



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

December 22, 2011

Mr. Christopher Wamser  
Entergy Nuclear Operations, Inc.  
Vermont Yankee Nuclear Power Station  
185 Old Ferry Road  
P.O. Box 500  
Brattleboro, VT 05302-0500

**SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION – NRC INTEGRATED  
INSPECTION REPORT 05000271/2011011**

Dear Mr. Wamser:

On October 20, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Vermont Yankee Nuclear Power Station. The enclosed report documents the results of the inspection, which were discussed on October 20, and December 2 2011, with you and other members of your staff.

This inspection was an examination of activities under your renewed operating license related to the completion of commitments made during the renewed license application process and compliance with the conditions of your license. Under the renewed operating license, entry into the period of extended operations is planned for March 22, 2012. The inspection was directed toward those activities and facilities accessible during the refueling outage. Within these areas, the inspection involved examination of selected procedures and representative records, observations of activities, and interviews with personnel.

On the basis of the samples selected for review, there were no findings identified during this inspection. We plan to continue to review Commitment Nos. 6, 12, and 25, along with your process for commitment change management during future planned license renewal team inspections, prior to March 22, 2012.

C. Wamser

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Sincerely,



Richard J. Conte, Chief  
Engineering Branch 1  
Division of Reactor Safety

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

Enclosure:  
NRC Inspection Report 05000271/2011011

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C. Wamser

2.

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Sincerely,

/RA/

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U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Docket No.: 50-271

License No.: DPR-28

Report No.: 05000271/2011011

Licensee: Entergy Nuclear Operations, Inc. (Entergy)

Facility: Vermont Yankee Nuclear Power Station

Location: Vernon, VT

Dates: October 17 - 20, and December 1, 2011

Inspectors: G. Meyer, Senior Reactor Inspector, Division of Reactor Safety  
M. Modes, Senior Reactor Inspector, Division of Reactor Safety

Approved By: Richard J. Conte, Chief  
Engineering Branch 1  
Division of Reactor Safety

## **SUMMARY OF FINDINGS**

**IR 05000271/2011011; 10/17/2011 – 12/1/2011; Vermont Yankee Nuclear Power Station;  
Review of License Renewal Activities.**

**The report covers a one week inspection of the implementation of license renewal activities during the Vermont Yankee refueling outage. It was performed by two region based engineering inspectors under Inspection Procedure 71003.**

## Report Details

### 4. OTHER ACTIVITIES (OA)

#### 40A2 Other – License Renewal Activities

On March 21, 2011, NRC issued a renewed operating license for the facility, based on review of the Vermont Yankee License Renewal Application (LRA) submitted on January 27, 2006. In March 2011, NRC issued Supplement 2 to NUREG 1907, "Safety Evaluation Report Related to the License Renewal of Vermont Yankee Nuclear Power Station," which contained Appendix A, Commitment Listing, listing 55 commitments. The applicant made the commitments to provide aging management programs to manage aging effects on structures, systems, and components (SSC) prior to and during the period of extended operation, as well as other information. The period of extended operation begins on March 22, 2012, upon expiration of the plant's original license term.

#### a. Inspection Scope (IP 71003)

This inspection was performed by two NRC Region I based inspectors to evaluate the license renewal activities at the Vermont Yankee Nuclear Power Station in accordance with Inspection Procedure (IP) 71003. The inspection was directed toward those activities and facilities accessible during the refueling outage in order to determine if license renewal commitments were being met.

#### b. Findings and Observations

No findings were identified.

#### b.1 In-plant Observations

The inspectors observed ongoing activities and inspected the general condition of SSCs within the scope of license renewal. The inspectors performed reviews in the following areas, as related to commitments and aging management programs (AMP):

- Drywell – Inservice Inspection (ISI) Program
- Service Water System – Commitment 24 (System Walkdown Program)
- Reactor Building – Commitment 12 (Heat Exchanger Monitoring Program)
- Turbine Building – Commitment 24 (System Walkdown Program)
- Cooling Tower – Commitments 21 and 23 (Cooling tower structural examinations)
- Yard – Commitment 1 (Offgas system buried piping 24" OG-5 and 16" OG-2)
- Yard – Commitment 54 (Standby gas treatment system buried piping 12" SGT-1)
- Advanced Offgas Building – Commitment 15 (Non-EQ Insulated Cables and Connections Program)

The inspectors determined the general conditions to be satisfactory and the Entergy activities to be in accordance with facility programs and procedures.

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**b.2 Commitments Reviewed****Commitment 6 - Computerized fatigue monitoring**

In the March 2011 SER Supplement, Commitment 6 states, "A computerized monitoring program (e.g., FatiguePro) will be used to directly determine cumulative fatigue usage factors (CUF) for locations of interest."

The inspectors determined that Entergy had removed the use of FatiguePro as a part of Commitment 6. Specifically, Entergy submitted the Vermont Yankee license renewal application on January 27, 2006, with an enhancement to the Fatigue Monitoring Program, which stated that "A computerized monitoring program (e.g., FatiguePro) will be used to directly determine CUFs for locations of interest." On March 30, 2007, NRC issued "Safety Evaluation Report with Confirmatory Items Related to the License Renewal of Vermont Yankee Nuclear Power Station," which contained Appendix A, Commitment Listing, in which Commitment 6 was recorded. Subsequent versions of the Safety Evaluation Report (SER) as NUREG-1907 did not revise the commitment. Entergy approved the removal of FatiguePro on January 6, 2011. The renewed license was issued March 21, 2011. In letter BVY 11-026 dated May 19, 2011, Entergy informed NRC that Commitment 6 had been changed to be "Manual cycle counting will be used to track and compare accumulated cycles against allowable values to determine if cumulative usage factors are required to be updated." The inspectors noted that this change, in essence, rescinded the commitment, as manual cycle counting had been the existing method at the time of the application submittal and would not have necessitated an enhancement and subsequent commitment. Also, the Entergy letter did not request approval of the rescinding, as indicated by the statement that no action was required of NRC.

The inspectors could not clearly determine whether Entergy had met the expectations of the commitment change processes as specified in the license conditions of the renewed Vermont Yankee license, NRC-endorsed NEI 99-04 "Guidelines for Managing NRC Commitment Changes," (ML003680088), and Entergy procedure EN-LI-110, Commitment Management Program, Revision 4. The key concern is whether NEI 99-04 and EN-LI-110 were consistent in pointing Entergy towards NRC notification versus NRC approval in making changes to its commitments. The answer was not apparent in this situation due to various possible interpretations of the two guidance documents, particularly on how the commitment was considered during the staff's review and the implementation timing of the commitment (scheduled for March 22, 2012).

The inspectors noted that the significance of the above concerns was minimal in this particular case. Manual cycle counting has represented an acceptable method in some applications. The Pilgrim license renewal application, which was submitted concurrently with the Vermont Yankee license renewal application, had used manual cycle counting, and NRC issued the Pilgrim Safety Evaluation Report and supplements without a commitment for fatigue monitoring. Other plants with renewed licenses have had manual cycle counting. Also, Entergy chose to notify NRC in writing of the commitment change.

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In response to inspector questioning, Entergy wrote a condition report (CR-HQN-2011-1213) to address the commitment change guidance regarding NRC notification vs. approval and disparities between the step-by-step form and a flowchart.

Further the renewed Vermont Yankee license includes a license condition (No. 3.P) that requires Vermont Yankee to use the process stipulated in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59 for changes to the updated final safety analysis report (UFSAR) supplement submitted as part of a license renewal application pursuant to 10 CFR 54.21(d). 10 CFR 50.59 is required for any changes made to the information in the UFSAR supplement if the changes are made in the supplement prior to the UFSAR supplement being incorporated into the next UFSAR update. The UFSAR update is scheduled in compliance with 10 CFR 50.71(e) without regard to the date the new license is issued. Because Commitment 6 is not referenced in the information in the UFSAR supplement, the license condition does not apply.

The inspectors determined that the revised Commitment 6 was being implemented. The review of the May 19, 2011, letter is pending further NRC staff review.

#### **Commitments 21 and 23 – Structural examinations of cooling tower**

Commitment 21 states that “Guidance for performing structural examinations of wood to identify loss of material, cracking, and change in material properties will be added to the Structures Monitoring Program” by March 21, 2012. Commitment 23 states that “Guidance for performing structural examinations of PVC cooling tower fill to identify cracking and change in material properties will be added to the Structures Monitoring Program procedure” by March 21, 2012.

The inspectors reviewed the commitment completion review report, the structural monitoring program procedure, and the cooling tower inspection procedure. In addition, the inspectors inspected the general condition of the cooling towers and discussed the most recent inspection records and repairs with the responsible engineer. The inspectors reviewed condition reports from 2009, 2010, and 2011 related to identified conditions and repairs for the cooling towers.

The inspector determined that Commitments 21 and 23 had been completed.

#### **Commitment 25 – Cast Austenitic Stainless Steel Program**

Commitment 25 states “Implement the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program as described in LRA Section B.1.29.” Section B.1.29 states the program will be “comparable to the program described in NUREG-1801 Section XI.M13.” The applicable edition of NUREG-1801 (GALL Report) at the time of the application was Revision 1. In addition to addressing critical elements of CASS aging, Section B.1.29 states: “EPRI, the BWR Owners Group and other industry groups are focused on reactor vessel internals to ensure a better understanding of aging effects. Future Boiling Water Reactor Vessel Internals Project (BWRVIP) reports, Electric Power Research Institute (EPRI) reports, and other industry operating experience will provide additional bases for evaluations and inspections under

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this program. This program will supplement reactor vessel internals inspections required by the BWR Vessel Internals Program to assure that aging effects do not result in loss of the intended functions of reactor vessel internals during the period of extended operation.”

The inspectors determined that in response to later guidance from the BWRVIP, Entergy's revised program for CASS aging management program was technically acceptable. Specifically, after the details of the Vermont Yankee license renewal application were established, the programmatic details of the thermal aging and neutron irradiation embrittlement of cast austenitic stainless steel were resolved and specified in the Boiling Water Reactor Vessels Internal Program (BWRVIP 234-2009). Section 6.7 of the VIP states: “The inspection recommendation given are based on the following criteria: (1) fluence less than  $3 \times 10^{20}$  n/cm<sup>2</sup>, (2) adequate toughness ( $> 255$  kJ/m<sup>2</sup>), and (3) applied stress ( $< 5$ ksi). Entergy used BWRVIP 234-2009 as the method necessary to manage the aging effect of thermal aging and neutron irradiation embrittlement of cast austenitic stainless steel within procedures and specifications in the CASS aging management program. Using the BWRVIP 234-2009 thresholds, all of Vermont Yankee's CASS components that were within the scope of the original application were below the stress threshold of the VIP procedure. Thus the components screened out of the aging management program and needed no inspection.

However, the inspector noted a contradiction between the current program and what Entergy had submitted in the application, including Commitment 25. More specifically, the inspectors determined that use of the BWRVIP 234-2009 contradicted the application, because GALL Report, Section XI.M13, Revision 1, stipulates the threshold for inspection be established based on a single criterion of fluence  $> 10^{17}$  n/cm<sup>2</sup> (for  $E > 1$  MeV), which is three orders of magnitude, i.e., 1,000 times, lower than the threshold used in BWRVIP 234-2009. It should be noted that all of Vermont Yankee's CASS components that were within the scope of the original application were below this lower stress threshold also. The inspectors noted that GALL Report, Section XI.M13, Revision 2 had established BWRVIP 234-2009 as an acceptable aging management approach, but the inspectors also noted that an appropriate method of changing the commitment had not come to completion using at least the commitment change process based on NEI 99-04 (LO-LAR-2010-256). Also, in this case, the inspector observed that the license condition 3.P that required the use of the 10 CFR 50.59 process for the interim period between the issuance of the license and the extended period would have applied to the changes to the commitment. On December 1, 2011, the NRC staff learned that Entergy had revised LO LAR 2010 0256 by Corrective Action No. CA-006; and this change was made in order to implement the necessary corrective actions and track the approval by the NRC, if needed, for the upgraded use of the VIP procedure in their current program.

The inspectors determined that Commitment 25 and related change process will be further reviewed in the next commitment inspection.

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**Commitment 12 – Heat Exchanger Monitoring Program**

Commitment 12 provides that Entergy will “Implement the Heat Exchanger Monitoring Program as described in LRA Section B.1.14” by March 21, 2012.

The inspectors reviewed the commitment completion review report, the heat exchanger program procedure, and the heat exchanger monitoring procedure. In addition, the inspectors inspected the general condition of the 1A and 1B motor generator lubricating oil coolers (E-40-1A and E-40-1B) and the turbine lubricating oil cooler (E-25-1A), which were undergoing cleaning and inspection during the outage.

The inspectors determined that additional NRC review was appropriate on Commitment 12 in general and Entergy corrective actions for any identified degradations in particular during planned NRC inspections prior to the period of extended operations.

**c. Summary**

No findings were identified and general conditions in the plant areas observed were satisfactory. The inspectors determined that Entergy actions on Commitments Nos. 23 and 25 were complete and met regulatory expectations as reflected in the staff's SER. Additional NRC staff review is needed for the others noted in this report.

**4OA6 Exit Meeting**

The inspectors presented the inspection results to Mr. Michael Colomb, then Site Vice President; Mr. Steve Wamser, then Plant Manager; and other members of the staff on October 20, 2011. The inspectors confirmed that no proprietary material was examined during the inspection.

On December 1, 2011, Mr. Richard Conte, NRC, led a discussion with Mr. Robert Wanczyk, Manager of Licensing, and other Entergy staff on the observations related to the commitment tracking process and how it was used for Commitment Nos. 6 and 25. The results of this review were discussed under Commitment Nos. 6 and 25.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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**ATTACHMENT**

**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

Licensee Personnel

M. Colomb	Site Vice President
N. Rademacher	VY engineering director
C. Wamser	VY general manager
B. Wanczyk	VY licensing manager
G. Thomas	VY LR project manager
P. Guglielmino	VY LR project implementation manager
J. Hoffman	VY LR team
D. Lach	Entergy LR team
J. DeVincentis	VY licensing engineer

**LIST OF ACRONYMS**

AMP	Aging Management Program
BWR	Boiling Water Reactor
BWRVIP	Boiling Water Reactor Vessel Internals Project
CASS	Cast Austentic Stainless Steel
CR	Condition Report
CUF	Cumulative Fatigue Usage Factors
EPRI	Electric Power Research Institute
EQ	Environmental Qualification
GALL	Generic Aging Lessons Learned
IP	Inspection Procedure
ISI	Inservice Inspection
LRA	License Renewal Application
NEI	Nuclear Energy Institute
RFO	Refueling Outage
SER	Safety Evaluation Report
SSC	Structure, Systems, and Components
UFSAR	Updated Final Safety Analysis Report
UT	Ultrasonic Test
WO	Work Order

General

VY License Renewal Commitment and Program Implementation, October 17, 2011

**LIST OF DOCUMENTS REVIEWED**

In-plant Observations

EN-DC-348, Non-EQ Insulated Cables and Connections Inspection, Rev. 2

Commitment 6

EN-LI-110 Rev. 4, Entergy Management Manual "Commitment Management Program"  
Letter BVY 11-026, Entergy Vermont Yankee to NRC, Dated May 19, 2011

LRSICMS A-16774

LRSICMS A-16775

LRSICMS A-16776

LO-LAR-2101-00236

LO-LAR-2101-00237

LO-LAR-2101-00238

Commitment 12 (Heat Exchanger Monitoring Program)

VYNPS-LRID-14, Review of the Heat Exchanger Monitoring Aging Management Program for  
License Renewal Implementation, Rev. 0

ENN-SEP-HX-001, Heat Exchanger Program, Rev. 1

EN-DC-316, Heat Exchanger Performance and Condition Monitoring, Rev. 3

WO 52298380

Commitments 21 and 23 (Cooling tower structural examinations)

VYNPS-LRID-27-2, Review of the Structural Monitoring Aging Management Program for  
License Renewal Implementation, Rev. 1

EN-DC-150, Condition Monitoring of Maintenance Rule Structures, Rev. 1 and Rev. 2 (draft)

MTMP-CTS-52114-10, Cooling Tower Structural Inspection and Repair, Rev. 4

CR -2009-03034

CR-2010-02853

CR-2010-03793

CR-2010-03799

CR-2010-03833

Commitment 25

LO LAR 2010 00256

VYNPS-LRID-29 "Vermont Yankee Nuclear Power Station, Thermal Aging and Neutron  
Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program Review  
for License Renewal Implementation"

BWRVIP-234 "BWR Vessel and Internals Project Thermal Aging and Neutron Embrittlement."

Commitment 54

BVY 11-010

Attachment