September 26, 2008

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

SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION – NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000271/2008008

Dear Mr. Sullivan:

On August 14, 2008, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Vermont Yankee Nuclear Power Station. The enclosed inspection report documents the inspection results. The preliminary inspection results were discussed with Mr. C. Wamser, General Manager, and other members of your staff, and Mr. J. Thayer, Vice President – Entergy Operations, on August 14, 2008.

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. In conducting the inspection, the team examined the adequacy of selected components and operator actions to mitigate postulated transients, initiating events, and design basis accidents. The inspection involved field walkdowns, examination of selected procedures, calculations and records, and interviews with station personnel.

This report documents three NRC-identified findings which were of very low safety significance (Green). All of these findings were determined to involve violations of NRC requirements. However, because of the very low safety significance of the violations and because they were entered into your corrective action program, the NRC is treating the violations as non-cited violations (NCV) consistent with Section VI.A.1 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 U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, Region 1; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspectors at Vermont Yankee Nuclear Power Station.

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 the public inspection in the NRC Public Docket Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/**RA**/

Lawrence T. Doerflein, Chief
Engineering Branch 2
Division of Reactor Safety

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

Enclosure: Inspection Report 05000271/2008008
w/Attachment: Supplemental Information

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REGION I

Docket Nos.:	50-271
License Nos.:	DPR-28
Report No.:	05000271/2008008
Licensee:	Entergy Nuclear Operations, Inc.
Facility:	Vermont Yankee Nuclear Power Station
Location:	320 Governor Hunt Road Vernon, Vermont 05354-9766
Dates:	July 21 – August 14, 2008
Inspectors:	S. Pindale, Senior Reactor Inspector, Team Leader O. Ayegbusi, Reactor Inspector J. Benjamin, Resident Inspector (Millstone) J. Lilliendahl, Reactor Inspector G. Ottenberg, Reactor Inspector S. Kolbylarz, NRC Contractor W. Sherbin, NRC Contractor M. Shlyamberg, NRC Contractor
Approved by:	Lawrence T. Doerflein, Chief Engineering Branch 2 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000271/2008008; 07/21/2008 – 08/14/2008; Vermont Yankee Nuclear Power Station; Component Design Bases Inspection.

The report covers the Component Design Bases Inspection conducted by a team of five NRC inspectors and three NRC contractors. Three findings of very low risk significance (Green) were identified, which were also considered to be non-cited violations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The team identified a finding of very low safety significance involving a non-cited violation of 10 CFR 50, Appendix B, Criterion XI, "Test Control," in that, Entergy did not properly document and evaluate safety related battery test results. Specifically, the NRC identified three instances involving the rotating uninterruptible power supply system and the alternate shutdown batteries where Entergy did not adequately evaluate test results to calculate battery capacity. In response, Entergy entered these issues into the corrective action program and demonstrated that there was sufficient margin to assure operability of the safety related batteries.

  The finding is more than minor because it is associated with the human performance attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined the finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program Component, because Entergy did not identify issues in a timely manner commensurate with their safety significance. (IMC 0305, Aspect P.1(a)) (1R21.2.1.1)

- Green. The team identified a finding of very low safety significance involving a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," in that, Entergy did not ensure that the design basis, as defined in calculations and the Updated Final Safety Analysis Report for manual emergency diesel generator (EDG) loading, was verified by a suitable testing program. Specifically, Entergy had not performed a suitable test to demonstrate that the 1B EDG was capable of loading to a value that demonstrated its calculated maximum load during a postulated accident scenario, as allowed in operating procedures. Entergy entered the issue into their corrective action program and completed an operability assessment, which demonstrated that the emergency diesel generators were capable of performing their design function.

The finding is more than minor because it is associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in a loss of standby onsite power operability or functionality. (1R21.2.1.19)

- Green. The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR 50.63, “Loss of all Alternating Current Power,” in that, Entergy did not ensure that adequate battery capacity would be available during a station blackout (SBO), as assumed in the station’s SBO analysis. Specifically, unrecognized delays in performing a credited manual direct current (DC) load shedding operator action, as well as an incorrectly translated minimum battery voltage referenced in the station’s SBO procedure, could have resulted in the ‘B’ station battery capacity being insufficient during an SBO. Entergy entered the issue into the corrective action program. Entergy also recalculated the ‘B’ station battery capacity and determined that sufficient battery capacity existed when realistic load shedding assumptions were applied (battery remained operable).

  The finding is more than minor because it is associated with the procedure quality attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding was determined to be of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. (1R21.2.2.1)

B. Licensee-Identified Violations

None

REPORT DETAILS

1. REACTOR SAFETY

Cornerstone: Initiating Events, Mitigating Systems, Barrier Integrity

1R21 Component Design Bases Inspection (IP 71111.21)

.1 Inspection Sample Selection Process

The team selected risk significant components and operator actions for review using information contained in the Vermont Yankee Nuclear Power Station Probabilistic Risk Assessment (PRA) and the U. S. Nuclear Regulatory Commission's (NRC) Standardized Plant Analysis Risk (SPAR) model. Additionally, the Vermont Yankee Significance Determination Process (SDP) Phase 2 Notebook, Revision 2, was referenced in the selection of potential components and operator actions for review. In general, the selection process focused on components and operator actions that had a Risk Achievement Worth (RAW) factor greater than 1.3 or a Risk Reduction Worth (RRW) factor greater than 1.005. The components selected were located within both safety related and non-safety related systems, and included a variety of components such as pumps, breakers, heat exchangers, generators, transformers, and valves.

The team initially compiled a list of components and operator actions based on the risk factors previously mentioned. Additionally, the team reviewed the previous component design bases inspection reports (05000271/2006007 and 05000271/2004008) and excluded the majority of those components previously inspected. The team then performed a margin assessment to narrow the focus of the inspection to 23 components, four operator actions and three operating experience items. The team's evaluation of possible low design margin included consideration of original design issues, margin reductions due to modifications, or margin reductions identified as a result of material condition/equipment reliability issues. The assessment also included items such as failed performance test results, corrective action history, repeated maintenance, maintenance rule (a)(1) status, operability reviews for degraded conditions, NRC resident inspector insights, system health reports, and industry operating experience. Finally, consideration was also given to the uniqueness and complexity of the design and the available defense-in-depth margins. The margin review of operator actions included complexity of the action, time to complete the action, and extent of training on the action.

The inspection performed by the team was conducted as outlined in NRC Inspection Procedure (IP) 71111.21. This inspection effort included walkdowns of selected components, interviews with operators, system engineers and design engineers, and reviews of associated design documents and calculations to assess the adequacy of the components to meet design basis, licensing basis, and risk-informed beyond design basis requirements. Summaries of the reviews performed for each component, operator action, operating experience sample, and the specific inspection findings identified are discussed in the subsequent sections of this report. Documents reviewed for this inspection are listed in the Attachment.

.2 Results of Detailed Reviews

.2.1 Results of Detailed Component Reviews (23 samples)

.2.1.1 'B' Rotating Uninterruptible Power Source

a. Inspection Scope

The team reviewed the design, testing and operation of the 'B' rotating uninterruptible power source (RUPS) to verify that it could perform its design function of providing a reliable source of alternating current (AC) power to connected loads under operating, transient, and accident conditions. The team reviewed design specifications to assess the adequacy of the associated motor-generator set unit to ensure the unit could provide constant AC power to the connected loads. The team reviewed design calculations to assess the adequacy of the associated 432 Vdc battery sizing and capacity to ensure the battery could power the required equipment for a sufficient duration, at a voltage above the minimum required for equipment operation. The team reviewed completed tests, including the battery discharge tests, to ensure the testing was sufficient and was in accordance with plant technical specifications; and that the results confirmed acceptable performance. The team interviewed design and system engineers regarding component design, operation, testing and maintenance. The team performed a walkdown of the 'A' and 'B' RUPS to assess the material condition of components and systems. As the 'B' RUPS was considered to be a representative sample, additional station batteries were inspected to assess extent-of-condition when deficiencies were identified. Finally, a sample of condition reports (CR) was reviewed to ensure Entergy was identifying and properly correcting issues associated with the RUPS.

b. Findings

Introduction: The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR 50, Appendix B, Criterion XI, "Test Control," in that, Entergy did not properly document and evaluate battery test results. Specifically, the team identified three examples involving safety related batteries where Entergy did not correctly evaluate battery test results that were used to calculate battery capacity.

Description: The team reviewed test procedures and test results for four safety related batteries: 'A' and 'B' RUPS batteries, alternate shutdown battery AS-2, and 'A' station battery. The team identified several test control issues that affected the reviewed batteries. Included in these test control issues were instances where Entergy did not correctly evaluate battery test results, which resulted in incorrectly calculating battery capacity.

Performance tests are technical specification required tests that are performed every five years for safety related batteries. A performance test is used to determine the capacity of a battery, which, when trended and properly evaluated, will accurately determine when a battery is reaching the end of its service life.

The team identified that the battery capacity for the AS-2 battery was incorrectly calculated for the previous two performance tests (2003 and 2008); and, the battery capacity for the 'B' RUPS battery was incorrectly calculated in 1999. Accurate battery capacity calculations are required to verify the operability of the battery and to determine if battery degradation is occurring. Degradation requires measuring the capacity more often even if the capacity is adequate. Therefore, because Entergy had incorrectly calculated battery capacity by as much as 9%, there was reasonable doubt whether the battery test control program would recognize a degraded or marginal battery in a timely fashion. In addition, the raw data for the previous two 'A' station battery performance tests was not saved as required by OP 4215, "B-1-1A Main Station Battery Performance Test." The team was therefore unable to independently verify the capacity calculations for the 'A' Station battery.

The team also identified other test control issues related to battery testing, which included: the test procedure was not followed for the AS-2 battery in 2008, in that, the performance test was manually resumed after the computer had correctly ended the test at minimum battery voltage; and the final battery voltage was not updated after jumpering out a cell during the 1999 performance test for the 'B' RUPS battery.

Based on the incorrect capacity calculations, missing data, and test control issues, the team determined that there was a reasonable doubt that the battery test program would promptly and correctly identify a degraded battery in a timely fashion. Entergy entered the issue into the corrective action program (CR 2008-03423) and implemented actions to verify operability and evaluate and correct the deficiencies in the battery testing program. Entergy evaluated the individual batteries and determined that there were no operability issues. The team reviewed Entergy's bases for operability and independently evaluated battery operability. The team similarly concluded that the issues identified did not render any of the batteries inoperable, based on the design margin, age, and current performance and test data for the batteries.

Analysis: The team determined that the failure to properly document and evaluate battery test results that were used to calculate battery capacity was a performance deficiency that was reasonably within Entergy's ability to foresee and prevent. The finding was more than minor because it was associated with the human performance attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Traditional enforcement does not apply because the issue did not have any actual safety consequences or potential for impacting the NRC's regulatory function, and was not the result of any willful violation of NRC requirements. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," a Phase 1 SDP screening was performed and determined the finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event.

This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program Component, because Entergy did not identify issues in a timely manner commensurate with their safety significance. Specifically, although all of the tests involved in this issue were reviewed by Entergy staff after completion, the individual issues and the overall battery testing program effectiveness deficiencies were not self-identified. (IMC 0305, Aspect P.1(a))

Enforcement: 10 CFR 50, Appendix B, Criterion XI, “Test Control,” requires, in part, that a test program shall be established to assure that all testing is performed in accordance with written test procedures and test results are documented and evaluated to assure that test requirements have been satisfied. Contrary to the above, on three occasions between 1999 and August 14, 2008, Entergy did not adequately document and evaluate battery test results, which resulted in incorrectly calculating battery capacity for safety related batteries. Because this violation was of very low safety significance (Green) and has been entered into their corrective action program (CR 2008-03423), this violation is being treated as a non-cited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000271/2008008-01, Inadequate Testing of Safety Related Batteries)**.

.2.1.2 ‘1B’ Emergency Diesel Generator Starting Air System

a. Inspection Scope

The team inspected the starting air system for emergency diesel generator (EDG) ‘1B’ to verify that EDG air start system could meet its design basis requirements, which included maintaining sufficient capacity for a minimum of three independent cold diesel engine starts without recharging. The inspection included interviews with system and design engineers; system walkdowns; and a review of normal, alarm response, and abnormal plant procedures. Drawings and calculations were reviewed to determine what assumptions were used in the analyses to confirm system operation. The team verified that the depressurization rates used in the system analyses were conservative with respect to the values documented in system tests. The team reviewed periodic test results to verify that the air start system was capable of performing its safety function and that compressor actuation switch settings were correct. The team also reviewed an air accumulator modification that increased the accumulator volume. Additionally, the team reviewed performance tests to verify that check valve performance was properly monitored for leakage at the safety related boundary of the system. Finally, the team reviewed condition reports, maintenance history, and system health reports to determine the overall health of the starting air system, and to determine if issues entered into the corrective action program were properly addressed.

b. Findings

No findings of significance were identified.

.2.1.3 Service Water Pump Discharge Check Valves, V70-1A/B/C/D

a. Inspection Scope

The team inspected the service water (SW) system pump discharge check valves, V70-1A/B/C/D, to verify that they were capable of meeting design basis requirements. These swing check valves are required to open to allow sufficient SW flow to essential SW heat loads, and they must close to prevent bypass flow through an idle SW pump. The team reviewed modifications and associated post modification testing to verify the design basis function was not negatively impacted. Inservice test results were reviewed to verify that the appropriate standards and requirements were being satisfied. Walkdowns of the valves and portions of the SW system were performed to assess the material condition of the valves and associated equipment. Finally, the team reviewed condition reports and maintenance history to determine the overall health of the components.

b. Findings

No findings of significance were identified.

.2.1.4 Service Water System Supply to Turbine Building Isolation Valve, V70-20

a. Inspection Scope

The team inspected the service water system supply to turbine building isolation valve, V70-20, to verify that it was capable of meeting its design basis requirements. This motor-operated valve (MOV) normally supplies cooling water to non-essential turbine building heat loads and has a safety function to automatically close and isolate the turbine building loads from the safety related loads on a low SW header pressure signal. The team reviewed system and MOV calculations to verify the MOV was sized appropriately to satisfy system requirements, and that the in-field settings provided for an appropriate amount of margin under design basis accident conditions (including degraded voltage conditions). Inservice test results were reviewed to verify that the stroke time acceptance criteria were in accordance with the design basis and accident analysis assumptions; and that any degradation was being identified during testing. Periodic diagnostic testing was reviewed to ensure control switch settings were appropriately set and were not drifting. Walkdowns of the valve, actuator, electrical cables, motor control center, and local emergency control panel were performed to assess the material condition of the valve and associated equipment. Finally, the team reviewed condition reports and maintenance history to determine the overall health of the component.

b. Findings

No findings of significance were identified.

.2.1.5 Reactor Building Closed Cooling Water Pumps, P-59-1-A/B

a. Inspection Scope

The team inspected the performance of reactor building closed cooling water (RBCCW) pumps P-59-1-A/B and the associated potential impact on plant operations (failure of the pumps could lead to a plant transient). The inspection included interviews with system and design engineers and operators, system walkdowns; and reviews of drawings, and normal, alarm response, and abnormal plant procedures. This review focused on the RBCCW system's response to a postulated automatic initiation of a stand-by pump due to a discharge header low pressure signal; and operator actions following this initiation. The team reviewed the historical discharge header pressures during pump operation to determine if these pressures were above the low header pressure setpoint, and if the RBCCW pumps exhibited any apparent degradation. The team reviewed plant procedures to determine whether the operator actions were acceptable to assure reliable operation of the RBCCW system. Finally, the team reviewed condition reports, maintenance history, and system health reports to determine the overall health of the pumps, and to determine if issues entered into the corrective action program were properly addressed.

b. Findings

No findings of significance were identified.

.2.1.6 '1B' Emergency Diesel Generator Fuel Oil System

a. Inspection Scope

The team reviewed the adequacy and appropriateness of design assumptions and calculations related to EDG fuel oil storage capacity and consumption. The team reviewed design calculations to ensure fuel tank capacities were sufficient to meet required fuel oil consumption rates and to ensure vortexing would not occur in the fuel oil storage and day tanks. The team reviewed seismic calculations performed to support modifications to the fuel oil day tank structural restraints, and verified the restraints were properly installed in the field. The team ensured that the inservice tests of the fuel oil transfer pumps demonstrated the design basis required capacity. To ensure the quality of the fuel oil, the team verified that an appropriate chemical control program for fuel oil was in place. This program included such items as moisture and impurity controls. Entergy's calculation for the use of ultra low sulfur fuel was also reviewed. The team reviewed system and test procedures to ensure the fuel oil transfer pumps can deliver an adequate flow rate to the EDGs during maximum anticipated electrical loading. Finally, the team reviewed maintenance history to determine the overall health of the fuel oil system; and reviewed selected condition reports to ensure problems were properly identified and corrected.

b. Findings

No findings of significance were identified.

.2.1.7 '1B' Emergency Diesel Generator Room Ventilation Exhaust

a. Inspection Scope

The team reviewed the calculations related to EDG room exhaust air ventilation requirements, and compared the calculated airflow requirements with fan test data to ensure adequate heat removal capability. The team observed ventilation system fan and damper operation and alignments during an EDG surveillance to ensure they were consistent with design and licensing bases assumptions. The team reviewed failure positions of pneumatic louver operators in the ventilation air inlet enclosures to ensure louvers will open on a loss of instrument air. Preventive maintenance activities for lubricating the ventilation exhaust fan motor and fan shaft bearings were also reviewed to ensure vendor recommended lubrication preventative maintenance (PM) activities were being performed. Finally, the team conducted a system walkdown and reviewed condition report history to determine the overall health of the affected components.

b. Findings

No findings of significance were identified.

.2.1.8 Emergency Diesel Generator Service Water Flow Control Valves, FCV-104-28A/B

a. Inspection Scope

The team inspected the emergency diesel generator service water (SW) flow control valves, FCV-104-28A/B, to verify that they were capable of meeting design requirements. These air-operated globe valves are used to throttle SW outlet flow through the EDG jacket water heat exchangers, and have a design requirement to automatically open on an EDG start signal and provide sufficient SW flow through its associated EDG cooler. The team reviewed valve and actuator design, procurement specifications, and associated quality requirements. The team also reviewed procedures that provided for inspection of the instrument air system, in order to ensure the normal motive supply was capable of supporting the valves' design basis accident function. EDG tests were reviewed to ensure that the testing included measures to verify that the valves fail in the fully open position, as required, to provide adequate cooling to the EDGs during a loss of instrument air; and that any degradation was being identified during testing. The team witnessed portions of the '1A' EDG test performed on August 11, 2008, and verified that FCV-104-28A satisfactorily modulated flow through the jacket water cooler. Finally, the team conducted a walkdown and reviewed condition report history to determine the overall health of the valves.

b. Findings

No findings of significance were identified.

.2.1.9 Feedwater System Check Valve, V2-96B

a. Inspection Scope

The team inspected feedwater system check valve V2-96B to verify that it was capable of meeting its design basis requirement. This swing check valve has an active function to close in order to ensure high pressure coolant injection (HPCI) system flow is directed to the reactor and not the feedwater system. The team reviewed a modification and associated post modification test to verify the design basis function was not negatively impacted. Inservice test results were reviewed to verify that associated requirements were being met; and leakage test results were reviewed to ensure HPCI system flow requirements were satisfied. The team also reviewed condition reports to determine the overall health of the valve.

b. Findings

No findings of significance were identified.

.2.1.10 Nitrogen System Check Valve, NSS-CKV-CC-V102

a. Inspection Scope

This check valve has a safety function to open to provide a safety related back-up nitrogen supply from a bottle system to the automatic depressurization system (ADS) pneumatic accumulators to ensure a 72 hour capability of reactor vessel pressure control during a seismic event. It also has a safety function to close and remain leak-tight for containment isolation. The team reviewed recent check valve forward flow testing to ensure the valve can pass the forward flow rate assumed in the design basis and the associated leakage calculation. The team reviewed recent stroke (closed) and local leak rate testing to ensure the valve satisfied 10 CFR 50, Appendix J (Containment Leakage Testing) requirements. The team performed a walkdown of the check valve and nitrogen bottle station to ensure appropriate seismic mounting and acceptable housekeeping. The team also reviewed condition reports and maintenance history to determine the overall health of the system, and to determine if issues entered into the corrective action program were properly addressed.

b. Findings

No findings of significance were identified.

.2.1.11 Safety Relief Valve RV-2-71C

a. Inspection Scope

The safety relief valves (SRV) are pilot-operated to automatically open at a specified reactor pressure. The valves also can be manually opened to perform the ADS function. The team verified that SRV opening setpoints, derived from power uprate design documents, were properly translated into plant technical specifications and system test procedures. The team reviewed calculations for sizing of the pneumatic accumulators, as well as the structural design capability, for the SRV accumulators to ensure the valve pneumatic system was capable of functioning under design basis conditions. The team reviewed the maintenance and inservice test history, condition reports, calculations, design specifications, drawings, and surveillance testing procedures to verify the valve's ability to meet design basis requirements in response to transient and accident events.

b. Findings

No findings of significance were identified.

.2.1.12 Circulating Water System Fouling Contributor

a. Inspection Scope

The team inspected the affect of fouling in the circulating water (CW) system, including the potential common cause impact on the safety related service water (SW) system. The inspection included interviews with system and design engineers and operators; system walkdowns; and reviews of drawings, and normal, and abnormal plant procedures. This review focused on corrective actions for prior instances of CW system fouling and Entergy's extent-of-condition evaluations for the SW system. The team reviewed the historical operation of the CW system, corrective actions and a modification of the CW traveling screens (screen debris barrier) to resolve prior CW fouling concerns. The team also reviewed a recent modification (manual backwash operation) of the SW strainers. Finally, the team reviewed condition reports, maintenance history, and system health reports to determine the overall health of the CW system, and to determine if issues entered into the corrective action program were properly addressed.

b. Findings

No findings of significance were identified.

.2.1.13 Core Spray System Suction Strainers

a. Inspection Scope

The team inspected the core spray system suction strainers to verify that the core spray system could meet its design bases, which include protecting the reactor core following a postulated large break loss-of-coolant accident (LOCA). The inspection included interviews with system and design engineers, and a review of plant procedures. Drawings and calculations were reviewed to evaluate the assumptions used in the analyses to confirm system operation. The team verified that the assumptions used in the strainer performance analyses were conservative and were derived based on extensive industry test data and results. The team also reviewed a strainer modification that increased the strainer flow area. Finally, the team reviewed condition reports and system health reports to determine the overall health of the suction strainers, and to determine if issues entered into the corrective action program were properly addressed.

b. Findings

No findings of significance were identified.

.2.1.14 Residual Heat Removal Heat Exchanger Service Water Discharge Valves, V10-89A/B

a. Inspection Scope

The team inspected the residual heat removal (RHR) heat exchanger 'A' and 'B' SW discharge valves, V10-89A/B, to verify the valves were capable of meeting design basis requirements. These motor-operated globe valves are used to throttle residual heat removal service water (RHRSW) flow through the RHR heat exchangers, have a safety function to automatically open upon a RHRSW pump start demand signal, and must be able to pass 4500 gpm of RHRSW flow through the RHR heat exchangers. The team reviewed system and motor-operated valve calculations to verify the motor and actuator were appropriately sized for this application, and that the in-field settings provided for an appropriate amount of margin under design basis accident conditions. Periodic diagnostic testing was reviewed to ensure control switch settings were appropriately set and not drifting. Inservice test results were reviewed to verify that the stroke time acceptance criteria were in accordance with the design basis and accident analysis assumptions, and that any degradation was being identified during testing.

The team also reviewed valve control logic and associated modifications to verify the safety function was not negatively impacted by the modifications. Voltage analyses were reviewed to verify that conservative assumptions were used to determine the available motor torque during degraded grid voltage conditions. Walkdowns of the valves, actuators, electrical cables, motor control centers, and local emergency control panel were performed to assess the material condition of the valves and associated equipment. Finally, the team reviewed condition reports and maintenance history to determine the overall health of the components.

b. Findings

No findings of significance were identified.

.2.1.15 Torus Hardened Vent Valve, V16-19-86

a. Inspection Scope

The team inspected the torus hardened vent valve, V16-19-86, to ensure it had the capability to be operated both electrically and manually during certain beyond design basis events. The design of this motor-operated gate valve is to open in order to vent the torus in the case of an overpressure event inside the primary containment. It must also be able to close in order to isolate primary containment. The team reviewed system calculations and design specifications to verify the motor, actuator, and handwheel were sized according to system requirements; and also assessed whether operations personnel could manually operate the valve. The team reviewed the modification that was implemented that installed the vent valve to ensure that the vent system met the criteria stipulated in NRC Generic Letter 89-16, "Installation of a Hardened Wetwell Vent." Walkdowns of the valve, actuator, and available operator equipment were performed. Finally, the team reviewed condition reports and maintenance history to determine the overall health of the valve.

b. Findings

No findings of significance were identified.

.2.1.16 Main Turbine Auxiliary Oil Pump, P-72-1A

a. Inspection Scope

The team reviewed the performance of the main turbine auxiliary oil pump, P-72-1A, and the associated potential impact on plant operations (failure of the pump could adversely affect operation of the main turbine bypass valves). The inspection included interviews with system and design engineers and operators; system walkdowns; and reviews of drawings, and normal, and abnormal plant procedures. This review focused on the consequences of a postulated pump failure. The team reviewed the historical pump operation to determine if this pump exhibited any apparent degradation. Finally, the team reviewed condition reports, maintenance history, and system health reports to determine the overall health of the auxiliary oil pump, and to determine if issues entered into the corrective action program were properly addressed.

b. Findings

No findings of significance were identified.

.2.1.17 125 Volt DC Alternate Shutdown Battery, AS-2

a. Inspection Scope

The team reviewed the design, testing and operation of the AS-2 125 Vdc battery to verify that it could perform its design function of providing a reliable source of direct current (DC) power to connected loads under operating, transient and postulated accident conditions. The team reviewed design calculations to assess the adequacy of the battery sizing to ensure the battery could power the required equipment for a sufficient duration, and at a voltage above the minimum required for equipment operation. The team reviewed the DC protective coordination study to verify that adequate protection existed for postulated faults in the DC system. The team reviewed battery performance test results, including discharge tests, to ensure the testing was sufficient and was in accordance with plant technical specifications; and that the results confirmed acceptable battery performance. Design and system engineers were interviewed regarding the design, operation, testing and maintenance of the battery. The team performed a walkdown of the AS-2 battery, the battery chargers and associated distribution panels to assess the material condition of the battery cells and associated electrical equipment. Finally, a sample of condition reports was reviewed to ensure Entergy was identifying and properly correcting issues associated with the AS-2 battery and associated DC system components.

b. Findings

No findings of significance were identified, with the exception of the battery testing issues identified in Section 1R21.2.1.1 of this report.

.2.1.18 ‘A’ 125 Volt DC Battery

a. Inspection Scope

The team reviewed the design, testing and operation of the ‘A’ 125 Vdc station battery to verify that it could perform its design function of providing a reliable source of DC power to connected loads under operating, transient and accident conditions. The team reviewed design calculations to assess the adequacy of the battery sizing to ensure the battery could power the required equipment for a sufficient duration, and at a voltage above the minimum required for equipment operation. The team reviewed the DC protective coordination study to verify that adequate protection exists for postulated faults in the DC system. The team reviewed the battery room hydrogen generation calculation to verify that the hydrogen concentration levels would stay below acceptable levels during normal and postulated accident conditions. The team reviewed battery performance test results, including discharge tests, to ensure the testing was sufficient and was in accordance with plant technical specifications; and that the results confirmed acceptable performance of the battery. Design and system engineers were interviewed regarding the design, operation, testing and maintenance of the battery. The team performed a walkdown of the ‘A’ station battery, the battery chargers and associated distribution panels to assess the material condition of the battery cells and associated electrical equipment. Finally, a sample of condition reports was reviewed to ensure Entergy was identifying and properly correcting issues associated with the 'A' station battery and associated DC system components.

b. Findings

No findings of significance were identified, with the exception of the battery testing issues identified in Section 1R21.2.1.1 of this report.

.2.1.19 '1A' Emergency Diesel Generator (Electrical) and Voltage Regulator (2 Samples)

a. Inspection Scope

The team selected the '1A' emergency diesel generator (EDG) as a representative EDG electrical sample (some EDG '1B' components were also evaluated). The team reviewed vendor drawings and the elementary diagrams for the EDG starting circuit and generator breaker closing and trip circuits. Vendor nameplate rating data for the EDG was also reviewed. The team reviewed the EDG loading study for the worse case design basis loading conditions. Voltage regulator response data was evaluated to verify adequate response for automatic motor loading during emergency core cooling system testing. The team reviewed the results of capacity tests to verify that the EDG test conditions enveloped design basis and technical specification requirements. The team reviewed the coordination calculation and protective relay surveillance tests, and also the vendor manual for diesel engine automatic trip devices, to determine that generator breaker overcurrent trip settings and diesel engine trip devices settings were appropriately selected; and that calibration tests were performed in accordance with the established standards and acceptance criteria. The team conducted walkdowns of both of the EDGs to determine the material condition and the operating environment for indications of degradation of equipment. Finally, a sample of condition reports was reviewed to ensure Entergy was identifying and properly correcting issues associated with the '1A' EDG system.

b. Findings

Introduction: The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," in that, Entergy did not ensure that the design basis, as defined in calculations and the Updated Final Safety Analysis Report for manual EDG loading, was verified by a suitable testing program.

Description**:** The team noted that the automatically connected EDG emergency loads were within the 2750 kW continuous rating of the EDG's. However, the maximum load (including manually added loads) on the EDG during a postulated design basis scenario was determined by design calculation and was stated in Updated Final Safety Analysis Report (UFSAR) Tables 8.5.1A and 1B. The UFSAR indicated that the calculated maximum load was 2696 kW and 2880 kW for EDGs 1A and 1B, respectively. The UFSAR further stated that the generators can be manually loaded up to 3000 kW for 7 days, and to the short time rating of 2 hours at 3025 kW in any 24 hour period (at the discretion of the operators). The maximum calculated load requirement was found by the team to be bounded by the EDG short-time rating, 3025 kW for 2-hour in any 24 hr period, which was the maximum load limitation that was stipulated in EDG operating procedure OP 2126, “Diesel Generators.” However, the team found that the 3025 kW 2-hour load rating was not incorporated as an appropriate acceptance limit in EDG test procedure OP 4126, “Diesel Generator Surveillance.” The test procedure load tested the EDGs to only the 2750 kW continuous rating. Therefore, the 1B EDG was not tested to a value that demonstrated its calculated maximum load during a postulated accident scenario. In response to the team’s concern, Entergy entered this item into the corrective action program and performed an operability assessment which afforded reasonable assurance of operability of the emergency onsite (standby EDG) power supply. The operability assessment included the EDG rating (3025 kW) and acceptance testing, the fact the emergency loads were below the continuous rating (2750 kW), and the results of the refueling outage integrated ECCS tests and the monthly EDG testing, during which critical diesel generator parameters are monitored and trended. The team reviewed the operabilitiy evaluation and agreed with the assessment.

In reviewing the requirements, standards, and procedures associated with EDG testing, the team identified an inconsistency. Specifically, NRC Regulatory Guide 1.9, “Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants,” endorses IEEE Standard 387, “Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations,” which recommends testing the EDGs at the short term rating. However, Vermont Yankee Technical Specification 4.10.A.1.a.1 requires a monthly test of each EDG, to be gradually loaded to expected maximum emergency loading not to exceed the continuous rating to demonstrate operational readiness. In the case of the 1B EDG, the maximum loading (including manually added loads) of the EDG during a postulated accident scenario (2880 kW) exceeds the continuous rating (2750 kW), and in fact, station procedures allow operation as high as 3025 kW (for two hours in a 24 hour period). While the team noted that Entergy is not committed to either the Regulatory Guide or the IEEE Standard, the current EDG testing does not properly demonstrate that the EDG system will perform in accordance with the requirements and acceptance limits contained in applicable design documents (i.e., design calculations and the UFSAR).

The team also found that motor kW load was developed non-conservatively in the calculation that determined the EDG loading for design basis events. Specifically, in several cases, the team found that vendor motor efficiency data was either not being utilized or it was non-conservatively applied in the load calculation, which resulted in slightly understating the kW load on the generator and the maximum design loading requirements. In response to the team’s concern, Entergy performed analyses during this inspection that determined that the additional loads on the generator were within the EDG ratings allowed by the operating procedures (3025 kW).

The above items have been entered into Entergy’s corrective action program as CR 2008-03359 and CR 2008-03117, respectively.

Analysis: The team determined that failure to ensure that the design basis was verified by a suitable testing program was a performance deficiency that was reasonably within Entergy’s ability to foresee and correct. Specifically, the 1B EDG was not tested to a value (2880 kW) that demonstrated its calculated maximum manual load during a postulated accident scenario. Consequently, there was the potential that manually loading the EDG during a postulated design basis event could result in loading the 1B EDG to a level not suitably verified by testing.

The finding was more than minor because it was similar to NRC Inspection Manual Chapter 0612, Appendix E, "Examples of Minor Issues," Example 3j, in that the lack of testing to maximum expected design basis loading conditions resulted in a condition where there was a reasonable doubt on the operability of the standby onsite power supply. The finding was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Traditional enforcement does not apply because the issue did not have any actual safety consequences or potential for impacting the NRC's regulatory function, and was not the result of any willful violation of NRC requirements. In accordance with NRC IMC 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," a Phase 1 SDP screening was performed and determined the finding was of very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in a loss of standby onsite power operability or functionality.

Enforcement: 10 CFR 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures be established to provide for verifying or checking the adequacy of design, such as by the performance of a suitable testing program. Contrary to the above, prior to August 14, 2008, Entergy did not ensure that the design basis, as defined in calculations and the UFSAR for manual EDG loading, was verified by a suitable testing program. Specifically, Entergy had not performed a suitable test to demonstrate that the 1B EDG was capable of loading to a value (2880 kW) that demonstrated its calculated maximum load during a postulated accident scenario, as allowed in operating procedures. Because this violation is of very low safety significance and has been entered into Entergy's corrective action program (CR 2008-03359 and CR 2008-03117), it is being treated as a non-cited violation consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000271/2008008-02, Inadequate Design Control for Emergency Diesel Generator Load Testing)**

.2.1.20 24 Volt DC Circuit Breaker 7

a. Inspection Scope

The team inspected the power supply breaker (No. 7) to the channel 1 emergency core cooling system logic bus. The team reviewed drawings to ensure the design was adequate and consistent with installed conditions. The team reviewed breaker coordination for the associated bus to evaluate the adequacy of the supply breaker to interrupt potential faults. Recently completed work orders were evaluated to verify the breaker was being maintained properly. The team performed a walkdown of the 24 Vdc system, including the DC-to-DC power supply and distribution panel, to assess the material condition of the equipment. The team interviewed design engineers regarding the operations and performance of the breaker and 24 Vdc system. Finally, a sample of condition reports was reviewed to ensure Entergy was identifying and properly correcting issues associated with the 24 Vdc system.

b. Findings

No findings of significance were identified.

.2.1.21 345 kV to 115 kV Autotransformer, T-4-1A

a. Inspection Scope

The team reviewed load flow conditions to determine whether the transformer had sufficient capacity to support its required loads under worst case accident loading conditions. The team reviewed transformer protective relaying to determine whether there was adequate protection and that appropriate relay calibration testing was performed. The team reviewed maintenance procedures to determine whether tasks and acceptance criteria were consistent with vendor recommendations. The team also verified that condition monitoring for the transformer, bushings and lightning arrestors was consistent with vendor and industry recommendations. A visual inspection of the transformer and the associated auxiliaries was completed by the team in order to assess material condition. Finally, the team reviewed maintenance records and corrective action program documents to determine whether there was an adverse equipment operating trend.

b. Findings

No findings of significance were identified.

.2.1.22 Motor for Residual Heat Removal Pump, P-10-1A

a. Inspection Scope

The team reviewed electrical load flow and voltage calculations to determine whether offsite power was available and of sufficient quality to provide motive power to residual heat removal (RHR) pump P-10-1A during worst case degraded voltage and service conditions. The team reviewed protective relaying calculations and setpoints to determine whether the motor was protected from and immune to spurious tripping during maximum pump brake horsepower conditions. The team reviewed elementary and control wiring diagrams to determine whether motor control logic was in conformance with the design bases. A visual inspection of the motor and its associated switchgear was completed by the team in order to assess material condition. Finally, the team reviewed maintenance and corrective action documents to determine whether the equipment has exhibited adverse performance trends.

b. Findings

No findings of significance were identified.

.2.2 Detailed Operator Action Reviews (4 samples)

The team assessed manual operator actions and selected a sample of three operator actions for detailed review based upon risk significance, time urgency, and factors affecting the likelihood of human error. The operator actions were selected from a probabilistic risk assessment (PRA) ranking of operator action importance based on risk reduction worth (RAW) and risk achievement worth (RRW) values. The non-PRA considerations in the selection process included the following factors:

- Margin between the time needed to complete the actions and the time available prior to adverse reactor consequences;
- Complexity of the actions;
- Reliability and/or redundancy of components associated with the actions;
- Extent of actions to be performed outside of the control room;
- Procedural guidance to the operators; and
- Amount of relevant operator training conducted.

.2.2.1 Operators Shed DC Loads Following a Station Blackout

a. Inspection Scope

The team inspected the operator actions associated with shedding (removing) several 125 Vdc loads during a postulated station blackout (SBO) event using procedure OT 3122, "Loss of Normal Power." The team reviewed Entergy's PRA and SBO analyses to determine when and how quickly this action should be accomplished. The team interviewed licensed operators and support staff, observed equipment response through a SBO simulator run, reviewed emergency and operating procedures, walked down applicable panels in the main control room and in the plant, and observed a walk down of a simulated SBO response in the plant. The team also independently assessed Entergy's configuration control and condition of the associated panels, emergency lighting, batteries, and motor control centers.

b. Findings

Introduction: The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR 50.63, "Loss of all Alternating Current Power," in that, Entergy did not ensure that adequate battery capacity would be available during an SBO, as assumed in Entergy's SBO analysis. Specifically, unrecognized delays in performing a credited manual DC load shedding operator action, as well as an incorrectly translated minimum battery voltage referenced in the station's SBO procedure, could have resulted in the 'B' station battery capacity being insufficient during an SBO.

Description: The team identified two instances in which incorrect station battery sizing design assumptions were made within the SBO analysis. This analysis was performed in accordance with 10 CFR 50.63, "Loss of All Alternating Current," to demonstrate the station could cope with a loss of all AC power for a specified time period. The results of this analysis concluded that the station batteries would have sufficient capacity and capability to ensure the core was cooled and containment integrity maintained for the specified coping time (2 hours).

With regard to the first instance, the SBO analysis assumed that the main turbine emergency bearing oil pump (EBOP) would be secured within 30 minutes upon the onset of an SBO. The actual time in which the pump would be secured is dictated through the implementation of the manual DC load shedding step, contained in Appendix A of procedure OT 3122, “Loss of Normal Power.” This step states the following:

15. Minimize DC loads as follows:

    a. After the recirculation motor-generator sets have coasted to a stop (approximately 20 minutes), secure the recirculation motor-generator DC lube oil pumps.

    b. Break vacuum on the main condenser.

    c. After the main turbine has coasted to a stop (approximately 30 minutes), secure the main turbine EBOP.

The team noted that securing the main turbine EBOP was conditional upon the completion of steps 15.a, 15.b, and the main turbine coasting to a stop. Based on a review of the procedure, table top discussions with Operations personnel, and a plant walk down, the team determined that Entergy could not ensure the main turbine EBOP would be secured within the 30 minute time frame specified in the SBO analysis. The team identified it would take closer to 60 minutes to secure this pump based on an estimated 30 minutes to reach and perform step 15.b and an estimated 30 additional minutes for the main turbine to coast down. The team recognized the 60 minute estimate was a rough approximation and could have been further complicated by additional delays since the SBO procedure did not prioritize the DC load shedding step earlier in the procedure. Other foreseeable delays the team identified included:

- Dedication of operational support staffing in performing OT-3122 step 15 was not predefined and step 15 did not establish a time limit for completion. In addition, competing actions for station resources prioritized earlier in the procedure could delay implementing the DC load shedding (e.g., troubleshooting a failed EDG, remotely ensuring nitrogen was available for safety/relief valve operation).
- Operators had not received specific training in performing the load shedding step in initial or requalification training.
- A health physics brief would be required prior to a plant operator entering the locked high radiation area in which the vacuum break valve is located. Coordination for this brief could be delayed since health physics technicians would be performing simultaneous reactor building surveys.

With regard to the second instance, the team identified that step 12 of OT-3122 cited an incorrect and non-conservative battery voltage, which cautioned operators that equipment damage may occur. Specifically, OT-3122, step 12, cautioned that station battery voltages at 105 Vdc may cause damage due to low voltage and high current. The team identified that actual minimum voltage for the ‘B’ station battery (which supplies power to the EBOP) is 108Vdc. The non-conservative 105 Vdc caution could have allowed battery operation to a level below which sufficient capacity existed.

Based on these deficiencies, the team determined that the 30 minute EBOP load shedding design assumption was incorrect and could not be ensured. In response, Entergy entered the issue into the corrective action program (CR 2008-03424) and recalculated the battery capacity. In the re-analysis, Entergy determined that sufficient capacity was available as long as the main turbine EBOP was stopped within 75 minutes. The team reviewed this analysis and did not identify any additional concerns.

Analysis: The team determined that the failure to ensure that sufficient battery capacity was available during an SBO was a performance deficiency that was reasonably within Entergy's ability to foresee and correct. The finding was more than minor because it was associated with the procedure quality attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Traditional enforcement does not apply because the issue did not have any actual safety consequences or potential for impacting the NRC's regulatory function, and was not the result of any willful violation of NRC requirements. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," a Phase 1 SDP screening was performed and determined the finding was of very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event.

Enforcement: 10 CFR 50.63, "Loss of all alternating current power," requires, in part, that the station batteries must provide sufficient capacity and capability to ensure that the core is cooled and appropriate containment integrity is maintained in the event of a station blackout for the specified duration. Contrary to the above, prior to August 14, 2008, incorrect design assumptions and inadequate procedural guidance could have prevented the 'B' station battery from having sufficient capacity during an SBO. Entergy has entered this issue into the corrective action program (CR 2008-03424). Corrective actions included 1) recalculating the battery capacity using the more realistic assumptions, 2) revising procedure OT 3122 to prioritize the manual DC load shedding action to ensure that it can be accomplished within the prescribed time, and 3) revising the procedure to ensure the proper minimum DC voltage is referenced. Because this violation is of very low safety significance and has been entered into Entergy's corrective action program this violation is being treated as a non-cited violation consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000271/2008008-03, Inadequate Procedure for Station Blackout Load Shedding)**

.2.2.2 Operators Vent Containment via the Torus Hardened Vent Valve (V16-19-86)

a. Inspection Scope

The team inspected the operator action to vent the containment to the main stack via the torus hardened vent given a failure to align drywell spray and a failure to align suppression pool cooling. The team reviewed Entergy's PRA to determine when and how quickly this action should be accomplished. The team interviewed licensed operators and support staff, reviewed emergency and operating procedures, walked down applicable panels in the main control room and in the plant, and observed a walkdown of a simulated response in the plant. In addition, the team independently assessed Entergy's configuration control and condition of the associated panels and valves.

b. Findings

No findings of significance were identified.

.2.2.3 Operators Isolate a Service Water Line Rupture with the Reactor Building

a. Inspection Scope

The team inspected the operator actions associated with identifying and isolating a service water line rupture with the reactor building. The team reviewed Entergy's PRA and design basis documents to determine when and how quickly this action should be accomplished. The team interviewed licensed operators and support staff, reviewed emergency and operating procedures, and walked down applicable portions of the reactor building to ensure licensed based assumptions remained valid. In addition, the team independently assessed the material condition of various floor seals within the reactor building to ensure systems, structures and components were adequately protected.

b. Findings

No findings of significance were identified.

.2.2.4 Operator Starts a Standby Control Rod Drive Pump as Needed for Inventory Control

a. Inspection Scope

The team inspected the operator actions associated with starting a standby control rod drive pump when needed for reactor water level inventory control. The team reviewed Entergy's PRA and design basis documents to determine when and how quickly this action should be accomplished. The team interviewed licensed operators and support staff, reviewed emergency and operating procedures, and walked down applicable portions of main control board to ensure this action could be performed as credited.

b. Findings

No findings of significance were identified.

.2.3 Review of Industry Operating Experience and Generic Issues (3 samples)

a. Inspection Scope

The team reviewed selected operating experience issues for applicability at Vermont Yankee. The team performed a detailed review of the operating experience issues listed below to verify that Entergy had appropriately assessed potential applicability to site equipment and initiated corrective actions when necessary.

.2.3.1 NRC Information Notice 2005-23, Vibration-Induced Degradation of Butterfly Valves

The team evaluated Entergy's applicability review and disposition of NRC Information Notice (IN) 2005-23. The NRC issued this IN to inform licensees of the degradation of butterfly valves supplied by Fisher Controls and other manufacturers. Specifically, taper pins that connect the valve disc to the valve stem had the potential to become displaced during plant operations. The team reviewed Entergy's evaluation of butterfly valves Vermont Yankee. The team also reviewed vendor manual, drawings and corrective action documents to determine whether the butterfly valves at Vermont Yankee were susceptible to the specific degradation in the information notice.

.2.3.2 NRC Information Notice 1989-90, Safety Valve Setpoint Shift

The team reviewed the applicability and disposition of NRC IN 1989-90. The NRC issued this Notice to inform licensees of possible problems resulting from operating safety/relief valves in environments different from that used to establish the safety/relief valve lift setpoints. The team reviewed Entergy's evaluation of the safety/relief valves at Vermont Yankee. Specifically, the team reviewed drawings, procedures, valve specifications and corrective action documents to determine whether the safety/relief valves were tested and setpoint set in an environment similar to the SRV operating environment.

.2.3.3 NRC Information Notice 2005-30, Safe Shutdown Potentially Challenged By Unanalyzed Internal Flooding Events and Inadequate Design

The team performed a detailed review of Entergy's evaluation of NRC IN 2005-30. This IN discussed the importance of establishing and maintaining the plant flooding analysis and design, consistent with NRC requirements and principles of effective risk management, to ensure that internal flooding risk was effectively managed. The team reviewed Entergy's evaluation of potential internal flooding events at Vermont Yankee, and reviewed the Entergy's internal flooding design basis document. The team verified that Entergy had appropriately evaluated the operational experience and had made modifications to minimize and limit the impact of potential internal flooding events.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA2 Identification and Resolution of Problems (IP 71152)

The team reviewed a sample of problems that Entergy had previously identified and entered into the corrective action program. The team reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions. In addition, condition reports written on issues identified during the inspection were reviewed to verify adequate problem identification and incorporation of the problem into the corrective action system. The specific corrective action documents that were sampled and reviewed by the team are listed in the attachment.

b. Findings

No findings of significance were identified.

4OA6 Meetings, including Exit

The team presented the preliminary inspection results to Messrs. J. Thayer and C. Wamser, and other members of Entergy staff, at an exit meeting on August 14, 2008. The team verified that none of the information in this report is proprietary.

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

R. Booth	Component Engineer
J. Callaghan	System Engineering Manager
M. Faunce	Programs/Components Engineer
M. Flynn	Design Engineering
B. Gelinas	Electrical Lead
A. Haumann	Electrical Design Supervisor
P. Johnson	Design Engineer
N. Lisai	System Engineer
W. Lynch	Design Engineer
D. Mannai	Licensing Manager
B. K. Naeck	System Engineer
N. Rademacher	Director of Engineering
J. Rogers	Design Engineering Manager
G. VonderEsch	Assistant Operations Manager

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened and Closed

NCV	05000271/2008008-01	Inadequate Testing of Safety Related Batteries (Section 1R21.2.1.1)
NCV	05000271/2008008-02	Inadequate Design Control for Emergency Diesel Generator Load Testing Criteria (Section 1R21.2.1.19)
NCV	05000271/2008008-03	Inadequate Procedure for Station Blackout Load Shedding (Section 1R21.2.2.1)

LIST OF DOCUMENTS REVIEWED

Calculations:

VY-RPT-05-00088, Task T902, ATWS EPU Task Report for ER-04-1409, Rev. 1
VYC-0298, Battery Sizing Calculation for VY 125 Vdc Station Batteries A-1 and B-1, Rev. 12
VYC-0418, Valve Stem Thrust, Rev. 11
VYC-0685, Miscellaneous Diesel Generator Parameter Monitoring, Rev. 0
VYC-0685G, Diesel FOST Level Monitoring Uncertainty, Rev. 2
VYC-0708, Torus Narrow Range Level Indication, Rev. 1
VYC-0730, Sizing Calculation for 125 Vdc Station Battery AS-2, Rev. 2
VYC-0791, MCC 8A, 8B, 8C, 8E, 9A, 9B, 9C, 9D, 89A, 89B Loading Calculation, Rev. 7
VYC-0830, Voltage Drop Calculation for VY Distribution Panels DC-1 and DC-2, Rev. 9
VYC-0836, Diesel Generator Loading, Rev. 13
VYC-0950, Torus Vent Sizing, Rev. 9
VYC-1049, 24 Vdc Power Supply Sizing, Short Circuit Current, and Voltage Drop, Rev. 4
VYC-1053, MOV Voltage Analysis, Rev. 8
VYC-1087B, 4160 Vac and 480 Vac Relay and Breaker Coordination, Rev. 0
VYC-1088, Vermont Yankee 4160/480 Volt Short Circuit/Voltage Study, Rev. 4
VYC-1096, Hydrogen Generation from Main Station/Neutron Monitoring Batteries, Rev. 1-3
VYC-1136, Cooling Airflow Requirements to Diesel Generator Room, Rev. 1
VYC-1171, Electrical Design Basis Review of Safety Related MOVs for GL 89-10, Rev. 8
VYC-1181, System Level Review of RHR MOVs for NRC Generic Letter 89-10, Rev. 6
VYC-1182, System Level Review of Service Water MOVs for GL 89-10, Rev. 3
VYC-1188, 125 Vdc and 24 Vdc ECCS Distribution System Coordination, Rev. 1-5
VYC-1254, Containment and PRV Volume, Rev. 3
VYC-1279, Service Water System Hydraulic Analysis (Attachment 3), Rev. 0
VYC-1347, Main Steam Tunnel Heatup Calculation, Rev. 0
VYC-1349, 125 Vdc Control Circuit Voltage Drop Study – Batteries A1 & B1, Rev. 2
VYC-1404, EDG Fuel Oil Usage and Storage Capacity, Rev. 2
VYC-1630, Battery Sizing Calculation for 400 Vdc UPS Batteries B-UPS-1A/B, Rev. 2
VYC-1645, AS-2 Alternate Shutdown Voltage Drop, Rev. 1
VYC-1717, Emergency Diesel Generator Starting Air System Capacity, Rev. 1
VYC-1835, ADS System Nitrogen Bottle Sizing for 72 Hour Standby Period, Rev. 1
VYC-1891, EDG Fuel Oil Day Tanks, Seismic Mods for 99-021, SQUG Outlier, Rev. 0
VYC-1919, RHR & Core Spray Suction Strainer Assembly Clean Strainer Head Loss, Rev. 0
VYC-1920, RHR & Core Spray Suction Strainer Vortex/Minimum Submergence, Rev. 0
VYC-1921, RHR & Core Spray Suction Strainer Bubble Ingestion, Rev. 0
VYC-1924, ECCS Suction Strainer Head Loss Performance Assessment Calculations, Rev. 1
VYC-2091, Head Loss in Suction Line from FOST to Fuel Oil Transfer Pump, Rev. 0
VYC-2153, 125 Vdc Battery A-1 Electrical System Calculation, Rev. 0-4
VYC-2154, 125 Vdc Battery B-1 Electrical System Calculation, Rev. 0-5
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VYC-2374, Suppression Pool Temperature for Appendix R without Overpressure, Rev. 0
VYC-2396, Containment System Response, Task 0400, Rev. 0
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VYPC 98-011, Component Level Review of RHR MOVs for Generic Letter 89-10, Rev. 2
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OP 4028, Non-Appendix J Leak Rate Testing (10/28/05, 5/20/07, 6/02/07)
OP 4100, ECCS Integrated Automatic Initiation Test (4/23/04, 11/06/05, 6/01/07)
OP 4124, RHR and RHRSW System Test (4/25/07, 5/2/07, 5/23/07, 7/27/07, 10/23/07, 11/1/07, 4/24/08, 4/29/08)
OP 4126, EDG Surveillance (7/19/06, 8/18/06, 9/18/06, 10/23/06, 11/25/06, 12/14/06, 1/18/07, 2/12/07, 3/2/07, 5/11/07, 7/16/07, 8/16/07, 9/19/07, 10/15/07, 11/12/07, 12/18/07, 1/15/08, 3/13/08, 5/8/08, 7/16/08, 07/21/08)
OP 4172, FW System Test (11/17/06, 2/12/07, 6/7/07, 8/13/07, 11/12/07, 2/14/08, 5/13/08)
OP 4181, SW/Alt. Cooling System (2/2/07, 5/18/07, 6/4/07, 8/2/07, 11/5/07, 1/28/08, 4/28/08)
OP 4195, Fuel Oil Transfer System Surveillance (4/21/08)
OP 4209, UPS Battery Performance Test (11/06/99, 4/10/04, 4/12/04)
OP 4210, ‘A’ Station Battery Quarterly Surveillance (11/15/07, 2/5/08, 5/5/08)
OP 4210, AS-2 Quarterly Surveillance (10/17/07, 1/14/08, 4/17/08)
OP 4210, Battery Weekly Surveillance (5/19/08, 5/27/08, 6/2/08, 6/9/08)
OP 4215, B-1-1A Main Station Battery Performance Test (10/17/02, 5/25/07)
OP 4215, Main Station Battery Service Test (4/13/04, 11/12/05)
OP 4217, Alternate Shutdown Battery Performance Test (7/17/03, 5/13/08)
OP 4217, Alternate Shutdown Battery Service Test (4/13/05, 8/9/06)
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VYOPF 4126.05, EDG Starting Air System Test (6/9/08, 6/15/08)
VYOPF 4126.09, EDG Starting Air Compressor Capacity Test (6/28/06, 3/01/07, 2/27/08)
VYOPF 4126.11, Diesel Starting Air Receiver Inlet Check Valve Test (4/22/06, 7/19/06, 11/08/06, 1/18/07, 5/09/07, 7/09/07, 10/13/07, 1/15/08, 4/14/08)

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5920-4150, Lube Oil system Schematic, Rev. 9
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B-191301, Control Wiring Diagram 4kV Swgr Bus 4. Compt 5, P-10-1A, Sh. 1301, Rev. 12
B-191301, Control Wiring Diagram MCC 89A Interconnections, Sh. 370A, Rev. 4
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G-191160, Flow Diagram Diesel Generator Starting Air System, Sh. 7, Rev. 23
G-191160, Instrument Air System, Sh. 4, Rev. 20
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OP 2143, 480 and Lower Voltage AC System, Rev. 117
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OP 2149, Normal 24 Vdc Operation, Rev. 16
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OP 4195, Fuel Oil Transfer System Surveillance, Rev. 37
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LIST OF ACRONYMS

AC	Alternating Current
ADS	Automatic Depressurization System
CFR	Code of Federal Regulations
CR	Condition Report
CW	Circulating Water
DBD	Design Basis Document
DC	Direct Current
EBOP	Emergency Bearing Oil Pump
EDG	Emergency Diesel Generator
gpm	Gallons per Minute
HPCI	High Pressure Coolant Injection
IEEE	Institute of Electrical and Electronics Engineers
IMC	Inspection Manual Chapter
IN	Information Notice
kV	kilo-Volts
kW	kilo-Watts
MOV	Motor-Operated Valve
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
PRA	Probabilistic Risk Assessment
RAW	Risk Achievement Worth
RBCCW	Reactor Building Closed Cooling Water
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RRW	Risk Reduction Worth
RUPS	Rotating Uninterruptible Power Source
SBO	Station Blackout
SDP	Significance Determination Process
SPAR	Standardized Plant Analysis Risk
SRV	Safety Relief Valve
SW	Service Water
UFSAR	Updated Final Safety Analysis Report
Vac	Volts, Alternating Current
Vdc	Volts, Direct Current