

July 26, 2006

Mr. Theodore A. Sullivan  
Site Vice President  
Entergy Nuclear Operations, Inc.  
Vermont Yankee Nuclear Power Station  
320 Governor Hunt Road  
Vernon, VT 05354

SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION - NRC INTEGRATED  
INSPECTION REPORT 05000271/2006003

Dear Mr. Sullivan:

On June 30, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Vermont Yankee Nuclear Power Station. The enclosed report documents the inspection findings which were discussed on July 12, 2006, with 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.

Based on the results of this inspection, no findings of significance were identified.

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 the 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/**

Raymond J. Powell, Chief  
Projects Branch 5  
Division of Reactor Projects

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.: 50-271

Licensee No.: DPR-28

Report No.: 05000271/2006003

Licensee: Entergy Nuclear Operations, Inc.

Facility: Vermont Yankee Nuclear Power Station

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

Dates: April 1, 2006 through June 30, 2006

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## **SUMMARY OF FINDINGS**

IR 05000271/2006003; 04/01/06 - 06/30/06; Vermont Yankee Nuclear Power Station; Routine Integrated Report.

This report covered a 13-week period of inspection by resident inspectors and announced inspections by regional engineering and health physics inspectors. 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

No findings of significance were identified.

B. Licensee Identified Findings

None.

## REPORT DETAILS

### Summary of Plant Status

Vermont Yankee (VY) Nuclear Power Station began the inspection period operating at 87% reactor power. At that time, Entergy personnel were performing power ascension testing activities related to an NRC license amendment authorizing an increase in VY's licensed maximum reactor power level from 1593 megawatts thermal (MWth) to 1912 MWth. On April 1, operators increase power to approximately 91%. Power was again increased to approximately 93% and 96% on April 6 and 22, respectively. On April 28, power was increased to 98%. On May 5, 2006, operators increased reactor power to the new 100% reactor power limit of 1912 MWth.

On May 8, power decreased to approximately 70% during the planned condensate pump trip test performed as part of power ascension testing activities. Following the successful completion of the condensate pump trip test, reactor power was returned to 100% on May 9. On May 17, operators performed a planned power reduction to approximately 55% to perform individual control rod scram time testing, main steam isolation valve (MSIV) closure testing, turbine valve testing, and rod pattern adjustments. Reactor power was subsequently returned to 100% power on May 21.

On May 24, operators reduced reactor power to approximately 58% in response to indications of a fire in the east switchgear room and ground faults within the electrical system. This event also resulted in the declaration of an Unusual Event in accordance with Entergy's approved Emergency Plan. (See Section 4OA3 of this report for more details on Entergy's response to this event.) Following this event, operators maintained reactor power at approximately 80% pending the completion of necessary repairs to plant equipment. Reactor power was returned to 100% on May 27 where it remained throughout the remainder of the inspection period, with the exception of minor power reductions to support control rod pattern adjustments.

## **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 design features and procedural controls established for the residual heat removal service water (RHRSW) system to minimize the impact of river silting on the RHRSW system and associated cooling loads (i.e., the residual heat removal (RHR) system). River silting is a phenomenon typically associated with springtime snow melt and runoff conditions that result in high flow, high silt conditions on the Connecticut River but can also be a concern throughout the year following periods of

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heavy rain. The impact of river silt on the RHRSW system is minimized by the silt removal capability of the service water (SW) system strainers (upstream of the RHRSW system) and by maintaining a minimum flow of water through the RHRSW pump motor cooling lines. The inspectors performed walkdowns of the accessible portions of the RHRSW and SW systems and compared the current system alignments and established RHRSW pump cooling flow to the requirements of Vermont Yankee Operating Procedures (OP) 2124, "Residual Heat Removal System;" OP 2181, "Service Water/Alternate Cooling Operating Procedure;" OP 0150, "Conduct of Operations and Operator Rounds;" Technical Specifications (TS); and the Update Final Safety Analysis Report (UFSAR). The inspectors also reviewed condition reports (CRs) to verify that identified silting and other weather-related issues were entered into the corrective action program and appropriate actions were completed or planned to properly resolve the issues.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

a. Inspection Scope (three samples)

The inspectors performed three partial system walkdowns 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 applicable standby alignment of equipment specified in OP 2124, "Residual Heat Removal System;" OP 2117, "Standby Gas Treatment;" and OP 2126, "Diesel Generators." 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 "B" train of the RHR system while the "A" train was out of service for planned maintenance;
- The "B" train of the standby gas treatment system while the "A" train was out of service for planned maintenance; and
- The "B" emergency diesel generator (EDG) while the "A" EDG was out of service for planned maintenance.

b. Findings

No findings of significance were identified.



1R05 Fire Protection (71111.05Q)a. Inspection Scope (nine samples)

The inspectors identified fire areas important to plant risk based on a review of Entergy's Vermont Yankee Safe Shutdown Capability Analysis, the Fire Hazards Analysis, and the Individual Plant Examination External Events (IPEEE). The inspectors toured plant areas important to safety in order to verify the suitability of Entergy's control of transient combustibles and ignition sources, and the material condition and operational status of fire protection systems, equipment, and barriers. The following fire areas (FAs) and fire zones (FZs) were inspected.

- East Switchgear Room (FA-4);
- West Switchgear Room (FA-5);
- "A" EDG Room (FA-8);
- "B" EDG Room (FA-9);
- Cable Vault (FZ-2);
- Battery Room (FZ-3);
- Reactor Building, 280 foot elevation, North (FZ RB5);
- Reactor Building, 280 foot elevation, South (FZ RB6); and
- Relay House - 345 kilovolt (no 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 external flooding events. The inspectors reviewed external flooding information contained in Entergy's IPEEE and compared it to required flooding actions delineated in OP 3127, "Natural Phenomena." The inspectors performed walkdowns of flood-vulnerable areas and ensured equipment needed to mitigate an external flooding event (e.g., sump pumps, floor drain plugs, sand bags, etc.) was available and in working order. The inspectors also reviewed a sample of problems identified in Entergy's corrective action program to verify that Entergy identified and implemented appropriate corrective actions.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07)a. Inspection Scope (one sample)

The inspectors performed an annual review to verify the readiness of the "A" RHR heat exchanger. The inspectors observed Entergy's execution of biofouling controls for, and inspections of, the "A" RHR heat exchanger including the state of cleanliness of the heat exchanger tubes. Following the completion of these activities, the inspectors performed walkdowns of the "A" RHR heat exchanger to observe inlet and outlet temperatures, primary and secondary side fluid flows, and to look for evidence of leakage. Observed temperatures and flow rates were compared to expected values contained in OP 2124, "Residual Heat Removal System," the TS, and the UFSAR. The inspectors also reviewed a sample of problems identified in Entergy's corrective action program to verify that Entergy identified and implemented appropriate corrective actions.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification (71111.11Q)a. Inspection Scope (one sample)

The inspectors observed simulator-based licensed operator requalification training provided to operators regarding the expected plant response to a trip of either a feedwater pump or a condensate pump from the new extended power uprate (EPU) 100% reactor power level. Training included a discussion of expected plant response(s) and a series of simulator scenarios requiring operators to respond to simulated condensate pump and feedwater pump trips. The inspectors evaluated crew 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 command and control. Crew performance in these areas was compared to Entergy management expectations and guidelines as presented in 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 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 to be discussed with the crew. Additionally, the inspectors observed the fidelity of the plant-specific simulator and compared it to actual plant response(s) and to the requirements of American National Standards Institute/American Nuclear Society (ANSI/ANS) 3.5-1998, "Nuclear Power Plant Simulators for Use in Operator Training and Examination."

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12Q)

a. Inspection Scope (three samples)

The inspectors performed three issue/problem-oriented inspections of actions taken by Entergy in response to the inability of operators to fully open "D" SW pump discharge valve SW-2D, the failure of the "A" reactor building-to-torus vacuum breaker to open within in-service testing acceptance criteria during surveillance testing, and the observation of inconsistent closure of an east switchgear room fire damper (FPD-115-12) which is required to close during an actuation of the switchgear room carbon dioxide (CO<sub>2</sub>) fire suppression system. The inspectors reviewed work practices that may have contributed to degraded system performance, Entergy's ability to identify and address common cause failures, the applicable maintenance rule scoping document for each system, the current classification of these systems in accordance 10 CFR 50.65 (a)(1) or (a)(2), and the appropriateness of the performance criteria and goals established for each system.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope (six samples)

The inspectors evaluated online risk management for four planned maintenance activities and two emergent repair activities. 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 AP 0125, "Plant Equipment" and AP 0172, "Work Schedule Risk Management - Online." The inspectors reviewed the following work activities:

- Planned maintenance on the "A" train of the RHR system;
- Planned maintenance on the "A" EDG;
- Planned replacement of rod position indicating system (RPIS) power supply, PSX-5;
- Planned de-silting of the deep basin which required the safety-related cooling tower cell 2-1 to be taken out of service;
- Emergent repair of the "A" reactor building-to-torus vacuum breaker; and
- Emergent replacement of reactor protection system (RPS)/primary containment isolation system (PCIS) Agastat relays 5-12C(X) and 5-12D(X).

b. Findings

No findings of significance were identified.

1R14 Personnel Performance During Non-Routine Plant Evolutions (71111.14)a. Inspection Scope (three samples)

The inspectors directly observed and assessed control room operator performance during the following non-routine evolutions:

- The second of four planned 5% reactor power increases in support of extended power uprate on April 1, 2006;
- The third of four planned 5% reactor power increases in support of EPU. This 5% increase was broken into two separate 2.5% reactor power increases, performed on April 6 and April 22. The increase was performed in two increments due to a "hold" that had been temporarily placed on EPU testing. (See Section 4OA5.1 of this report for more detail.); and
- The fourth of four planned 5% reactor power increases in support of EPU. This 5% increase was also broken into two separate 2.5% reactor power increases, performed on April 28 and May 5. The increase was performed in two increments due to two "holds" that had been placed on EPU testing. (See Section 4OA5.1 of this report for more detail).

The adequacy of personnel performance, procedure compliance, and use of the corrective action process for all non-routine evolutions were evaluated against the requirements and expectations contained in TS and the following station procedures, as applicable:

- AP 0151, "Responsibilities and Authorities of Operations Department Personnel;"
- AP 0153, "Operations Department Communication and Log Maintenance;"
- DP 0166, "Operations Department Standards;"
- Engineering Request Special Test Instruction (ERSTI) 04-VY1-1409, "Power Ascension Test Procedure for Extended Power Conditions 1593 to 1912 MWth;"
- OP 0105, "Reactor Operations;" and
- OP 2403, "Control Rod Sequence Exchange with the Reactor Online."

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 the operability determinations against the guidance contained in NRC Inspection Manual, Part 9900, Technical Guidance, "Operability Determinations and Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety," as well as Entergy procedure ENN-OP-104, "Operability Determinations." The inspectors verified the adequacy of the following evaluations of degraded or non-conforming conditions:

- While testing the mechanical hydraulic pressure control system per ERSTI 04-VY1-1409 at 1832 MWth, a "hold" was placed on testing when Entergy identified steam flow data that exceeded established acceptance criteria;
- During the performance of ERSTI 04-VY1-1409, a "hold" was placed on testing when operators observed control valve position and steam dome-to-turbine steam chest pressure values that were inconsistent with observed steam flow values;
- Inability to fully open "D" SW pump discharge valve SW-2D;
- RPS/PCIS Agastat relays 5-12C(X) and 5-12D(X) potentially exceeded their environmental qualification lifetime;
- Oil leak on the auto transformer (345-to-115 kilovolt transformer that supplies the startup transformers in the event of a turbine trip); and
- "A" EDG jacket water cooling pump leakage.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing (71111.19)a. Inspection Scope (five samples)

The inspectors reviewed five post-maintenance testing (PMT) activities on risk-significant systems. The inspectors either directly observed the testing or reviewed completed PMT documentation to verify that the test data met the required acceptance criteria contained in the TS, UFSAR, and inservice testing program. 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 also verified that the test activities were adequate to ensure system operability and functional capability following maintenance, systems were properly restored following testing, and any discrepancies were appropriately documented in the corrective action program. The inspectors reviewed the following PMT activities:

- Testing in accordance with OP 4124, "Residual Heat Removal and RHR Service Water System Surveillance," following planned maintenance on the "A" train of RHR;
- Testing in accordance with work order (WO) 05-2027, following the replacement of RPIS power supply PSX-5;
- Testing in accordance with WO 05-5204, following emergent troubleshooting of the "A" reactor building-to-torus vacuum breaker;
- Testing in accordance with ERT 04-526-03-01, "C51/C52 Breaker and Capacitor Bank Functional Test," following the installation of the 115 kilovolt switchyard capacitor banks; and
- Testing in accordance with OP 4126, "Diesel Generator Surveillance," following planned maintenance on the "A" EDG.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope (five samples)

The inspectors observed surveillance testing to verify that the test acceptance criteria specified for each test was consistent with TS and UFSAR requirements, the test was performed in accordance with the written procedure, the test data was complete and met procedural requirements, and the system was properly returned to service following testing. The inspectors observed selected pre-job briefs for the test activities.

The inspectors also verified that discrepancies were appropriately documented in the corrective action program. The inspectors verified that the following surveillance testing activities met the above requirements:

- MSIV quarterly closure testing (in-service test) in accordance with OP 4113, "Main and Auxiliary Steam System Surveillance," Section A;
- Core spray pump quarterly operability testing (in-service test) in accordance with OP 4123, "Core Spray System Surveillance," Section C;
- SW pump operability and discharge check valve quarterly testing (in-service test) in accordance with OP 4181, "Service Water/Alternate Cooling System Surveillance," Section A;
- High pressure coolant injection (HPCI) steam line high flow instrument calibration (routine surveillance) in accordance with OP 4356, "HPCI Steam Line Flow Functional/Calibration," Section B; and
- Control rod scram time testing (in-service test) in accordance with OP 4424, "Control Rod Scram Testing and Data Recording," Section B.

b. Findings

No findings of significance were identified.

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1R23 Temporary Plant Modifications (71111.23)a. Inspection Scope (one sample)

The inspectors reviewed temporary alteration (TA) 2006-006 made to the circulating water system deicing gate to install restraints to hold the gate closed pending installation of a newly designed deicing gate. The deicing gate can be opened during winter conditions to admit a flow of warm, recirculated circulating water from the discharge structure to the SW intake bay to melt ice buildup. The original gate guide frame and anchorage had degraded and would no longer support the gate in the closed position. The inspectors compared the information in the TA package to requirements contained in Entergy Nuclear Management Manual Procedure EN-DC-136, "Temporary Alterations." The inspectors observed the installation of the TA and verified that required tags were applied and that the alteration was properly maintained.

b. Findings

No findings of significance were identified.

**2. RADIATION SAFETY****Cornerstone: Public Radiation Safety**2PS3 Radiological Environmental Monitoring Program (REMP) (71122.03)a. Inspection Scope (one sample, 02.02.e)

During the initial power increase into the EPU range of operation, the inspectors reviewed the effects on offsite dose with respect to 10 CFR 20.1301(e) and 40 CFR 190 public dose limits. The inspectors witnessed pressurized ion chamber data collection at the highest offsite dose location at the VY fence (location DR-53) on March 5, 2006, during the initial EPU power increase, and again on May 5, 2006 once the 100% EPU power level was reached. Entergy's basis for accurate dose rate measurement and correlations with main steam line radiation monitors were evaluated. This included reviews of applicable procedure and instrument vendor manuals, as well as calibration records for the pressurized ion chamber and main steam line radiation monitor instrumentation. In addition, the licensee's process of data collection, background subtraction, and data reduction was witnessed and reviewed. Inspectors performed an inspection of Entergy's REMP program during the fourth quarter of 2005. During this inspection, unresolved item (URI) 05000271/2005005-03, Information Needed to Validate the Direct Dose Calculation Method in Offsite Dose Calculation Manual (ODCM) Section 6.11.1, was opened because additional information was required for the inspectors to determine the adequacy of the direct dose calculation methodology in the ODCM. Since then, an in-office review of the licensee's technical basis for the direct dose calculation methodology contained in Section 6.11.1 of the ODCM was performed with assistance from the NRC's Office of Nuclear Reactor Regulation (NRR). The

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purpose of the review was to determine whether the calculation was correct and provided acceptable results to determine dose to the public from VY power operations. This evaluation was completed on May 16, 2006.

b. Findings

No findings of significance were identified. With the installation of additional turbine shielding on May 17, 2006, the current calculation in Section 6.11.1 of the ODCM is conservative. Entergy plans to conduct another power ascension fence line dose measurement correlation with main steam line radiation monitor measurement at the next outage opportunity and revise Section 6.11.1, accordingly. Inspection and in-office review of this issue has determined that the licensee's offsite dose during EPU operation as determined by the calculation method in the ODCM is adequate and that offsite doses are within the NRC and Environmental Protection Agency (EPA) public dose limits. Based on this inspection and in-office review, Unresolved Item 05000271/2005005-03 is closed.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator Verification (71151)

a. Inspection Scope (two samples)

The inspectors sampled Entergy submittals for the two performance indicators (PIs) listed below for the period from April 2004 to March 2006. PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline;" EN-LI-114, "Performance Indicator Process;" and AP 0094, "NRC Performance Indicator Reporting" were used to verify the basis in reporting for each data element.

- Reactor Coolant System Specific Activity; and
- Reactor Coolant System Leakage.

The inspectors reviewed portions of operator logs and raw PI data developed from monthly operating reports and discussed the methods for compiling and reporting the PIs with cognizant licensing, operations, and chemistry department personnel. The inspectors compared graphical representations from the most recent PI report to the raw data to verify that the data was correctly reflected in the report.

b. Findings

No findings of significance were identified.



#### 4OA2 Identification and Resolution of Problems (71152)

##### .1 Review of Items Entered into the Corrective Action Program

###### 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 program 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 the description of each new CR and/or by attending daily CR screening meetings. A listing of CRs and other documents reviewed is included in the attachment to this report.

###### b. Assessments and Observations

No findings of significance were identified.

##### .2 Semi-Annual Trend Review

###### a. Inspection Scope

The inspectors performed a review of Entergy's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The review was focused on human performance-related issues and considered the results of reviews discussed in Section 4OA2.1. The inspectors' review nominally considered the six-month period of January through June 2006. The inspectors compared their results with the results contained in Entergy's quarterly trend report for the first quarter 2006; recently developed "trend" condition reports; Entergy's human performance PI data; and discussions with Operations, Radiation Protection (RP), and Technical Support Department management. The corrective actions assigned to address the individual issues as well as to address human performance trends were reviewed for adequacy.

###### b. Assessment and Observations

No findings of significance were identified.

In May 2006, the Operations Manager initiated trending CR 2006-1492 that summarized two recent Operations Department human performance errors. These errors included operator manipulation of an incorrect valve while attempting to remove the "C" condensate demineralizer from service and an operator inadvertently tripping open a breaker associated with the EDGs while hanging a tag on an adjacent breaker. As a result of these errors, the Operations Department Human Performance PI turned Red. Also in May, the RP manager initiated trending CR 2006-1314 summarizing six recent

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human performance “precursor” events. For example, an RP technician contaminated himself while performing a survey, there were multiple examples of high radiation area entries without a radiological conditions briefing, and a seavan radioactive material container was missing a required lock.

Operations Department Management held a “stand down” to brief operating crews on the individual issues listed in CR 2006-1492 and the apparent trend in human performance errors. Additionally, Operations Department Management plans to develop a human performance improvement plan and to perform focused assessments of human performance-related errors and events. Likewise, RP Department Management held a stand down to brief RP personnel on the individual issues and the trend in human performance error precursors and will continue to maintain a heightened level of awareness to human performance-related issues and events.

The inspectors concluded that Operations and RP Department Management made appropriate use of available tools such as the trending process and the PI process to recognize and take action on low level human performance issues before they became more significant and rose to the level of a finding or violation. However, the inspectors also stressed the need for continued diligence in the area of human performance.

### .3 Annual Sample Review - Special Nuclear Material Controls

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

On April 20, 2004, Entergy determined that two spent fuel rod pieces were not in the storage location designated in the special nuclear material (SNM) inventory records. On July 13, 2004, following an investigation, Entergy discovered that the two spent fuel rod pieces were still in the spent fuel pool, but in a different location. In 2004, NRC conducted a special inspection to review Entergy’s investigation and conclusions regarding the search for the two spent fuel rod pieces (Inspection Report 05000271/2004007, dated December 2, 2004). On June 22, 2005, NRC issued a Severity Level III Notice of Violation with no civil penalty to Entergy for failure to keep adequate records of the SNM in its possession and failure to conduct adequate physical inventories (EA 04-0174).

The purpose of this inspection was to review the corrective actions taken by Entergy to address the identified root causes of the failure to account for the spent fuel rod pieces. The inspectors reviewed the corrective actions completed since September 2004, and assessed the effectiveness of the corrective actions in addressing the identified causes of the event. Specifically, the inspectors reviewed CRs associated with the misplaced spent fuel rod pieces, and other CRs associated with SNM controls initiated since September 2004. The inspectors also reviewed assessments of SNM controls performed by Entergy. The inspector reviewed procedures for control of SNM that had been revised to address the causes of the event, and reviewed records of SNM inventories completed since September 2004. The inspector also toured the refuel floor and held discussions with reactor engineering personnel.

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b. Findings and Observations

No findings of significance were identified.

The inspectors found that Entergy had taken significant actions to improve SNM controls since the event in 2004. Procedures were revised and processes were changed to establish detailed controls for transfer and tracking of SNM with an appropriate level of management oversight. There were two instances in which tamper seals for SNM containers were found broken (no material was misplaced) in 2004 and 2005. In both cases, Entergy appropriately considered the effectiveness of previous corrective actions and took further actions to prevent recurrence.

Entergy had performed several assessments of SNM controls since the loss of accountability of the fuel rod pieces in 2004. The inspectors questioned the timing of the licensee's effectiveness review of the corrective actions for the event because, at the time it was performed in June 2005, no fuel transfers had been performed and the 2005 annual inventory had not yet been conducted. Although the effectiveness review was not performance based, a Quality Assurance (QA) surveillance was subsequently performed which included observations of SNM transfers during refueling outage (RFO) 25 and conduct of the 2005 annual inventory. Entergy also conducted a self-assessment of SNM controls during RFO 25 and the 2005 annual inventory, and a corporate assessment of SNM controls at Vermont Yankee was completed in early 2006.

Based on the results of this inspection, VIO 05000271/2004007-01, "Did Not Keep Adequate Records, Follow Procedures, and Perform Physical Inventory of Special Nuclear Material," (EA 04-0174) is closed.

.4 Annual Sample: Failure of Emergency Diesel Generator Loss of Field Relays

a. Inspection Scope (one sample)

The inspectors reviewed Entergy's corrective actions in response to CR 2005-3854, "DG-1-1A and DG-1-1B loss of field relays may not adequately protect the EDGs during a loss of field event when operating in parallel with the grid." The inspectors reviewed CRs, night orders, work orders, plant drawings and engineering documentation as listed in the attachment to this report. The inspectors also performed walkdowns of the EDGs and interviewed operations and engineering department personnel to determine if Entergy had adequately resolved the issues.

b. Findings and Observations

No findings of significance were identified.

Entergy's identification of the cause of the "B" emergency diesel generator failure and the associated corrective actions were appropriate. However, the inspectors identified that an interim administrative control measure was not maintained to ensure that the

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EDGs were appropriately secured during a loss of field event while paralleled with offsite power or the main generator. An entry was originally made in the Operations Night Orders shortly after identification of the issue (November 2005) that alerted operators to the lack of field-loss protection. This entry reminded operators to monitor field volts and output voltage during surveillance testing, to trip the EDG immediately upon indication of an EDG loss of field, and that the preferred method for tripping the EDG was by using the Test switch in the main control room. The inspectors identified that the entry was removed from the Night Orders on approximately February 16, 2006, without transferal to another administrative process despite the continuing lack of protection. Modifications to the EDG loss of field relays are scheduled to occur later in 2006. Entergy entered this issue into their corrective action program (CR 2006-1438) and incorporated the information into the pre-job briefing form used during monthly EDG surveillances. This finding was minor because operators had received licensed operator requalification training on the November 2005 EDG event, which included the associated operator responses, and operating procedures were in place to take appropriate emergency actions in the case of abnormal EDG performance.

#### 4OA3 Event Followup (71153)

##### .1 Indications of a Fire in the East Switchgear Room and the Declaration of an Unusual Event

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

The inspectors responded to the site following the declaration of an Unusual Event (UE) on May 24. The UE was declared on the basis of indications of an in-plant fire that was not extinguished within 10 minutes. The inspectors observed reactor plant parameters in the control room and evaluated safety system response to the event. The inspectors also assessed the response of the licensed operators against applicable operating procedures, abnormal operating procedures, and emergency operating procedures. The inspectors evaluated Entergy's classification of the event as a UE against the Emergency Plan Emergency Action Level (EAL) procedures and the ability of emergency response staff to notify NRC and State/Local Governments as required. The inspectors also evaluated the response of Entergy's fire brigade and the east switchgear room automatic fire protection systems.

###### b. Findings

The event appears to have been initiated by a ground fault that developed in the windings of the "C" condensate pump motor. The resultant fault current was transferred, by design, to a resistor bank located in the east switchgear room on bus 2. This resistor bank is designed to dissipate the current generated during a ground fault in the form of heat. Initial fire brigade reports from the east switchgear room indicated that there were no signs of flames or smoke in the vicinity of the "C" condensate pump breaker. However, the heat generated by the resistor bank appears to have been sufficient to have ionized dust that had accumulated on and around the resistor bank.

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It is believed that the ionized dust caused adjacent fire detectors to alarm and actuate the automatic CO2 fire suppression system. Similar switchgear room CO2 discharge events occurred at VY during motor ground faults in 1983 and 1989. As of the conclusion of this inspection, Entergy had not completed their root cause analysis of this event. Additionally, the inspectors continue to review internal and external operating experience (OE) related to pump motor ground faults, large motor preventive maintenance, and adverse effects of dust accumulation on electrical equipment. Pending the completion of the inspectors review of Entergy's root cause analysis and applicable OE, these issues are considered to be an unresolved item (URI): URI 0500271/2006003-01, Condensate Pump Motor Fault and Switchgear Room CO2 Initiation Result in the Declaration of an Unusual Event.

#### 4OA5 Other

##### .1 Power Uprate: Power Ascension Testing (71004)

###### a. Inspection Scope (four samples)

The inspectors observed power ascension testing performed in accordance with attachments to test procedure ERSTI-04-VY1-1409. The four inspection samples comprised level and pressure testing at 1752, 1832, and 1912 MWth as well as a condensate pump trip test conducted within 7 days of reaching 1912 MWth. The inspectors observed testing to verify that the test acceptance criteria specified was consistent with TS and UFSAR requirements, the test was performed in accordance with the written procedure, test data was complete and met procedural requirements, and affected systems were properly returned to service following testing. The inspectors also observed selected testing pre-job briefs. The inspectors verified that discrepancies identified during testing were appropriately documented in the corrective action program. The inspectors verified that the following testing activities met the above requirements:

- Testing at 1752 MWth
  - Attachment 7B, "Feedwater Level Changes 1752 MWth"
  - Attachment 8B, "MHC [mechanical hydraulic control] Pressure Change Demonstration 1752 MWth"
- Testing at 1832 MWth
  - Attachment 7C, "Feedwater Level Changes 1832 MWth"
  - Attachment 8C, "MHC Pressure Change Demonstration 1832 MWth"
- Testing at 1912 MWth
  - Attachment 7D, "Feedwater Level Changes 1912 MWth"
  - Attachment 8D, "MHC Pressure Change Demonstration 1912 MWth"
- Condensate Pump Trip Testing
  - Attachment 18, "Condensate Pump Trip Test at Full EPU Power"

At 1793 MWth, 1832 MWth, and 1872 MWth, the licensee identified conditions that met Level 2 acceptance criteria established in ERSTI-04-VY1-1409 and required a "hold" be placed on further testing pending review of the data by Engineering Department

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personnel and NRC staff, as appropriate. The conditions identified included “A” main steam line strain gage data that exceeded acceptance criteria at 1793 MWth; steam flow indication variability that exceeded acceptance criteria and operator-observed inconsistencies between indicated steam flow, control valve position, and steam system differential pressure at 1832 MWth; and moisture carryover acceptance criteria was exceeded at 1872 MWth. For each of the “holds” placed on testing, the inspectors ensured Entergy had entered the issues into their corrective action program and had appropriately evaluated the condition(s) prior to continuing with testing. NRC headquarters staff also reviewed selected issues prior to continuing with testing. Section 1R15 of this report discusses inspections of the steam flow indication variability and observed inconsistencies between indicated steam flow, control valve position, and steam system differential pressure since these conditions did not specifically require NRC headquarters staff review prior to continuing with testing.

At 1752 MWth and 1912 MWth, the inspectors performed walkdowns of the feedwater heaters, the main condenser and moisture separators, and main steam system piping and valves. The inspectors looked for visual evidence of water and steam leaks and equipment vibration.

b. Findings

No findings of significance were identified.

.2 (Closed) URI 05000271/2006002-01: Training Provided to Licensed Operators Regarding Plant Response to a Condensate Pump Trip

During the observation of training initially provided to licensed operators on the expected plant response to a trip of a condensate pump from 100% reactor power, the inspectors noted that the simulated plant response differed from the predicted plant response indicated in Reactor Engineering’s analysis for this event. The difference was in the final values of core thermal power and core flow immediately following the pump trip. At that time, the inspectors were concerned that the condensate pump trip training initially provided to licensed operators did not meet the met the guidance outlined in American National Standards Institute/American Nuclear Society (ANSI/ANS) 3.5-1998, “Nuclear Power Plant Simulators for Use in Operator Training and Examination.” Based on the results of the inspections of licensed operator training discussed in Section 1R11 and on the results of the inspections of the condensate pump trip test discussed in Section 4OA5.1, the inspectors concluded that the condensate pump trip training provided to licensed operators met the guidance outlined in ANSI/ANS-3.5-1998. This URI is closed.

.3 (Closed) NRC Temporary Instruction (TI) 2515/165, "Operational Readiness of Offsite Power and Impact on Plant Risk"

a. Inspection Scope

The objective of TI 2515/165, "Operational Readiness of Offsite Power and Impact on Plant Risk," was to gather information to support the assessment of nuclear power plant operational readiness of offsite power systems and impact on plant risk. The inspectors evaluated licensee procedures against the specific offsite power, risk assessment and system grid reliability requirements of TI 2515/165. They also discussed the attributes with licensee personnel.

The information gathered while completing this TI was forwarded to the Office of Nuclear Reactor Regulation for further review and evaluation on April 3, 2006.

b. Findings

No findings of significance were identified.

.4 Institute of Nuclear Power Operations (INPO)/World Association of Nuclear Operators (WANO) Plant Assessment Report Review

The inspectors reviewed the final report for the INPO/WANO plant assessment of the Vermont Yankee Power Station conducted in April 2005. The inspectors reviewed the report to ensure that issues identified were consistent with the NRC perspectives of Entergy's performance and to verify if any significant safety issues were identified that required further NRC follow-up.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On July 12, the resident inspectors presented the inspection results to Messrs. Bill Maguire and John Dreyfuss and members of the VY staff. The inspectors asked whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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**SUPPLEMENTAL INFORMATION****KEY POINTS OF CONTACT**Entergy Personnel

J. Devinentis, Licensing Manager  
 J. Dreyfuss, Director of Engineering  
 M. Hamer, Licensing  
 W. Maguire, General Manager of Plant Operations  
 K. Pushee, Radiation Protection Manager  
 N. Rademacher, Director of Nuclear Safety  
 J. Thayer, Site Vice President (former)  
 T. Sullivan, Site Vice President (current)

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

05000271/2006003-01	URI	Condensate Pump Motor Fault and Switchgear Room CO2 Initiation Result in the Declaration of an Unusual Event (Section 4OA3.1)
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Closed

05000271/2004007-01	VIO	Did Not Keep Adequate Records, Follow Procedures, and Perform Physical Inventory of Special Nuclear Material (Section 4OA2.3)
05000271/2005005-03	URI	Information Needed to Validate the Direct Dose Calculation Method in ODCM Section 6.11.1 (Section 2PS3)
05000271/2006002-01	URI	Training Provided to Licensed Operators Regarding Plant Response to a Condensate Pump Trip (Section 4OA5.2)

**LIST OF DOCUMENTS REVIEWED****Section 2PS3: Radiological Environmental Monitoring Program**Procedures

OP 4505	Source Calibration of Main Steam Line Radiation Monitors
OP 4658	Periodic Evaluation of Direct Dose From Plant Operation



Miscellaneous Documents

GE-Reuter Stokes User's Manual for Pressurized Ion Chamber

**Section 4OA2.1: Routine Review of Identification and Resolution of Problems**

Condition Reports

2004-1474	"A" SW discharge valve bonnet guide ribs severely worn
2005-3633	A EDG potential transformer fuse blown annunciator momentarily received
2006-0950	Unanticipated dose rate alarm during dose rate verification survey
2006-0958	Four strain gages installed as part of the Steam Dryer monitoring plan for EPU appear to be providing inaccurate readings
2006-0960	Ground water leak on torus floor
2006-0961	Eight accelerometers installed as part of the piping vibration monitoring plan appear to be non-functioning
2006-0962	Observation of increased vibration of conduit associated with LSH-101-38A
2006-0966	The difference between steam flow and feed flow is increasing as reactor power is raised to 100% EPU
2006-0986	Recombiner "A" failed to warm up after attempted repair of MS-107-1A
2006-1018	Steam Dryer level 2 performance criteria exceeded during power ascension
2006-1031	Condensate demineralizer inadvertently removed from service when wrong valve was manipulated
2006-1038	EQ qualified life relay replacements not performed for assets 5-12C(X) & 5-12D(X)
2006-1083	Siren controller radio was found unplugged at the Bernardston Fire Station
2006-1134	Breaker opened inadvertently while operator was hanging tags
2006-1137	Cross-contamination (non-rad dye) of potable water system when a contractor
2006-1164	Excessive black exhaust exiting EDG stack during surveillance run on April 20, 2006 is in violation of State of VT regulations
2006-1197	Steam/Feed mismatch observed
2006-1210	During the performance of ERSTI-04-VY1-1409-000, Level 2 acceptance criteria for Total Steam flow deadband was exceeded
2006-1249	Main steam line pressure drop larger than expected at 1832 MWth
2006-1260	Moisture carryover analysis result >0.10% after power increase to 1872 MWth
2006-1360	Moisture carryover analysis result >0.10% at 1912MWth
2006-1404	Unable to close SW pump discharge valve SW-2D
2006-1406	D SW pump discharge valve will not fully close
2006-1413	The D SW LCO was not able to commence due to the inability to close V70-2D
2006-1427	'A' RHR heat exchanger cleaning period exceeds 18 month requirement
2006-1446	Fuel pooling cooling pump tripped due to operator starting the pump without a suction path established
2006-1470	Less than minimum staffing 5/15/06 2346
2006-1570*	NRC identified that I&C personnel took as-left voltage readings from incorrect RPIS power supply
2006-1583	Fire damper not closing consistently

2006-1593	Diesel Generator day tank high and low alarm switches not checked monthly as per TS bases 4.10.A
2006-1641	HPCI-14 cycling after HPCI freedom of movement test
2006-1660	The 5/24/06 ground fault on Bus 2 resulted in East switchgear CO2 initiation and unusual event declaration
2006-1737	Expected site boundary exposure rates are higher than postulated in calculations prepared prior to plant power uprate
2006-1738	Installation of HP Turbine Shield impacts the Offsite Dose Calculation Manual method for determining the maximum contribution of direct dose due to Nitrogen-16
2006-1740	SM authorized tag removal from RHRSW pump without considering impact on operability of core spray pump in same room
2006-1805	Improper weapon manipulation in armory
2006-2037	Following the "A" EDG 2 hour load test, the #60 relay Line B LOW target was in
2006-2046*	An existing workaround was not contained in pre-job briefing form for EDG fast start test. It was in slow start form.

\* Inspector-identified issues.

## **Section 40A2.2: Semi-Annual Trend Review**

### Procedures

EN-LI-102	Corrective Action Process
EN-LI-121	Entergy Trending Process

### Condition Reports

2006-0967	RP tech performing survey became contaminated
2006-0973	RP tech errors when ED alarmed
2006-0974	Failure to document radiological conditions briefing
2006-1110	Multiple entries made under high rad RWP without documented rad briefing
2006-1148	Sealand container missing required lock
2006-1031	Condensate demineralizer inadvertently removed from service when wrong valve was manipulated
2006-1134	Breaker opened inadvertently while operator was hanging tags
2006-1137	Cross-contamination (non-rad dye) of potable water system when a contractor connected unauthorized equipment to the potable water supply to clean cooling towers
2006-1314	Emerging trend in RP department HU error precursors
2006-1446	Fuel pool cooling pump tripped due to operator starting the pump without a suction path established
2006-1492	Operations department HU performance indicator is red
2006-1570	NRC identified that I&C personnel took as-left voltage reading from incorrect RPIS power supply
2006-1740	SM authorized tag removal from RHRSW pump without considering impact on operability of core spray pump in same room

2006-1805 Improper weapon manipulation in armory

Miscellaneous Documents/Reports

Vermont Yankee Quarterly Trend Report, First Quarter 2006

Vermont Yankee Human Performance PIs for the station, the operations department, and the radiological protection department

**Section 40A2.3: Annual Sample Review - Special Nuclear Material Controls**

Procedures

EN-NF-200 Special Nuclear Material Control, Rev. 1, dated 12/4/2005  
 EN-NF-202 Tamper Proof Seals for Special Nuclear Material, Rev. 1, dated 12/4/2005  
 EN-NF-104 Special Nuclear Materials Program, Rev. 1, dated 12/4/2005

Condition Reports and Work Tasks

2004-1339 Two fuel rod pieces not properly tracked  
 2004-1906 Process for tamper-evident devices not fully effective to ensure accounting of SNM  
 2004-2562 Physical inspection of SFP failed to identify SNM container  
 2004-3837 SNM tamper-evident seal on gang box found broken during annual physical inventory of onsite SNM  
 2005-3159 Box containing SNM with tamper seal opened prior to notifying Reactor Engineering  
 2005-3993 CR 2005-3159 identified corrective actions, but did not generate CAs  
 2006-0022 CR 2004-1339 was closed without completion of recommended corrective actions

LO 2004-0346 Perform bench-marking in the area of Reactor Engineering  
 LO 2004-0329 Followup verification for CR 2004-1339  
 LO 2004-0492 Perform snap-shot self-assessment of SNM during refueling  
 LO 2004-0494 Perform management observation of annual SNM inventory  
 LO 2005-0206 Training for new Entergy fleet SNM procedures

WT 2005-0000, CA 00417 Forward SNM case study to managers and supervisors for presentation at monthly staff meetings  
 WT 2005-0000, CA 00992 Establish a standard for signs and postings  
 WT 2005-0000, CA 00998 Review signs and postings against new standard  
 WT 2005-0000, CA 01948 Review CR 2004-1339, CA 9 and CA 20 to ensure actions are complete  
 WT 2005-0000, CA 01976 Consider including SNM program requirements in pre-outage or annual refresher training for general staff

Assessment Reports

CARB Effectiveness Review Report "Results of Effectiveness Review for CR-VTY-2004-1339, "The Loss of Accountability of SNM,"" dated 6/13/2005  
QA Surveillance Report QS-2005-VY-028, "SNM Controls Assessment," dated 1/4/2006  
VY Benchmark Report "SNM Control and Process," dated 1/20/2005  
VY Snapshot Self-Assessment Report, "Special Nuclear Materials Self-Assessment for RFO25 Activities and SNM Inventory 2005," dated 1/18/2006

**Section 40A2.4: Annual Sample: Failure of Emergency Diesel Generator Loss of Field Relays**

Procedures

OP 4126 Diesel Generator Surveillance

Drawings

5920-3909 Emergency Diesel Generator AC Schematic Diagram, Rev. 11  
5920-3910 Emergency Diesel Generator DC Schematic Diagram, Rev. 15  
5920-3992 Emergency Diesel Generator Engine Control, Rev. 9  
5920-4152 Emergency Diesel Generator Interconnection Diagram – Static Exciter, Rev. 1  
B-191301 Sh.327A, "4KV Swgr #3, Compt 9, 4KV Swgr #3 Tie to 4KV Swgr #1 Bkr #3T1", Rev. 0  
B-191301 Sh.328A, "4KV Swgr. #3, Compt. 10, Diesel Generator DG1-1B Bkr. & Lnp. Ckt.", Rev. 11

Miscellaneous

ER 05-0992, Emergency Diesel Generator KLF Loss of Field Relay Modification – Nuclear Change, Minor Calculation Change Document under ER-05-0992 for Calculation VYC-1671, EDG A & B Protective Relay Settings Verification  
Vermont Yankee Night Orders Book  
Vermont Yankee Pre-Job Briefs for the Diesel Generator Monthly Start and Load Tests  
Licensed Operator Requalification Training Program, LOR-25-205  
ResponsesWestinghouse Infogram IG93010, GVER-93-202  
Work Order 05-04242-000  
Work Order 05-04242-001

Condition Reports

2005-3622 Loss of "B" EDG during ECCS test on 11/06/2005  
 2005-3633 DG-1-1A potential transformer fuse blown annunciator momentarily received during ECCS integrated test following the start of the RFO 25 ECCS integrated test  
 2005-3854 The EDG-1-1A and DG-1-1B loss of field relays may not adequately protect the EDGs during a loss of field event when operating in parallel with the Grid  
 2005-3979 The impedance unit which is internal to the DG-1-1B loss of field relay was found to be in the actuated position  
 2005-3981 The trip setting of "A" and "B" diesel generator loss of field impedance units are set closer to the operating point of the EDG than desired  
 2006-1112 EDG-some delay in sending 30 year old relay to lab for failure analysis per CA  
 2006-1433\* Editorial error describing KLF loss of field relay target tap setting in VYC-1671  
 2006-1438\* Administrative issue identified with the tracking of the diesel generator loss of field relays

\* Inspector-identified Issues.

**Section 40A3.1: Indications of a Fire in the East Switchgear Room and the Declaration of an Unusual Event**

Procedures

EAL U-4-a Any Unplanned On-Site or In-Plant Fire Not Extinguished Within 10 Minutes  
 OP 0105 Reactor Operations  
 OP 3020 Fire Emergency Response Procedure  
 OP 3540 Control Room Actions During an Emergency

Condition Reports

2006-1574 Ground on bus 2  
 2006-1660 The 5/24/06 ground fault on bus 2 resulted in East switchgear CO2 initiation and Unusual Event declaration

Miscellaneous Documents

Control Room Logs

**Section 40A5.4: NRC Temporary Instruction (TI) 2515/165, "Operational Readiness of Offsite Power and Impact on Plant Risk"**

Procedures

AP-0172 Work Schedule Risk Management-Online, Rev 7  
 ENN-PL-158 Transmission Grid Interface, Rev 0  
 ON 3179 Grid Instability, Rev 0

**LIST OF ACRONYMS**

ADAMS	Agencywide Documents Access and Management System
ANSI/ANS	American National Standards Institute/American Nuclear Society
CFR	Code of Federal Regulations
CO <sub>2</sub>	Carbon Dioxide
CR	Condition Report
DP	Vermont Yankee Department Procedure
EAL	Emergency Action Level
EDG	Emergency Diesel Generator
EPA	Environmental Protection Agency
EPU	Extended Power Uprate
ER	Engineering Request
ERSTI	Engineering Request Special Test Instruction
FA	Fire Area
FZ	Fire Zone
HPCI	High Pressure Coolant Injection
IPEEE	Individual Plant Examination External Events
INPO	Institute of Nuclear Power Operations
IR	Inspection Report
MHC	Mechanical Hydraulic Control
MSIV	Main Steam Isolation Valve
MWth	Thermal Megawatts
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
ODCM	Offsite Dose Calculation Manual
OE	Operating Experience
OP	Vermont Yankee Operating Procedure
PARS	Publicly Available Records
PCIS	Primary Containment Isolation System
PI	Performance Indicator
PMT	Post Maintenance Testing
QA	Quality Assurance
REMP	Radiological Environmental Monitoring Program
RFO	Refueling Outage
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RP	Radiation Protection
RPS	Reactor Protection System
RPIS	Rod Position Indicating System
SNM	Special Nuclear Material
SW	Service Water
TA	Temporary Alteration

TI	Test Inspection
TS	Technical Specification
UE	Unusual Event
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
VIO	Violation
VY	Vermont Yankee
WANO	World Association of Nuclear Operators
WO	Work Order