**UNITED STATES**
**NUCLEAR REGULATORY COMMISSION**
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

September 26, 2008

Docket Nos. 05000271
07200059

License No. DPR-28

Mr. Theodore A. Sullivan
Site Vice President
Entergy Nuclear Operations, Inc.
Vermont Yankee Nuclear Power Station
185 Old Ferry Road
P.O. Box 500
Brattleboro, VT 05302-0500

SUBJECT: INSPECTION REPORT 05000271/2008006 AND 07200059/2008001, VERMONT YANKEE NUCLEAR POWER STATION

Dear Mr. Sullivan:

On August 13, 2008, the NRC completed an inspection of the Vermont Yankee Nuclear Power Station Independent Spent Fuel Storage Installation (ISFSI) pre-operational activities and the initial loading of spent fuel into the ISFSI facility. The inspection period began on April 21, 2008. The findings of the inspection were discussed with Chris Wamser and members of your staff during an exit meeting on August 13, 2008. The enclosed report presents the results of that inspection.

The inspection reviewed activities associated with the preparation, movement and placement of spent fuel from the Vermont Yankee spent fuel pool into the ISFSI facility. The inspection included field observations, examination of procedures and documents, and interviews with personnel.

This report documents one self-revealing finding of very low safety significance (Green). This finding did not involve a violation of an NRC requirement. The issue involved not developing an appropriate preventative maintenance program to periodically confirm the proper operation of voltage sensing relays in the reactor building crane main hoist braking system.

In accordance with Section 2.390 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations (CFR), a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

We appreciate your cooperation with us during this inspection.

Sincerely,

***/Original signed by RLorson/***

Raymond Lorson, Chief
Decommissioning Branch

Enclosure:
Inspection Report No. 05000271/2008006 and 07200059/2008001
w/Attachment: Supplemental Information

cc w/encl:
Vice President, Operations, Entergy Nuclear Operations
Senior Vice President, Entergy Nuclear Operations
Vice President, Oversight, Entergy Nuclear Operations
Senior Manager, Nuclear Safety & Licensing, Entergy Nuclear Operations
Senior Vice President and COO, Entergy Nuclear Operations
Assistant General Counsel, Entergy Nuclear Operations
Manager, Licensing, Entergy Nuclear Operations
Hon. Molly Kelly, New Hampshire Senate
S. Lousteau, Treasury Department, Entergy Services, Inc.
D. O' Dowd, Administrator, Radiological Health Section, DPHS, State of New Hampshire
W. Irwin, Chief, CHP, Radiological Health, Vermont Department of Health
Chief, Safety Unit, Office of the Attorney General, Commonwealth of Mass.
D. Lewis, Pillsbury, Winthrop, Shaw, Pittman LLP
G. D. Bisbee, Esquire, Deputy Attorney General, Environmental Protection Bureau
J. P. Matteau, Executive Director, Windham Regional Commission
D. Katz, Citizens Awareness Network (CAN)
R. Shadis, New England Coalition Staff
G. Sachs, President/Staff Person, c/o Stopthesale
J. Volz, Chairman, Public Service Board, State of Vermont
Chairman, Board of Selectman, Town of Vernon
C. Pope, State of New Hampshire, SLO
D. O'Brien, State of Vermont, SLO
J. Giarrusso, SLO, MEMA, Commonwealth of Massachusetts
J. Angil, II, Manager, Vermont Emergency Management Agency
U. Vanags, State Nuclear Engineer, Vermont Department of Public Service
J. Block, Esquire
S. Shaw
G. Edwards

We appreciate your cooperation with us during this inspection.

Sincerely,
***/Original signed by RLorson/***
Raymond Lorson, Chief
Decommissioning Branch

Enclosure:
Inspection Report No. 05000271/2008006 and 07200059/2008001
w/Attachment: Supplemental Information

cc w/encl:
Vice President, Operations, Entergy Nuclear Operations
Senior Vice President, Entergy Nuclear Operations
Vice President, Oversight, Entergy Nuclear Operations
Senior Manager, Nuclear Safety & Licensing, Entergy Nuclear Operations
Senior Vice President and COO, Entergy Nuclear Operations
Assistant General Counsel, Entergy Nuclear Operations
Manager, Licensing, Entergy Nuclear Operations
Hon. Molly Kelly, New Hampshire Senate
S. Lousteau, Treasury Department, Entergy Services, Inc.
D. O' Dowd, Administrator, Radiological Health Section, DPHS, State of New Hampshire
W. Irwin, Chief, CHP, Radiological Health, Vermont Department of Health
Chief, Safety Unit, Office of the Attorney General, Commonwealth of Mass.
D. Lewis, Pillsbury, Winthrop, Shaw, Pittman LLP
G. D. Bisbee, Esquire, Deputy Attorney General, Environmental Protection Bureau
J. P. Matteau, Executive Director, Windham Regional Commission
D. Katz, Citizens Awareness Network (CAN)
R. Shadis, New England Coalition Staff
G. Sachs, President/Staff Person, c/o Stopthesale
J. Volz, Chairman, Public Service Board, State of Vermont
Chairman, Board of Selectman, Town of Vernon
C. Pope, State of New Hampshire, SLO
D. O'Brien, State of Vermont, SLO
J. Giarrusso, SLO, MEMA, Commonwealth of Massachusetts
J. Angil, II, Manager, Vermont Emergency Management Agency
U. Vanags, State Nuclear Engineer, Vermont Department of Public Service
J. Block, Esquire
S. Shaw
G. Edwards

Distribution w/encl:
S. Collins, RA
M. Dapas, DRA
D. Jackson, DRP
B. Norris, DRP
N. Sieller, DRP
S. Williams, RI OEDO
M. Kowal, NRR
R. Nelson, NRR
J. Kim, PM, NRR
J. Boska, Backup PM, NRR
R. Fernandes, SRI
B. Sienel, DRP, Resident Inspector
A. Rancourt, DRP, Resident OA
Region I Docket Room (with concurrences)
ROPreports Resource (All IRs)

DOCUMENT NAME: G:\WordDocs\D&LB\VY\ISFSI\VY ISFSI Dry Run DRAFT IR.doc
**SUNSI Review Complete:** JNicholson ML082740170
After declaring this document "An Official Agency Record" it **will** be released to the Public.
**To receive a copy of this document, indicate in the box:** "**C**" = Copy w/o attach/encl "**E**" = Copy w/ attach/encl "**N**" = No copy

| OFFICE | DNMS/RI | N | DRP/RI | | DNMS/RII | | | |
|---|---|---|---|---|---|---|---|---|
| NAME | JNicholson | | BNorris | | RLorson | | | |
| DATE | 9/19/2008 | | 9/26/2008 | | 9/26/2008 | | | |

OFFICIAL RECORD COPY

# U.S. NUCLEAR REGULATORY COMMISSION
# REGION I
# INSPECTION REPORT

| | |
|---|---|
| Inspection Nos. | 05000271/2008006 and 07200059/2008001 |
| Docket Nos. | 05000271 and 07200059 |
| License No. | DPR-28 |
| Licensee: | Entergy Nuclear Operations, Inc. |
| Location: | 320 Governor Hunt Road<br>Vernon, VT 05354 |
| Inspection Dates: | April 21, 2008 through August 13, 2008 |
| Inspectors: | John Nicholson, Health Physicist, Region I<br>Earl Love, Safety Inspector, Nuclear Materials Safety and Safeguards (NMSS)<br>Clyde Morrell, Safety Inspector, NMSS<br>Mark Roberts, Senior Health Physicist, Region I<br>Robert Temps, Senior Safety Inspector, NMSS |
| Approved By: | Raymond Lorson, Chief<br>Decommissioning Branch<br>Division of Nuclear Materials Safety |

## SUMMARY OF FINDINGS

IR 05000271/2008006 & 07200059/2008001; 04/21/2008 – 08/13/2008; Vermont Yankee Nuclear Power Station; Maintenance Effectiveness.

This report covered an on-site inspection and in-office review by region and headquarters based inspectors of activities related to the dry cask storage of spent fuel, NRC observed dry run, and the initial loading campaign. One Green self-revealing finding was identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using 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 Finding

Cornerstone: Initiating Events

Green. A self-revealing Finding of very low safety significance was identified for Entergy not fully developing an adequate preventive maintenance (PM) program for the reactor building crane (RBC). As a result, on May 12, 2008, when the first loaded spent fuel storage cask was removed from the spent fuel pool (SFP) and was being lowered to a height of four inches above the refueling floor, the crane brakes did not engage and the spent fuel storage cask continued to be slowly lowered to the refueling floor. This issue was entered into the licensee’s corrective action program as condition report CR-VTY-2008-02043.

This issue is greater than minor because the finding resulted in the failure of the RBC brakes to engage during the lowering of a loaded spent fuel storage cask. The finding was determined to be of very low safety significance (Green) because the spent fuel storage cask remained under control of the reactor building crane, was in an approved load path, and the emergency braking system was available.

B. Licensee-Identified Violations

None.

## REPORT DETAILS

Summary of Facility Activities

Preparations for loading spent fuel from the Vermont Yankee SFP to the Holtec International Dry Cask Storage System were initiated during this inspection period. Upon completion of the pre-operational testing activities, on May 2, 2008, Entergy began the transfer of VY spent fuel to the onsite Independent Spent Fuel Storage Installation (ISFSI).

Entergy completed initial loading of the first multi-purpose canister (MPC) on May 6, 2008. The loaded MPC was placed on the ISFSI pad on May 29, 2008. Four additional MPCs were loaded during this initial campaign.

### 1. Preoperational Test Program

a. Inspection Scope (60854)

The Certificate of Compliance (CoC) for the Holtec International HI-STORM 100 Cask System required Entergy to conduct preoperational testing (i.e. dry runs) to demonstrate the loading, closure, and transfer of the cask system prior to the first loading of spent fuel assemblies. The NRC conducted several onsite inspections to observe Entergy's demonstration of the activities required by the CoC. The inspection consisted of field observations, interviews with cognizant personnel, and a review of Entergy's documentation.

The work packages for the dry run activities were reviewed. The work packages contained the applicable procedures associated with the scope of the dry run activities. In addition, condition reports related to dry cask storage system components and equipment were reviewed to ensure that issues were adequately dispositioned prior to commencement of dry run activities. Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

During the period of April 22 to April 25, 2008, the inspectors observed the placement of the HI-TRAC containing an MPC (i.e., stackup activities) onto the HI-STORM overpack, transfer of the MPC from the HI-TRAC to the HI-STORM, placing the lid on the HI-STORM, transport of the HI-STORM overpack to the ISFSI along the designated haul path, and placement of the HI-STORM onto the ISFSI pad. To more accurately approximate the weight of a fully loaded HI-STORM (less the weight of the loaded fuel for an actual loaded MPC) Entergy placed an empty MPC into the HI-STORM prior to the transport to the ISFSI pad.

During the period of April 28 to May 2, 2008, the inspectors observed the movement of the HI-TRAC to the cask storage area of the SFP, and also observed fuel handlers place

a dummy fuel assembly into an MPC storage cell while the HI-TRAC was positioned in the cask placement area of the SFP. Movement of the HI-TRAC to and from the SFP was performed in a deliberate manner in strict compliance with designated heavy load paths. The inspectors noted coordination of the work activity with the Vermont Yankee main control room. The SFP water level was properly controlled during all phases of HI-TRAC handling activities.

Entergy conducted a pre-job briefing on April 28, 2008, for personnel involved with the dry run activities. The briefing covered key aspects of the evolutions, including: procedural adherence expectations, industrial and radiological safety, peer checking, three-way communications, and a detailed overview of the tasks to be performed. Radiological conditions were simulated and appropriate measures implemented to provide a degree of realism during the performance of the dry run. Entergy issued neutron dosimetry to workers and posted affected areas with simulated radiological postings in order to prepare workers for the potential radiological conditions associated with the transfer of spent fuel. Entergy had obtained radiological survey data from other licensees and used this data to communicate expected radiation levels to workers during the dry run.

c. Conclusions

Entergy demonstrated the ability to safely place the HI-TRAC onto the HI-STORM and subsequently transport the loaded HI-STORM to the ISFSI. The placement of an MPC into the HI-TRAC to verify fit and confirmation that the MPC fuel storage cells were capable of accepting VY spent fuel assemblies was successfully demonstrated. Entergy successfully demonstrated the ability to insert an MPC into the HI-TRAC and HI-STORM. Individuals were knowledgeable of their responsibilities and able to perform their assigned functions.

## 2. Review of Evaluations

a. Inspection Scope (60856 and 60857)

The inspectors evaluated Entergy's compliance with the requirements of 10 CFR 72.212 and 10 CFR 72.48. The inspection consisted of interviews with cognizant personnel and review of license documentation. Additional documents reviewed are listed in the attachment.

Entergy was required, as specified in 10 CFR 72.212(b)(1)(I), to notify the NRC of the intent to store spent fuel at an ISFSI at least 90 days prior to the first storage of spent fuel. Entergy notified the NRC on March 13, 2007, of their intent to use the Holtec International HI-STORM 100 Cask System, in accordance with CoC Number 1014. This letter met the requirements for the 90-day notification. Entergy was required, as specified in 10 CFR 72.212(b)(1)(ii), to register the use of each cask with the NRC within 30 days of using that cask to store spent fuel. Entergy provided this registration to the NRC in letters dated June 5, and 26, July 10, 23, and 31, 2008, which included information on each of the first five casks.

b. Observations and Findings

No findings of significance were identified.

A written evaluation is required per 10 CFR 72.212(b)(2)(I), prior to use, to establish that the conditions of the CoC have been met. Entergy documented its written evaluation to confirm the ISFSI was within the licensed scope in "Vermont Yankee, 10 CFR 72.212 Report Revision 0." Based on the review of the 10 CFR 72.212 report, the inspectors determined Entergy's evaluation contained a sufficient level of detail to reach the stated conclusions.

Entergy had performed written evaluations which confirmed that the conditions set forth in the CoC had been met, the ISFSI pad had been designed to support the stored load of the casks, and the requirements of 10 CFR 72.104 had been met. Applicable reactor site parameters, such as fire, explosions, tornados, wind-generated missile impacts, seismic qualification, lightning, flooding, and temperature**,** had been evaluated for acceptability with the bounding values specified in the HI-STORM 100 Cask System Safety Analysis Report (SAR) and the NRC Safety Evaluation Report (SER).

A 50.59 evaluation of the construction and operation of the ISFSI and plant interfaces had been performed to demonstrate that changes to plant Technical Specifications, or a license amendment were not required and that ISFSI-related work activities would not impact safe operation of VY. No safety concerns were identified.

The inspectors reviewed selected referenced records and procedure changes related to the security, emergency preparedness, training, health physics and quality assurance programs. The inspectors interviewed cognizant personnel to confirm that they were knowledgeable of the impact of ISFSI-related activities. The emergency plan, quality assurance program, radiological safety program, and training program had been evaluated and their effectiveness were determined not to be decreased by ISFSI activities.

c. Conclusions

Entergy's 10 CFR 72.212 report and 10 CFR 50.59 ISFSI-related safety evaluation were determined to be adequate.

## 3. Fuel Characterization and Verification

a. Inspection Scope (60854)

The CoC for the HI-STORM 100 cask system specified the parameters that must be met in order to allow spent fuel to be stored at the ISFSI. The inspectors evaluated Entergy's programs to verify that spent fuel assemblies selected for storage met the applicable requirements of the CoC. The inspection consisted of interviews with cognizant personnel and review of licensee documentation. Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

The inspectors reviewed Entergy's process for selecting and verifying fuel assemblies for placement into dry cask storage. The inspectors reviewed various documents associated with the qualification, characterization, and selection of fuel assemblies for storage at the ISFSI.

Technical Specifications require that selected fuel assemblies be visually inspected, independently identified, be free of cladding defects, and be within specified limits for such parameters as fuel enrichment, burn-up, and decay heat output. Entergy had developed procedures to ensure the proper characterization of loaded fuel to meet the requirements of the CoC. The inspectors discussed the fuel selection process with cognizant personnel and determined that individuals were knowledgeable of the Technical Specification requirements. The inspectors noted that Entergy had made arrangements to perform a general cleaning of the VY SFP prior to loading of the first MPC in January 2008. Serial numbers were verified and some loose debris was removed. The inspectors discussed the results of the cleaning effort with cognizant personnel. Fuel Assembly Qualification Data Sheets for the 68 fuel assemblies selected for loading into the first MPC were reviewed to confirm that the fuel assemblies met the requirements of the CoC. The inspectors noted that the selected fuel assemblies met all the appropriate Technical Specification requirements for placement into an MPC for dry storage. Supporting documentation adequately characterized the selected fuel assemblies for loading into the first MPC. For the initial MPC, the inspectors viewed the recording of the selected fuel assemblies as they were placed in the MPC directly from a computer hard drive.

c. Conclusions

Entergy had developed a program to ensure the proper selection and characterization of fuel assemblies for dry cask storage in accordance with approved procedures. Entergy documentation supported the proper characterization of the first 68 fuel assemblies to be loaded and was in compliance with design parameters specified in the CoC.

## 4. Welding and Nondestructive Testing

a. Inspection Scope (IP 60854)

The inspectors observed and evaluated the welding and nondestructive examination (NDE) processes to determine whether the VY staff and Entergy's contractor had developed the capability to properly weld and perform NDE on the type of MPC to be used for storage of spent fuel at the VY site. Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

Entergy utilized the services of a dedicated contractor welding and nondestructive examination team experienced in the MPC type used at VY. The welding portion of the dry run was observed by the inspectors on April 28 – May 2, 2008. The inspectors observed the welding equipment setup, welding of the mockup shield cover, visual weld examination, penetrant testing, and helium leak-testing of the shield cover and drain/vent port covers. Portions of the applicable work instructions and procedures were reviewed. The inspection included verification that the activities were accomplished in accordance with the commitments and requirements contained in the SAR, the NRC's SER, the CoC, Entergy's Quality Assurance (QA) program, and 10 CFR Part 72. The inspectors discussed the work steps and plans with those involved and reviewed portions of various controlling procedures to verify their adequacy. The inspectors also examined the welding equipment, observed welding in progress on an MPC shield cover, and reviewed welder qualification records, and portions of the welding and NDE procedures.

The inspectors, while reviewing welder qualification records, identified that the welding contractor's penetrant testing (PT) inspector had not been trained on the VY PT examination procedure. Entergy initiated a condition report (CR) and implemented immediate action to train the contractor's PT inspector to resolve this issue.

The inspectors observed preparations for welding activities on May 23, 2008. Contractor personnel were knowledgeable of their work activities and worked closely with Entergy personnel. Rigging and handling of the lid, welding machine, and associated equipment were performed in a safe manner. The inspectors discussed the methods employed by the crane operator and riggers regarding the selection of slings and inspecting slings prior to use. The individuals were knowledgeable of procedural requirements and followed approved rigging and lifting practices.

c. Conclusions

Entergy successfully demonstrated the ability to adequately weld and perform NDE of the MPCs.

**5. Heavy Loads Program**

a. Inspection Scope (60854)

Entergy was required to demonstrate the adequacy of their heavy loads program pertaining to the movement of the HI-TRAC and MPC from the SFP to the truck bay and placement of the HI-TRAC on top of the HI-STORM in the truck bay. The inspection consisted of field observations, interviews with cognizant personnel, and reviews of Entergy documentation. Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

The VY RBC is a single trolley, overhead crane with a 110-ton capacity main hoist. The crane is a single failure proof Whitting crane procured in 1975 and accepted by the NRC as single failure proof in a 1977 Safety Evaluation based on a comparison to standards of the Auxiliary Systems Branch (ASB) Branch Technical Position 9-1 (attachment to the Standard Review Plan (SRP) Section 9.1.4 in NUREG-75/087) which subsequently became NUREG-0554. The inspectors reviewed VY's response to NRC Bulletin 96-02, "Movement of Heavy Loads Over Spent Fuel, Over Fuel in the Reactor Core, or Over Safety-Related Equipment," as described in letter BVY-96-62, dated May 9, 1996. The RBC included various controls and interlocks to ensure that loads could be stopped and held in a safe manner in the event of fault indications or if certain parameters exceeded specified limits (e.g. over-speed, over-travel, and over-load).

The inspectors reviewed the initial load test results provided by VY. The load test was performed once the crane was in place at VY in 1976. This test was witnessed by Entergy personnel. The test plan included 100% and 125% load tests on the main hoist, bridge, and trolley components.

To ensure that the crane could not travel over areas of the SFP where spent fuel was stored, Entergy designated restricted load paths when handling heavy loads. Additionally, crane rail stops were installed and/or removed that physically limited the movement of heavy loads beyond the cask loading area of the SFP, thus preventing the movement of loads over areas of the SFP containing stored assemblies.

The RBC is used to move the HI-TRAC containing an MPC from the cask loading area of the SFP to the cask preparation area and back again. The crane is also utilized to lift the HI-TRAC onto the HI-STORM in the truck bay. The inspectors observed personnel performing visual inspections and pre-operational checks of the RBC and associated lifting devices in accordance with approved procedures prior to lifting and movement of the HI-TRAC.

Over the course of the dry run, the inspectors observed all the movement pathways of a HI-TRAC. Pre-lift job briefings were thorough and emphasized safety aspects of handling heavy loads. Individual responsibilities were clearly communicated during pre-

job briefings. Crane operators, spotters and members of the lifting team were knowledgeable of their responsibilities. Movements of heavy loads were performed in a deliberate and safe manner. The inspectors noted that effective communication was maintained between the load director, crane operator and members of the lifting team while lifts were in progress. Positive controls were established to keep non-essential personnel away from the work area to minimize distractions of the lift team.

c. Conclusions

Entergy had developed a heavy loads lifting program and procedures to ensure the proper handling of any heavy load. Entergy documentation supported compliance with the Holtec CoC and Final Safety Analysis Report (FSAR).

**6. Crane Operation and Maintenance**

a. Inspection Scope (60854)

The inspectors reviewed Entergy's crane operation and maintenance program to ensure that the crane was capable of operating safely and handling the required loads associated with the dry cask storage system components.

b. Observations and Findings

Introduction: A self-revealing finding of very low safety significance (Green) was identified for Entergy not fully developing a preventive maintenance (PM) activity to ensure proper operation of relays critical to the operation of the RBC main hoist braking system.

Description: On May 12, 2008, the loaded MPC and HI-TRAC were lifted out of the SFP. The load was moved horizontally to the east, clear of the SFP, to a designated location above the refuel floor. While the cask was being lowered to a height of four inches above the refuel floor, a stop signal was given. However, instead of stopping at the four inch height, the load continued lowering slowly to the floor. When a portion of the load was transferred to the refuel floor, the crane brakes engaged and the load stopped with the majority of the load still held by the RBC. The load was manually lowered to the refuel floor later that day, and supplemental cooling was established to the MPC on May 14, 2008. After an investigation, it was determined that two RBC main hoist voltage relays were not adjusted to the proper set points.

After consultation with the RBC manufacturer, the voltage setpoints for the RBC main hoist relays were adjusted. A 100% load test of the RBC was conducted on May 22, 2008, and the crane was declared operable. The voltage readings for the two RBC main hoist relays were verified to be in the expected voltage range. Entergy personnel then moved the MPC from the refuel floor in a controlled and deliberate manner and placed it in the cask handling area.

Analysis: The performance deficiency associated with this finding involved not utilizing industry guidance and operating experience to develop an effective PM program for the RBC braking system electrical control relays. Specifically, VY submitted details of the reactor building crane modification to the NRC in a document dated December 30, 1975. In the "Tests and Maintenance Inspections," section of the reactor building crane modification document, VY stated "an inspection schedule will be prepared and executed to cover such items as inspection of all brakes for wear and proper adjustment, and the General Electric Max-Speed control system, which controls the main hoist, will be examined for appropriate setpoints." Contrary to this commitment, Entergy's RBC PM program did not include any periodic check to confirm proper operation of the voltage settings for the main hoist relays.

Entergy's RBC PM program had been developed in accordance with the crane manufacturer's guidance as prescribed by ANSI Standard B30.2, "Overhead and Gantry Cranes." The inspectors reviewed the crane manufacturer's PM guidelines and did not identify any recommended PM requirements for these relays. In addition, the inspectors reviewed the RBC inspection and surveillance requirements contained in Technical Specification Surveillance Requirements 4.12.G.1.a and 4.12.G.1.b, and determined that Entergy met these requirements prior to the use of the crane for the spent fuel cask handling operations. As a result, the inspectors determined that this issue was appropriately characterized as a finding and not as a violation of a regulatory requirement.

This issue is greater than minor because the failure to implement an adequate PM program resulted in the failure of the RBC brakes to engage during the lowering of a loaded spent fuel storage cask.

The inspectors used Inspection Manual Chapter 0609 Appendix M, "Significance Determination Process Using Qualitative Criteria," because other significance determination process guidance was not suited to provide reasonable estimates of the significance of this inspection finding. With the assistance of Region I management, the inspectors determined that the finding was of very low safety significance (Green) because the spent fuel storage cask was under the control of the RBC, in an approved load path, the brakes engaged when sufficient load was removed from the hoist by the refuel floor, and the emergency braking system, although not utilized, was available.

Enforcement: Enforcement action does not apply because the finding did not involve a violation of a regulatory requirement. The finding was determined to be of very low safety significance, and has been entered into Entergy's corrective action program. **FIN 05000271/2008006-01, Inadequate Preventative Maintenance Program for Reactor Building Crane.**

## 7. Vacuum Drying and Helium Backfill Operations

a. Inspection Scope (60854)

Entergy was required to drain the MPC, dehydrate the MPC, and backfill the canister with helium. The inspection consisted of a review of the Entergy's equipment and procedures, field observations, and interviews with cognizant personnel.

b. Observations and Findings

No findings of significance were identified.

During the period of April 29 to May 1, 2008, NRC inspectors reviewed the vacuum drying and helium backfilling sequence. The sequence involves draining water from the MPC, drying the MPC, backfilling the MPC with helium, and helium leakage testing.

The inspectors observed the pre-job briefing. The briefing was thorough and addressed pertinent aspects of the relevant procedures and CoC. Entergy provided simulated radiological conditions based on industry experience. This data was utilized as simulated radiation levels during the actual performance of the dry run to promote as low as reasonably achievable (ALARA) awareness. Procedure steps were strictly followed. The field supervisor maintained effective oversight of work activities.

Entergy demonstrated the capability, using a mockup, to drain an MPC and to perform drying and helium backfilling of an MPC during the preoperational tests**.** The technique for the helium leak testing of the final closure welds was demonstrated on a mockup canister during the welding portion of the dry run inspection. The helium leak testing was performed by experienced contract personnel qualified to perform NDE on these components. The vacuum drying process was performed in accordance with approved procedures. The required vacuum pressure and dew point readings were achieved and the pressure maintained well within the Technical Specifications limits. Helium backfilling operations were also performed in accordance with approved procedures. Individuals performing the leak test demonstrated good understanding of the requirements for performing helium leak tests and the associated acceptance criteria.

A supplemental cooling system was available to support MPC drying and helium backfilling activities. The supplemental cooling system is provided, if required to provide cooling to a loaded MPC in the event that the vacuum drying was not available. Entergy personnel were knowledgeable in the operation of the supplemental cooling system and of various contingency measures that could be employed to ensure an adequate cooling supply to an MPC.

c. Conclusions

Entergy demonstrated the capability to perform drain-down, vacuum drying, and helium backfilling of an MPC. Procedures and processes were sufficient in achieving the required limits specified in the Technical Specifications, ensuring minimal water content of loaded MPCs, and maintaining an inert atmosphere to support the safe storage of spent fuel assemblies. Adequate arrangements to provide supplemental cooling to an MPC during vacuum drying operations were established.

**8. Training and Qualifications**

a. Inspection Scope (60854)

Entergy's training program was reviewed to verify that appropriate training requirements were identified for dry cask storage (DCS) tasks and that personnel were qualified to perform dry cask storage related activities. Entergy's training program was reviewed to verify that the required elements described in 10 CFR 72 Subpart I was incorporated into the dry cask storage training program. The inspection consisted of a review of Entergy documentation, interviews with cognizant personnel, and field observations.

b. Observations and Findings

No findings of significance were identified.

The inspectors interviewed the training instructors regarding the training and qualification of personnel performing DCS activities. Training modules were developed with a vendor (Tri-Vis) and cask System Manufacturer (Holtec) specific to development of mechanical maintenance dry fuel storage (DFS) training material. Job and task analysis worksheets based on DFS procedures were prepared by Tri-Vis, reviewed by Holtec and approved by ENVY's training superintendent. Training modules covered activities in the areas of DCS Overview; Vertical Cask Transporter; Handling, Inspection and Storage; Loading Preparation and Fuel Loading; MPC Processing, Downloading and Transport; and Unloading. The inspectors reviewed selected names from the training qualification list to verify individuals that individuals observed in the field were qualified for tasks that they performed.

RP technicians demonstrated familiarity with the expected dose rates while performing mock surveys around the MPC, HI-STORM, and HI-TRAC during all dry run demonstration phases of loading, storage, and unloading. The inspectors observed simulated radiological conditions and postings based on expected conditions during the actual process. Inspectors also observed RP personnel performing initial baseline contamination surveys, and monitoring during fuel loading, transfer of HI-TRAC to cask wash down, welding, vacuum drying, helium back fill, decontamination, and transfer of the MPC to the HI-STORM.

c. Conclusions

Appropriate training modules were developed for the various tasks and licensee personnel were adequately trained to safely conduct ISFSI activities.

**9. Initial Loading of the ISFSI**

a. Inspection Scope (60855)

The inspectors observed the loading of spent fuel into the first MPC on May 5, 2008. The inspection consisted of field observations, review of license documentation, and interviews with cognizant personnel. The inspectors also reviewed Licensee Event Report, LER 2008-001-00, dated July 31, 2008 regarding an issue that occurred on June 10, 2008 involving the crane travel limit stops.

b. Observations and Findings

Licensee Event Report LER 2008-001-00

A Licensee Event Report, LER 2008-001-00, dated July 31, 2008, was submitted for an issue that was discovered on June 10, 2008. A loaded MPC had been removed from the SFP and was suspended over the refuel floor adjacent to the SFP. The RBC travel limit mechanical stops were not removed/installed in the proper sequence in accordance with Technical Specification 4.12.G.2 “Crane Travel.” The RBC was de-energized at the time. VY personnel were on the refuel floor during the evolution. There was no movement of the cask as per the procedural requirement while the travel limit mechanical stops were being adjusted. The inspectors determined that this failure to comply with Technical Specification 4.12.G.2 “Crane Travel” constituted a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the NRC’s enforcement policy. This LER is closed.

The inspectors observed the first loading of spent fuel into an MPC on May 5, 2008. The pre-job brief was conducted with the same thoroughness observed at several other pre-job briefings. During the loading of spent fuel, the inspectors observed that there were two people on hand confirming that the selected fuel assemblies were being loaded into the proper MPC location. The inspectors also reviewed the MPC loading documentation to confirm that the selected fuel assemblies, that had been previously characterized for loading, met the technical specification requirements. The fuel transfer forms were independently witnessed by a second individual during loading of the spent fuel assemblies into the MPC. Documentation was accurate and completed in accordance with approved procedures. The drain tube was installed on the MPC lid and the lid was placed on the MPC.

During the initial loading campaign which started on May 5, 2008, an issue with the RBC load cell trip point was averted just prior to lifting the loaded canister out of the SFP. At the morning pre-job briefing on May 7, 2008, prior to lifting the loaded MPC out of the SFP, one of the crew members questioned whether the crane load cell trip point was

properly set, as the upcoming lift would be the heaviest the crane had handled since the initial load testing. After review, Entergy determined that the load cell, although it had been calibrated on January 10, 2008, was not properly set to handle the load of a fully loaded MPC and HI-TRAC. An engineering change was drafted to change the crane load cell trip point from 90 tons to cover the load of the approximately 99 tons for the loaded MPC.

Several radiation monitors were staged at strategic locations in the immediate vicinity of the SFP and areas adjacent to MPC handling operations. These monitors were equipped with local alarms and remote readout displays. The inspectors discussed the purpose and function of these monitors with Entergy RP personnel and determined that individuals were aware of the actions to take in the event of a radiation monitor alarm.

d. Conclusions

Spent fuel loaded into the MPC was properly characterized. The MPC was properly sealed, tested, surveyed, and inspected, and met the requirements of the CoC.

**Exit Meeting Summary**

The inspectors presented the inspection results to VY personnel at the end of the inspection on August 13, 2008. The licensee acknowledged the findings presented.

**SUPPLEMENTAL INFORMATION**
**PARTIAL LIST OF PERSONS CONTACTED**

Licensee
Steve Arnold, Maintenance
Mike Bankston, PCI Welder
Don Calsyn – QA Oversight
John Card, Reactor Engineer
Pat Corbertt, QA Manager
*James DeVincentis – Licensing Engineer
*Tim Drouin, Manager, Project Management
John Dryfess, Manager, Regulatory Assurance
Matt Garland – Mechanical Maintenance Supervisor
Rodney Hawkins, PCI Welder
Walker Hawkins, PCI Superintendent
Dennis Humbert, Welding Engineer
Steve Howe, Electrical Supervisor
Andy Jacobs – Maintenance (Tri-Vis)
Dave King, NDE Level III
*Lee Kitchen, Manager, Maintenance
*Glen Lozier, Manager, CA&A
*Dave Mannai, Manager, Licensing
Leonard Murphy – Training Instructor
Mike O'Brien – Sr. Engineer
Tom O'Conner, Design Engineering
*Mike Philippon, Manager, Operations
*Norm Rademacher, Director, Engineering
Mike Romeo, Manager, Training
Brian Smith, Engineer, Maintenance
Tom Stetson – Reactor Engineer
Paul Stover – Radiation Protection Supervisor
*Ken Swanger – DFS Project Manager
*George Thomas – DFS Project Manager
*Lori Tkaczyk, Sr. Emergency Planner
Dave Tkatch, Superintendent, Maintenance
Larry Vice, PCI NDE Level II PT
Greg Wallin, System Engineer, BOP
*Chris Wamser, General Manager Plant Operations
*Robert Wanczyk, Site Transition Lead
Frank Xirafakis, PCI Welding Technician

***Denotes those present at the exit meeting.**

## INSPECTION PROCEDURES USED

60854 Preoperational Testing of an Independent Spent Fuel Storage Installation
60855 Operation of an Independent Spent Fuel Storage Installation
60856 Review of 10 CFR 72.212(b) Evaluations
60857 Review of 10 CFR 72.48 Evaluations

## ITEMS OPENED, CLOSED, DISCUSSED

| | | |
|---|---|---|
| 05000271/2008006-01 | FIN | Inadequate Preventative Maintenance Program for Reactor Building Crane |
| 05000271/2008-001-00 | LER | Reactor Building Crane Travel Limit Mechanical Stops not Removed/Installed in the Proper Sequence |

## LIST OF DOCUMENTS REVIEWED

Amendment No. 29 to license No. DPR-28, dated January 23, 1977, including the RBC upgrade SER
BVY 96-62 letter, VYNPS to USNRC, Subject:Response to NRC Bulletin 96-02, dated May 9, 1996
Contract Order No. 10171929, dated January 2, 2008, “PCI Energy Services for Welding, NDE and Lid Cutting Services”
DP2220, “MPC Off-Loading, Storage, and Handling”
DP2221, “MPC Prior to Use Inspection and Handling”
DP2222, “HI-STORM 100 and Overpack Storage Prior to Use Inspections, and Handling”
DP2226, “MPC Alternate Cooling”
DP2227, “Vacuum Drying System (VDS) Operation”
DP2228, “Low Profile Transporter (LPT) Maintenance & Operation”
DP2229, “Vertical Cask Transporter (VCT) Operation”
DP2230, “HI-TRAC Off-Loading, Storage, Inspections, and Handling”
DP2460, “Fuel Selection for Dry Cask Storage”
DP2461, 1/31/08, “Dry Cask Loading Verification”
Engineering Change (EC) No. 1604 (Draft), “Dry Fuel Storage Operations
Engineering Change 1604, 10CFR 50.59 Evaluation Form
Engineering Report No. VY-RPT-08-00001, Rev. 0, Vermont Yankee 10CFR72.212 Report
Engineering Report No. VY-RPT-08-0013, Rev. 0, HOLTEC Documentation Package – HI-TRAC Transfer Cask S/N 006
Engineering Report No. VY-RPT-08-0018, Rev. 0, HI-STORM Certificate of Conformance Radiation Protection Program Dose Limits – 2008 Initial Loading Campaign
EN-MA-126, Revision 5, Control of Supplemental Personnel”
Entergy Operations, Vermont Yankee, Root Cause Analysis Report, Reactor Building Crane (CR-1-1A) Main Hoist Malfunction CR-VTY-2008-02043, 06/11/2008
Entergy Vermont Yankee Dry Fuel Storage Project Cask Handling Operations NRC Demonstration Plan
EVY Approved Supplier List, Airgas, Inc. for Specialty Gases
EVY Approved Supplier List, Airgas, Inc. for Specialty Gases
EVY DFS Cask Handling Operations Demonstration Plan, revision 1, 5/2/2008
EVY QC Inspection and Commercial Grade Dedication Reports

EVY QC Inspection Report No. RN00002082, dated 3/3/2008, Helium Gas 99.999%
FSAR 1014
HOLTEC International Certificate of Compliance 1014
HSP-113, Revision 5, 1/9/2008, "Trunnion Load test Procedure for HI-TRAC 100 and 125 Systems"
LPC dated 4/21/2008, "Fuel Selection for Dry Cask Storage"
MSLT-DSC-PCI, Revision VY-0, 1/16/2008, "Helium Mass Spectrometer Leak Test Procedure"
OP 2200, Revision 33, "Operation of the Reactor and Turbine Bridge Cranes"
OP 2223, "MPC Fuel Loading Preparations and Sealing Operations"
OP 2224, "MPC Transfer Operations and HI-STORM Transport"
OP 2530 (Draft), "Radiological Monitoring for Dry Fuel Storage"
OP 5240, Revision 28, dated 03/18/2008, "Turbine and Reactor Building Bridge Crane Inspection and Maintenance"
OP 5241, Revision 22, dated 3/5/2008, "Lifting fixtures and Equipment"
PO 10182861, revision 1, Gas helium 99.999% Ultra High Purity
Preventative Maintenance Change Request (PMCR), Component ID OP-DFS-01 through 05, "Inspection of HI-STORM Loaded Spent Fuel Casks on Storage Pad"
Preventative Maintenance Change Request (PMCR), Component ID OP-DFS-01 thru 05, "Inspection of HI-STORM Loaded Spent Fuel Casks on Storage Pad"
RWP 08-024, Revision 02, Radiological Work Permit, "Dry Fuel Storage Dry Run"
Trunnion Load Test Data Record, MTR-0331-16, dated 8/1/2007
Vermont Yankee Licensee Event Report 2008-001-00, Reportable Occurrence
Vermont Yankee Reactor Building Crane Load Test documentation, 12/22/1975 – 02/04/1976
VLP-PRCT-DFSO, Revision 0, dated 2/4/2008, "ISFSI RP Support,"
VY Report No. 51-5038591-00, 12/203, Spent Fuel Historical Records Characterization Report
Work Order 139025-01; Perform DFS NRC Demonstration – Wet Ops
Work Order 139025-02; Perform DFS NRC Demonstration – MPC Sealing
WVY 75-122 Reactor Building Crane Modification, dated 12/30/1975

## LIST OF ACRONYMS USED

| | |
|---|---|
| ALARA | As Low As Reasonably Achievable |
| CoC | Certificate of Compliance |
| CFR | Code of Federal Regulations |
| CR | Condition Report |
| DCS | Dry Cask Storage |
| DCSS | Dry Cask Storage System |
| DFS | Dry Fuel Storage |
| FSAR | Final Safety Analysis Report |
| IMC | Inspection Manual Chapter |
| IP | Inspection Procedure |
| ISFSI | Independent Spent Fuel Storage Installation |
| MPC | Multi-Purpose Canister |
| NDE | Nondestructive Examination |
| NRC | Nuclear Regulatory Commission |
| PM | Preventive Maintenance |
| PT | Penetrant Testing |
| QA | Quality Assurance |
| RBC | Reactor Building Crane |
| RP | Radiation Protection |
| RWP | Radiation Work Permit |
| SAR | Safety Analysis Report |
| SDP | Significance Determination Process |
| SER | Safety Evaluation Report |
| SFP | Spent Fuel Pool |
| SRP | Standard Review Plan |
| VCT | Vertical Cask Transporter |
| VY | Vermont Yankee |