas was compared to Entergy management expectations and guidelines as presented in the following documents:

- Vermont Yankee Administrative Procedure (AP) 0151, "Responsibilities and Authorities of Operations Department Personnel";
- AP 0153, "Operations Department Communication and Log Maintenance"; and
- Vermont Yankee Department Procedure (DP) 0166, "Operations Department Standards."

The inspectors discussed the scenario and training objectives with training personnel and attended the trainees' critique following the scenario. The inspectors also compared simulator configurations with actual control board configurations. For any weaknesses identified, the inspectors observed Entergy evaluators to verify that they also noted the issues and discussed them in the critique at the end of each session.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule Implementation (71111.12Q)

a. Inspection Scope (two samples)

The inspectors performed one issue/problem-oriented inspection of actions taken by Entergy in response the failure of both containment floor drain system pumps coincident with a failure of containment equipment drain system level indication. Additionally, the inspectors performed one system/function performance history-oriented inspection of the control room ventilation system. The inspectors reviewed the UFSAR, system DBD, operating procedures, system's maintenance rule scoping document, most recent system health report, list of historical condition reports written for system problems, maintenance rule functional failure determination for the September 2003 control room chiller trips, and corrective actions taken in response to the equipment problems in accordance with station procedures and the requirements of 10 CFR 50.65.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessment and Emergent Work Evaluation (71111.13)

a. Inspection Scope (five samples)

The inspectors evaluated on-line risk management for four planned maintenance activities and one emergent condition. The inspectors reviewed maintenance risk evaluations, work schedules, recent corrective actions, and control room logs to verify that other concurrent or emergent maintenance activities did not significantly increase plant risk. The inspectors compared reviewed items and activities to requirements listed in procedures AP 0125, "Equipment Release," and AP 0172, "Work Schedule Risk Management - Online." The inspectors reviewed the following on-line work activities:

- Planned maintenance on service water (SW) system supply to the turbine building valve SW-19A, resulting in Yellow on-line risk;
- Planned limiting condition for operation (LCO) outage of the HPCI system, resulting in Yellow on-line risk;
- Emergent Orange online risk condition during the HPCI outage coincident with an offsite switching error which resulted in the unavailability of the Vernon tie for approximately eight minutes;
- Planned 115/345 KV breaker failure testing, resulting in Yellow online risk; and
- Planned LCO outage of the ACS, resulting in Yellow on-line risk.

b. Findings

No findings of significance were identified.

1R14 Personnel Performance During Non-routine Plant Evolutions (71111.14)

a. Inspection Scope (two samples)

The inspectors assessed the control room and in-plant operators' performance during two non-routine evolutions; troubleshooting activities performed the week of February 8, associated with the operability of the drywell floor drain system and planned power reductions in support of rod pattern adjustments and main turbine control valve/stop valve testing. The inspectors evaluated the adequacy of personnel performance, procedure compliance, and use of the corrective action process against the requirements and expectations contained in the following station procedures:

- AP 0091, "Risk Assessment Procedure - Temporary Configuration Changes";
- AP 0151, "Responsibilities and Authorities of Operations Department Personnel";
- AP 0153, "Operations Department Communication and Log Maintenance"; and
- DP 0166, "Operations Department Standards."

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope (six samples)

The inspectors reviewed six operability determinations prepared by Entergy. The inspectors evaluated operability determinations against the requirements and guidance contained in NRC Generic Letter 91-18, "Resolution of Degraded and Nonconforming Conditions," as well as procedure AP 0167, "Operability Determinations." The inspectors verified the adequacy of the following evaluations of degraded or non-conforming conditions:

- Standby liquid control (SLC) system low current condition on the "A" squib valve circuitry following system maintenance;
- Containment drywell equipment drain and floor drain systems inoperability;
- Unexpected annunciator "Core Spray A Vlv Leakage Hi" while starting the "A" core spray (CS) system pump;
- "B" EDG inlet damper bolting issues;
- Corrosion products discovered inside the housing for reactor protection system (RPS) pressure switch PS-5-14D; and
- SLC system relief valve discharge lines not maintained flooded as required by the UFSAR and the DBD.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing (71111.19)

a. Inspection Scope (six samples)

The inspectors reviewed six post-maintenance test (PMT) activities on risk-significant systems. Where testing was directly observed, the inspectors verified that installed test equipment was appropriate and controlled and that the test was performed in accordance with applicable station procedures. The inspectors either directly observed or reviewed completed PMT documentation to verify that the test data met the required acceptance criteria contained in the TS, UFSAR, Vermont Yankee Program Procedure (PP) 7013, "In-Service Testing Program Implementation," and AP 0048, "Work Planning." The inspectors also ensured that the test activities were adequate to ensure system operability and functional capability following maintenance; that systems were properly restored following testing; and that any discrepancies were appropriately documented in the corrective actions program. The inspectors reviewed the following PMT activities:

- Testing performed following replacement of O-rings on a RPS pressure transmitter;
- Testing performed following the replacement of the battery for the John Deere diesel generator;
- Testing performed following planned maintenance on the SW supply to TB valve, SW-19A;
- Testing performed following the replacement of leaking fittings on the "B" control rod drive (CRD) system pump;
- Testing performed following planned maintenance on the HPCI system; and
- Testing of the "B" train of the SBT system following general maintenance.

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities (71111.20)a. Inspection Scope (partial sample)

During the inspection period, Entergy finalized preparations for refueling outage (RFO) 24. The inspectors reviewed the following areas related to RFO 24:

- Refueling outage schedule risk review; and
- New reactor fuel inspection.

The inspectors evaluated outage schedule risk against the requirements in TS and procedure AP 0173, "Work Schedule Risk Management - Outage." New fuel inspections were evaluated against the requirements of procedures OP 1400, "Fuel Receipt and preliminary Handling"; OP 0400, "Special Nuclear Material Inventory and Accountability Procedure"; OP 1401, "New Fuel Inspection and Channeling"; and OP 1410, "Fuel Loading Schedule Generation."

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)a. Inspection Scope (six samples)

The inspectors observed surveillance testing to verify that the acceptance criteria specified for each test was consistent with the requirements of the TS and UFSAR, to verify that testing was performed as written in the procedure, that the test data was complete and met procedural requirements, and that the system was properly returned to service following the completion of testing. The inspectors reviewed procedure PP 7013, "In-Service Testing Program Implementation," procedure AP 4000, "Surveillance Testing Program," and observed selected pre-job briefings supporting testing. The inspectors also verified that discrepancies identified had been entered into the corrective actions program. The inspectors verified that testing in accordance with the following procedures met the above requirements:

- OP 4181, "Service Water/Alternate Cooling System Surveillance," Section A, "Service Water Pump Operability and Discharge Check Valve Test";
- OP 4126, "Diesel Generator Surveillance," Section B.1, "Diesel Generator Readiness Demonstration - Monthly" for the "B" EDG;
- OP 43109, "Reactor Pressure Recirc Pump Trip (RPT) and Alternate Rod Insertion (ARI) Functional/Calibration";
- OP 4152, "Equipment and Floor Drain Sump Totalizer Surveillance";
- OP 43111, "Reactor Water Level Recirc Pump Trip (RPT) and Alternate Rod Insertion (ARI) Functional/Calibration"; and

- OP 4121, “Reactor Core Isolation Cooling System Surveillance,” Sections C, “RCIC Pump Operability and Full Flow Test” and D, “RCIC Turbine Mechanical Overspeed Trip Test.”

b. Findings

No findings of significance were identified.

1R23 Temporary Modifications (71111.23)

a. Inspection Scope (one sample)

The inspectors reviewed temporary modification (TM) 2003-023, “Install Temporary Instrumentation to Monitor Recirc Pump 1B, No. 1 and 2 Seal Cavity Pressure” to ensure that the modification did not adversely affect the availability, reliability, or functional capability of any risk-significant structures, systems, or components. The inspectors compared the information in TM 2003-023 to Entergy’s TM program requirements contained in AP 0020, “Control of Temporary and Minor Modifications.” The inspectors also performed walk-downs of accessible portions of this TM to verify that required tags and markings had been applied and that the TM was being properly maintained.

b. Findings

No findings of significance were identified.

**Cornerstone: Emergency Preparedness**

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)

a. Inspection Scope (one sample)

The inspectors performed an in-office review of recent changes made to the Vermont Yankee Emergency Plan implementing procedures to ensure changes made did not decrease the overall effectiveness of the Plan. The inspectors reviewed documents related to the risk-significant planning standards (RSPS) and a general review of non-RSPS documents. A listing of documents reviewed is included in the Attachment to this report. The inspectors verified that changes made to implementing procedures satisfied the requirements of 10 CFR 50.54(q), 10 CFR 50.47(b), and 10 CFR 50 Appendix E. The inspectors also compared changes made to Entergy’s Emergency Plan implementing procedures to the guidance in NUREG-0654, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants.” The changes reviewed, as with any change made to the emergency program, will be subject to future NRC inspections as part of an on-going effort to ensure that Entergy’s Emergency Plan continues to meet NRC regulations.



b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

**Cornerstone: Occupational Radiation Safety**

2OS1 Access Control to Radiologically Significant Areas (71121.01)

a. Inspection Scope (one sample)

The inspectors verified that Entergy had properly implemented physical, engineering, and administrative controls for access to high radiation and other radiologically controlled areas, and that workers were adhering to these controls when working in these areas. Implementation of the access control program was reviewed against the criteria contained in 10 CFR 20, site TS, and the applicable Entergy procedures.

The inspectors conducted independent radiation surveys, reviewed radiation surveys, and reviewed the exposure controls specified in the radiation work permit (RWP) while observing refueling floor clevis pin replacement on contaminated local power range monitor (LPRM) bender tool. Additionally, work area conditions and electronic dosimetry set points were reviewed and evaluated.

b. Findings

No findings of significance were identified.

2OS2 ALARA Planning and Controls (71121.02)

a. Inspection Scope (two samples)

The inspectors conducted a review of the following Spring 2004 refueling outage work activity As Low As Reasonably Achievable (ALARA) plans and conducted interviews with six ALARA engineer/specialists, to verify that Entergy had developed sound exposure estimates and applied reasonable exposure mitigation requirements to these outage work activities:

- Reactor disassembly/reassembly, refueling and in-vessel work;
- Underwater diving steam dryer modifications;
- Safety relief valve replacements, motor operated valve testing, and RHR service water valve replacement;
- Drywell In-Service Inspection and support activities; and
- Drywell permanent and temporary shielding activities.

The inspectors conducted interviews with the in-service inspection personnel, a maintenance support planner, a maintenance planning supervisor, and an outage scheduler with respect to the above activities (this activity represents one sample).

Plant source term records were reviewed in regards to noble metals injection and hydrogen water chemistry. The inspectors reviewed radiological survey data regarding the redistribution of source term materials (i.e., crud burst) resulting from hydrogen water chemistry. The inspectors reviewed actions taken by Entergy to minimize the impact of a crud burst and discussed the issue with the assistant Operations Manager and the Plant Chemist (this activity represents one sample).

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator Verification (71151)

a. Inspection Scope (six samples)

The inspectors sampled Entergy submittals for the performance indicators (PIs) listed below for the period from January 2003 to December 2003. The PI definitions and guidance contained in Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Indicator Guideline," and AP 0094, "NRC Performance Indicator Reporting," were used to verify the accuracy and completeness of the PI data reported during this period.

Initiating Events Cornerstone

- Unplanned Power Changes per 7000 Critical Hours;
- Unplanned Scrams per 7000 Critical Hours; and
- Scrams with Loss of Normal Heat Removal;

The inspectors reviewed selected operator logs, plant process computer data, condition reports, and monthly operating reports for the period January 1, 2003, through December 31, 2003.

Physical Protection Cornerstone

- Fitness-for-Duty (FFD)/Personnel Reliability Program Performance;
- Personnel Screening Program Performance; and
- Protected Area Security Equipment Performance Index.

The review included Entergy's tracking and trending reports, personnel interviews and security event reports for the PI data collected from the first quarter of 2003 through the fourth quarter of 2003.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

1. Routine Review of Identification and Resolution of Problems

a. Inspection Scope

The inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify they were being entered into Entergy's corrective action system at an appropriate threshold and that adequate attention was being given to timely corrective actions. Additionally, in order to identify repetitive equipment failures and/or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into Entergy's corrective action program. This review was accomplished by reviewing selected hard copies of condition reports (a listing of CRs reviewed is included in the Attachment to this report) and/or by attending daily screening meetings.

b. Findings

No findings of significance were identified.

2. Annual Sample Review of RCIC and HPCI System Flow Controller Problems

a. Inspection Scope (one sample)

The inspectors selected RCIC and HPCI system flow controller (GEMAC flow controller) problems based on a recent failure of HPCI system controller, the fact that the same style controller is used in the RCIC and CRD systems, and the fact that there has been a history of problems with these controllers over the past several years. A listing of reviewed CRs is included in the Attachment to this report. The CRs were reviewed to ensure the full extent of documented issues were identified, an appropriate evaluation was performed, and appropriate corrective actions were specified and prioritized. The inspectors evaluated CRs against the requirements of AP 0009, "Condition Reports," Revision 15. The inspectors reviewed the root cause report for the most recent HPCI system flow controller failure and discussed the results of that evaluation and planned corrective actions with the responsible system engineers to understand the basis of established long-term corrective actions.

b. Findings and Observations

No findings of significance were identified. The inspectors concluded that the completed immediate and planned short and long-term corrective actions were appropriate.

Enclosure

3. Cross-Reference to PI&R Findings Documented Elsewhere

Section 4OA3 describes a finding wherein Entergy personnel did not perform an adequate “assessment of similar conditions,” as required by their correction action procedures, following the identification that an inadequate procedure resulted in the improper installation of packing in RCIC system valve V13-16 in April 2000. As a result, Entergy did not identify the extent of improperly packed valves and did not identify a condition adverse to quality associated with the improperly installed packing in valve V2-19.

4OA3 Event Followup

1. (Closed) Licensee Event Report (LER) 05000271/2003001-00, Reactor Shutdown Completed for an Increase in Unidentified Leakage Located Inside Primary Containment.

a. Inspection Scope (one sample)

The inspectors reviewed LER 05000271/2003001-00 and CRs 2003-02123 and 2003-02116 that documented this event in Entergy’s corrective action program. The inspectors reviewed the above LER and CRs to verify that Entergy identified the cause of the condition requiring the shutdown of the reactor and identified reasonable corrective actions. The inspectors reviewed key plant parameters during the reactor shutdown to verify that plant equipment performed as expected, that Entergy made timely notifications in accordance with 10 CFR 50.72, and station personnel properly implemented appropriate station procedures. The inspectors also reviewed Event Report (ER) 2000-00514, OP 5281, “Valve Packing Guidelines,” and interviewed station personnel involved with the development of the LER.

b. Findings

Introduction: A very low safety significance (Green) self-revealing non-cited violation (NCV) of 10 CFR 50 Criterion XVI was identified because Entergy did not promptly identify a condition adverse to quality. Specifically, in April 2000, following the identification that packing on a reactor core isolation cooling system valve failed because the procedure, OP 5281, for installing the valve packing was inadequate, Entergy performed a limited review of other instances in which procedure OP 5281 had been used to install valve packing. As a result, Entergy did not identify that maintenance personnel had improperly installed packing on a reactor head vent isolation valve using procedure OP 5281 in November 1999. In September 2003 the valve packing failed and developed a packing leak that required the reactor to be shutdown.

Description: On September 27, 2003, operators shutdown Vermont Yankee because the packing of reactor head vent line isolation valve V2-19 failed and caused leakage into the drywell to increase at a rate greater than that allowed by Technical

Specifications. Station personnel placed the reactor plant in a cold shutdown condition within 24 hours after identification of the valve packing failure. Valve V2-19 is a 2 inch, manually operated globe valve that is normally left in the open position during power operation. Entergy's root cause investigation identified that the valve packing had not been properly installed (i.e., not properly compressed during installation to ensure packing material is radially expanded against the valve stem and stuffing box) which resulted in the packing leakage. The valve packing had been installed in November 1999 using OP 5281, "Valve Packing Guidelines."

In 2000, Entergy issued ER 2000-0514 to document the failure of packing on RCIC system valve V13-16. The packing on this valve was also installed using OP 5281. Entergy identified that the instructions contained in OP 5281 for installing packing were inadequate. Procedure AP 0009, "Event Reports," Revision 10, required performing an assessment of potentially similar conditions following the identification of a condition adverse to quality. Although a cursory assessment of the packing failure of valve V13-16 was performed, the assessment did not take into account all other valves that might have had packing installed improperly using procedure OP 5281. As a result, Entergy did not identify that the packing in valve V2-19 had been installed improperly in November 1999. The condition remained unidentified until September 2003, when the valve packing in valve V2-19 failed resulting in the need to perform a controlled shutdown of the reactor plant.

Analysis: The performance deficiency associated with this finding is that Entergy performed an inadequate "assessment of similar conditions" following the identification that an inadequate procedure resulted in the improper installation of packing in RCIC system valve V13-16 in April 2000. The finding is greater than minor since it is associated with the Equipment Performance attribute of the Initiating Events Cornerstone and because it affects the associated Cornerstone objective. Specifically, unexpected packing leakage from valve V2-19 on September 27, 2003, increased the likelihood of an event that upset plant stability and challenged critical safety functions during power operations. In accordance with IMC 0609, Appendix A, "Significance Determination of Reactor Findings for At-Power Situations," the inspectors conducted a SDP Phase 1 screening and determined that an SDP Phase 2 evaluation was required because the performance deficiency was considered to be a transient initiator contributor and because it degraded a reactor coolant system barrier. The inspectors conducted an SDP Phase 2 evaluation of the risk significance of the performance deficiency and determined that the finding is of very low safety significance (Green). The inspectors applied the SDP worksheet for TRANS and determined that it was dominated by two accident sequences (a transient with a loss of the power conversion system, loss of containment heat removal, and loss of containment venting; and a transient with a loss of the power conversion system, high pressure injection, and depressurization system) each with a risk significance equal to eight. The inspectors also determined that there were no accident sequences with a risk significance less than eight as indicated on the counting rule worksheet.

The assumptions used for the SDP analysis included:

- The actual leakage rate into the drywell was 3.6 gpm. The maximum possible leakage rate from valve V2-19 if all the packing were to fail was determined to be 18.9 gpm;
- The improperly installed packing in valve V2-19 was assumed to have existed for greater than a year based on the fact that the valve was improperly re-packed in November 1999;
- The Small Loss of Coolant Accident (SLOCA) worksheet was not required to be completed since the maximum leakage possible from valve V2-19 if all of the packing were to have failed was much less than 400 gpm which is the leakage rate necessary to constitute a loss of coolant accident; and
- All mitigating capabilities described on the SDP Phase 2 Worksheet for TRANS core damage sequences were maintained.

The inspectors determined that a contributing cause of this finding is related to the cross-cutting area of Problem Identification and Resolution. Station personnel did not perform an adequate "assessment of similar conditions," as required by Entergy's correction action procedures, following the identification that an inadequate procedure resulted in the improper installation of packing in RCIC system valve V13-16 in April 2000. As a result, Entergy did not identify the extent of improperly packed valves and did not identify a condition adverse to quality associated with the improperly installed packing in valve V2-19.

**Enforcement:** 10 CFR 50, Appendix B, Criterion XVI states, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified. Vermont Yankee Administrative Procedure (AP) 0009, "Event Reports," Revision 10, requires for the identification and correction of conditions adverse to quality, performing an assessment of potentially similar conditions. Contrary to the above, in April 2000, Entergy performed an inadequate "assessment of potentially similar conditions" following the identification that packing on a reactor core isolation cooling system valve V13-16 failed because the procedure (OP 5281) for installing the valve packing was inadequate. As a result, Entergy did not identify that packing on reactor head vent isolation valve V2-19 had been improperly installed in November 1999, using procedure OP 5281, until September 2003 when the valve developed a packing leak that required the reactor to be shutdown. Because the finding is of very low safety significance and has been entered into Entergy's Corrective Actions Program (CR 2003-02116), this violation is being treated as a Non-Cited Violation (NCV), consistent with Section VI.A of the NRC Enforcement Policy: **NCV 0500271/2004002-01, Did Not Perform Adequate Extent of Condition Review Following Identification of An Improperly Installed RCIC Valve Packing.**

#### 40A5 Other Activities

1. Temporary Instruction (TI) 2515/154, "Spent Fuel Material Control and Accounting at Nuclear Power Plants."
  - a. Inspection Scope

The inspectors completed Phase I and Phase II of TI 2515/154 during this inspection period. The inspectors reviewed Vermont Yankee operating procedure (OP) 0400, "Special Nuclear Material Inventory and Accountability Procedure," Form 0400.19; reviewed Entergy spent fuel pool maps; and interviewed Entergy reactor engineering personnel.

Phase I of TI 2515/154 required the inspectors to determine through interviews and review of spent fuel records whether the Vermont Yankee staff had ever removed irradiated fuel rods from a fuel assembly or reconstituted fuel assemblies. If the Phase I review identifies that this had occurred, then the inspectors were required to perform Phase II which required the inspectors to obtain information through interviews and review of spent fuel records to answer 12 specific questions contained in the TI. The TI Phase II questions required, in part, that the inspectors obtain a list of all irradiated fuel rods that have been removed from their parent assembly, determine the location of these fuel rods in the spent fuel pool, and determine, to the extent possible, whether the fuel rods were in recorded locations by observing from the edge of the spent fuel pool. Other TI-related questions required the inspectors to determine whether the Vermont Yankee staff conducted an annual physical inventory of special nuclear material and resolved discrepancies identified during such physical inventory.

b. Findings

The inspectors identified that the method used by the station staff to perform the physical inventory of two fuel rod segments stored in an unlocked, uncovered stainless steel container located on the bottom of the spent fuel pool did not comply with Vermont Yankee operating procedure OP 0400. The inspectors determined that Entergy performed a physical inventory of items in the spent fuel pool annually using procedure OP 0400. OP 0400 indicates that the physical inventory can be accomplished by performing a "piece count" or using other provisions within the procedure. Rather than a piece count of these two fuel rod segments, Entergy personnel ensured the container storing these two fuel rod segments remained upright and in place on the bottom of the spent fuel pool. The inspector determined that this method of performing the physical inventory was not in accordance with the provisions contained in OP 0400. Procedure OP 0400 permits this type of physical inventory provided the container is sealed using a "tamper-safe" locking device. The container storing these two fuel rod segments had no tamper safe locking device.

In response to the inspector's observations, on March 26, 2004, Entergy personnel looked from the refueling floor to determine if they could see the two fuel rod segments stored in the container on the bottom of the spent fuel pool. Although the Entergy personnel believed they saw some indication that the fuel rod segments were in the container, the indication was not of sufficient detail and clarity to definitively conclude that the two fuel rod segments were stored in the container. Entergy personnel also plan to perform a detailed inspection of the container using equipment that will be available during the April 2004 refueling outage.

Because additional information is needed to determine if this issue is more than minor, it is considered to be an unresolved item (URI) pending completion of Entergy's detailed inspection of the container. The issue has been entered into Entergy's corrective actions program (CR 2004-0671): **URI 0500271/2004002-02, Did Not Adhere to Procedural Requirements for Performing an Annual Physical Inventory of two Spent Fuel Rod Segments.**

4OA6 Meetings, including Exit

Resident Exit

On April 9, the resident inspectors presented the inspection results to Mr. J. Thayer and members of his staff. The inspectors asked whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

Annual Assessment Meeting

A public meeting was conducted with Mr. Jay Thayer, Vermont Yankee Site Vice President, and other members of Entergy's staff at the Vernon Elementary School in Vernon, Vermont on March 31, 2004. The meeting was held to discuss the Annual Assessment of the Vermont Yankee Nuclear Power Station. The meeting summary and slides can be found in ADAMS (Accession Numbers ML040980128 and ML041110021).

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure



**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

Licensee Personnel:

J. Thayer	Site Vice President
K. Bronson	General Plant Manager
P. Corbett	Maintenance Manager
J. Dreyfuss	Project Engineering Manager
J. Devinentis	Licensing Manager
J. Geyster	Radiation Protection Superintendent
D. Giorowall	Programs Supervisor
S. Goodwin	Mechanical Design Department Manager
M. Gosekamp	Superintendent of Operations Training
D. Leach	Director of Engineering
R. Morissette	Principal As Low As Reasonably Achievable (ALARA) Engineer
M. Pletcher	Radiation Protection Supervisor - Instruments
B. Renny	Supervisor, Access Authorization
K. Stupak	Technical Training
C. Wamser	Operations Manager
R. Wanczyk	Director of Nuclear Safety

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

0500271/2004002-01	NCV	Did Not Perform Adequate Extent of Condition Review Following Identification of An Improperly Installed RCIC Valve Packing (Section 4OA3.1)
0500271/2004002-02	URI	Did Not Adhere to Procedural Requirements for Performing an Annual Physical Inventory of two Spent Fuel Rod Segments (Section 4OA5.1)

Closed

0500271/2004002-01	NCV	Did Not Perform Adequate Extent of Condition Review Following Identification of An Improperly Installed RCIC Valve Packing (Section 4OA3.1)
50-271/2003-001-00	LER	Reactor Shutdown Completed for an Increase in Unidentified Leakage Located Inside Primary Containment (Section 4OA3.1)

## LIST OF DOCUMENTS REVIEWED

### **Section 1EP4: Emergency Action Level and Emergency Plan Changes**

Vermont Yankee Emergency Plan, Rev 38 (Change 42)

#### Procedures

- OP 3505, "Emergency Preparedness Exercises and Drills," Revision 25
- OP 3506, "Emergency Equipment Readiness Check," Revision 43, limited procedure change (LPC) 1; Revision 44
- OP 3508, "On-Site Medical Emergency Procedure," Revision 24
- OP 3509, "Environmental Sample Collection During an Emergency," Revision 18
- OP 3510, "Off-site and Site Boundary Monitoring, Revision 27," LPC 1
- OP 3511, "Off-Site Protective Action Recommendation," Revision 13
- OP 3513, "Evaluation of Off-Site Radiological Conditions," Revision 22
- OP 3524, "Emergency Actions to Ensure Accountability and Security Response," Revision 20, LPC 1
- OP 3525, "Radiological Coordination," Revision 11
- OP 3531, "Emergency Call-In Method," Revision 17
- OP 3533, "Post Accident Sampling of Reactor Coolant," Revision 6, LPC 2
- OP 3540, "Control Room Actions During an Emergency," Revision 2, LPC 1
- OP 3541, "Activation of the Technical Support Center (TSC)," Revision 2, LPC1
- OP 3542, "Operation of the Technical Support Center (TSC)," Revision 2, LPC 1
- OP 3543, "Activation of the Operations Support Center (OSC)," Revision 0, LPC 1
- OP 3544, "Operation of the Operations Support Center (OSC)," Revision 3, LPC 1
- OP 3545, "Activation of the Emergency Operation Facility / Recovery Center," Revision 2, LPC 1
- OP 3546, "Operation of the Emergency Operation Facility / Recovery Center (EOF/RC)," Revision 4
- OP 3547, "Security Actions During an Emergency," Revision 2, LPC 1

### **Section 4OA1: Performance Indicator Verification**

#### Reports

- Performance Indicator Report, Protected Area Security Equipment Performance, 1st Quarter 2003 - 4th Quarter 2003
- Vermont Yankee Nuclear Power Station Semi-Annual Part 26 Performance Data Report for January 1, 2003 to June 30, 2003
- Vermont Yankee Nuclear Power Station Semi-Annual Part 26 Performance Data Report For July 1, 2003 to December 31, 2003

**Section 40A2.1: Routine Review of Problem Identification and Resolution**Condition Reports

2000-0514 RCIC-16 has a packing leak and a leak off connection plug  
2002-0020 SCH 1-1 tripped during surveillance testing

2002-0870 Chiller compressor found with circuit breaker tripped, adverse trend  
2003-0682 Power reduction directed by ISO-NE  
2003-1436 Unexpected annunciator 3-D-4, "Core Spray Valve Leakage Hi," on core spray "A" pump start

2003-1598 Forced power reduction due to Scobie line problems  
2003-1727 Downpower due to breaker out of service  
2003-1826 Control room ventilation tripped  
2003-1973 Control room chillers found tripped due to high discharge pressure  
2003-2116 Increase in Drywall Leakage  
2003-2123 Excessive Packing Leak  
2003-2346 RP Tech Incorrect Response to Alarm  
2003-2770 TI-16-1930, The Torus Temperature Indicator on the alternate Shutdown Panel in RCIC room is not indicating a temperature

2003-2785 Emergency diesel inlet damper bolts rubbing  
2003-2795 Unexpected annunciator 3-D-4, "Core Spray Valve Leakage Hi," on "A" core spray pump start

2004-0008 While troubleshooting the Alarm for LS-12-4-80 under WO 03-5670-00 it was discovered that the alarm for LS-20-463A and 463B is not wired correctly

2004-0018 E-Plan and Nureg required Annual Health Physics Drill not done in 2003  
2004-0021 AC Input breaker on a Battery Charger was Opened vice the Battery Charger AC Input Breaker Lighting Panel

2004-0092 Actual Core Thermal Power Suspected of Exceeding Licensed Power Level  
2004-0172 Plant related activity detected in protected area snow pile  
2004-0223 FFD Permanent Record book is not bound  
2004-0224 No Formal FFD Collection Process Procedure  
\*2004-0226 NRC resident observed procedure non-compliance during SW surveillance  
\*2004-0230 ARI/RPT procedure stopped due to incorrect test equipment being used  
2004-0292 PVC Conduit Unexpectedly Struck and Damaged While Performing Excavation Work in the 345KV Switchyard

2004-0304 Incorrect Procedure Section used to return Battery Charger BC-1-1B to service  
\*2004-0366 During the first time evolution for bore sighting Contingency weapons, instructions were misunderstood, causing poor range performance

\*2004-0371 Individual Alarms Portal Monitor Upon Exit of Plant Informed by NRC Inspector that an individual was observed to have alarmed the Gate 2 portal monitor upon exiting the plant

\*2004-0405 Error in identified remain in service equipment for HPCI out of service  
\*2004-0433 RCIC governor valve open limit switch sticky, required manual fingering for proper operation during quarterly surveillance

2004-0471 Found rust inside switch housing of PS-5-14D  
\*2004-0479 The AP 0091 risk assessment for Work Order 04-313 was improperly performed

- \*2004-0485 Refueling Bridge Computer not booting up Refueling Bridge would not boot-up when the bridge was powered up
- \*2004-0487 NRC resident identified RCIC-1 reset light out during control room walkdown
- 2004-0506 Testing and Validation of simulator training load not in accordance with simulator procedure
- \*2004-0519 NRC resident identified that an unplanned RPS actuation during I&C surveillance was not logged in the control room log.
- \*2004-0546 Failure to follow written procedures was observed during an NRC audit
- \*2004-0596 ORAM color change from green to yellow made after the K-186 breaker tagged out for VELCO
- \*2004-0657 Visitor Controls into the Protected Area
- 2004-0664 Non-compliance with UFSAR requirement for relief valve discharge line flooding
- \*2004-0671 Question on special nuclear material physical inventory in spent fuel pool
- \*2004-0679 NRC resident inspector tour of cable vault identified fiberglass insulation laying in cable tray

\*Inspector-identified issues.

**Section 40A2.2: Annual Sample Review of RCIC and HPCI System Flow Controller Failures**

Condition Reports

- 1995-0689 Unexpected response of the HPCI system during the implementation of engineering design change
- 1997-1089 HPCI system inoperable due to lightning
- 1999-1047 HPCI failure to meet required time to rated flow
- 1999-0175 RCIC flow element curve/RCIC flow testing
- 2000-1567 Effect of RCIC flow rate greater than design on fluid system calculation
- 2001-2184 RCIC flow controller needed to be set greater than 400 gpm to control RCIC flow at 400 gpm
- 2002-1623 Failure of CRD flow controller to respond in auto
- 2002-2755 Loss of automatic CRD flow control function
- 2002-2038 HPCI controller received from vendor not repaired
- 2003-2535 HPCI Flow Controller FIC-23-108 Performed Sluggishly when Controlling in the AUTO Mode

**Section 40A5.1: Temporary Instruction (TI) 2515/TI-154, “Spent Fuel Material Control and Accounting at Nuclear Power Plants.”**

Procedures

OP 0400, “Special Nuclear Material Inventory and Accountability Procedure”  
 OP 1403, “Fuel Bundle Non-Destructive Testing and reconstitution”  
 DP 0545, “Fuel Pool Storage Requirements”

**LIST OF ACRONYMS**

AC	Alternating Current
ACS	Alternate Cooling System
ADAMS	Automated Document Access Management System
ALARA	As Low As Is Reasonably Achievable
AP	Vermont Yankee Administrative Procedure
ARI	Alternate Rod Insertion
CFR	Code of Federal Regulations
CR	Condition Report
CRD	Control Rod Drive
CS	Core Spray
CY	Calendar Year
DBD	Design Basis Document
DP	Vermont Yankee Department Procedure
EDGs	Emergency Diesel Generator
EOF	Emergency Operations Facility
ER	Event Report
FA	Fire Area
FFD	Fitness-For-Duty
FZ	Fire Zone
HPCI	High Pressure Coolant Injection
IMC	Inspection Manual Chapter
IPEEE	Individual Plant Examination External Events
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LPC	Limited Procedure Change
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OP	Vermont Yankee Operating Procedure
OSC	Operations Support Center
PI	Performance Indicator
PMT	Post Maintenance Testing
PP	Vermont Yankee Program Procedure
RC	Recovery Center
RCIC	Reactor Core Isolation Cooling
RFO	Refueling Outage
RPS	Reactor Protection System

RPT	Recirculation Pump Trip
RSPS	Risk Significant Planning Standards
SBGT	Standby Gas Treatment
SDP	Significance Determination Process
SLC	Standby Liquid Control
SW	Service Water
TI	Temporary Instruction
TM	Temporary Modification
TRANS	Transients
TS	Technical Specification
TSC	Technical Support Center
UFSAR	Updated Final Safety Analysis Report
VY	Vermont Yankee