



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
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August 2, 2007

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 05000271/2007003

Dear Mr. Sullivan:

On June 30, 2007, 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 9, 2007, with you and members of your staff.

This 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,

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

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

Enclosure: Inspection Report 05000271/2007003

w/Attachment: Supplemental Information

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4

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.: 50-271

Licensee No.: DPR-28

Report No.: 05000271/2007003

Licensee: Entergy Nuclear Operations, Inc.

Facility: Vermont Yankee Nuclear Power Station

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

Dates: April 1, 2007 through June 30, 2007

Inspectors: David L. Pelton, Senior Resident Inspector
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James D. Noggle, Senior Health Physicist
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Approved by: Raymond J. Powell, Chief
Projects Branch 5
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TABLE OF CONTENTS

SUMMARY OF FINDINGS	iii
REPORT DETAILS	1
REACTOR SAFETY	1
1R01 Adverse Weather Protection	1
1R04 Equipment Alignment	1
1R05 Fire Protection	2
1R06 Flood Protection Measures	3
1R07 Heat Sink Performance	3
1R08 Inservice Inspection Activities	4
1R11 Licensed Operator Requalification Program	5
1R12 Maintenance Effectiveness	6
1R13 Maintenance Risk Assessment and Emergent Work Evaluation	6
1R15 Operability Evaluations	7
1R17 Permanent Plant Modifications	7
1R19 Post Maintenance Testing	8
1R20 Refueling and Other Outage Activities	9
1R22 Surveillance Testing	10
1R23 Temporary Plant Modifications	11
1EP7 Force-On-Force (FOF) Exercise Evaluation	12
RADIATION SAFETY	12
2OS1 Access Control to Radiologically Significant Areas	12
2OS2 ALARA Planning and Controls	13
OTHER ACTIVITIES	14
4OA1 Performance Indicator Verification	14
4OA2 Problem Identification and Resolution	15
4OA3 Event Followup	17
4OA5 Other Activities	19
4OA6 Meetings, Including Exit	19
ATTACHMENT: SUPPLEMENTAL INFORMATION	19
KEY POINTS OF CONTACT	A-1
LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED	A-1
LIST OF DOCUMENTS REVIEWED	A-1
LIST OF ACRONYMS	A-5

SUMMARY OF FINDINGS

IR 05000271/2007003; 04/01/07 - 06/30/07; 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 health physics and inservice inspection inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

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 full power. An unplanned reactor power reduction to approximately 38 percent was performed on April 9, 2007, as a result of a loss of offsite power line 381. The plant was returned to full power on April 11, 2007. On May 12, 2007, the plant was shutdown for approximately 24.5 days to support a planned refueling outage. The plant was successfully restarted (breaker closure) on June 6, 2007, and returned to full power on June 8, 2007. With the exception of additional minor power reductions to support rod pattern adjustments, VY remained at full power throughout the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

a. Inspection Scope (one sample)

The inspectors reviewed measures established by Entergy for the restoration from cold weather operations. The inspectors reviewed Vermont Yankee Operating Procedure (OP) 2196, "Preparations for Cold Weather Operations," including Form VYOPF 2196.02, "Cold Weather Restoration Operations Checklist;" discussed the completion of items with operations personnel to confirm the items on the checklist had been completed or were appropriately tracked for completion; and independently walked down portions of the plant to verify selected actions to restore from cold weather operations had been completed appropriately.

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 2181, "Service Water/Alternate Cooling Operating Procedure;" OP 2121, "Reactor Core Isolation Cooling System;" and OP 2120, "High Pressure Coolant Injection System." The inspectors 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 service water (SW) system during the replacement of the “A” SW pump;
- The reactor core isolation cooling (RCIC) system while the high pressure coolant injection (HPCI) system was removed from service for isolation logic testing; and
- The HPCI system while the RCIC system was removed from service for governor maintenance and troubleshooting.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

Quarterly Inspection (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:

- The East switchgear room (FA 4);
- The West switchgear room (FA 5);
- The “A” emergency diesel generator room (FA 8);
- The “B” emergency diesel generator room (FA 9);
- The cable vault (FZ 2);
- The battery room (FZ 3);
- The reactor building, 280 foot elevation, North (FZ RB5);
- The reactor building, 280 foot elevation, South (FZ RB6); and
- The 345 kilovolt (kV) switchyard relay house, (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 internal flooding in the RCIC system upper and lower rooms, including Vermont Yankee Off-Normal Procedure (ON) 3148, "Loss of Service Water;" ON 3158, "Reactor Building High Area Temperature/Water Level;" and Emergency Operating Procedure (EOP) 4, "Secondary Containment and Radioactive Release." The inspectors reviewed internal flooding information contained in Entergy's IPEEE, the Updated Final Safety Analysis Report (UFSAR), and the Internal Flooding Design Basis Document (DBD) as it related to the RCIC system. Finally, the inspectors performed walkdowns 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 condition reports (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.

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

The inspectors reviewed the readiness and availability of the southeast emergency core cooling system (ECCS) corner room cooler (RRU-8). RRU-8 provides cooling for the "B" and "D" residual heat removal (RHR) system pumps and the "B" core spray (CS) system pump. The inspectors performed a review of the most recent results of RRU-8 thermal performance testing performed per OP 4181, "Service Water/Alternate Cooling System Surveillance." The inspectors reviewed this test and the test results to ensure the test methodology was consistent with accepted industry standards, that the test conditions established were appropriate, and that acceptance criteria selected was consistent with the design assumptions made in DBD 22, "Service Water, RHR Service Water & Alternate Cooling;" DBD 18, "Residual Heat Removal System;" DBD 7, "Core Spray System;" and the UFSAR. The inspectors also reviewed Entergy's corrective action program to ensure significant heat exchanger performance problems were appropriately identified and documented and that corrective actions assigned, if any, were appropriate.

b. Findings

No findings of significance were identified.

1R08 Inservice Inspection Activities (71111.08)a. Inspection Scope (eight samples)

The purpose of this inspection was to assess the effectiveness of the Entergy's Inservice Inspection (ISI) program for monitoring degradation of the reactor coolant system boundary, risk significant piping system boundaries, and the containment boundary. The inspectors reviewed the results of dissimilar weld examination activities specific to the welding of safe ends to reactor pressure vessel (RPV) nozzles. The inspectors assessed ISI activities using requirements and acceptance criteria specified in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, and applicable NRC Regulatory Requirements.

The inspectors selected a sample of nondestructive examination (NDE) activities for observation and documentation review for compliance with the requirements of ASME, Section XI. The sample selection was based on the inspection procedure objectives, sample availability, and risk priority of those components and systems where degradation could result in a significant increase in risk of core damage. The inspectors verified by documentation review that NDE test examiner's qualifications were current and in accordance with the ASME Code requirements. Also, the inspectors reviewed examiner qualifications for use of the performance demonstration initiative ultrasonic test procedures to examine nozzle to safe end welds. The inspector's observation and documentation review of non-destructive testing included the following samples:

- Ultrasonic testing (UT) of HPCI system valve-to-elbow welds HP3-S53C and HP3-S54C;
- Magnetic particle test (MT) of welds HP3-S53C and HP3-S54C;
- Liquid penetrant (PT) test of the end preparations for welds HP3-S53C and HP3-S54C; and
- MT of RHR structural support weld H-A-RHR-CC-1.

The inspectors selected the remote visual examination (VT-1) of the steam dryer for review of the in-vessel visual inspection (IVVI) activity to evaluate the effectiveness of the vessel internals inspection program. The inspectors reviewed portions of the remote in-vessel visual inspection of the reactor steam dryer base metal and structural welds to evaluate NDE test examiner skill, test equipment performance, examination technique, and inspection environment (water clarity) to verify Entergy's ability to identify and characterize observed indications. The inspectors viewed indications identified during this examination and reviewed condition report CR 2007-01846 which documents indications noted in the tack weld of one leveling screw at azimuth 144 and at two stitch weld locations on lifting rods at azimuth 144 and 324.

The inspectors selected two ASME Section XI repair/replacement plans for review where welding on a pressure boundary was performed. The review was performed to evaluate control of the welding process to determine whether welding examinations were performed in accordance with the ASME code requirements.

The two ASME Section XI repair/replacement work orders (WOs) reviewed were:

- WO 06-005668, Engineering Request ER 05-0921 R0, "Replacement of 20 Inch HPCI Nozzle Check Valve V23-3 with a Lift Check Valve;" and
- WO 06-005338 and WO 04-004826, Engineering Request ER 04-0868, "Replace SW System 14 Inch Check Valve V70-1D and Gate Valve V70-2D".

The inspectors performed a walkdown within the primary containment at the 238 and 252 foot elevations to assess the condition of the liner coating. The inspectors performed a visual examination to determine the extent of any peeling, blistering, or other damage or loss of coating as a result of foreign material impact or lack of maintenance.

Finally, the inspectors performed a review to verify that Entergy was identifying ISI problems at an appropriate threshold and is entering them into their corrective action program.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11Q)

a. Inspection Scope (one sample)

The inspectors observed simulator-based licensed operator requalification training provided to operators. 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. Finally, the inspectors observed Entergy evaluators discuss identified weaknesses with the crew and/or individual crew members, as appropriate.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12Q)a. Inspection Scope (two samples)

The inspectors performed two issue/problem-oriented inspections of actions taken by Entergy in response to repeated tripping of the John Deere diesel generator (JDDG) output breaker and in response to the failure of HPCI system injection valve V23-19 to open during surveillance testing. 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 with 10 CFR 50.65 (a)(1) or (a)(2), the applicable system (a)(1) performance evaluation, and the adequacy of the performance criteria and goals established for each system. The inspectors also reviewed recent system health reports and/or discussed system performance with the responsible system engineer.

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/unplanned repair activity. 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 also walked down areas of the plant containing equipment that was determined to have higher risk significance during the following work activities:

- Emergent power reduction to approximately 38 percent due to the loss of 345 kV offsite power line 381 and feed water system equipment challenges;
- Planned maintenance on the "A" emergency diesel generator (EDG);
- Planned testing of HPCI system isolation logic;
- Planned maintenance and troubleshooting of the RCIC system governor and control oil systems; and
- Planned maintenance and testing of RCIC system isolation logic.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)a. Inspection Scope (five samples)

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

- Containment air monitoring (particulate) detector discovered to have one of six mounting studs stripped;
- The "A" SW system pump appears to be extruding brass flakes into pump packing;
- The time delay for the "A" channel of HPCI system isolation logic (high steam tunnel temperature) was discovered to be outside required TS parameters during surveillance testing;
- RRU-8 differential pressure exceeds surveillance value; and
- Sodium-24 chemistry sample (moisture carryover) results exceed 0.16 percent.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications (71111.17A)a. Inspection Scope (one sample)

The inspectors reviewed design change documentation associated with the permanent installation of a CS system piping penetration repair clamp. The repair clamp is external to CS system piping and is bolted to the outside diameter of the core shroud within the reactor vessel. The repair clamp, the affected CS piping, and the core shroud are internal to the reactor vessel. The repair clamp provides a structural replacement for existing welds and limits leakage of CS injection flow to allow the CS piping to perform its safety-related functions in accordance with the original design and safety basis requirements. The inspectors reviewed this design change to verify that the design bases and performance capability of the core shroud and the core spray system had not been degraded. The inspectors interviewed cognizant engineering personnel to assess the extent of the design inputs, material compatibility, acceptance criteria and documentation requirements. The inspectors focused on the impact the permanent plant change might have on operator actions and changes to key safety functions. The selection of this permanent plant change for review was based on a review of risk insights and on a review of available operating experience information. The inspectors reviewed the Areva Design Report, the VY Engineering Change Notice and associated 10 CFR 50.59 screening, CS system drawings, CS system DBD, the UFSAR, and TS.

Enclosure

Finally the inspectors reviewed CRs to verify that Entergy is identifying permanent plant modification issues at an appropriate threshold and entering them into the corrective actions program.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing (71111.19)

a. Inspection Scope (four samples)

The inspectors reviewed four 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 applicable WO, TS, UFSAR, and/or inservice testing program. Where testing was directly observed, the inspectors verified that installed test equipment was appropriate and controlled and 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:

- Local leakage rate testing (LLRT) of HPCI system valve V23-3 following valve replacement per OP 4030, "Type B and C Primary Containment Leakage Rate Testing;"
- RCIC system governor testing following planned maintenance per OP 4121, "Reactor Core Isolation Cooling System Surveillance," Section A;
- "A" SW system pump capacity testing following pump replacement per OP 4181, "Service Water/Alternate Cooling System Surveillance;" and
- HPCI system valve HPCI-19 stroke time testing following valve contactor replacement per OP 4120, "High Pressure Coolant Injection System Surveillance," Section B; and OP 5217, "MOV [motor operated valve] Motor Control Center Testing."

b. Findings

No findings of significance were identified.

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

The inspectors evaluated the following VY refueling outage (RFO 26) activities to verify that Entergy considered risk when developing outage schedules; adhered to administrative risk reduction methodologies for plant configuration control; and adhered to their operating license, TS requirements, and approved procedures:

- Review of the Outage Plan and Daily Shutdown Risk Assessments - The inspectors reviewed the RFO 26 shutdown risk assessment to verify that Entergy addressed the outage's impact on defense-in-depth for the five shutdown critical safety functions: electrical power availability, inventory control, decay heat removal, reactivity control, and containment. The daily risk assessments, accounting for schedule changes and unplanned activities, were also periodically reviewed to determine whether adequate defense-in-depth was maintained for each safety function when redundancy was limited and that planned contingencies were appropriate;
- Monitoring of Shutdown Activities - The inspectors observed the shutdown of the reactor plant including reactor plant cooldown and transition to shutdown cooling operations. As soon as practical following the shutdown, the inspectors performed walkdowns of the primary containment. Additionally, the inspectors performed walkdowns in the heater bay in the vicinity of the main steam control valve actuator box to verify the condition of attachment welds;
- Electrical Power - The inspectors reviewed the status and configuration of safety-related buses throughout RFO 26. The inspectors ensured the electrical lineups met the requirements of TS and the outage risk control plan. The inspectors performed frequent walkdowns of affected portions of the electrical plant including startup transformers, the auxiliary transformer, and the emergency diesel generators;
- Decay Heat Removal (DHR) System Monitoring - The inspectors monitored decay heat removal (i.e., shutdown cooling) status on a daily basis. Monitoring included daily reviews of residual heat removal system alignment, reviews of spent fuel pool cooling system alignment, and reviews of reactor coolant system (RCS) time-to-boil calculations and results;
- Inventory Control - The inspectors performed daily RCS inventory control reviews including reviews of available injection systems and flow paths to ensure consistency with the outage risk plan. The inspectors also verified that operators maintained reactor vessel and/or refueling cavity levels within established ranges;

- Reactivity Control - The inspectors observed reactivity management actions taken by control room operators during refueling evolutions including procedure place keeping, communications with refueling floor personnel, monitoring of source range nuclear instrumentation, and monitoring of individual control rod positions;
- Containment Closure - The inspectors verified proper primary and secondary containment configuration was maintained throughout the outage. The inspectors performed a primary containment closeout walkdown prior to final containment closure. Finally, the inspectors verified primary and secondary containment had been appropriately reestablished prior to and during startup;
- Refueling Activities - The inspectors observed portions of refueling operations, including fuel handling and accounting in the reactor vessel and spent fuel pool. The inspectors also performed an independent core reload verification of approximately 100 percent of the core;
- Heatup and Startup Activities - The inspectors observed portions of the heatup and startup of the reactor plant following the completion of RFO26; and
- Identification and Resolution of Problems - The inspectors also verified that Entergy identified problems related to refueling activities and entered them into their corrective actions program.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope (seven 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:

- Testing the ability to backfeed offsite power through the main and auxiliary transformers per OP 4142, "Vernon Tie and Delayed Access Power Source Backfeed Surveillance;"
- Integrated ECCS system initiation testing per OP 4100, "ECCS Integrated Automatic Initiation Test;"
- Testing of the alternate cooling system (ACS) per Vermont Yankee Special Test Procedure (STP) 2007-01, "Hydraulic Performance Test of the ACS System;"
- LLRT of RCIC system valves V13-6 and V13-7 per OP 4030;
- LLRT of inboard (V2-80A through D) and outboard (V2-86A through D) main steam isolation valves (MSIVs) per OP 4030; and
- Monthly testing of the JDDG per OP 4127, "John Deere Diesel Generator Surveillance;" and
- Testing of RCIC system initiation logic per OP 43102, "RCIC System Actuation Logic Functional/Calibration Test."

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23)

a. Inspection Scope (two samples)

The inspectors reviewed temporary modification (TM) 2007-003, "Temporary Power via Reactor Building Secondary Containment Penetration," and TM 1269, "Temporary Disabling of Primary Containment Isolation System (PCIS) Group 3 Trip Function." The inspectors reviewed these TM packages to ensure they did not adversely affect the availability, reliability, or functional capability of any risk-significant structures, systems, or components. The inspectors performed walkdowns of the accessible portions of these TMs and compared the installation and control of these modifications to the requirements of Entergy Corporate Procedure ENN-DC-136, "Temporary Alterations." The inspectors also performed walkdowns following the removal of these TMs to ensure affected equipment had been appropriately restored.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP7 Force-On-Force (FOF) Exercise Evaluation (71114.07)

a. Inspection Scope (one sample)

The inspectors observed licensee performance in the Technical Support Center during one site emergency preparedness drill conducted in conjunction with a Force-on-Force exercise, documented in inspection report (IR) 05000271/2007201. The following licensee procedures were reviewed as part of this inspection:

- AP 3125, "Emergency Plan Classification and Action Level Scheme;" and
- OP 3132, "Operations Response to Security Events."

The inspectors observed communications, event classification, and event notification activities by the simulated shift manager. The inspectors also observed portions of the post drill critique to determine whether any observed deficiencies were also identified by the licensee evaluators.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety (OS)

2OS1 Access Control to Radiologically Significant Areas (71121.01)

a. Inspection Scope (eight samples)

The inspectors conducted the following inspection activities, during a refueling outage, to verify that Entergy was properly implementing physical, engineering, and administrative controls for access to high radiation areas, 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, TS, and Entergy procedures:

- Radiation work permits (RWPs) associated with exposure significant areas of the plant (e.g., high radiation areas) were reviewed. Electronic personal dosimeter alarm set points were reviewed with respect to current radiological condition applicability and workers were queried to verify their understanding of plant procedures governing alarm response and knowledge of radiological conditions in their work area;

- There were no work activities performed within an airborne radioactivity area with the potential for individual worker internal exposures of >50 milli-rem (mrem) committed effective dose equivalent (CEDE);
- Internal dose assessments were reviewed to determine if any indicated an individual internal exposure in excess of 50 mrem CEDE;
- The following radiologically significant work activities were reviewed along with the radiological work activity job requirements and the work activity job performance:
 - Refueling activities including IVVI, steam dryer inspections, and reactor vessel head O-ring replacement;
 - “B” recirculation motor seal replacement;
 - Non-destructive examination of several reactor vessel nozzles;
 - Drywell sump pump replacement;
 - Installation of temporary shielding in the drywell;
 - Safety relief valve replacement; and
 - RHR system check valve V10-46B maintenance.
- Inspections of the work activities listed above included reviews of surveys performed, job coverage provided, and contamination controls employed;
- There were no opportunities to evaluate Entergy’s monitoring of whole body and extremity exposures involving significant dose gradients during the above work activities;
- During observation of the work activities listed above, radiation worker performance was evaluated with respect to the specific radiation protection work requirements and their knowledge of the radiological conditions in their work areas; and
- During observation of the work activities listed above, radiation protection technician work performance was evaluated with respect to their knowledge of the radiological conditions, the specific radiation protection work requirements and radiation protection procedures.

b. Findings

No findings of significance were identified.

2OS2 ALARA Planning and Controls (71121.02)

a. Inspection Scope (three samples)

The inspectors conducted the following activities to verify that Entergy was properly maintaining individual and collective radiation exposures as low as is reasonably achievable (ALARA). Implementation of the ALARA program was reviewed against the criteria contained in 10 CFR 20.1101(b) and Entergy procedures.

The following highest exposure work activities for RFO 26 were selected for review:

- Refueling activities;
- Drywell miscellaneous work;
- Non-destructive examination of several reactor vessel nozzles; and
- Installation of temporary shielding in the drywell.

These work activities were observed to evaluate if surveys and ALARA controls were implemented as planned.

Radiation worker and radiation protection technician performance was observed during the performance of these work activities in order to evaluate worker and technician ALARA principles and practices.

b. Findings

No findings of significance were identified.

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 2006 through March 2007. The inspectors reviewed portions of operator rounds surveillances and monthly reactor coolant iodine isotopic reports and discussed the methods for compiling the data with cognizant operations and chemistry personnel. The 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 determine the accuracy and completeness of the PI data reported during this period.

Cornerstone: Barrier Integrity

- RCS Specific Activity; and
- RCS Identified Leak Rate.

b. Findings

No findings of significance were identified.

4OA2 Problem Identification and Resolution (71152).1 Review of Items Entered into the Corrective Action Programa. 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 Annual Sample Review - History of Challenges with Maintaining the Shutdown Cooling Safety Function during Refueling Outagesa. Inspection Scope (one sample)

The inspectors reviewed actions taken by Entergy to maintain the shutdown cooling (SDC) safety function during RFO 26. This sample was selected based on a history of human performance-related errors that resulted in short-term losses of SDC during three previous RFOs. The inspectors had previously documented these errors as non-cited violation (NCV) 05000271/2001004-01, "Failure to Properly Verify 4KV Breaker ["C" RHR system pump breaker] Installation as Required by OP 2142;" NCV 05000271/2004003-01, "Ineffective Corrective Actions Assigned Following a May 2001 Trip of the "C" RHR System Pump During SDC Operation;" and NCV 05000271/2005005-02, "Inadequate Procedure Resulted in the Loss of Shutdown Cooling." Actions taken by Entergy to protect SDC included a review of corrective actions taken as a result of the NCVs listed above and the placement of physical and administrative barriers on SW system, RHR system, residual heat removal service water system, and spent fuel pool cooling system components needed to support SDC.

b. Findings and Observations

No findings of significance were identified.

The inspectors found that Entergy had taken appropriate actions to protect the SDC safety function during RFO 26. Establishment of physical barriers (e.g., switch covers and locking devices) and administrative barriers (e.g., tags, critical plant equipment warning signs, shiftily control panel walkdowns, procedural adherence) effectively

protected RHR system components supporting SDC. The inspectors also noted that Entergy successfully maintained a heightened level of awareness to protecting SDC amongst all plant personnel through pre-shift and pre-job briefings, in-field coaching by supervisory personnel, and discussions during daily outage status meetings.

.3 Semiannual Review to Identify Trends

a. Inspection Scope (one sample)

The inspectors performed a semiannual review to identify trends, either Entergy or NRC identified, that might indicate the existence of a more significant safety issue. Included within the scope of this review were repetitive human performance errors documented by Entergy in CRs, in the corrective action program 1st Quarter 2007 trend report, and as discussed in briefing packages prepared for a January 11, 2007 human performance-related plant stand down and a subsequent human performance-related plant stand down conducted on March 27, 2007. The inspectors also reviewed human performance-related NRC findings identified at VY in 2007 and previously performed semiannual trend reviews that discussed adverse trends in human performance.

b. Assessment and Observations

No findings of significance were identified.

However, VY was challenged by declining trend in human performance during the first quarter of 2007. This trend was recognized by Entergy and resulted in the performance of two human performance-related plant stand downs in January and in March. The most notable human performance errors were:

- Errors made by an electrical maintenance technician, while testing a new breaker in the switchyard, resulted in a loss of 1 of 3 offsite power lines and the need to reduce reactor power to maintain grid stability. This issue was also determined to be a finding of very low safety significance (FIN 50000271/2007002-04); and
- An operator operated the wrong valve, while testing a fuel oil transfer pump, which caused the operating emergency diesel generator to trip. This issue was also determined to be a finding of very low safety significance (NCV 50000271/2007002-03).

The inspectors reviewed the results of the 2006 NRC semiannual trend reviews, both of which document licensee-identified declining trends in human performance. As discussed in these trend reviews, Entergy took actions to address the decline in human performance including performance of department level stand downs to discuss human performance, the development of human performance improvement plans, and performance of human performance-focused assessments. However, as demonstrated by the need for two subsequent human performance-related plant stand downs, the inspectors concluded that previous actions taken by Entergy to address human

performance errors had not been completely effective. The inspectors discussed this continuing trend during weekly meetings with plant management.

The inspectors noted a decrease in the number and significance of human performance errors during the second quarter of 2007. During this time, Entergy also completed a 24.5 day refueling outage. While there were a number of low level human performance-related issues identified during the outage, none were considered to be of greater than minor significance. Additionally, the number of errors was very low considering the total volume of work and testing completed during the outage.

The inspectors concluded that Entergy has had short term success with reversing the trend in human performance errors. Corrective actions taken by Entergy to reinforce human performance expectations included posting signs and messages at plant entrances reinforcing human performance expectations, frequent discussions during pre-shift and pre-job briefings, and an increased focus on management in-field coaching and mentoring. Entergy also developed a human performance action plan which will provide further analysis of identified issues, review of possible error precursors, and assign additional actions to further enhance human performance at VY. The inspectors will continue to monitor Entergy's progress in this area.

4OA3 Event Followup (71153)

.1 Plant Response to an Unanticipated Loss of a 345 Kilovolt Off-Site Power Line

a. Inspection Scope (one sample)

The inspectors reviewed actions taken by plant personnel in response to a April 9, 2007, unanticipated loss of one of three 345 kV offsite power lines (i.e., the 381 line) that also resulted in the need to perform a reactor power reduction in order to meet grid stability limits. The loss of the 381 line was due to the failure of a breaker at a substation downstream of the VY switchyard and was not considered to be a licensee performance deficiency by the inspectors. The inspectors discussed the event with control room operators and Entergy management. The inspectors reviewed control room logs, reviewed plant computer data, and performed a walkdown of the 345 kV and 115 kV switchyards. The inspectors also assessed the response of licensed operators during the power reduction against applicable operating procedures, abnormal operating procedures, and Emergency Action Level (EAL) procedures.

b. Findings

No findings of significance were identified.

.2 (Closed) Licensee Event Report (LER) 05000271/2007001-00, High Pressure Coolant Injection System Isolation Time Delay Surveillance Test Failures due to an Inadequate Calibration Methodology

On April 6, 2007, Entergy I&C technicians were performing OP 4361, "High Pressure Coolant Injection System isolation A/B logic Functional/Calibration Test." During the performance of this test, technicians identified that the time delay for the "A" channel of HPCI system isolation logic relay (isolation on high main steam tunnel temperature) was set at 36.5 minutes which was greater than the TS, Table 3.2.2, required value of less than or equal to 35 minutes.

This isolation system includes separate "A" and "B" logic channels and each channel includes two temperature switches which monitor main steam tunnel temperatures. A HPCI system isolation signal will be generated if any two of the four temperature switches actuates. During the time the "A" channel of HPCI system isolation logic relay was inoperable, the "B" channel relay passed all required testing. Because the "B" channel relay passed all testing and because this channel had two functioning temperature switches, the HPCI system high main steam line temperature automatic isolation function remained available despite the condition of the "A" channel.

In the associated root cause analysis report, Entergy identified the cause of the relay time delay problem to be an inadequate relay calibration procedure. Specifically, OP 4361 did not account for relevant manufacturer (Agastat) information regarding the unique operational characteristics of relays that employ a long time delay. Both the Agastat data sheet and the Agastat installation and operation bulletin for this type of relay (Agastat 7000 series relays) recommend performing multiple actuations when setting these relays including a three hour wait between actuations. According to the manufacturer, waiting three hours between actuations allows the relay an opportunity to cool down. Setting this style of relay while it is still warm can result in a setpoint error of as much as 15 percent.

Corrective actions taken by Entergy included entering this issue into their corrective actions program (CR 2007-1078); revising OP 4361 to require relays be tested and set using multiple actuations with a minimum cooldown period between; successfully re-setting and re-testing the "A" channel relay and returning the HPCI system to operable status, conducting an extent-of-condition review including a review of safety and non-safety applications of this type of relay as well as the associated calibration procedures; and enhancing the process for periodic reviews of manufacturer's literature for possible impact on plant equipment.

The inspectors concluded that this finding constitutes a TS violation of minor significance that is not subject to enforcement action in accordance with Section IV of the NRC's Enforcement Policy. As stated above, the "B" channel of HPCI system high main steam line temperature automatic isolation remained available despite the condition of the "A" channel. Additionally, use of the inadequate calibration procedure would have introduced no more than a 15 percent calibration error that when combined with the required as-left tolerances would not have resulted in a time delay setting in excess of the 40 minute delay time credited in Entergy's design basis calculations. This LER is closed.

4OA5 Other Activities

By letter dated June 14, 2007, the NRC informed Entergy of our conclusion that a NCV of 10 CFR 20.1501 occurred when a radiation protection technician willfully failed to perform a survey to establish radiological conditions in a locked high radiation area prior to allowing access to an auxiliary operator. (NCV 05000271/2007010-01) This letter is administratively documented as NRC Inspection Report 05000271/2007010 and is available under ADAMS accession number ML071650364. This NCV is administratively closed.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On July 9, 2007, the resident inspectors presented the inspection results to Messrs. Theodore Sullivan and William Maguire, 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

Enclosure

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Entergy Personnel

J. Dreyfuss, Director of Nuclear Safety
E. Harms, Operations Manager
W. Maguire, General Manager of Plant Operations
D. Mannai, Licensing Manager
K. Pushee, Radiation Protection Manager
N. Rademacher, Director of Engineering
T. Sullivan, Site Vice President

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000271/2007010-01 NCV Improper Entry into a Locked High Radiation Area
(Section 4OA5)

Closed

05000271/2007001-00 LER High Pressure Coolant Injection System Isolation Time
Delay Surveillance Test Failures due to an Inadequate
Calibration Methodology (Section 4OA3.2)

LIST OF DOCUMENTS REVIEWED

Section 1R08: Inservice Inspection Activities

NDE Reports

26-9.31-002 Magnetic particle examination report, HPCI system, HP3-S53C & S54C
26-9.31-001 Magnetic particle examination report, RHR system, H-A-RHR-CC-1
26-9.40-003 Liquid penetrant examination report, HPCI system, HP3-S54C weld preps
26-9.40-002 Liquid penetrant examination report, HPCI system, HP213 weld preps
26-9.40-001 Liquid penetrant examination report, HPCI system, HPCI Steam Exhaust

Indication Data Sheet

- 26-9.04-002 Indications of inside diameter geometry seen 360 degrees intermittently, HPCI, HP3-S53C
- 26-9.04-002 Indications of inside diameter geometry seen 360 degrees intermittently, HPCI, HP3-S54C

NDE Procedures

- ENN-NDE-9.04 R1 Ultrasonic examination of ferritic piping welds (ASME Section XI)
- ENN-NDE-9.31 R0 Magnetic Particle Examination (MT) for ASME Section XI
- ENN-NDE-9.30 R1 Magnetic Particle Examination (MT)
- ENN-NDE-10.08 R0 Visual Examination of Welds (VT)
- ENN-NDE-9.41 R1 Liquid Penetrant Examination (PT)

In Vessel Remote Visual Examination

- VY-RPT-06-00006 R0 Reactor Vessel Internals Inspection Program

Engineering Requests

- ER 05-0921 R0 HPCI Turbine Exhaust V23-3 Check Valve Modification
- ER 04-0868 R0 Service Water 14" V70-1C, V70-1D, V70-2C, V70-2D Valve Replacement

Welding Procedures

- WPS CS-1/1-A R3 Gas Tungsten Arc/Shielded Metal Arc (GTAW/SMAW) carbon steel/carbon Steel (P1 to P1)
- WPS CS-1/1-B R2 GTAW of carbon steel to carbon steel (P1 to P1)
- WPS SS-8/8-B R2 GTAW of stainless steel to stainless steel (P8 to P8)
- WPS CS-1/1-C R3 SMAW of carbon steel to carbon steel (P1 to P1)

Work Orders

- WO 06-005668 Replacement of HPCI nozzle check valve V23-3
- WO 06-005338 Replacement of Service Water (SW) check valve V70-1D
- WO 04-004826 Replacement of SW gate valve V70-2D

Drawings

- 729E913 Steam Dryer Reactor 5920-493
- VY-2000 R0 Internal Core Spray Piping
- 0249-0044-01 R0 Core Spray Pipe Clamp Assembly and Details Sheet 1, 2, 3 & 4
- 0249-0044-02 R0 Core Spray Pipe Clamp Shroud Machining

Steam Dryer Indication Notification Reports

Steam Dryer Indication Notification Report (INR) IVVI-VYR26-07-01
INR IVVI VYR26-07-02

Condition Reports

CR 2007-1973, CR 2007-1846

Miscellaneous Documents

PP 7015 R9 EC 327	Vermont Yankee In-Service Inspection Program (04/19/07) Installation of pre-emptive repair to weld 3P8b on core spray piping internal to the reactor vessel at azimuth 193-30
EC 327 (50.59) MPR-3015	50.59 Evaluation Review and Screening for EC 327 Design report for VYNPS core spray piping repair clamp
BWRVIP-18-AB	WR Vessel and Internals Project BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines
BWRVIP-19-A	BWR Vessel and Internals Project Internal Core Spray Piping and Sparger Repair Design Criteria
26-9.04-002	Ultrasonic Calibration Data Sheet for HP3-S53C and S54C

Section 1R11Q: Licensed Operator Requalification Program

Procedures

EOP 3107, "EOP/SAG Appendices"

Lesson Plans

Entergy Nuclear Lesson Plan LOR-26-101-2, "Loss of Bus 8, Main Steam Line "A" Rupture in
the Drywell, Reactor Mode Switch failure, Containment Failure, Containment Venting"

Section 1R12: Maintenance Effectiveness

Maintenance Rule Scoping Documents

10CFR50.65 Maintenance Rule Scoping Basis Document, "Security Equipment"
10CFR50.65 Maintenance Rule Scoping Basis Document, "High Pressure Coolant Injection
System"

Condition Reports

CR 2005-1759, CR 2006-3457, CR 2007-2003, CR 2007-2101, CR 2007-2137, CR 2007-2140,
CR 2007-2329

Section 1R17: Permanent Plant Modifications

Design Documents

Vermont Yankee Engineering Change Notice 327, "Core Spray System Piping Repair Clamp Installation"

Areva Design Report 3015, "Design Report for Vermont Yankee Nuclear Station Core Spray Piping Repair Clamp"

Vermont Yankee DBD 7, "Core Spray System"

Drawings

VY Piping Isometric Drawing ISI-5920-9208, "Core Spray"

VY Piping and Instrumentation Drawing G-191168, "Flow Diagram Core Spray System"

Condition Reports

CR 2007- 1818, CR 2007-2131

Section 1R20: Refueling and Other Outage Activities

Procedures

OP 0105, "Reactor Operations"

OP 1411, "Core Verification"

OP 4101, "RPV [reactor pressure vessel] Operational System leakage Test"

OP 4111, "Control Rod Drive System Surveillance"

OP 4320, "Reactor System Response Time Check"

Section 2OS1: Access Control to Radiologically Significant Areas

Condition Reports

CR 2007-0725, CR 2007-1371, CR 2007-1577

Section 4OA2.1: Review of Items Entered into the Corrective Action Program

Condition Reports

CR 2007-1048, CR 2007-1073, CR 2007-1078, CR 2007-1087, CR 2007-1096,
CR 2007-1099, CR 2007-1134, CR 2007-1143, CR 2007-1151, CR 2007-1158,
CR 2007-1238, CR 2007-1244, *CR 2007-1285, CR 2007-1302, CR 2007-1310,
CR 2007-1335, CR 2007-1529, CR 2007-1536, CR 2007-1543, CR 2007-1579,
CR 2007-1592, CR 2007-1616, CR 2007-1769, CR 2007-1930, CR 2007-1942,
CR 2007-2008, CR 2007-2009, CR 2007-2010, CR 2007-2011, CR 2007-2028,
CR 2007-2043, CR 2007-2132, CR 2007-2133, CR 2007-2219, CR 2007-2220,

CR 2007-2221, CR 2007-2222, CR 2007-2223, CR 2007-2224, CR 2007-2248,
CR 2007-2250, CR 2007-2260, CR 2007-2349, CR 2007-2400, CR 2007-2480,
CR 2007-2475

**Section 40A2.2: Annual Sample Review - History of Challenges with Maintaining the
Shutdown Cooling Safety Function during Refueling Outages**

Condition Reports

CR 2004-0826, CR 2004-0845, CR 2004-2058, CR 2004-2890, CR 2005, 3576,
CR 2005-3586, CR 2006-2430, CR 2007-1575

LIST OF ACRONYMS

ALARA	as low as reasonably achievable
ACS	alternate cooling system
ADAMS	Agencywide Documents Access and Management System
AP	administrative procedure
ASME	American Society of Mechanical Engineers
CEDE	committed effective dose equivalent
CFR	code of federal regulations
CR	condition report
CS	core spray
DHR	decay heat removal
DBD	design basis document
DP	department procedure
EAL	emergency action level
ECCS	emergency core cooling system
EDG	emergency diesel generator
EOP	emergency operating procedure
FA	fire area
FIN	finding
FZ	fire zone
GTAW	gas tungsten arc welding
HPCI	high pressure coolant injection
I&C	instrumentation and control
IPEEE	individual plant examination external events
IR	inspection report
ISI	inservice inspection
IVVI	in-vessel visual inspection
JDDG	John Deere diesel generator
kV	kilovolt
LER	licensee event report
LLRT	local leakage rate testing
mrem	milli-rem

MSIV	main steam isolation valve
NDE	non-destructive examination
NCV	non-cited violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
ON	off-normal procedure
OP	operating procedure
OS	occupational radiation safety
PARS	Publicly Available Records System
PCIS	primary containment isolation system
PI	performance indicator
PMT	post maintenance testing
RCIC	reactor core isolation cooling
RCS	reactor coolant system
RFO	refueling outage
RHR	residual heat removal
RPV	reactor pressure vessel
RRU	reactor building room cooler
RWP	radiation work permit
SDC	shutdown cooling
SMAW	shielded metal arc welding
STP	special test procedure
SW	service water
TM	temporary modification
TS	technical specification
UFSAR	updated final safety analysis report
VT-1	visual examination
VY	Vermont Yankee
WO	work order