

# Vermont Yankee

## 3Q/2010 Plant Inspection Findings

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### Initiating Events

**Significance:**  Jun 30, 2010

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

#### **Loss of RCS Inventory During Emergency Core Cooling System (ECCS) Testing Due to Inadequate Test Procedure**

A self-revealing NCV of very low safety significance (Green) of TS 6.4, "Procedures," was identified when operators inadvertently drained water from the RPV during integrated ECCS testing. Specifically, Entergy failed to establish the initial plant conditions necessary to perform integrated ECCS testing without causing an inadvertent drain down of the vessel through the main steam lines, the RCIC turbine, and into the torus. On May 17, 2010, while VY was shutdown for a refueling outage, VY experienced an inadvertent loss of reactor coolant inventory when operators initiated integrated ECCS testing. The vessel head was installed and the vessel was flooded up to the RPV flange. At the start of the integrated ECCS test, the RCIC and HPCI systems were aligned normally. When the test was initiated, the RCIC and HPCI steam supply isolation valves opened as expected. This provided a path for water to flow from the RPV, through the main steam lines, followed by the RCIC and HPCI turbines, and into the torus. The inspectors performed an initial screening of the finding in accordance with IMC 0609.04, "Phase 1 – Initial Screening and Characterization of Findings." The inspectors concluded that the finding was a Primary System Loss of Coolant Accident initiator contributor that affected the safety of the reactor during the refueling outage. The inspectors then evaluated the significance of the finding using Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process." The inspector determined this issue was of very low safety significance using Appendix G, Attachment 1, "Phase 1 Operational Checklist for Both PWRs and BWRs," and specifically, Checklist 8, "BWR Cold Shutdown or Refueling Operation, Time to Boil > 2 Hours: RCS Level < 23' Above Top of Flange." This determination was based on the fact that the reactor vessel water level would not decrease below the level of the main steam lines. The inadvertent draining of the water level to the level of the main steam lines would not significantly impact the shutdown safety functions of decay heat removal and maintaining water level in the reactor core. The finding had a cross-cutting aspect in the area of human performance, resources, because the test procedure was inadequate. Specifically, the procedure did not provide adequate directions for establishing plant conditions during a test that had the capability of draining RCS inventory (H.2(c)).

Inspection Report# : [2010003](#) (*pdf*)

**Significance:**  Mar 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

#### **Inadequate Design Control for Continuously Submerged Underground Cables**

The inspectors identified an NCV of very low safety significance (Green) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," because Entergy did not select and review safety-related cables suitable for application in the environment in which they were found. Specifically, Entergy allowed the continuous submergence of safety-related cables that were not qualified for continuous submergence and failed to demonstrate that the cables would remain operable. Entergy initiated CR VTY-2009-04142 and CR-VTY-2010-01422 to address the issues, commenced dewatering of the affected manholes, and initiated a preventive maintenance plan to ensure proper conditions.

This finding is more than minor because if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern. Specifically, the inspectors noted that the insulation of continuously submerged cables would degrade more than dry or periodically wetted cables which would lead to failures. The inspectors determined the significance of the finding using IMC 0609.04, "Phase 1 – Initial Screening and Characterization of

Findings.” The finding was determined to be of very low safety significance (Green) because it was a design or qualification deficiency which was confirmed to have not resulted in a loss of operability or functionality. Specifically, the continuously submerged cables were not designed or qualified for that environment but were still fully capable of performing their design functions. The inspectors determined this finding had a cross-cutting aspect in the area of problem identification and resolution within the CAP component because Entergy personnel did not thoroughly evaluate the problem when submerged cabling was identified. (P.1(c)) (Section 40A2)

Inspection Report# : [2010002](#) (pdf)

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## Mitigating Systems

**Significance:**  Sep 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadvertent Isolation of Reactor Core Isolation Cooling (RCIC) During Surveillance Testing**

A self-revealing, Green, non-cited violation (NCV) of Technical Specification 6.4, “Procedures,” was identified in which technicians incorrectly performed reactor core isolation cooling (RCIC) surveillance test operating procedure (OP) 4365, “RCIC Steam Line Low Pressure Functional/Calibration,” Rev. 25, resulting in the inadvertent isolation of the RCIC system. Entergy entered this issue into their corrective action program, correctly installed the test equipment, and subsequently performed the test satisfactorily.

The inspectors determined that the finding was more than minor because it adversely affected the Human Performance attribute for the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. In accordance with IMC 0609, Attachment 0609.04, “Phase 1 - Initial Screening and Characterization of Findings,” the finding was determined to be of very low risk significance (Green) because the finding was not a design or qualification deficiency, did not represent a loss of system safety function or loss of a single train for greater than its allowed technical specification time, and did not screen as potentially risk significant due to seismic, flooding, or severe weather initiating events. The inspectors determined this finding had a cross-cutting aspect in the Human Performance cross-cutting area, Work Practices component, in that Entergy failed to appropriately self-check and peer-check the digital multimeter (DMM) setup prior to connecting it to the RCIC isolation logic.

Inspection Report# : [2010004](#) (pdf)

**Significance:**  Mar 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **High Pressure Coolant Injection Inoperable Due to Spurious Suction Valve Swap and Technical Specification Actions Not Performed**

The inspectors identified an NCV of very low safety significance (Green) of technical specification 3.5.E, “High Pressure Coolant Injection (HPCI) System,” because Entergy staff failed to identify that HPCI was inoperable, enter the required limiting condition for operation, and immediately verify that the reactor core isolation cooling (RCIC) system was operable. Entergy initiated CR-VTY-2010-01420 and CR-VTY-2010-01506 to address the issues, issued standing orders to ensure HPCI and RCIC are considered inoperable when not aligned to the condensate storage and transfer system (CST), and initiated corrective actions to ensure design basis analysis associated with power uprate is properly incorporated into various documents, including technical specifications (TS) and the updated final safety analysis report (UFSAR).

This finding is more than minor because it affected the equipment performance attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Specifically, the availability of the CST to provide water for core cooling to HPCI during transient and emergency situations was affected. The inspectors determined the significance of the finding using IMC 0609, Appendix A, “Determining the Significance of Reactor Inspection

Findings for At-Power Situations.” The finding was determined to be of very low safety significance (Green) because the exposure time associated with the HPCI suction valves being not properly aligned to the CST was 45 minutes, i.e. less than three days. The inspectors determined this finding had a cross-cutting aspect in the area of problem identification and resolution within the corrective action program (CAP) component because Entergy personnel did not completely and accurately identify the issues associated with HPCI being aligned to the torus instead of to the CST. (P.1(a)) (Section 1R12)

Inspection Report# : [2010002](#) (pdf)

**Significance:**  Mar 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

**Emergency Diesel Generator Surveillance Testing Not Risk Assessed in Accordance with 10 CFR 50.65**

. The inspectors identified an NCV of very low safety significance (Green) of 10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” because Entergy staff did not assess and manage the increase in risk due to surveillance testing activities that impacted the availability of the ‘A’ emergency diesel generator (EDG) in accordance with 10 CFR 50.65 (a)(4). Entergy initiated CR-VTY-2010-01019 to address the issue, issued a standing order to ensure the EDGs are properly considered unavailable during future surveillance tests, and commenced an extent of condition review to determine the staff’s effectiveness at properly accounting for unavailability in accordance with 10 CFR 50.65 (a)(4) for the EDGs and other risk significant systems.

This finding is more than minor because it affected the equipment performance attribute of the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the availability of the ‘A’ EDG was affected and Entergy’s risk assessment did not consider risk significant structures, systems and components (SSCs) (i.e., EDGs) that were unavailable during the maintenance activity and did not take risk management actions. 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 time the ‘A’ EDG was unavailable was less than 1.0E-6. The inspectors determined this finding had a cross-cutting aspect in the area of human performance within the work control component because Entergy did not appropriately plan and incorporate risk insights in work activities that impacted the availability of the ‘A’ EDG. (H.3(a)) (Section 1R13)

Inspection Report# : [2010002](#) (pdf)

**Significance:**  Dec 31, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**Entergy did not assess and manage the increase in risk that resulted from maintenance activities that impacted the availability of the low pressure coolant injection (LPCI) subsystem**

On December 4, 2009, Entergy conducted a test of the high pressure coolant injection (HPCI) system as a retest following maintenance activities. Operations personnel placed both trains of the residual heat removal (RHR) system in the torus cooling mode to maintain the torus within limits contained within the emergency operation procedures. Because this alignment made the LPCI mode inoperable, Operations personnel entered the appropriate Limiting Condition of Operation in the Technical Specifications for this condition. However, the inspectors noted that the LPCI subsystem was not included as part of the risk assessment, and questioned its accuracy. The condition of concern was a loss of coolant accident followed by a loss of normal power and the failure of one emergency diesel to start. This would result in a loop drain condition to the torus for one train of LPCI, and that train would not be fully available to perform its coolant injection function. The inspectors noted that there was no dedicated operator, and the recovery actions were not proceduralized as required by EN-WM-104, “On Line Risk Assessment,” to maintain availability. Entergy entered this issue into the CAP (CR 2009-4234), and initiated a preliminary investigation to review the effectiveness of Maintenance Rule accounting for LPCI unavailability while in the torus cooling mode.

Analysis: The performance deficiency is that Entergy did not conduct an adequate risk assessment for maintenance activities that impacted the availability of the LPCI subsystem. This issue was within Entergy’s ability to foresee and

correct, and should have been prevented. Traditional Enforcement did not apply, as the issue did not have actual or potential safety consequence, had no willful aspects, nor did it impact the NRC's ability to perform its regulatory function. A review of NRC Inspection Manual Chapter (IMC) 0612, Appendix E, "Minor Examples," revealed that the finding is similar to Example 7.f, in that, the elevated overall plant risk when correctly assessed would put the plant into a higher risk category. The LPCI subsystem is considered risk significant because it is identified as such in Table 2 of the NRC's Phase 2 Significance Determination Process notebook for Vermont Yankee.

Using IMC 0612, "Power Reactor Inspection Reports," Appendix B, Section 3, Item 5(a), the finding is more than minor because Entergy's risk assessment did not consider risk significant SSCs (i.e., LPCI subsystem) that were unavailable during the maintenance activity. The finding is associated with the Configuration Control attribute of the Mitigating Systems cornerstone, and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Because this finding involves the licensee's assessment and management of risk associated with performing maintenance activities under all plant operating or shutdown conditions, the inspectors used IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process," to evaluate this finding. The inspectors determined that the finding is of very low safety significance (Green) because the incremental core damage probability deficit was less than  $1.0E-6$ . This finding has a cross-cutting aspect in the Human Performance cross-cutting area, Work Control component, because Entergy did not appropriately plan and incorporate risk insights in work activities that impacted the availability of the LPCI subsystem. [H.3(a)]

Inspection Report# : [2009005](#) (pdf)

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## Barrier Integrity

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## Emergency Preparedness

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## Occupational Radiation Safety

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## Public Radiation Safety

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## Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the [cover letters](#) to security inspection reports may be viewed.

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## Miscellaneous

Last modified : November 29, 2010