

**VERMONT YANKEE LICENSING DEPARTMENT**  
**Outgoing NRC Correspondence Distribution**

**FOR INFORMATION**

BVY 15-012

DATE: 5/4/15

YES  NO 10CFR19.11(a)(4) action? If yes, posting required within 2 working days after dispatch.

SUBJECT: PC 309 - Defueled TS and

Revised License Conditions for Permanently Defueled Condition - Supplement 5

LICENSING LEAD: P. Couture

COMMITMENTS: YES (Enter EN-LI-110)  NO

COMMENTS: \_\_\_\_\_

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<p><b><u>By Subject:</u></b></p> <p><input type="checkbox"/> Mike McKenney, Manager, Emergency Preparedness</p> <p><input type="checkbox"/> VY AA/FFD</p> <p><input type="checkbox"/> Other:</p> <p><b><u>White Plains:</u></b></p> <p><input type="checkbox"/> Guy Davant, Manager, Licensing Programs, WPO</p> <p><input checked="" type="checkbox"/> Michael T Twomey, VP, External Affairs-Wholesale, WPO</p> <p><input type="checkbox"/> Other:</p> <p><b><u>Decommissioning:</u></b></p> <table border="0"> <tr> <td><input type="checkbox"/> Susan Raimo</td> <td><input type="checkbox"/> Andy Cardine</td> </tr> <tr> <td><input type="checkbox"/> Barrett Green</td> <td><input type="checkbox"/> Scott Dorval</td> </tr> <tr> <td><input type="checkbox"/> Jennifer Evans</td> <td><input type="checkbox"/> Mike Tessier</td> </tr> <tr> <td><input type="checkbox"/> Jeff Wagner</td> <td><input type="checkbox"/> Dave Duffy</td> </tr> <tr> <td><input type="checkbox"/> Dave Mannai</td> <td><input type="checkbox"/> Brian Copperthite</td> </tr> <tr> <td><input type="checkbox"/> Tim Ngau</td> <td><input type="checkbox"/> Phil Couture</td> </tr> <tr> <td><input type="checkbox"/> Steven Scheurich</td> <td><input type="checkbox"/> Nancy Eng</td> </tr> <tr> <td><input type="checkbox"/> P.L. Swigart</td> <td><input type="checkbox"/> Monique Hoffmeister</td> </tr> <tr> <td><input type="checkbox"/> Robin Nilson</td> <td><input type="checkbox"/> Elizabeth Hunter</td> </tr> </table>	<input type="checkbox"/> Susan Raimo	<input type="checkbox"/> Andy Cardine	<input type="checkbox"/> Barrett Green	<input type="checkbox"/> Scott Dorval	<input type="checkbox"/> Jennifer Evans	<input type="checkbox"/> Mike Tessier	<input type="checkbox"/> Jeff Wagner	<input type="checkbox"/> Dave Duffy	<input type="checkbox"/> Dave Mannai	<input type="checkbox"/> Brian Copperthite	<input type="checkbox"/> Tim Ngau	<input type="checkbox"/> Phil Couture	<input type="checkbox"/> Steven Scheurich	<input type="checkbox"/> Nancy Eng	<input type="checkbox"/> P.L. Swigart	<input type="checkbox"/> Monique Hoffmeister	<input type="checkbox"/> Robin Nilson	<input type="checkbox"/> Elizabeth Hunter	<p><b><u>All:</u></b></p> <p><input checked="" type="checkbox"/> Dodi Emery (Chronological File)</p> <p><input checked="" type="checkbox"/> Coley Chappell, Manager, Licensing</p> <p><b><u>By Subject:</u></b></p> <p><input checked="" type="checkbox"/> Chris Wamser, Site Vice President</p> <p><input type="checkbox"/> Mike Romeo, Plant Manager</p> <p><input checked="" type="checkbox"/> Jack Boyle, Director, Engineering</p> <p><input checked="" type="checkbox"/> Paul Paradis, Director, Decommissioning</p> <p><input type="checkbox"/> Ed Harms, Manager Operations</p> <p><input type="checkbox"/> Rhonda Felumb, Supervisor, CA&amp;A</p> <p><input type="checkbox"/> Jim Rogers, Manager, Design Engineering</p> <p><input type="checkbox"/> George Wierzbowski, Manager, Programs/Systems</p> <p><input type="checkbox"/> Steve Naeck, Manager, Production/Maintenance</p> <p><input type="checkbox"/> Jim Cordell, Manager, Decommissioning</p> <p><input type="checkbox"/> Mike Pletcher, Manager, Chemistry/RP</p> <p><input type="checkbox"/> Patrick Ryan, Manager, Security</p> <p><input type="checkbox"/> Joe Laughney, Manager, QA</p> <p><input type="checkbox"/> Bob Burns, Maintenance Rule Program</p> <p><input checked="" type="checkbox"/> Jeff Meyer, State Liaison Engineer</p> <p><input type="checkbox"/> Scott Hill, Superintendent, Training</p> <p><input type="checkbox"/> Dodi Emery, All LER &amp; License Amendment Requests to SRC members</p> <p><input checked="" type="checkbox"/> Joe Lynch, External Affairs Mgr.</p> <p><input checked="" type="checkbox"/> Martin Cohn, Communications Manager</p> <p><input checked="" type="checkbox"/> Other: <u>Phil Couture (Licensing)</u></p> <p><input type="checkbox"/> Paper distribution or <input type="checkbox"/> Electronic distribution</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>Distributed by: <u>DME</u> Date: <u>5/4/15</u></p> </div> <p align="center"><b>Latest update: January 21, 2015 (DME)</b></p>
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Tel 802 257 7711

**Christopher J. Wamser**  
Site Vice President

BVY 15-012

May 4, 2015

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

**SUBJECT:** Technical Specifications Proposed Change No. 309, Defueled Technical Specifications and Revised License Conditions for Permanently Defueled Condition - Supplement 5 (TAC No. MF3714)  
Vermont Yankee Nuclear Power Station  
Docket No. 50-271  
License No. DPR-28

**REFERENCES:**

1. Letter, Entergy Nuclear Operations, Inc. to NRC, "Technical Specifications Proposed Change No. 309, Defueled Technical Specifications and Revised License Conditions for Permanently Defueled Condition," BVY 14-010, dated March 28, 2014 (ML14091A291) (TAC No. MF3714)
2. Email, NRC to Entergy Nuclear Operations, Inc. "VY RAI from DSS/SRXB for MF3714," dated January 30, 2015 (ML15033A053)

Dear Sir or Madam:

By letter dated March 28, 2014 (Reference 1), Entergy Nuclear Operations, Inc. (ENO) proposed an amendment to Renewed Facility Operating License (OL) DPR-28 for Vermont Yankee Nuclear Power Station (VY). The proposed amendment would revise the VY OL and Technical Specifications (TS) to be consistent with the permanently shutdown and defueled condition of VY.

In Reference 2, the NRC provided ENO with a request for additional information (RAI). Attachment 1 of this letter contains the response to the RAI.

The conclusions of the no significant hazards consideration and the environmental considerations contained in Reference 1 are not affected by, and remain applicable to, this supplement.

There are no new regulatory commitments made in this letter.

If you have any questions on this transmittal, please contact Mr. Philip Couture at 802-451-3193.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on May 4, 2015.

Sincerely,

 Romeo for CJW  
CJW/plc

Attachment: 1. Response to Request for Additional Information (6 pages)

cc: Mr. Daniel H. Dorman  
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Mr. Christopher Recchia, Commissioner  
VT Department of Public Service  
112 State Street, Drawer 20  
Montpelier, VT 05620-2601

Attachment 1

Vermont Yankee Nuclear Power Station

Proposed Change 309 - Supplement 5

Response to Request for Additional Information

**REQUEST FOR ADDITIONAL INFORMATION DEFUELED TECHNICAL  
SPECIFICATIONS AND REVISED LICENSE CONDITIONS FOR PERMANENTLY  
DEFUELED CONDITION VERMONT YANKEE NUCLEAR POWER STATION  
DOCKET NO. 50-271**

By letter dated March 28, 2014, Entergy, the licensee for the Vermont Yankee Nuclear Power Station, provided a License Amendment Request in order to revise the Technical Specifications and License Conditions to support the permanently defueled condition of the Vermont Yankee Nuclear Power Station.

This Request for Additional Information intends to identify the Structures and Components (SCs) needed to maintain the spent fuel in a safe condition during the decommissioning period and describe what actions are in place to provide reasonable assurance that the SCs are capable of fulfilling their intended functions.

The provisions of 10 CFR 50.51(b) require licensees that have provided certifications for permanent cessation of power operations and permanent removal of fuel in accordance with 10 CFR 50.82(a)(1)(i) and 10 CFR 50.82(a)(1)(ii) to take actions necessary to decommission and decontaminate the facility and continue to maintain the facility in a safe condition. The SCs required to maintain the safe operation of the facility during the decommissioning period may remain operational beyond the normal licensed operating period of 40 years. Under the provisions of 10 CFR 50.82, the licensee must complete decommissioning within 60 years of permanent cessation of operations.

The provisions of 10 CFR 50.51(b) state:

Each license for a facility that has permanently ceased operations, continues in effect beyond the expiration date to authorize ownership and possession of the production or utilization facility, until the Commission notifies the licensee in writing that the license is terminated. During such period of continued effectiveness the licensee shall--

(1) Take actions necessary to decommission and decontaminate the facility and continue to maintain the facility, including, where applicable, the storage, control and maintenance of the spent fuel, in a safe condition, and

The provisions of 10 CFR 50.65 require licensees to monitor performance or condition of Structures, Systems and Component (SSC) to ensure they are capable of fulfilling their intended function. The scope of the monitoring specified in 10 CFR 50.65(a)(1) applies to safety-related SSCs as stated in Section 50.65(b)(1) and to nonsafety-related SSC whose failure could prevent safety-related SSCs from fulfilling their intended function as stated in Section 50.65(b)(2)(ii).

The provisions of 10 CFR 50.65(a)(1) state:

Each holder of an operating license for a nuclear power plant ... shall monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components, as defined in paragraph (b) of this section, are capable of fulfilling their intended functions.

The provisions of 10 CFR 50.65(a)(1) also state:

**For a nuclear power plant for which the licensee has submitted the certifications specified in § 50.82(a)(1) or 52.110(a)(1) of this chapter, as applicable, this section shall only apply to the extent that the licensee shall monitor the performance or condition of all structures, systems, or components associated with the storage, control, and maintenance of spent fuel in a safe condition, in a manner sufficient to provide reasonable assurance that these structures, systems, and components are capable of fulfilling their intended functions.**

**The treatment of passive, long-lived SCs under the monitoring program during the original period of operation is likely to involve minimal performance or condition monitoring to maintain functionality. Passive SCs generally have functions that do not have performance and condition characteristics that are as readily observable as SCs that perform active functions. Long-lived SCs may not be subjected to periodic replacement based on a qualified life or specified time period. The U.S. Nuclear Regulatory Commission (NRC) staff needs to determine whether the licensee's programs are sufficient to adequately manage the degradation effects of passive, long-lived SCs to prevent the loss of intended function beyond the normal licensed operating period of 40 years. Licensees, under the provisions of 10 CFR 50.51(b) and 10 CFR 50.82, shall take actions necessary to decommission and decontaminate the facility and continue to maintain the facility, including, the Spent Fuel Pool (SFP), in a safe condition until license termination, which period in this case will extend beyond the normal licensed operating period of 40 years.**

**The licensee does not describe what actions it will take to maintain the SFP in a safe condition, i.e., how it intends to monitor and maintain the intended function of passive, long-lived SCs (e.g., the neutron absorbing materials) in the SFP, the fire protection system and the radiation protection system beyond the normal licensed operating period of 40 years. Accordingly, the staff requests that the licensee provide the following information:**

- 1. Identify and list the long-lived, passive SCs (e.g., neutron absorbing materials) in the SFP, the fire protection system and the radiation protection system that are needed, pursuant to the provisions of 10 CFR 50.51(b), to provide reasonable assurance that safe condition of the spent fuel will be monitored and maintained during the decommissioning period.**
- 2. Provide a summary description of actions that will be taken to monitor and maintain the performance or condition of long-lived, passive SCs, identified in the response to Request 1, to provide reasonable assurance that the long-lived, passive SCs are capable of fulfilling their intended functions during the decommissioning period.**

#### Response

Prior to the permanent cessation of operations and permanent removal of fuel from the reactor vessel, Vermont Yankee Nuclear Power Station (VY) was operating under a renewed facility operating license. As part of the license renewal application review and approval process, the NRC reviewed the results of the scoping and screening of SCs that would be considered within the scope of 10 CFR 54.4(a) and therefore require a program to manage the effects of aging. The NRC Safety Evaluation Report (SER) for the VY license renewal is documented in NUREG-1907, as supplemented (Reference 1).

Notwithstanding the above, ENO hereby provides the following SCs for the SFP, fire protection system and radiation protection system which were determined to be within the scope of 10 CFR 54.4(a) and their associated aging management programs. As stated in Section 2.1.2 of the VY Post Shutdown Decommissioning Activities Report (PSDAR)

(Reference 2), the transfer of the spent fuel to dry fuel storage is scheduled to be completed in 2020.

### Spent Fuel Pool - Neutron Absorbing Material

#### SCs within the scope of License Renewal

As discussed in Section 3.0.3.3.9 of the SER, the VY SFP utilizes Boral as the neutron absorbing material in the spent fuel storage racks.

#### Aging Management Programs

Loss of material and cracking are aging effects requiring management for Boral spent fuel storage racks exposed to a treated water environment. These aging effects are managed by the Water Chemistry Control-BWR Program, which is described in Section 15.2.35 of the VY Updated Final Safety Analysis Report (UFSAR). The One-Time Inspection Program confirmed the effectiveness of the program.

The Neutron Absorber Monitoring Program manages the reduction in neutron absorbing capacity and loss of material and is described in Section 15.2.40 of the UFSAR.

The Structures Monitoring Program is used to monitor the condition of the SFP (bottom slab and walls) to ensure there is no loss of structure or structural component intended function. This program is described in Section 15.2.30 of the UFSAR.

The NRC staff's evaluations of the VY Water Chemistry Control-BWR Program, Neutron Absorber Monitoring Program and Structures Monitoring Program are documented in SER Sections 3.0.3.1.11, 3.0.3.3.9 and 3.0.3.2.17, respectively.

#### Industry Experience with Boral Degradation

There have been no industry reports that have identified a concern with respect to the Boral having a loss of B-10 areal density. EPRI Report 1025204, "Strategy for Managing the Long Term Use of Boral<sup>®</sup> in Spent Fuel Storage Pools," July 2012 (Reference 3), contains the following conclusions:

*Possible BORAL<sup>®</sup> performance issues can be divided into two main classes:*

- A) Safety (criticality safety) relative to the functionality of the B-10 in the core material; and,*
- B) Operational as characterized by blistering of the BORAL<sup>®</sup> surface where the aluminum cover material (cladding) separates from the core Boron containing material thus potentially effecting fuel handling.*

*BORAL<sup>®</sup> has successfully met all the criticality safety performance requirements for over 25 years of service as demonstrated by the following considerations:*

- *There have been no surveillance data or observed cases where there has been significant loss or redistribution of B-10 from BORAL®.*
- *No mechanisms have been identified or observed that would lead to severe degradation of the BORAL® core material.*
- *No mechanisms have been identified that would lead to a sudden loss or reconfiguration of the BORAL® core material.*

#### Neutron Attenuation Testing Results

As part of License Renewal Commitment 52, VY neutron attenuation testing using an in-situ method was completed prior to the end of 2014. The test was performed in September/October 2014 using the Boron-10 Areal Density Gage for Evaluating Racks (BADGER) method, which was developed by Northeast Technology Corp. (NETCO) for the Electric Power Research Institute (EPRI).

BADGER is a device that allows for the in-situ measurement of the boron-10 areal density of the neutron absorber material installed in spent fuel racks for the purpose of reactivity control. The VY SFP has two different manufacturers of spent fuel racks, NES and Holtec. For both rack manufacturers, a representative number of panels were measured. Each measured panel had a measured average panel areal density values above the minimum required areal density. No additional actions were recommended by NETCO, which performed the test.

The VY Neutron Absorber Monitoring Program requires neutron attenuation testing every ten years. Based on this and the 2014 test results, no subsequent tests are anticipated prior to 2020, which is the date by which the transfer of spent fuel from the SFP to dry fuel storage is scheduled to be completed. The program requires subsequent attenuation testing to be performed no later than 2024 if the transfer has not been completed by that time.

#### Fire Protection System

##### SCs within the scope of License Renewal

The fire protection system SCs that are within the scope of license renewal were evaluated by the staff in SER Sections 2.3.3.8 and 2.3.3.9.

##### Aging Management Programs

Section 15.2.12 of the VY UFSAR describes the aging management program for the fire protection system and is reproduced below for convenience.

*The Fire Protection Program includes a fire barrier inspection and a diesel driven fire pump inspection. The fire barrier inspection requires periodic visual inspection of fire barrier penetration seals, fire barrier walls, ceilings, and floors, and periodic visual inspection and functional tests of fire rated doors to ensure that their operability is maintained. The diesel driven fire pump inspection requires that the pump be periodically tested to ensure that the fuel supply line can perform its intended function. Corrective actions, confirmation process, and administrative controls in accordance with the requirements of 10 CFR Part 50 Appendix B are applied to the Fire Protection Program.*



License renewal commitments 3, 4, 8, 9, 10, 11, 31 and 46 (described in Section 15.5 of the UFSAR) are applicable to the fire protection system.

The NRC staff's evaluation of the Fire Protection Program is documented in SER Sections 3.3.2.1 and 3.0.3.2.11 (Reference 1).

### Radiation Protection System

The elements of the VY radiation protection system that monitor the radiological conditions in the area of the SFP are the refuel floor radiation monitor (component number RM-17-453A/B) and the reactor building ventilation monitor (RM-17-452A/B). The detectors associated with these radiation monitors were included in the VY 10 CFR 50.49 Environmental Qualification (EQ) program while the plant was operating. Compliance with 10 CFR 50.49 provided reasonable assurance that components could perform their intended functions during accident conditions after experiencing the effects of in-service aging. Pursuant to 10 CFR 50.49(a), an EQ program is not required for nuclear power plants that have submitted the certifications required by 10 CFR 50.82(a)(1).

During the electrical component screening process for license renewal, the cables associated with these radiation monitors were determined to not support a license renewal intended function and did not require an aging management review. Additionally, the radiation detectors and radiation monitors themselves were screened as active components in accordance with NEI 95-10 (Reference 4). Therefore, it can be reasonably concluded that there are no passive, long-lived SCs associated with these radiation monitors that require additional actions, beyond those described below, to ensure that the monitors are capable of fulfilling their intended functions during the decommissioning period.

### Performance Monitoring of the Refuel Floor and Reactor Building Ventilation Radiation Monitors

The refuel floor and reactor building ventilation radiation monitors provide an indication of local radiation levels in the vicinity of the SFP and initiate an alarm in the Control Room to alert operators if the alarm setpoint is reached. These monitors are verified to be functioning during operator rounds. Indication of equipment faults would be identified during these rounds. If any monitor is found to be out of service, compensatory actions that include periodic area surveys using portable instruments would be implemented until repairs are completed. Additionally, the performance of these radiation monitors is monitored under the VY 10 CFR 50.65 Maintenance Rule program. Conditions adverse to quality associated with these monitors are addressed through the VY 10 CFR 50, Appendix B corrective action program. These actions are sufficient to ensure that these radiation monitors will continue to perform their intended function.

## **REFERENCES**

1. NUREG-1907, Safety Evaluation Report Related to the License Renewal of Vermont Yankee Nuclear Power Station, May 2008 (ML081430057 - Volume 1, ML081430109- Volume 2, ML092740567 - Supplement 1, ML110770495 - Supplement 2)
2. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Vermont Yankee Nuclear Power Station Post Shutdown Decommissioning Activities Report," BVY 14-078, dated December 19, 2014 (ML14357A110)

3. EPRI Report 1025204, "Strategy for Managing the Long Term Use of Boral® in Spent Fuel Storage Pools,' July 2012
4. NEI 95-10, Industry Guideline on Implementing the Requirements of 10 CFR Part 54, The License Renewal Rule, Rev. 6, June 2005 (ML051860406)