



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I**  
2100 RENAISSANCE BOULEVARD, SUITE 100  
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

July 26, 2012

Mr. Christopher Wamser  
Site Vice President  
Entergy Nuclear Operations, Inc.  
Vermont Yankee Nuclear Power Station  
Vernon, VT 05354

**SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION – NRC INTEGRATED  
INSPECTION REPORT 05000271/2012003**

Dear Mr. Wamser:

On June 30, 2012 the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Vermont Yankee Nuclear Power Station. The enclosed inspection report documents the inspection results, which were discussed on July 23, 2012 with you and other members of your staff.

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

This report documents two NRC-identified findings of very low safety significance (Green). These findings were determined to involve violations of NRC requirements. However, because of the very low safety significance, and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs), consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U. S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Senior Resident Inspector at Vermont Yankee. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Senior Resident Inspector at Vermont Yankee.

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

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Sincerely,

*/RA/*

Ronald R. Bellamy, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

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

Enclosure: Inspection Report No. 05000271/2012003  
w/ Attachment: Supplementary Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.: 50-271

License No.: DPR-28

Report No.: 05000271/2012003

Licensee: Entergy Nuclear Operations, Inc.

Facility: Vermont Yankee Nuclear Power Station

Location: Vernon, Vermont 05354-9766

Dates: April 1, 2012 through June 30, 2012

Inspectors: S. Rutenkroger, PhD, Senior Resident Inspector  
S. Rich, Resident Inspector  
C. Williams, Reactor Inspector, Division of Reactor Safety (DRS)  
K. Dunham, Reactor Inspector, Division of Reactor Projects (DRP)  
B. Dionne, Health Physicist, DRS  
J. Brand, Reactor Inspector, DRS

Approved by: Ronald R. Bellamy, PhD, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

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## SUMMARY OF FINDINGS

IR 05000271/2012003; 04/01/2012 – 06/30/2012; Vermont Yankee Nuclear Power Station; Maintenance Risk Assessments and Emergent Work Control.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. Two NRC-identified findings of very low safety significance (Green), which were characterized as non-cited violations (NCVs), are documented in this report. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). The cross-cutting aspects for the findings were determined using IMC 0310, "Components Within Cross-Cutting Areas." Findings for which the SDP does not apply may be Green, or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### Cornerstone: Mitigating Systems

- Green. The inspectors identified an NCV of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," paragraph (a)(4), for Entergy's failure to conduct an adequate risk assessment prior to isolating the condensate pumps' minimum flow automatic control valve. Specifically, the inspectors identified that Entergy personnel had not analyzed the impact to plant risk with the condensate pumps' minimum flow line to the main condenser isolated. Entergy's corrective actions included declaring and announcing to site personnel the plant risk to be "Orange," protecting further equipment, and initiating CR-VTY-2012-02074.

The inspectors determined that the issue was more than minor because it is similar to IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," example 7.e in that the overall elevated plant risk put the plant into a higher risk category established by Entergy. The inspectors determined the significance of the finding using IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." The finding was determined to be of very low safety significance (Green) because the Incremental Core Damage Probability Deficit for the timeframe that the condensate pumps were unavailable was less than 1E-6 (approximately 2E-7). The inspectors determined that the finding had a cross-cutting aspect in the Human Performance cross-cutting area, Resources component, because the equipment relied upon to perform the risk assessment, the equipment out of service software program (EOOS), did not include the condensate system automatic minimum flow control valve, which was not adequate to ensure nuclear safety. [H.2(d)]. (Section 1R13)

- Green. The inspectors identified an NCV of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," paragraph (a)(4) for Entergy's failure to conduct an adequate risk assessment prior to securing the "C" feedwater pump. Specifically, the inspectors identified that Entergy personnel had not analyzed the impact to plant risk of securing the "C" feedwater pump. Entergy's corrective actions included briefing operators that securing a feedwater pump was a HRE-TRAN, i.e. an activity considered to raise the likelihood of an initiating event that is likely to result in a plant trip, and initiating CR-VTY-2012-02160 and CR-VTY-2012-02894.

The inspectors determined that the issue was more than minor because it is similar to IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," example 7.e in that the overall elevated plant risk put the plant into a higher risk category established by Entergy. The inspectors determined the significance of the finding using IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." The finding was determined to be of very low safety significance (Green) because the Incremental Core Damage Probability Deficit for the timeframe that the "C" feedwater pump was being secured was less than  $1E-6$  (approximately  $4E-9$ ). The inspectors determined that the finding had a cross-cutting aspect in the Human Performance cross-cutting area, Resources component, because the procedure describing HRE-TRAN was not sufficiently clear and complete in its description to ensure nuclear safety. [H.2(c)]. (Section 1R13)

## REPORT DETAILS

### Summary of Plant Status

Vermont Yankee Nuclear Power Station (VY) began the inspection period operating at 100 percent power. On April 9, operators reduced power to 35 percent to repair a tube leak in the main condenser. Operators returned VY to 100 percent power on April 12. On April 23, operators reduced power to 32 percent to clean the main condenser and implement modifications to improve main condenser performance. Operators returned VY to 100 percent power on April 28. On May 7, operators reduced power to 80 percent to make repairs to the “C” reactor feedwater pump. On May 8, operators reduced power to 48 percent to repair a leak on the condensate system minimum flow line. Operators returned VY to 100 percent power on May 11. On June 12, operators reduced power to 40 percent to perform a control rod pattern adjustment and install a temporary patch on a steam leak on the steam seal header associated with the main turbine. Operators returned VY to 100 percent power on June 13. On June 15, operators reduced power to 69 percent for a control rod pattern adjustment and returned VY to 100 percent power the same day. On June 18, power reduced when the “A” recirculation pump tripped due to an electrical fault associated with the “A” recirculation pump motor-generator set, causing VY to enter single-loop operation, and operators further reduced power to 33 percent. After repairing the “A” recirculation pump motor-generator set, operators returned VY to 100 percent power on June 30, the last day of the inspection period.

### 1. REACTOR SAFETY

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

1R01 Adverse Weather Protection (71111.01 – 1 sample)

#### Summer Readiness of Offsite and Alternate Alternating Current (AC) Power Systems

##### a. Inspection Scope

The inspectors performed a review of plant features and procedures for the operation and continued availability of the offsite and alternate AC power systems to evaluate readiness of the systems prior to seasonal high grid loading. The inspectors reviewed Entergy’s procedures affecting these areas. This review focused on changes to the established program and material condition of the offsite and alternate AC power equipment. The inspectors assessed whether Entergy established and implemented appropriate procedures and protocols to monitor and maintain availability and reliability of both the offsite AC power system and the onsite alternate AC power system. The inspectors evaluated the material condition of the associated equipment by interviewing the responsible system engineer, reviewing condition reports and open work orders, and accompanying electricians during their weekly inspection of onsite transformers. Documents reviewed for each section of this inspection report are listed in the Attachment.

##### b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)Partial System Walkdowns (71111.04Q – 4 samples)a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- “A” core spray during “A” residual heat removal (RHR) maintenance on May 1
- Reactor core isolation cooling system during “A” RHR maintenance on May 3
- “A” RHR during unavailability of the condensate pumps due to the isolation of the condensate system minimum flow control valve on May 9
- “B” core spray during “A” core spray surveillance testing on June 22

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the updated final safety analysis report (UFSAR), technical specifications (TS), condition reports (CRs), and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted system performance of their intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether Entergy staff had properly identified equipment issues and entered them into the corrective action program for resolution with the appropriate significance characterization.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)Resident Inspector Quarterly Walkdowns (71111.05Q – 5 samples)a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that Entergy controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment was available for use as specified in the area pre-fire plan, and passive fire barriers were maintained in good material condition. The inspectors also verified that station personnel implemented compensatory measures for out of service, degraded, or inoperable fire protection equipment, in accordance with procedures.

- Reactor building 252' elevation, on April 12
- Intake structure, on April 13
- Reactor building torus area 213' elevation, on April 18

- Reactor building torus area 232' elevation, on April 24
- Northwest corner room 213' and 232' elevations, on May 17

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

Internal Flooding Review

a. Inspection Scope

The inspectors reviewed the UFSAR, the site flooding analysis, and plant procedures to assess susceptibilities involving internal flooding. The inspectors also reviewed the corrective action program to determine if Entergy identified and corrected flooding problems and whether operator actions for coping with flooding were adequate. The inspectors focused on the east and west switchgear rooms to verify the adequacy of equipment seals located below the flood line, floor and water penetration seals, common drain lines and sumps, and temporary flood barriers.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (IP 71111.07T - 4 samples)

a. Inspection Scope

Based on a VY specific risk assessment, prior heat sink performance inspections at VY, and recent operational experience, the inspectors selected the following heat sink samples:

- "B" RHR heat exchanger
- "B" standby fuel pool cooling heat exchanger
- Reactor building air recirculation unit RRU-7
- Ultimate heat sink (UHS), which included service water system performance testing and a service water system walkdown.

The inspectors reviewed the system designs for the listed samples to evaluate the adequacy of system monitoring, testing, and maintenance. The UHS and service water systems were designed to supply cooling water from the Connecticut River to various plant heat loads to ensure continuous flow of cooling water to systems and components necessary for plant safety during normal, abnormal and accident conditions. The standby and the normal fuel pool cooling systems were designed to remove the decay heat released from the spent fuel and maintain fuel pool water temperature within specified limits. The RHR system was designed to remove decay heat during and after shutdown and to inject water into the reactor vessel and remove heat from primary containment following a large break loss of cooling accident. The reactor building air

recirculation units provide area cooling, including areas associated with the RHR pumps and motors.

The inspectors reviewed Entergy's test, inspection, maintenance, and performance monitoring methods and task frequencies for the selected components and systems to determine whether potential deficiencies could mask degraded performance, and to assess the capability of the systems to perform their design functions. In addition, the inspectors evaluated the associated programs at VY to assess whether they conformed to Entergy's commitments to NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." In addition, the inspectors evaluated whether any potential common cause heat sink performance problems could affect multiple heat exchangers or heat removal paths in mitigating systems or could result in an initiating event. The inspectors also reviewed Entergy's evaluations and operational controls associated with the potential for water hammer, heat exchanger degradation due to excessive flow-induced vibration, and system leakage.

The inspectors reviewed system health reports, heat exchanger and service water pipe inspection records, eddy current test results, performance and surveillance test results, design specifications, and calculations. The inspectors compared as-found inspection results, and performance and surveillance test results to established acceptance criteria to determine whether the as-found conditions were acceptable and conformed to design basis assumptions for heat transfer capability. The inspectors evaluated performance trends to assess whether the inspection and test frequencies were adequate to identify degradation prior to loss of heat removal capabilities below their design requirements. In addition, the inspectors assessed Entergy's methods to monitor and control bio-fouling, corrosion, erosion, and silting to verify Entergy's methodology and acceptance criteria, as-implemented, were adequate.

The inspectors performed field walkdowns of selected components and accessible portions of the service water, RHR, and spent fuel pool systems, including piping, pumps, and heat exchangers. The inspectors also performed field walkdowns of the safety-related portion of the cooling tower and the intake structure to independently assess the material condition of the systems and components. The inspectors reviewed the most recent quarterly and comprehensive in-service pump test results for the service water, RHR, and standby fuel pool cooling systems. The inspectors compared the as-found data against established acceptance criteria to evaluate the pumps' hydraulic performance and assess Entergy's in-service testing effectiveness. In addition, the inspectors reviewed work order history and discussed system health with the respective system and design engineers. The inspectors reviewed Entergy's monitoring and testing of interface valves between the safety-related standby fuel pool cooling and the non-safety normal fuel pool cooling systems to ensure that adequate flow would be available after a seismic event consistent with design basis assumptions.

The inspectors reviewed Entergy's buried pipe inspection and monitoring program to independently assess the condition and structural integrity of the service water and other buried piping. The inspectors reviewed a risk-informed sample of Entergy's disposition of active through-wall pipe leaks, including completed or planned corrective actions and structural evaluations. The inspectors reviewed system health and walkdown reports, service water pipe inspection records, operating logs, and surveillance test results to ensure that Entergy appropriately identified and dispositioned any service water leakage or degradation. The inspectors performed an above ground walkdown of accessible

areas containing buried piping to look for soil subsidence or other indications of piping leakage and/or degradation.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program (71111.11 – 2 samples)

.1 Quarterly Review of Licensed Operators' Regualification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on May 14, which included the failure of the feedwater level control system feed flow followed by a recirculation system line break coincident with a failure of control rods to insert automatically. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classification made by the shift manager and shift technical advisor and the TS action statements entered. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance in the Main Control Room

a. Inspection Scope

The inspectors observed control room operators during a power reduction on April 23 for turbine valve testing and on April 24 for main condenser cleaning and turbine valve testing. The inspectors observed pre-shift briefings and reactivity control briefings to verify that roles and responsibilities, critical steps, expected results and hold points were discussed. The inspectors verified that procedure use, crew communications, and response to alarms met established expectations and standards.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12 – 1 sample)a. Inspection Scope

The inspectors reviewed the primary containment atmosphere control system to assess the effectiveness of maintenance activities on structure, system and component (SSC) performance and reliability. The inspectors reviewed system health reports, corrective action program documents, and maintenance rule basis documents to ensure that Entergy was identifying and properly evaluating performance problems within the scope of the maintenance rule. For the sample selected, the inspectors verified that the SSC was properly scoped into the maintenance rule in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by Entergy staff were reasonable. This system is classified as (a)(1), and the inspectors assessed the adequacy of goals and corrective actions to return the system to (a)(2). Additionally, the inspectors ensured that Entergy's staff was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 6 samples)a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Entergy performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. The inspectors verified that Entergy personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When Entergy performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's work week manager and probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the TS requirements and inspected portions of redundant safety systems to verify risk analysis assumptions were valid and applicable requirements were met.

- Alternate cooling system maintenance – workweek (WW) 1216
- "A" RHR maintenance and isolation of the condensate system minimum flow line – WW 1218
- Isolation of the condensate system minimum flow line and removing the "C" feedwater pump from service for emergent maintenance – WW 1219
- "A" emergency diesel generator monthly surveillance and "C" service water pump lift adjustment and capacity testing – WW 1220
- "A" RHR maintenance and John Deere diesel generator surveillance – WW 1222
- High pressure coolant injection (HPCI) quarterly surveillance and suction transfer on low condensate storage tank level surveillance and torus cooling – WW 1223

b. Findings

.1 Inadequate Risk Assessment for Isolating the Condensate Pumps' Minimum Flow Line's Automatic Flow Control Valve

Introduction. The inspectors identified a Green NCV of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," paragraph (a)(4), for Entergy's failure to conduct an adequate risk assessment prior to isolating the condensate pumps' minimum flow automatic control valve. Specifically, the inspectors identified that Entergy personnel had not correctly analyzed the impact to plant risk with the condensate pumps' minimum flow line to the main condenser isolated.

Description. On the morning of May 3 an auxiliary operator identified a leak of approximately one to two gallons per minute on the condensate system minimum flow piping at a weld for a drain valve. Operators isolated this portion of the condensate piping which isolated the automatic minimum flow control valve for the condensate pumps. Without minimum flow available, within a short time following a plant trip the condensate pumps would experience an excessive temperature rise resulting in pump failure. To prevent this occurrence in the event of a plant trip, operations issued a standing order at 11:00 pm directing operators to start HPCI in pressure/level control mode and then trip the feedwater and condensate pumps following a trip. Operators performed a review of plant risk using the EOOS risk modeling software to account for the change in equipment status. However, because EOOS did not include the condensate system's automatic minimum flow control valve for selection, the operators did not select any additional equipment as out-of-service during their review.

On May 4, the inspectors reviewed the published "Yellow" risk profile and protected equipment list for the plant and independently modeled the plant risk using EOOS. The inspectors determined the plant risk to be "Orange" by selecting the three condensate pumps as unavailable combined with the ongoing "A" RHR planned maintenance. The inspectors questioned operators on the risk profile. Following further consultation with engineering personnel, operators declared the plant risk to be "Orange" in accordance with EN-WM-104, "On Line Risk Assessment," and administrative procedure (AP)-0172, "Work Schedule Risk Management – On Line," and protected further equipment in accordance with EN-OP-119, "Protected Equipment Postings." Entergy personnel repaired the piping and restored the condensate pumps' automatic minimum flow control valve to service on May 10. The inspectors calculated an incremental core damage probability deficit of approximately  $2E-7$  from May 3, 4:00 pm, through May 10, 3:00 pm (comparing the risk profiles with and without the condensate pumps unavailable in combination with the other activities performed).

Entergy's corrective actions included declaring and announcing to site personnel the plant risk to be "Orange," protecting further equipment, and initiating CR-VTY-2012-02074.

Analysis. The inspectors determined that Entergy personnel's incorrect assessment of the risk impact of isolating the condensate pumps' minimum flow line's automatic flow control valve was a performance deficiency that was reasonably within Entergy's ability to foresee and correct and should have been prevented. Traditional enforcement does not apply since there were no actual safety consequences, impacts on the NRC's ability to perform its regulatory function, or willful aspects to the finding.

The inspectors reviewed NRC IMC 0612, Appendix E, "Examples of Minor Issues," and found that example 7.e was sufficiently similar to the issue. The inspectors determined that the issue was more than minor because the overall elevated plant risk put the plant into a higher risk category established by Entergy. The inspectors determined the significance of the finding using IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." The finding was determined to be of very low safety significance (Green) because the Incremental Core Damage Probability Deficit for the timeframe that the condensate pumps were unavailable was less than 1E-6 (approximately 2E-7).

The inspectors determined that the finding had a cross-cutting aspect in the Human Performance cross-cutting area, Resources component, because the equipment relied upon to perform the risk assessment, EOOS, did not include the condensate system automatic minimum flow control valve and was not adequate to ensure nuclear safety. [H.2(d)]

Enforcement. 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," paragraph (a)(4), requires, in part, that "...the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities." Contrary to the above, on May 3 and 4, Entergy did not adequately assess the risk that resulted from isolating the condensate pumps' minimum flow line's automatic flow control valve. In addition, Entergy did not upgrade the advertised plant risk from "Yellow" to "Orange" and did not specify risk management actions for the increased risk condition. Entergy's corrective action to restore compliance consisted of declaring and advertising the "Orange" risk category to site personnel and taking the required risk management actions, such as protecting additional equipment. Because this violation was of very low safety significance and was entered into the corrective action program (CR-VTY-2012-02074), this violation is being treated as an NCV, consistent with the NRC Enforcement Policy. **(NCV 05000271/2012003-01, Inadequate Risk Assessment for Isolating the Condensate Pumps' Minimum Flow Line's Automatic Flow Control Valve).**

.2 Inadequate Risk Assessment Due to Not Considering the Increased Risk of a Plant Transient when Securing a Feedwater Pump

Introduction. The inspectors identified a Green NCV of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," paragraph (a)(4) for Entergy's failure to conduct an adequate risk assessment prior to securing the "C" feedwater pump. Specifically, the inspectors identified that Entergy personnel had not properly analyzed the impact to plant risk of securing the "C" feedwater pump.

Description. On the morning of May 7, a low oil pressure alarm annunciated for the "C" feedwater pump while the pump was running. Operators verified the standby lube oil pump was running and maintaining oil pressure at the lower pressure. Prior to commencing a downpower and securing the "C" feedwater pump to troubleshoot and repair the shaft driven lube oil pump, operators performed a review of plant risk using the EOOS risk modeling software. However, the operators only considered the "C" feedwater pump unavailable and did not include the increased risk of a plant transient and trip when securing a feedwater pump by selecting the activity "HRE-TRAN" in

EOOS. Operators performed a downpower and secured the “C” feedwater pump approximately one hour after the low oil pressure alarm annunciated.

The inspectors reviewed the published “Yellow” risk profile and protected equipment list for the plant and independently modeled the plant risk using EOOS. The inspectors determined the plant risk was “Orange” when selecting HRE-TRAN combined with the three condensate pumps unavailable, due to the continued isolation of the minimum flow line’s automatic flow control valve. Per AP-0172, “Work Schedule Risk Management – On Line,” the HRE-TRAN selection is a designation that is used for activities or configurations which are considered to raise the likelihood of an initiating event that is likely to result in a reactor trip. An example AP-0172 provided was maneuvering the plant at power above 25%, such that a significant number of adjustments of the power conversion systems are necessary.

The inspectors questioned operators on the risk profile following the evolution. After further consultation with Entergy’s engineering personnel, operators declared that the plant risk profile had been “Orange” when the “C” feedwater pump was secured, in accordance with EN-WM-104, “On Line Risk Assessment,” and AP-0172, and performed remaining relevant actions, such as plant notifications. Afterwards, the inspectors interviewed multiple senior reactor operators and work week managers regarding knowledge and use of HRE-TRAN and found multiple examples in which Entergy personnel did not know that the description contained within AP-0172 meant plant maneuvering that included starting or securing a feedwater pump was a HRE-TRAN activity. The inspectors calculated an incremental core damage probability deficit of approximately  $4E-9$  on May 7 from 8:00 am to 9:00 am (comparing the risk profile with and without HRE-TRAN in combination with the other activities performed).

Entergy’s corrective actions included briefing operators that starting or securing a feedwater pump was a HRE-TRAN activity and initiating CR-VTY-2012-02160 and CR-VTY-2012-02894.

Analysis. The inspectors determined that Entergy personnel’s incorrectly assessing the plant risk impact of securing the “C” feedwater pump was reasonably within Entergy’s ability to foresee and correct and should have been prevented. Traditional enforcement does not apply since there were no actual safety consequences, impacts on the NRC’s ability to perform its regulatory function, or willful aspects to the finding.

The inspectors reviewed NRC IMC 0612, Appendix E, “Examples of Minor Issues,” and found that example 7.e was sufficiently similar to the issue. The inspectors determined that the issue was more than minor because the overall elevated plant risk put the plant into a higher risk category established by Entergy. The inspectors determined the significance of the finding using IMC 0609, Appendix K, “Maintenance Risk Assessment and Risk Management Significance Determination Process.” The finding was determined to be of very low safety significance (Green) because the Incremental Core Damage Probability Deficit for the timeframe that the “C” feedwater pump was being secured was less than  $1E-6$  (approximately  $4E-9$ ).

The inspectors determined that the finding had a cross-cutting aspect in the Human Performance cross-cutting area, Resources component, because the procedure describing HRE-TRAN was not sufficiently clear and complete in its description to ensure nuclear safety. [H.2(c)]

Enforcement. 10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” paragraph (a)(4), requires, in part, that “ the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities.” Contrary to the above, on May 7, Entergy did not adequately assess the risk that resulted from securing the “C” feedwater pump. In addition, Entergy did not upgrade the advertised plant risk from “Yellow” to “Orange” and did not specify risk management actions for the increased risk condition. No corrective actions to restore compliance were necessary since the “Orange” risk condition had already ceased once the plant maneuvering had completed. Because this violation was of very low safety significance and was entered into the corrective action program (CR-VTY-2012-02160 and CR-VTY-2012-02894), this violation is being treated as an NCV, consistent with the NRC Enforcement Policy. **(NCV 05000271/2012003-02 Inadequate Risk Assessment Due to Not Considering the Increased Risk of a Plant Transient when Securing a Feedwater Pump).**

1R15 Operability Determinations and Functionality Assessments (71111.15 – 4 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions:

- Trip set point on high drywell pressure for a trip unit was found out of tolerance, CR initiated on April 2
- Control rods’ 06-35 and 18-43 stall flow were higher than specifications during monthly exercising, CRs initiated on May 6
- Sealed conduit within a manhole was missing an elbow cover and was filled with water, submerging the cable inside the conduit, CR initiated on June 5
- Electrical transient on Bus 1 evaluated for impact on “B” emergency diesel generator, CR initiated on June 18

The inspectors selected these issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the operability determinations to assess whether TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS and UFSAR to Entergy’s evaluations to determine whether the components or systems were operable. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)a. Inspection Scope

The inspectors evaluated a modification to the “F” torus to drywell vacuum breaker, V16-19-5F. The inspectors verified that the design bases, licensing bases, and performance capability of the primary containment atmosphere control system was not degraded by the modification to relocate the counterweights to reduce the closing force on the vacuum breaker. The inspectors reviewed modification documents associated with the design change, the implementing work order and the post modification test procedure to verify that the modification could be performed on line without impact to plant safety. The inspectors also interviewed engineering personnel involved with the modification.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 7 samples)a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the test procedure to verify that the procedure adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with the information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspectors also witnessed the test or reviewed test data to verify that the test results adequately demonstrated restoration of the affected safety functions.

- Cooling tower fan motor and panel cleaning on April 17
- Residual heat removal service water (RHRSW) to RHR emergency intertie valve, VIO-184, planned maintenance and replacement of the associated motor control center breaker on May 2
- RHRSW to RHR emergency intertie valve, VIO-183, and the associated motor control center breaker planned maintenance on May 3
- “A” RHR heat exchanger planned maintenance on May 3 and 4
- “C” feedwater pump shaft driven lube oil pump emergent maintenance on May 8
- HPCI motor operated valves diagnostic testing on May 24
- “B” service water pump replacement on June 13

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 6 samples)a. Inspection Scope

The inspectors observed performance of surveillance tests and reviewed test data of selected risk-significant SSCs to assess whether test results satisfied TS, the UFSAR, and Entergy's procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied. Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following surveillance tests:

- Reactor coolant system leak detection surveillance on April 9 (reactor coolant system)
- "B" emergency diesel generator slow start surveillance on April 16
- "B" RHRSW quarterly surveillance on April 20 (in-service test)
- Control rod scram time testing surveillance on April 24
- "C" service water pump quarterly surveillance on May 15 (in-service)
- Main condenser low vacuum isolation functional test on June 18

b. Findings

No findings were identified.

**2. RADIATION SAFETY****Cornerstone: Occupational Radiation Safety**2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

This area was inspected to review and assess Entergy's performance in assessing the radiological hazards in the workplace associated with licensed activities and the implementation of appropriate radiation monitoring and exposure control measures for both individual and collective exposures; verify Entergy is properly identifying and reporting Occupational Radiation Safety Cornerstone performance indicators; and identify those performance deficiencies that were reportable as a performance indicator and which may have represented a substantial potential for overexposure of the worker.

From April 9 to 12, the inspectors interviewed the radiation protection manager, radiation protection supervisors, and radiation workers. The inspectors performed walk-downs of various portions of the plant, performed independent radiation dose rate measurements, observed work activities in radiological control areas and reviewed Entergy documents. The inspectors used the requirements in 10 CFR Part 20 and guidance in Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas for Nuclear Plants," the TS, and Entergy's procedures required by TS as criteria for determining compliance.

.1 Inspection Planning

a. Inspection Scope

The inspectors reviewed the 2011 Entergy performance indicators for the occupational exposure cornerstone. The inspectors reviewed the results of radiation protection program audits. The inspectors reviewed any reports of operational occurrences related to occupational radiation safety since the last inspection.

b. Findings

No findings were identified.

.2 Radiological Hazard Assessment

a. Inspection Scope

The inspectors reviewed documents and conducted interviews to determine if there had been changes to plant operations since the last inspection that could have resulted in a significant new radiological hazard for onsite workers or members of the public. The inspectors evaluated whether Entergy assessed the potential impact of these changes and implemented periodic monitoring, as appropriate, to detect and quantify the radiological hazard.

The inspectors reviewed the last two radiological surveys from the condenser bays, reactor water cleanup pump cubicles, and transverse in-core probe cubicles. The inspectors evaluated whether the thoroughness and frequency of the surveys were appropriate for the given radiological hazard.

The inspectors conducted walk-downs and independent radiation measurements in the facility, including radioactive waste processing, storage, and handling areas to evaluate material and radiological conditions.

The inspectors selected the following radiologically risk-significant work activities that involved exposure to radiation.

- Investigate, troubleshoot, repair condenser waterbox
- Condenser waterbox cleaning, testing and plugging
- Reactor assembly and cavity decontamination during refueling outage 29 (RFO-29)
- Scaffolding support in drywell (RFO-29)

For these work activities, the inspectors assessed whether the pre-work surveys performed were appropriate to identify and quantify the radiological hazard and to establish adequate protective measures. The inspectors evaluated the radiological survey program to determine if radiological hazards were properly identified (e.g., discrete radioactive hot particles, alpha emitters contamination, transuranics and hard to detect nuclides in air samples, transient dose rates and large gradients in radiation dose rate).

The inspectors evaluated whether continuous air monitors e.g., particulate, iodine and noble gas monitors, were located in areas with low background to minimize false alarms and were representative of actual work areas. The inspectors evaluated Entergy's

program for monitoring levels of loose surface contamination in areas of the plant with the potential for the contamination to become airborne.

b. Findings

No findings were identified.

.3 Instructions to Workers

a. Inspection Scope

The inspectors selected five containers holding non-exempt quantities of licensed radioactive materials that may cause unplanned or inadvertent exposure of workers. The inspectors assessed whether the containers were labeled and controlled in accordance with 10 CFR Part 20 requirements.

The inspectors reviewed the radiation work permits (RWP) used to access high radiation areas (HRA) in the condenser waterbox and evaluated if the specified work control instructions and control barriers were consistent with TS requirements for High Radiation Areas.

For these radiation work permits, the inspectors assessed whether allowable stay times or permissible dose for radiologically significant work under each radiation work permit were clearly identified. The inspectors evaluated whether electronic personal dosimeter alarm set-points were in conformance with survey indications and plant procedural requirements.

For work activities that could suddenly and severely increase radiological conditions, the inspectors assessed Entergy's means to inform workers of these changes that could significantly impact their occupational dose.

b. Findings

No findings were identified.

.4 Contamination and Radioactive Material Control

a. Inspection Scope

The inspectors observed the health physics (HP) access control point where Entergy monitors potentially contaminated material leaving the radiological control area and inspected the methods used for control, survey, and release from these areas. The inspectors observed the performance of personnel surveying and releasing material for unrestricted use and evaluated whether the work was performed in accordance with plant procedures. The inspectors assessed whether the radiation monitoring instrumentation used for equipment release and personnel contamination surveys had appropriate sensitivity for the type(s) of radiation present.

The inspectors reviewed Entergy's criteria for the survey and release of potentially contaminated material. The inspectors evaluated whether there was guidance on how to respond to an alarm that indicates the presence of licensed radioactive material.

The inspectors reviewed Entergy's procedures and records to verify that the radiation detection instrumentation was used at its typical sensitivity level based on appropriate counting parameters. The inspectors selected three sealed sources (VY096-50 Curies (Ci) Cs-137; VY097-10 Ci Cs-137; and VY098-30 Ci Cs-137) from Entergy's inventory records and assessed whether the sources were accounted for and were tested for loose surface contamination.

The inspectors evaluated whether any transactions involving nationally tracked sources were reported in accordance with 10 CFR Part 20 requirements. No new nationally tracked sources were received since the last inspection.

b. Findings

No findings were identified.

.5 Radiological Hazards Control and Work Coverage

a. Inspection Scope

The inspectors evaluated ambient radiological conditions and performed independent radiation measurements during the walk-down of the facility. The inspectors assessed whether the conditions were consistent with applicable posted surveys, radiation work permits, and associated worker briefings.

The inspectors evaluated the adequacy of radiological controls, such as required surveys, radiation protection job coverage and contamination controls. The inspectors evaluated Entergy's use of electronic personal dosimeters in high noise areas that were also high radiation areas.

The inspectors assessed whether radiation monitoring devices were placed on the individual's body consistent with Entergy procedures. The inspectors assessed whether the dosimeter was placed in the location of highest expected dose or that Entergy properly implemented an NRC-approved method of determining effective dose equivalent.

The inspectors examined Entergy's physical and programmatic controls for highly activated or contaminated materials stored within spent fuel and other storage pools. The inspectors assessed whether appropriate controls were in place to preclude inadvertent removal of these materials from the pool.

The inspectors examined the posting and physical controls for selected high radiation areas and very high radiation areas to verify conformance with the occupational performance indicator.

b. Findings

No findings were identified.

## .6 Problem Identification and Resolution

### a. Inspection Scope

The inspectors discussed with the Radiation Protection Manager the controls and procedures for high-risk high radiation areas and very high radiation areas. The inspectors assessed whether any changes to relevant Entergy procedures substantially reduced the effectiveness and level of worker protection.

The inspectors discussed with first-line health physics supervisors the controls in place for special areas that have the potential to become very high radiation areas during certain plant operations. The inspectors assessed whether these plant operations require communication beforehand with the health physics group, so as to allow corresponding timely actions to properly post, control, and monitor the radiation hazards including re-access authorization.

The inspectors evaluated Entergy controls for very high radiation areas and areas with the potential to become a very high radiation area to ensure that an individual was not able to gain unauthorized access to these very high radiation areas.

### b. Findings

No findings were identified.

## .7 Radiation Worker Performance

### a. Inspection Scope

The inspectors observed radiation worker performance with respect to stated radiation protection work requirements. The inspectors assessed whether workers were aware of the radiological conditions in their workplace and the radiation work permit controls/limits in place, and whether their behavior reflected the level of radiological hazards present.

The inspectors reviewed eight radiological problem reports written since the last inspection that found the cause of the event to be human performance errors. The inspectors evaluated whether there was an observable pattern traceable to a similar cause. The inspectors assessed whether this perspective matched the corrective action approach taken by Entergy to resolve the reported problems.

### b. Findings

No findings were identified.

## .8 Radiation Protection Technician Proficiency

### a. Inspection Scope

The inspectors observed the performance of the radiation protection technicians with respect to radiation protection work requirements. The inspectors evaluated whether technicians were aware of the radiological conditions in their workplace and the RWP controls/limits, and whether their behavior was consistent with their training and qualifications with respect to the radiological hazards and work activities.

No radiological problem reports were written since the last inspection that found the cause of the event to be radiation protection technician error.

b. Findings

No findings were identified.

.9 Problem Identification and Resolution

a. Inspection Scope

The inspectors evaluated whether problems associated with radiation monitoring and exposure control were being identified by Entergy at an appropriate threshold and were properly addressed for resolution in Entergy's corrective action program. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by Entergy that involved radiation monitoring and exposure controls. The inspectors assessed Entergy's process for applying operating experience to their plant.

b. Findings

No findings were identified.

2RS2 Occupational ALARA Planning and Controls (71124.02)

This area was inspected during April 9 – 12, to assess performance with respect to maintaining occupational individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors used the requirements in 10 CFR Part 20, Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Plants will be As Low As Reasonably Achievable," Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposure As Low as Reasonably Achievable," the TS, and Entergy's procedures required by TS as criteria for determining compliance.

.1 Inspection Planning

a. Inspection Scope

The inspectors reviewed pertinent information regarding VY's collective dose history, current exposure trends, and ongoing or planned activities in order to assess current performance and exposure challenges. The inspectors reviewed the plant's three year rolling average collective exposure.

The inspectors compared the site-specific trends in collective exposures against the industry average values and those values from similar vintage reactors. In addition, the inspectors reviewed any changes in the radioactive source term by reviewing the trend in average contact dose rate with reactor recirculation piping. The inspectors reviewed site-specific procedures associated with maintaining occupational exposures ALARA, which included a review of processes used to estimate and track exposures from specific work activities.

b. Findings

No findings were identified.

.2 Radiological Work Planning

a. Inspection Scope

The inspectors selected the following work activities that had the highest exposure significance.

- ALARA Review (AR)# RFO-29 Scaffold Support in Drywell
- AR # RFO-29 Reactor Reassembly & Cavity Decon
- RWP 2011-0506 RFO-29 Scaffold Support in Drywell, Revision 0
- RWP 2011-0702 RFO-29 Reactor Reassembly & Cavity Decon, Revision 9
- RWP 2012-0066 Investigate, Troubleshoot, Repair Condenser Waterbox, Revision 3
- RWP 2012-0071 Condenser Waterbox Cleaning, Testing and Plugging, Revision 0

The inspectors reviewed the ALARA work activity evaluations, exposure estimates, and exposure reduction requirements. The inspectors determined whether Entergy reasonably grouped the radiological work into work activities, based on historical precedence, industry norms, and/or special circumstances.

The inspectors assessed whether Entergy's planning identified appropriate dose reduction techniques considered alternate dose reduction features and estimated reasonable dose goals. The inspectors evaluated whether Entergy's ALARA assessment had taken into account decreased worker efficiency from use of respiratory protective devices and/or heat stress mitigation equipment. The inspectors determined whether Entergy's work planning considered the use of remote technologies as a means to reduce dose and the use of dose reduction insights from industry operating experience and plant-specific lessons learned. The inspectors assessed the integration of ALARA requirements into work procedure and radiation work permit documents.

The inspectors compared the results achieved (dose rate reductions, person-rem used) with the intended dose established in Entergy's ALARA planning for these work activities. The inspectors compared the person-hour estimates provided by maintenance planning and other groups to the radiation protection group actual person-hours for the work activity time requirements, and evaluated the accuracy of these time estimates. The inspectors assessed the reasons for any inconsistencies between intended and actual work activity doses.

The inspectors determined whether post-job reviews were conducted to identify lessons learned. When problems were identified, the inspectors verified that worker suggestions for improving dose/contamination reduction techniques were entered into Entergy's corrective action program.

b. Findings

No findings were identified.

### .3 Verification of Dose Estimates and Exposure Tracking Systems

#### a. Inspection Scope

The inspectors reviewed the assumptions and basis for the current annual collective exposure estimate for accuracy. The inspectors reviewed applicable procedures to determine the methodology for estimating exposures from specific work activities and for department and station dose goals.

The inspectors evaluated whether Entergy had established measures to track, trend, and if necessary, reduce occupational doses for ongoing work activities. The inspectors assessed whether threshold criteria were established to prompt additional reviews and/or additional ALARA planning and controls.

The inspectors evaluated Entergy's method of adjusting exposure estimates, or re-planning work, when unexpected changes in scope or emergent work were encountered. The inspectors assessed whether adjustments to exposure estimates were based on sound radiation protection and ALARA principles or if they were just adjusted to account for failures to plan/control the work.

#### b. Findings

No findings were identified.

### .4 Source Term Reduction and Control

#### a. Inspection Scope

The inspectors used Entergy records to determine the historical trends and current status of the plant source term known to contribute to elevated facility collective exposure. The inspectors assessed whether Entergy had made allowances or developed contingency plans for expected changes in the source term as the result of changes in plant fuel performance issues or changes in plant primary chemistry. The RFO-29 Chemistry Water Management Plan dated July 28, 2011, was also reviewed to identify chemistry controls that reduced the radioactive source term during shutdown and startup. In addition, the Vermont Yankee 5-Year Exposure Reduction Plan 2012 – 2016, was reviewed.

#### b. Findings

No findings were identified.

### .5 Radiation Worker Performance

#### a. Inspection Scope

The inspectors observed radiation worker and radiation protection technician performance during work activities being performed in radiation areas and high radiation areas. The inspectors evaluated whether workers demonstrated the ALARA philosophy in practice (e.g., workers are familiar with the work activity scope and tools to be used, workers used ALARA low-dose waiting areas) and whether there were any procedure compliance issues.

b. Findings

No findings were identified.

.6 Problem Identification and Resolution

a. Inspection Scope

The inspectors evaluated whether problems associated with ALARA planning and controls were being identified by Entergy at an appropriate threshold and were properly addressed for resolution in Entergy's corrective action program.

b. Findings

No findings were identified.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator (PI) Verification (71151 – 2 samples)

Reactor Coolant System (RCS) Specific Activity and RCS Leak Rate

a. Inspection Scope

The inspectors reviewed Entergy's submittal for the RCS specific activity and RCS leak rate performance indicators for the period from April 2011 to March 2012. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in Nuclear Energy Institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The inspectors also reviewed RCS sample analysis and control room logs of daily measurements for RCS leakage, and compared that information to the data reported by the performance indicator. Additionally, the inspectors observed surveillance activities that determined the RCS identified leakage rate, and chemistry personnel taking and analyzing an RCS sample.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 2 samples)

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

As required by Inspection Procedure 71152, "Problem Identification and Resolution," the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that Entergy entered issues into their corrective action program at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the

inspectors performed a daily screening of items entered into the corrective action program and periodically attended condition report review group meetings.

b. Findings

No findings were identified.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a semi-annual review of site issues, to identify trends that might indicate the existence of more significant safety issues, as required by Inspection Procedure 71152, "Identification and Resolution of Problems." The inspectors reviewed the VY corrective action program database for the first and second quarters of 2012, to assess CRs written in various subject areas (equipment problems, human performance issues), as well as individual issues identified during the NRC's daily CR review (Section 40A2.1).

b. Findings and Observations

No findings were identified.

In the fourth quarter 2012 NRC integrated inspection report, the inspectors documented a potential emerging trend due to an increasing number of instances in which potentially adverse conditions were documented and/or recognized by Entergy staff without initiating a CR in accordance with EN-LI-102, "Corrective Action Process." Entergy initiated CR-VTY-2012-00570 and performed an apparent cause evaluation which did not identify a common cause for the instances. Entergy took corrective actions to address each individual occurrence.

In this semi-annual trend review, the inspectors observed an emerging trend due to an increased number of instances in the first and second quarters of 2012 where Entergy personnel documented and/or recognized potentially adverse conditions without initiating a CR. The inspectors determined the issues were minor with no actual or potential safety impact; therefore, they are not subject to enforcement action in accordance with the NRC Enforcement Policy. However, the inspectors noted a similar number of such instances during this semi-annual period to the number observed during the previous semi-annual period. In particular, the inspectors identified six minor conditions which had been documented and/or recognized by Entergy staff without initiating a CR. Entergy personnel initiated CRs following the inspectors' observations that no CR had been initiated.

- The inspectors informed Entergy control room staff that the inner reactor building railroad door was open with no apparent ongoing or planned work requiring the door to be open. (CR-VTY-2012-00974)
- The inspectors informed Entergy control room staff that the watertight door to the northeast corner room in the reactor building was latched with only one of the eight dogs. (CR-VTY-2012-00975)
- Entergy staff identified during a post-drill critique that emergency response organization members were initially paged about an unusual event instead of an

alert, potentially impacting their response time to the designated locations. (CR-VTY-2012-01481)

- During surveillance testing of the “B” emergency diesel generator, Entergy staff recorded the wrong value for fuel oil filter differential pressure and signed the surveillance as satisfactory, even though the recorded value was outside the acceptance criterion and was a value that could have impacted diesel operability. (CR-VTY-2012-01798)
- The inspectors identified a cable conduit with a displaced cover that contained standing water during manhole inspections. Entergy personnel noted that they recognized the condition during the previous inspection. (CR-VTY-2012-02560)
- Entergy staff recorded an as-left out-of-specification limit switch setting on a HPCI valve along with a note justifying the acceptability of the out-of-specification setting. (CR-VTY-2012-02755)

### .3 Annual Sample: RRU-7 Flow Rate Surveillance Failure

#### a. Inspection Scope

The inspectors performed an in-depth review of Entergy’s apparent cause analysis and corrective actions associated with CR-VTY-2011-03513, regarding the failure of the flow rate surveillance on room cooler RRU-7. Specifically, the stem and disc separated on the service water throttle outlet valve to RRU-7, preventing operators from adjusting the service water flow rate to within the acceptable band.

The inspectors assessed Entergy’s problem identification threshold, cause analyses, extent of condition reviews, interim corrective actions, and the prioritization and timeliness of Entergy’s corrective actions to determine whether Entergy was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned and completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Entergy’s corrective action program and 10 CFR 50, Appendix B. In addition, the inspectors interviewed engineering personnel to assess the effectiveness of the implemented corrective actions.

#### b. Findings and Observations

No findings were identified.

Entergy staff identified two apparent causes for the stem-disk separation. First, the method used to secure the disk to the stem was of insufficient quality for the application. Second, the valve type was not suitable for long term throttling. The design of the valve caused it to vibrate excessively while throttled, which caused the threaded connection between the stem and disc to wear away, ultimately resulting in separation. The disc of the outlet valve rested on the bottom of the valve body, restricting service water flow through the room cooler, causing it to fail the surveillance.

The inspectors determined Entergy’s overall response to the issue was commensurate with the safety significance, was timely, and included appropriate interim corrective actions. Entergy performed an extent of condition review which identified additional valves of the same design in use in the plant. Entergy prioritized these valves for inspection based on safety class and risk significance. Entergy personnel inspected the

corresponding valve on the opposite train room cooler, RRU-8, and found the same stem-disk separation. However, the flow through room cooler RRU-8 remained in the acceptable range with the separated disk. Although they are normally-open valves used in an air system as opposed to a water system, Entergy personnel inspected the air start manual stop valves on the “A” emergency diesel generator and found them to be unaffected.

For remaining inspections, Entergy personnel have not yet inspected the throttle outlet valves for room coolers RRU-5 and RRU-6. However, the inspectors determined the inspection schedule was acceptable given that RRU-5 and RRU-6 are not relied upon to maintain room temperatures within required limits during accident conditions and there has been no decline in their performance, which is monitored quarterly. Pending corrective actions include replacement of the RRU-7 and RRU-8 throttle outlet valves with a valve type well-suited to throttling. Entergy has installed new valves in RRU-7 and RRU-8 that are the current design as an interim action until the design change is implemented during the next refueling outage. The inspectors determined the interim actions and plans to install the new design during the next refueling outage are adequate because the failure mechanism develops over several years of service before causing an impact.

#### 4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153 – 1 sample)

##### Plant Events

##### a. Inspection Scope

On June 18, the “A” recirculation pump motor generator set experienced a fault in the electrical connection box to the drive motor. This resulted in a trip of the “A” recirculation pump, which caused the plant to enter single loop operations, and operators reduced power to 33 percent. The inspectors observed plant parameters and control room personnel performance. The inspectors communicated the plant events to appropriate regional personnel, and compared the event details with criteria contained in IMC 0309, “Reactive Inspection Decision Basis for Reactors,” for consideration of potential reactive inspection activities. The inspectors reviewed Entergy’s follow-up actions to ensure that Entergy implemented appropriate corrective actions commensurate with their safety significance.

##### b. Findings

No findings were identified.

#### 4OA5 Other Activities

##### Institute of Nuclear Power Operations (INPO) Report Review

##### a. Inspection Scope

The inspectors reviewed the final report for the INPO plant assessment and World Association of Nuclear Operators peer review of VY conducted in December 2011 and February 2012. The inspectors also reviewed the final report for the INPO accreditation

team evaluation of the maintenance, chemistry, radiological protection, and engineering technical training programs. The inspectors reviewed these reports to ensure that any issues identified were consistent with NRC perspectives of Entergy performance and to determine if INPO identified any significant safety issues that required further NRC follow-up.

b. Findings

No findings were identified.

4OA6 Meetings, including Exit

On April 12, the inspectors presented the occupational radiation safety program baseline inspection results to Mr. Christopher Wamser, Site Vice President and other members of the Entergy staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

On May 23, Ronald Bellamy, NRC Branch Chief for Vermont Yankee, presented and discussed the 2011 end-of-cycle performance assessment of the Vermont Yankee Nuclear Power Station with Mr. Christopher Wamser, Site Vice President, and other members of the Vermont Yankee staff. Entergy acknowledged the assessment and planned regulatory oversight. This discussion was completed prior to a public open-house meeting on May 23. (ADAMS Accession Number ML12121A628).

On May 29, the inspectors presented the triennial heat sink performance inspection results to Mr. Michael Gosekamp, General Manager, Plant Operations, and other members of the Entergy staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

On July 23, the inspectors presented the inspection results to Mr. Christopher Wamser, Site Vice President, and other members of the Entergy staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

**ATTACHMENT: SUPPLEMENTARY INFORMATION**

**SUPPLEMENTARY INFORMATION****KEY POINTS OF CONTACT**Vermont Yankee Personnel

C. Wamser, Site Vice President  
 M. Gosekamp, General Manager, Plant Operations  
 M. Romeo, Director of Nuclear Safety Assurance  
 R. Wanczyk, Licensing Manager  
 N. Rademacher, Director of Engineering  
 G. Wierzbowski, Director of Engineering  
 J. Rogers, Design Engineering Manager  
 P. Ryan, Security Manager  
 D. Jones, Operations Manager  
 V. Ferrizzi, Asst. Operations Manager  
 E. Harms, Asst. Operations Manager  
 R. Busick, Asst. Operations Manager  
 M. Tessier, Maintenance Manager  
 C. Daniels, Maintenance Manager  
 J. Hardy, Chemistry Manager  
 P. Corbett, Quality Assurance Manager  
 S. Naeck, Outage Manager  
 J. Bengtson, CA&A Manager  
 D. Tkatch, Radiation Protection Manager  
 M. Castronova, Manager of Projects  
 J. Ward, I&C Superintendent  
 M. McKenney, Emergency Preparedness Manager  
 P. McKenney, Material, Purchasing and Contracts Manager  
 J. Twarog, Operations Shift Manager  
 K. Sweet, Programs and Components Engineering Supervisor  
 J. Taylor, Operations Training Superintendent  
 T. Capelletti, Mechanical Maintenance Superintendent  
 S. Aprea, Operations Shift Manager  
 S. Goodman, Mechanical Maintenance Supervisor  
 K. Whippie, Chemistry Supervisor  
 G. Bacala, Field Support Supervisor  
 S. Howe, Electrical Maintenance Supervisor

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

05000271/2012003-01	NCV	Inadequate Risk Assessment for Isolating the Condensate Pumps' Minimum Flow Line's Automatic Flow Control Valve (Section 1R13)
05000271/2012003-02	NCV	Inadequate Risk Assessment Due to Not Considering the Increased Risk of a Plant Transient when Securing a Feedwater Pump (Section 1R13)

## LIST OF DOCUMENTS REVIEWED

In addition to the documents identified in the body of this report, the inspectors reviewed the following documents and records.

Vermont Yankee Nuclear Power Station Updated Final Safety Analysis Report  
 Vermont Yankee Nuclear Power Station Technical Specifications  
 Vermont Yankee Nuclear Power Station Narrative Logs, Night Orders, and Standing Orders

### **Section 1R01: Adverse Weather Protection**

#### Procedures

OP2140, "345kV/115kV Electrical System," Revision 55

#### Condition Reports

CR-VTY-2012-03019

#### Work Orders

52298263, "T-2-1A, Aux Transformer Refuel Outage PMs"

#### Miscellaneous

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### **Section 1R04: Equipment Alignment**

#### Procedures

OP 2121, "Reactor Core Isolation Cooling System," Revision 56  
 OP 2123, "Core Spray," Revision 44  
 AP 0155, "Current System Valve and Breaker Lineup and Identification," Revision 78  
 DP 4107, "EOP/Alternate Shutdown Tools and Supplies Surveillance," Revision 20  
 OP 2143, "480 and Lower Voltage AC System," Revision 127  
 OP 2123, "Core Spray," Revision 44  
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 OPOP-RHR-2124, "Residual Heat Removal System," Revision 6  
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#### Drawings

G-191168, "Flow Diagram Core Spray System," Revision 47  
 G-191174, "Reactor Core Isolation Cooling Sheets 1 + 2," Revision 44 and 24  
 G-191168, "Flow Diagram Core Spray System," Revision 47

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CR-VTY-2012-02002	CR-VTY-2012-00660	CR-VTY-2012-02073
CR-VTY-2012-00878	CR-VTY-2012-01150	CR-VTY-2012-02940

#### Work Orders

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Miscellaneous

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RCIC System Health Report, 4<sup>th</sup> Quarter 2011  
RHR "A" LCO Schedule – All Activities dated 4/27/2012  
VYEM-0119, "RCIC Turbine, Operator and Maintenance Manual," Revision 4  
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**Section 1R05: Fire Protection**

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OP 2186, "Fire Suppression Systems," Revision 63  
OP 3020, "Fire Emergency Response," Revision 57  
EN-OC-161, "Control of Combustibles," Revision 6  
OP 4103, "Fire Protection Equipment Surveillance," Revision 56  
PP 7011, "Vermont Yankee Fire Protection and Safe Shutdown," Revision 14  
OP 4800, "General Safety Surveillance," Revision 39

Pre-Fire Plans

PFP-IS, "Intake Elevation 237," Revision 3  
PFP-RB-6, "Elevation 252' 6" Reactor Building South," Revision 3  
PFP-RB-11, "Elevation 213' 9" Torus (North)" Revision 3  
PFP-RB-9, "Elevation 232' 6" Torus (North)," Revision 3

Condition Reports

CR-VTY-2012-01957

Miscellaneous

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**Section 1R07: Heat Sink Performance**

Calculations

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VYC-2069, "Re-Evaluation of Standby Fuel Pool Cooling Heat exchanger design Basis,"  
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VYC-0868 EC Markup 14737, "Service Water Inlet to Enhanced Fuel Pool Heat Exchangers,"  
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Temperatures," Revision 1

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CR-VTY-2010-01731	CR-VTY-2011-04859	CR-VTY-2012-02284
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 52328831, "Perform RHR HTEX Cleaning and Baffle Plate Inspection"  
 52301070, "Standby Fuel Pool Cooling HX Cleaning"  
 52295518, "Drain Deep Basin, Remove Silt and Inspect Below Water Line"  
 52298482, "Intake Structure Underwater Inspections and Cleaning"  
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 52267988, "SFPC HX EDDY Current Testing and Damaged Tube Plugging"  
 52267987, "Hydrolazing of SFPC Heat Exchanger: E-19-2B"  
 52267985, "Hydrolazing of SFPC Heat Exchangers"  
 52248693, "Perform RHR HT EX Cleaning and Baffle Plate Inspection"  
 51566745, "Standby Fuel Pool Cooling HX Cleaning"

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00310930, "Replace Service Water Pump Assembly; P-7-1B"  
00307787, "Leak Found on SW Discharge Piping"  
00295118, "FC-104-28B (DGB SW Intake) Not Controlling at Setpoint"  
00294324, "SW Pipeline Clogged with Silt"  
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**Section 1R11: Licensed Operator Regualification Program**

Procedures

OP-4160, "Turbine Generator Surveillance," Revision 54  
OP-0105, "Reactor Operations," Revision 93  
OT 3114, "Reactor High Level," Revision 17  
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Condition Reports

VTY-2012-1887

Miscellaneous

Training Cycle 29.4

**Section 1R12: Maintenance Effectiveness**

Procedures

EN-DC-206, "Maintenance Rule (a)(1) Process," Revision 1

Condition Reports

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Work Orders

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**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**Procedures

OPOP-AOG-2150, "Advanced Off Gas System and Air Evacuation Equipment," Revision 7  
 OP 2172, "Feedwater System," Revision 48  
 AP 0172, "Work Schedule Risk Management – On Line," Revision 23  
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Condition Reports

CR-VTY-2012-02074  
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Miscellaneous

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CR-VTY-2007-04150	CR-VTY-2012-02087	CR-VTY-2012-02647
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**Section 1R18: Plant Modifications**

Procedures

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Condition Reports

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Drawings

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Miscellaneous

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**Section 1R19: Post-Maintenance Testing**

Procedures

OP 5235, "AC and DC Motor Maintenance," Revision 22  
EN-WM-107, "Post Maintenance Testing," Revision 3  
OP 5210, "MCC Inspections," Revision 34  
OP 2172, "Feedwater System," Revision 48  
OPST-HPCI-4120-04, "HPCI Valve Operability Test (Quarterly)," Revision 1  
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Condition Reports

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52329084, "Panel-70-3 Outdoor SWGR Annual Panel Inspection"  
52327690, "MCC-9B-10M; MCC Cubicle Inspection – Major IAW OP5210"  
00313973, "MCC-9B-10M; Replace Breaker that Failed OP-5210 Testing"  
52327685, "MCC-8B-2F; MCC Cubicle Inspection – Major IAW OP 5210"  
52327797, "VIO-183; Routine Inspection of Limitorque Operator per OP 5220"  
52328833, "Perform RHR NT EXC Cleaning and Baffle Plate Inspection"  
00314358, "Repair Oil Pump Coupling"  
52336441, "Perform Thrust Verification Testing per EMMP-MOV-5219"

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00310930, "Replace Service Water Pump Assembly – P-7-1B"

Drawings

G-191172, "Flow Diagram Residual Heat Removal System," Revision 71  
5920-00646, "Residual Heat Removal Heat Exchanger Specifications," Revision 3  
5920-2014, "Reactor Feed Pump X-Section," Revision 2

Miscellaneous

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EC 37081, "Replace HFB 10 MAG Breaker with an HMCP 15 MAG Breaker in MCC-9B-10M  
Due to Failure of Old Breaker during Test," Revision 0  
EC 37256, "Feedwater Pump P-1-1C Keyway," Revision 0  
VY Leak Check Examination Report Form, performed 5/3/2012  
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Exchanger," Revision 3  
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**Section 1R22: Surveillance Testing**

Procedures

OPST-EDG-4126-02B, "Monthly "B" EDG Slow Start Operability Test," Revision 2  
OPST-FO-4195-02B, "Fuel Oil Transfer Pump (P92-1B) and Discharge Check Valve (FO-28B)  
Operability Test (Quarterly)," Revision 00  
OPST-RHR-4124-13B, "RHR Pump B Operability Test (Quarterly)," Revision 1  
OPST-RHR-4124-13D, "RHR Pump D Operability Test (Quarterly)," Revision 1  
OPST-RHR-4124-12B, "RHRSW/Valve D Operability and Full Flow Test," Revision 1  
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ON 3143, "Stuck Control Rod," Revision 12  
OP 4424, "Control Rod Scram Testing and Data Reduction," Revision 44  
OP 4181, "Service Water/Alternate Cooling System Surveillance," Revision 75  
OP 4325, "Condenser Low Vacuum Isolation Functional Test/ Calibration," Revision 28  
ARS 21003, "CRP 9-5 Alarm Response Sheets," Revision 12

Drawings

G-191172, "Flow Diagram Residual Heat Removal System," Revision 71  
G-191151, "Flow Diagram Service Water Sheets 1 and 2," Revision 84 and 95  
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Indication (Inboard)," Revision 16  
B-191301, Sheet 1110, "Control Wiring Diagram – Main Steam Valves DC Pilot Solenoids &  
Indication (Outboard)" Revision 7  
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27  
5920-2092, Sheet 2, "Elementary Diagram – Primary Containment Isolation System," Revision  
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Miscellaneous

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VYOPF 4424.01, "Control Room Scram Testing Form," Performed 4/24/2012

VYOPF 4424.04, "Scram Timing Summary Sheet," Performed 4/24/2012

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**Section 2RSO1: Radiological Hazard Assessment and Exposure Controls**

Procedures

DP 0522, "Radiologically Significant Plant Event Response for RP Personnel," Revision 13

DP 0545, "Fuel Pool Storage Requirements," Revision 16

DP 0555, "Transverse In-Core Probe (TIP) Room Entry, Revision 14

EN-RP-109, "Hot Spot Program," Revision 3

EN-RP-121, "Radioactive Material Controls," Revision 6

EN-RP-101, "Access Controls for Radiologically Controlled Areas," Revision 6

EN-RP-104, "Personnel Contamination Events," Revision 6

EN-RP-105, "Radiological Work Permits," Revision 11

EN-RP-106, "Radiological Survey Documentation," Revision 3

EN-RP-108, "Radiation Protection Posting," Revision 10

EN-RP-110-04, "Radiation Protection Risk Assessment Process," Revision 1

EN-RP-121-01, "Receipt of Radioactive Material," Revision 1

EN-RP-122, "Alpha Monitoring," Revision 6

EN-RP-131, "Air Sampling," Revision 9

EN-RP-143, "Source Control," Revision 8

EN-RP-404, "Operation and Maintenance of HEPA Vacuum Cleaners and HEPA Ventilation Units," Revision 4  
 EN-RP-201, "Dosimetry Administration," Revision 3  
 EN-RP-202, "Personnel Monitoring," Revision 8  
 EN-RP-204, "Special Monitoring Requirements," Revision 6  
 EN-RP-206, "Dosimeter of Legal Record Quality Assurance," Revision 5  
 RPRP-USER-0527, "Radiation Protection Department Site Specific Expectations and Requirements," Revision 1  
 RPRP-PC-0518, "Radiation Protection Requirements for Drywell with Reactor Shutdown," Revision 1

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LO – VTYLO-2012-00030 Snapshot Assessment Rad Hazard Assessment and Exposure Controls/ALARA Planning March 2012  
 QA-14/15-2011-VY-01 Audit Report: Combined Radiation Protection and Radwaste, January 16, 2012  
 LO VTYLO-2011-00101 Snapshot Assessment HRA/LHRA Control, June 21, 2011  
 LO VTYLO-2011-00050 Snapshot Assessment Vehicle Security Search & Procedure Review, May 10, 2011  
 Readiness Assessment in Support of September 2011 NRC HP Access Control and ALARA Inspection May 4, 2011

Corrective Action Document Name

CR-VTY-2011-04183	CR-VTY-2011-04590	CR-VTY-2011-05696
CR-VTY-2011-04505	CR-VTY-2012-01101	CR-VTY-2012-00265
CR-VTY-2011-04526	CR-VTY-2011-04828	

Miscellaneous

Performance Indicators 2011 Occupational Exposure Control Effectiveness  
 2012 Collective Dose Goals by Department  
 EN-RP-143 Attachment 9.4, "Sealed Source Leak Test Worksheet," completed 2/15/12  
 EN-RP-143 Attachment 9.5, "Radioactive Source List," completed 2/13/12  
 RPRP-USER-0527, Attachment 8 Radiation Protection Weekly Checkoff Log Sheet, completed 4/09/12  
 RWP 2012-0071, "Condenser Waterbox Cleaning, Testing and Plugging," Revision 1  
 VTY-1203-005, "Radiation Survey RB 280 B RWCU Pump," 3/12/12  
 VTY-1203-0061, "Radiation Survey RB 280 B RWCU Pump," 3/13/12  
 VTY-1203-0054, "Radiation Survey RB 280 B RWCU Pump," 3/14/12  
 VTY-11-1523, "Radiation Survey RB 252 A TIP Room," 10/20/11  
 VTY-11-1527, "Radiation Survey RB 252 A TIP Room," 10/21/11  
 VTY-1201-0095, "Radiation Survey RB 252 A TIP Room," 1/17/12  
 VYDPF 0527.01, "Locked High Radiation Area Key Inventory," performed 7/27/10

**Section 2RSO2: Occupational ALARA Planning and Controls**

Procedures

AP 0536, "ALARA Implementation for Design Changes and Work Analysis," Revision 25  
 EN-PL-169, "Commitment to ALARA," Revision 0  
 EN-RP-110, "ALARA Program," Revision 9  
 EN-RP-110-01, "ALARA Initiative Deferrals," Revision 1  
 EN-RP-110-02, "Elemental Cobalt Sampling," Revision 0  
 EN-RP-110-03, "Collective Radiation Exposure Reduction Guidelines," Revision 1

EN-RP-110-05, "ALARA Planning and Controls," Revision 0  
EN-RP-110-06, "Outage Dose Estimating and Tracking," Revision 0  
OP 0083, "Installation and Removal of Temporary Shielding," Revision 7  
EN-RP-105, "Radiological Work Permits," Revision 11  
EN-DC-115, "Engineering Change Process," Revision 12  
EN-DC-218, "Temporary Radiation Shield Evaluation," Revision 0  
RPRP-USER-0527, "Radiation Protection Department Site Specific Expectations and Requirements," Revision 1  
NAI-RPP-13, "RP Response to Notification of a Reactor Scram," Revision 0

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QA-14/15-2011-VY-01 Audit Report for Combined Radiation Protection and Radwaste,  
January 16, 2012  
Readiness Assessment in Support of September 2011 NRC HP Access Control and ALARA  
Inspection, May 4, 2011

Corrective Action Document Name

CR-VTY-2012-01648  
CR-VTY-2011-05604  
CR-VTY-2011-05603

Miscellaneous

Vermont Yankee RFO-29 ALARA Report  
2011 Collective Dose Goals and Actual by Department  
Vermont Yankee Five-Year Exposure-Reduction Plan 2012 -2016  
ALARA Manager Committee Meeting May 4, 2011  
ALARA Manager Committee Meeting June 9, 2011  
ALARA Manager Committee Meeting January 16, 2012  
RWP 2012-0066 "Investigate, Troubleshoot, Repair Condenser Waterbox," Revision 3  
RWP 2012-0071 "Condenser Waterbox Cleaning, Testing and Plugging," Revision 0  
RWP 2011-0702 "RFO-29 Reactor Reassembly & Cavity Decontamination," Revision 9  
RWP 2011-0506 "RFO-29 Scaffold Support in Drywell," Revision 0  
AR # RFO-29 Reactor Reassembly & Cavity Decontamination  
AR# RFO-29 Scaffold Support in Drywell  
VTY-1204-004 "Radiation Survey TB 248 Heater Bay," April 11, 2012  
VTY-1204-0041 "Radiation Survey TB 222 228 Heater Bay," April 11-12, 2012  
EN-RP-110 Attachment 9.1 ALARA Suggestion Form No. 2012-005 "Remote Video Monitoring  
for Security Guard in Radiation Area," March 28, 2012  
EN-RP-110 Att 9.1 ALARA Suggestion Form No. 2012-004 "Install Lanyard and Tool Bucket on  
All Scaffold during Installation on All Tiers," March 13, 2012  
VY Station Collective Radiation Exposure 2011  
Performance Indicators for 2011 Occupational Exposure Control Effectiveness, December 2011  
Vermont Yankee 2011 Department Dose Budget On-Line Work  
Vermont Yankee Sentinel Report 2011 Dose by Department  
Vermont Yankee 2012 Department Dose Budget On-Line Work  
BVY 12-029, R. Wanczyk to NRC: Document Control Desk, RE: 2011 Annual Report of the  
Results of Individual Monitoring Vermont Yankee Nuclear Power Plant, April 11, 2012  
Vermont Yankee RFO-29 Chemistry Water Management Plan July 28, 2011

**Section 40A1: Performance Indicator (PI) Verification**

Procedures

AP 0094 App. C, "Performance Indicator Data Input Sheets," April 2011 – March 2012

Miscellaneous

NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6

CHOP-RWS-4612-01, "Reactor Water System Sampling and Treatment," Revision 4

**Section 40A2: Problem Identification and Resolution**

Procedures

EN-LI-118-08, "Failure Modes Analysis (FMA)," Revision 0

EN-LI-119, "Apparent Cause Evaluation (ACE) Process," Revision 15

EN-LI-102, "Corrective Action Program," Revision 19

Condition Reports

CR-VTY-2011-003513	CR-VTY-2012-01704	CR-VTY-2012-01924
CR-VTY-2011-004345	CR-VTY-2012-01706	CR-VTY-2012-01929
CR-VTY-2011-005349	CR-VTY-2012-01708	CR-VTY-2012-01929
CR-VTY-2012-00405	CR-VTY-2012-01709	CR-VTY-2012-01957
CR-VTY-2012-00483	CR-VTY-2012-01710	CR-VTY-2012-01998
CR-VTY-2012-00560	CR-VTY-2012-01711	CR-VTY-2012-02002
CR-VTY-2012-00643	CR-VTY-2012-01712	CR-VTY-2012-02017
CR-VTY-2012-00961	CR-VTY-2012-01713	CR-VTY-2012-02018
CR-VTY-2012-00974	CR-VTY-2012-01715	CR-VTY-2012-02038
CR-VTY-2012-00975	CR-VTY-2012-01718	CR-VTY-2012-02052
CR-VTY-2012-01081	CR-VTY-2012-01719	CR-VTY-2012-02055
CR-VTY-2012-01126	CR-VTY-2012-01719	CR-VTY-2012-02068
CR-VTY-2012-01481	CR-VTY-2012-01735	CR-VTY-2012-02070
CR-VTY-2012-01517	CR-VTY-2012-01741	CR-VTY-2012-02072
CR-VTY-2012-01527	CR-VTY-2012-01755	CR-VTY-2012-02073
CR-VTY-2012-01546	CR-VTY-2012-01775	CR-VTY-2012-02073
CR-VTY-2012-01549	CR-VTY-2012-01779	CR-VTY-2012-02074
CR-VTY-2012-01549	CR-VTY-2012-01779	CR-VTY-2012-02075
CR-VTY-2012-01550	CR-VTY-2012-01791	CR-VTY-2012-02078
CR-VTY-2012-01576	CR-VTY-2012-01797	CR-VTY-2012-02084
CR-VTY-2012-01577	CR-VTY-2012-01798	CR-VTY-2012-02085
CR-VTY-2012-01578	CR-VTY-2012-01798	CR-VTY-2012-02086
CR-VTY-2012-01580	CR-VTY-2012-01808	CR-VTY-2012-02087
CR-VTY-2012-01581	CR-VTY-2012-01808	CR-VTY-2012-02094
CR-VTY-2012-01589	CR-VTY-2012-01810	CR-VTY-2012-02094
CR-VTY-2012-01596	CR-VTY-2012-01816	CR-VTY-2012-02094
CR-VTY-2012-01614	CR-VTY-2012-01817	CR-VTY-2012-02098
CR-VTY-2012-01618	CR-VTY-2012-01818	CR-VTY-2012-02151
CR-VTY-2012-01648	CR-VTY-2012-01831	CR-VTY-2012-02160
CR-VTY-2012-01663	CR-VTY-2012-01832	CR-VTY-2012-02163
CR-VTY-2012-01665	CR-VTY-2012-01833	CR-VTY-2012-02163
CR-VTY-2012-01685	CR-VTY-2012-01837	CR-VTY-2012-02164
CR-VTY-2012-01699	CR-VTY-2012-01849	CR-VTY-2012-02170
CR-VTY-2012-01700	CR-VTY-2012-01856	CR-VTY-2012-02170
CR-VTY-2012-01702	CR-VTY-2012-01897	CR-VTY-2012-02171
CR-VTY-2012-01703	CR-VTY-2012-01908	CR-VTY-2012-02174

CR-VTY-2012-02181	CR-VTY-2012-02391	CR-VTY-2012-02701
CR-VTY-2012-02182	CR-VTY-2012-02410	CR-VTY-2012-02715
CR-VTY-2012-02183	CR-VTY-2012-02419	CR-VTY-2012-02716
CR-VTY-2012-02225	CR-VTY-2012-02427	CR-VTY-2012-02717
CR-VTY-2012-02225	CR-VTY-2012-02428	CR-VTY-2012-02736
CR-VTY-2012-02230	CR-VTY-2012-02453	CR-VTY-2012-02745
CR-VTY-2012-02232	CR-VTY-2012-02506	CR-VTY-2012-02750
CR-VTY-2012-02259	CR-VTY-2012-02507	CR-VTY-2012-02751
CR-VTY-2012-02264	CR-VTY-2012-02508	CR-VTY-2012-02752
CR-VTY-2012-02269	CR-VTY-2012-02516	CR-VTY-2012-02755
CR-VTY-2012-02277	CR-VTY-2012-02519	CR-VTY-2012-02755
CR-VTY-2012-02277	CR-VTY-2012-02535	CR-VTY-2012-02757
CR-VTY-2012-02279	CR-VTY-2012-02537	CR-VTY-2012-02759
CR-VTY-2012-02281	CR-VTY-2012-02545	CR-VTY-2012-02761
CR-VTY-2012-02283	CR-VTY-2012-02548	CR-VTY-2012-02811
CR-VTY-2012-02284	CR-VTY-2012-02560	CR-VTY-2012-02817
CR-VTY-2012-02285	CR-VTY-2012-02560	CR-VTY-2012-02832
CR-VTY-2012-02293	CR-VTY-2012-02568	CR-VTY-2012-02842
CR-VTY-2012-02295	CR-VTY-2012-02573	CR-VTY-2012-02853
CR-VTY-2012-02315	CR-VTY-2012-02585	CR-VTY-2012-02857
CR-VTY-2012-02316	CR-VTY-2012-02640	CR-VTY-2012-02878
CR-VTY-2012-02327	CR-VTY-2012-02645	CR-VTY-2012-02886
CR-VTY-2012-02332	CR-VTY-2012-02647	CR-VTY-2012-02894
CR-VTY-2012-02341	CR-VTY-2012-02647	CR-VTY-2012-02940
CR-VTY-2012-02345	CR-VTY-2012-02648	CR-VTY-2012-02940
CR-VTY-2012-02351	CR-VTY-2012-02651	CR-VTY-2012-02968
CR-VTY-2012-02353	CR-VTY-2012-02652	CR-VTY-2012-02972
CR-VTY-2012-02358	CR-VTY-2012-02665	CR-VTY-2012-02994
CR-VTY-2012-02376	CR-VTY-2012-02666	CR-VTY-2012-03017
CR-VTY-2012-02383	CR-VTY-2012-02673	CR-VTY-2012-03032
CR-VTY-2012-02384	CR-VTY-2012-02691	CR-VTY-2012-03039
CR-VTY-2012-02390	CR-VTY-2012-02692	

Work Orders

000295154, "Inspect Stem to Disc Connection for Degradation"

000295155, "Inspect Stem to Disc Connection for Degradation"

**Section 4OA3: Event Follow-up**

Procedures

OPOT-3118-01, "Recirculation Pump Trip," Revision 3

Condition Reports

CR-VTY-2012-02810

CR-VTY-2012-02817

CR-VTY-2012-02835

CR-VTY-2012-02811

CR-VTY-2012-02818

CR-VTY-2012-02832

**LIST OF ACRONYMS**

AC	alternating current
ADAMS	Agencywide Documents Access and Management System
ALARA	as low as is reasonably achievable
AP	administration procedure
AR	ALARA review
CFR	Code of Federal Regulations
CR	condition report
DRP	[NRC] Division of Reactor Projects
DRS	[NRC] Division of Reactor Safety
EOOS	equipment out of service
HP	Health Physics
HPCI	high pressure coolant injection
HRA	high radiation areas
HX	Heat Exchanger
IMC	inspection manual chapter
NCV	non-cited violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records System
PI	performance indicator
RCS	reactor coolant system
RFO	refueling outage
RHR	residual heat removal
RHRSW	Residual Heat Removal Service water System
RWP	radiation work permit
SDP	significance determination process
SSC	structure, system and component
UFSAR	Updated Final Safety Analysis Report
UHS	Ultimate Heat Sink
VY	Vermont Yankee Nuclear Power Station
WW	workweek