November 5, 2004

Mr. Jay K. Thayer
Site Vice President
Entergy Nuclear Operations, Inc.
Vermont Yankee Nuclear Power Station
P.O. Box 0500
185 Old Ferry Road
Brattleboro, VT 05302-0500

SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION - PRELIMINARY RESULTS OF THE AUGUST 2004, ENGINEERING TEAM INSPECTION

Dear Mr. Thayer:

During the period of August 9 through September 3, 2004, the US Nuclear Regulatory Commission (NRC) conducted a pilot team inspection at the Vermont Yankee Nuclear Power Station (VYNPS) in accordance with Temporary Instruction 2515/158, "Functional Review of Low Margin/Risk Significant Components and Human Actions." This pilot inspection incorporated the best practices of existing and past design and engineering inspections and was part of an effort to improve the effectiveness of the Reactor Oversight Program at identifying significant engineering issues. The NRC had planned to conduct a public exit meeting to discuss the results of the inspection on November 9, 2004. However, we had to postpone the public meeting upon the advice of local officials due to potential public safety concerns. We are working with local, State, and Federal officials to locate a suitable location and forum for a future public meeting. In response to stakeholder requests, NRC committed to publically release the preliminary results of the inspection prior to the public exit meeting.

The enclosure to this letter provides a summary of the inspection scope and preliminary inspection results in the areas reviewed. Please note that the final inspection results, including the number of findings and characterization of their significance, may change based on additional information and further review. The final inspection results will be documented in NRC Inspection Report 05000271/2004008.

The inspection focused on verifying that the plant's design bases were correctly implemented for a sampling of components across multiple systems, both under current licensing conditions and under your proposed extended power uprate (EPU) conditions. Overall, the team found that the components and systems reviewed would be capable of performing their intended safety functions and that you have implemented sufficient design controls for engineering work conducted at VYNPS, including your EPU request. However, the team identified eight findings of very low safety significance. None of the identified findings resulted in system inoperability, but several of the findings relate to specific degraded conditions and deficiencies in the design control processes used at VYNPS to ensure that the facility remains within its licensed and analyzed design envelope. The team also identified one unresolved item associated with electrical equipment that will be reviewed further for significance and site-specific applicability.

Limited extent of condition reviews, performed by the team, for several of the findings that could have been indicative of broader problems did not identify any additional findings, indicating that the original problems were not widespread and were likely not programmatic in nature. All of the team's findings are being shared with the NRC's technical staff conducting the EPU review. Four of the findings concern topics within the scope of the NRC's EPU review. Specifically, these findings are associated with station blackout capability, the Appendix R operator timeline, the accident analysis inputs, and the validation of motor-operated valve testing methodology. Submittal of additional information on these issues may be required to supplement the power uprate license amendment request.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its Enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is temporarily unavailable due to an ongoing security review; therefore, this document will also be posted on the NRC Web site at http://www.nrc.gov/reactors/plant-specific-items/vermont-yankee-issues.html.

Sincerely,

/RA/

Wayne D. Lanning, Director
Division of Reactor Safety

Enclosure: Summary of Inspection Scope and Preliminary Results

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

cc w/encl:
M. R. Kansler, President, Entergy Nuclear Operations, Inc.
G. J. Taylor, Chief Executive Officer, Entergy Operations
J. T. Herron, Senior Vice President and Chief Operating Officer
D. L. Pace, Vice President, Engineering
B. O'Grady, Vice President, Operations Support
J. M. DeVincentis, Manager, Licensing, Vermont Yankee Nuclear Power Station
Operating Experience Coordinator - Vermont Yankee Nuclear Power Station
J. F. McCann, Director, Nuclear Safety Assurance
M. J. Colomb, Director of Oversight, Entergy Nuclear Operations, Inc.
J. M. Fulton, Assistant General Counsel, Entergy Nuclear Operations, Inc.
S. Lousteau, Treasury Department, Entergy Services, Inc.
Administrator, Bureau of Radiological Health, State of New Hampshire
Chief, Safety Unit, Office of the Attorney General, Commonwealth of Mass.
D. R. Lewis, Esquire, Shaw, Pittman, Potts & Trowbridge
G. D. Bisbee, Esquire, Deputy Attorney General, Environmental Protection Bureau
J. Block, Esquire
J. P. Matteau, Executive Director, Windham Regional Commission
M. Daley, New England Coalition on Nuclear Pollution, Inc. (NECNP)
D. Katz, Citizens Awareness Network (CAN)
R. Shadis, New England Coalition Staff
G. Sachs, President/Staff Person, c/o Stopthesale
J. Sniezek, PWR SRC Consultant
R. Toole, PWR SRC Consultant

Distribution w/encl:
S. Collins, RA
J. Wiggins, DRA
C. Anderson, DRP
D. Florek, DRP
J. Jolicoeur, RI OEDO
J. Clifford, NRR
R. Ennis, PM, NRR
V. Nerses, Backup PM, NRR
D. Pelton, DRP, Senior Resident Inspector
A. Rancourt, DRP, Resident OA
T. Kim, Director, DOC
Region I Docket Room (with concurrences)
W. Lanning, DRS
R. Crlenjak, DRS
L. Doerflein, DRS

DOCUMENT NAME: E:\Filenet\ML043100470.wpd
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 without attachment/enclosure "**E**" = Copy with attachment/enclosure "**N**" = No copy

OFFICE	NRR/PIPB		RI/DRS		RI/RA		RI/DRS			
NAME	JJacobsen*		LDoerflein		SCollins		WLanning			
DATE	11/03 /04		11/03/04		11/05/04		11/05/04			

OFFICIAL RECORD COPY

Via e-mail T. Walker

ENCLOSURE

November 5, 2004

MEMORANDUM TO: Wayne Lanning, Director
Division of Reactor Safety
Region I

FROM: Jeffrey Jacobson, Team Leader **/RA/**
Inspection Program Branch
Division of Inspection Program Management
Office of Nuclear Reactor Regulation

SUBJECT: ENGINEERING INSPECTION PRELIMINARY RESULTS

Attached to this memorandum are the preliminary results from the pilot team inspection conducted at the Vermont Yankee Nuclear Power Station, from August 9 through 20 and August 30 through September 3, 2004. These preliminary results have been reviewed and are supported by all team members (both NRC and contractors). These preliminary results do not include issues that are of minor significance, some of which may be included in the final report in accordance with the Temporary Instruction guidance. We understand that these results will be released to the licensee and the public prior to the public exit meeting, in order to facilitate discussion at that meeting.

Attachment: As Stated

DOCUMENT NAME: G:\DRS\Safety Systems\Doerflein\EngrInspPreliminaryResultsVYMemo.wpd
After declaring this document “An Official Agency Record” it **will not** be released to the Public.
To receive a copy of this document, indicate in the box: **"C"** = Copy without attachment/enclosure **"E"** = Copy with attachment/enclosure **"N"** = No copy

OFFICE	NRR/DIPM								
NAME	JJacobson								
DATE	11/05/04								

OFFICIAL RECORD COPY

Summary of Inspection Scope and Preliminary Results

A. Inspection Summary

During the period from August 9 through September 3, 2004, the NRC conducted a team inspection in accordance with Temporary Instruction 2515/158, "Functional Review of Low Margin/Risk Significant Components and Human Actions," at the Vermont Yankee Nuclear Power Station (VYNPS). The inspection was the first of four planned pilot inspections to be conducted throughout the country to assist the NRC in determining whether changes should be made to its Reactor Oversight Process (ROP) to improve the effectiveness of its inspections and oversight in the design/engineering area.

In selecting samples for review, the team focused on the most risk significant components and operator actions. The team selected these components and operator actions by using the risk information contained in the licensee's Probabilistic Risk Assessment (PRA) and the NRC's Simplified Plant Analysis Risk (SPAR) models. Consideration was also given to those components and operator actions most impacted by the licensee's request for an extended power uprate (EPU).

Many of the samples selected were located within the Reactor Core Isolation Cooling (RCIC), Main Feedwater, Safety Relief Valve, Onsite Electrical Power, and Offsite Electrical Power systems. In addition, inspection samples were added based upon operational experience reviews. The team also was briefed by the NRC's technical staff currently conducting the EPU licensing review, concerning issues that had arisen during their reviews or areas that might warrant additional inspection. A total of 91 samples were chosen for the team's initial review.

A preliminary review was performed on the 91 samples to determine whether any low margin concerns existed. For the purpose of this inspection, margin concerns included original design issues, margin reductions due to the proposed EPU, or margin reductions identified as a result of material condition issues. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in depth margins. Based upon these considerations, 45 of the original 91 samples were selected for a more detailed review.

B. Preliminary Inspection Results

1. Electrical Power Sources

The team reviewed the adequacy of the onsite and offsite electrical power sources that supply power to the safety related components chosen for detailed review. Particular focus was paid to the offsite power sources and grid stability,

as they would be impacted by an EPU. The team performed a detailed review of the ability of the Vernon Hydro-Electric Station to supply emergency power to VYNPS in the event of a station blackout caused by a disturbance in the electrical distribution system (grid).

Results

The team found that, overall, the design, operation, maintenance and material condition of the offsite and onsite electrical power sources were adequate to support the operation of safe shutdown equipment under the range of current and proposed EPU design bases conditions. However, the team identified the following findings:

Availability of Power from Vernon Station

The team identified that the licensee had not demonstrated that the alternate alternating current (AC) power source would be available within the time required following a loss of all AC power (station blackout). Specifically, for conditions where the loss of AC power could occur due to a grid collapse, VYNPS's alternate AC source, the Vernon Hydro-Electric Station, would separate from the grid and shutdown. During the inspection, the licensee estimated it would take between 20 minutes and 2 hours to restart the Vernon Station and configure the Vernon switchyard to supply emergency power to VYNPS. In 1992, as part of its submittal to the NRC regarding VYNPS's compliance to the station blackout rule, the licensee stated that the Vernon station would be available within one hour. The licensee had not demonstrated by test that the alternate AC source would be available within one hour, and had not completed a coping analysis for the period of time the alternate source would be unavailable. The finding is of very low safety significance because the licensee's draft coping analysis, performed during the inspection, indicated the facility could cope without electrical power for at least two hours. This issue is within the scope of NRC's EPU review.

Procedures for Assessing Offsite Power Operability

The team identified that the licensee had not provided adequate procedures for the loss of the 345/115 kilovolt (kV) auto transformer. Specifically, procedures failed to provide criteria for determining the operability of the 115 kV Keene line, which is designated as an alternate immediate access power source. The finding is of very low safety significance because the team did not identify any instances where the lack of procedural guidance had resulted in inoperability of the electrical system.

Degraded Voltage Relay Setpoint Calculations

The team identified that the licensee had not properly analyzed whether the minimum Technical Specification setting for the degraded voltage relay dropout function was sufficient to ensure that adequate voltage would be available to safety related electrical equipment. The finding is of very low safety significance because the team did not identify any instances where the degraded voltage relay dropout setting had resulted in inoperable equipment.

Vulnerabilities Due to Ungrounded Electrical System

The team identified an unresolved item associated with the potential for an arcing ground to propagate from non-safety-related to safety-related electrical equipment. The inability of the existing protective devices, in each switchgear, to detect and interrupt electrical malfunctions may be inconsistent with the VYNPS design bases as specified in the VYNPS Updated Final Safety Analysis Report (UFSAR). This issue will be reviewed further by NRC to determine applicability and safety significance.

2. Reactor Core Isolation Cooling System

The team reviewed selected components of the Reactor Core Isolation Cooling (RCIC) system to ensure the system and components would be capable of performing their required design functions for both current licensing basis conditions and the proposed EPU conditions.

Results

Based on review of selected system components, including the RCIC pump and turbine, auxiliary equipment, various system valves, and instrumentation and controls, the team found that the RCIC system could perform its required functions for both the current and the proposed EPU licensing and design bases conditions. However, the team identified the following findings:

Control Valve for RCIC Lube Oil Cooler

The team identified that the installed RCIC system design did not comply with the UFSAR because it was not independent of the instrument air system. As a result, a loss of the non-safety related instrument air supply to pressure control valve PCV-13-23 could have overpressurized the RCIC pump lube oil cooler and could have diverted RCIC system flow from the reactor vessel during transient conditions. The finding is of very low safety significance because the analysis, completed by the licensee during the inspection, showed the system would have been able to perform its intended function under such conditions.

Degraded RCIC Pressure Control Valve

The team identified that the licensee failed to correct a long-standing deficiency in the operation of PCV-13-23, the control valve that supplies cooling water to

the RCIC lube oil cooler. The team determined that during initial start-up testing, problems were identified with operation of this valve, which affected its ability to properly supply cooling flow to the lube oil cooler. During the inspection, the licensee could not demonstrate that this issue had been entered into its corrective action program prior to the inspection, as necessary to address this problem and correct the deficiency. This finding is of very low significance because the licensee had implemented changes to its operating procedures to compensate for the deficiency by implementing manual actions.

3. Residual Heat Removal Pumps

The team reviewed the Residual Heat Removal (RHR) pumps to ensure the pumps would be capable of performing their required design functions for both the current and the proposed EPU licensing and design bases conditions. In its EPU submittal to the NRC, the licensee stated that credit for the containment overpressure that would exist under postulated accident conditions would be needed to ensure adequate net positive suction head (NPSH) to the RHR pumps. Therefore, the inspection scope included specific reviews of the licensee's NPSH calculations for the RHR pumps. Although the team did not review whether crediting containment overpressure was appropriate, the team performed an independent review to ensure adequacy of the licensee's NPSH calculation.

Results

Based on review of selected system components, the team found that the RHR pumps could perform their required functions for both the current and the proposed EPU licensing and design bases conditions. The team had no significant findings associated with these components.

4. Safety Relief Valves and Code Safety Valves

The team reviewed analyses and modification packages associated with the safety relief valves (SRVs) and code safety valves needed to support the proposed EPU.

Results

The team found that the analysis and modification package for the installation of an additional code safety valve was adequate to support the increased steam flow expected to result from the proposed EPU conditions. Additionally, the team

found that the modified back-up nitrogen bottle system provided an adequate supply of nitrogen to the SRVs. The team had no significant findings associated with these components.

5. Reactor Feedwater and Condensate Components

The team reviewed selected components of the Reactor Feedwater and Condensate systems to ensure the components would be capable of performing their required design functions for both current licensing basis conditions and the proposed EPU conditions.

Results

Based on review of selected components, including the feed pumps and associated controls, feed and condensate flow controls, and feedwater piping and thermal sleeves, the team found that the increased feedwater flow resulting from the proposed EPU would not adversely affect the capability of the Feedwater and Condensate system components to perform the risk significant functions of these maintenance rule systems. The team had no significant findings associated with these components.

6. Reactor Building to Torus Vacuum Breakers

The team reviewed selected components of the Reactor Building-to-Torus Vacuum Breaker system and associated components to ensure the components would be capable of performing their required design functions for both current licensing basis conditions and the proposed EPU conditions.

Results

Based on review of selected system components, the team found that the Reactor Building-to-Torus Vacuum Breaker system could perform its required functions for both the current and the proposed EPU licensing and design bases conditions. The team had no significant findings associated with this system.

7. Review of Analysis Inputs

The team reviewed a sample of plant parameters and design inputs to the VYNPS accident and transient analyses to ensure that the analysis inputs were technically correct and valid under current and proposed EPU design bases conditions.

Results

The team found that, in general, plant parameters and design inputs used in the accident and transient analysis were valid under current and proposed EPU conditions. However, the team identified the following finding:

Condensate Storage Tank Temperature Control

The team identified that the licensee failed to take measures to ensure the condensate storage tank (CST) temperature was maintained within the values assumed in the facility's accident and transient analysis. As a result, the team found that actual CST temperature during certain periods of plant operation had exceeded the values assumed in the analysis. This finding is of very low safety significance because sufficient margin remained to ensure equipment supplied by the CST could perform its intended function. This issue is within the scope of NRC's EPU review.

8. Review of Operating Experience and Generic Issues

The team reviewed selected operating experience issues that had occurred at other facilities for their possible applicability to VYNPS. Several issues that appeared to be applicable to VYNPS were selected for a more in-depth review. Additional consideration was given to those issues that might be impacted by the licensee's proposed EPU.

Results

Except for some deficiencies noted with the licensee's implementation of the motor operated valve periodic verification program, the team did not identify significant issues relative to VYNPS's actions to review and address operating experience issues. However, the team identified the following finding:

Motor Operated Valve Periodic Verification Program

The team identified that the diagnostic tests of motor operated valves at VYNPS were conducted using procedures that did not include adequate acceptance limits or trending requirements and were conducted using a test methodology that had not been adequately validated to demonstrate that the tested MOVs would be capable of performing satisfactorily under design basis conditions. This finding is of very low safety significance because no examples of degraded or inoperable valves were identified during the inspection. This issue is within the scope of NRC's EPU review.

9. Review of Operator Actions

The team reviewed risk significant, time critical operator actions that presented little margin between the time required and time available to complete the action. For each selected operator action scenario, the team verified that operating procedures were consistent with operator actions for a given event or accident condition and that the operators had been adequately trained and evaluated for each action. Control room instrumentation and alarms were also reviewed by the team to verify their functionality and to verify alarm response procedures were accurate to reflect current plant configuration. Additionally, the team

performed a walkdown of accessible field portions of the reviewed systems to assess material condition and to verify that field actions could be performed by the operators as described in plant procedures.

The team also reviewed each operator action to assess the impact the proposed EPU could have on further reducing the margin available for task completion and to verify that the associated EPU plant modifications would be reviewed by the licensee for any affect on the operators ability to complete the critical actions within the required time parameters.

Results

In general, the team concluded that the plant procedures, operator training, plant instrumentation and alarms, and analyzed timelines would allow operators to take the actions required to respond to design bases events and accident conditions. The critical operator actions had been evaluated or were scheduled for evaluation of the time margins available for task completion under proposed EPU conditions. However, the team identified the following finding:

Timeline for Shutdown Outside the Control Room

The team identified that the Safe Shutdown Capability Analysis associated with the initiation of RCIC from alternate shutdown panels (outside the control room) during an Appendix R fire scenario had not been updated to account for increased operator action times associated with new electrical safety requirements. The analysis was found to be out of date and non-conservative, effectively reducing the time margin available for event mitigation by 50%. This finding is of very low safety significance because under current licensed operating conditions, sufficient margin would remain to ensure that the core would not be uncovered during the analyzed event. This issue is within the scope of NRC's EPU review. Had this finding not been identified, the loss of margin may have prevented the operators from initiating the RCIC system in sufficient time to prevent core uncovery under EPU conditions.