



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

November 2, 2015

Site Vice President
Entergy Nuclear Operations, Inc.
Vermont Yankee Nuclear Power Station
P.O. Box 250
Governor Hunt Road
Vernon, VT 05354

**SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION – CORRECTION LETTER
REGARDING STAFF REVIEW OF ENTERGY’S UPDATE TO THE
IRRADIATED FUEL MANAGEMENT PLAN (CAC NO. MF5478)**

Dear Sir or Madam:

By letter dated October 5, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15274A379), the Nuclear Regulatory Commission (NRC) approved the updated Vermont Yankee Nuclear Power Station (VY) Irradiated Fuel Management Plan (IFMP) on a preliminary basis.

Subsequently, the licensee pointed out that the references to the use of the Decommissioning Trust Fund (DTF) for site restoration expenditures, as stated in the NRC transmittal letter, safety evaluation (SE) and attached spreadsheet to the SE were in error. In addition, the line item of the \$145 million from the two planned external credit facilities to fund the transfer to dry storage costs was incorrectly included in the spreadsheet. Finally, due to a minor calculation error, the closing balance of the DTF in the year 2075 was overestimated by approximately \$3 million. The new estimated balance in 2075 is \$152,705,000.

As a result, the NRC staff has prepared a corrected transmittal letter, safety evaluation (SE) and spreadsheet attachment to the SE to reflect the corrections of the errors made. These errors did not change the staff’s conclusion on approving the updated VY IFMP on a preliminary basis.

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Please contact me at 301-415-4125 or James.Kim@nrc.gov if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "James Kim". The signature is written in a cursive style with a large initial "J" and a long horizontal stroke at the end.

James Kim, Project Manager
Plant licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor licensing
Office of Nuclear Reactor Regulation

Docket No. 50-271

Enclosure:
As stated

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VERMONT YANKEE NUCLEAR POWER STATION
CORRECTED TRANSMITTAL LETTER, SAFETY EVALUATION (SE),
AND SPREADSHEET ATTACHMENT TO THE SE REGARDING STAFF
REVIEW OF ENTERGY'S UPDATE TO
THE IRRADIATED FUEL MANAGEMENT PLAN



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 5, 2015

Site Vice President
Entergy Nuclear Operations, Inc.
Vermont Yankee Nuclear Power Station
P.O. Box 250
Governor Hunt Road
Vernon, VT 05354

SUBJECT: VERMONT YANKEE NUCLEAR POWER STATION - REVIEW OF UPDATE TO
THE IRRADIATED FUEL MANAGEMENT PLAN (TAC NO. MF5478)

Dear Sir or Madam:

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(bb), licensees of nuclear power plants within 2 years following permanent cessation of operations must submit to the U.S. Nuclear Regulatory Commission (NRC), for review and preliminary approval, the program by which the licensee intends to manage and provide funding for the management of all irradiated fuel at the reactor, until title and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository. Further, in accordance with 10 CFR, Section 50.54(bb), the licensees are to notify the NRC of any significant changes in the proposed waste management program as described in the initial notification. In addition, pursuant to Section 50.82(a)(4)(i), the licensee must submit a post-shutdown decommissioning activities report (PSDAR). A site-specific decommissioning cost estimate (DCE), containing the projected cost of managing irradiated fuel, is part of the PSDAR. On January 12, 2015, ENO Nuclear Operations, Inc. (ENO, the licensee) informed the NRC that it had permanently ceased operations of the Vermont Yankee Nuclear Power Station (VY) and removed fuel from the reactor vessel (Agencywide Documents Access and Management System (ADAMS) Accession No. ML 15013A426).

By letter dated December 19, 2014 (ADAMS Accession No. ML 14358A251), ENO submitted its update to the VY Irradiated Fuel Management Plan (IFMP) to the NRC. ENO concurrently submitted the PSDAR and the site-specific DCE under a separate cover letter (ADAMS Accession No. ML 14357A110). As approved by exemption dated June 17, 2015 (ADAMS Accession No. ML 15128A219), ENO uses the nuclear decommissioning trust fund (DTF) for license termination and irradiated fuel management expenditures. While costs associated with these activities are discussed in the IFMP, the enclosed review focuses on the costs associated with the management of the irradiated fuel. The NRC staff is conducting a separate review of the PSDAR and the site-specific DCE.

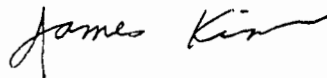
Based on its review of ENO's submittal, the NRC staff finds that the licensee's updated program to manage and provide funding for the management of all irradiated fuel is adequate and provides sufficient detail regarding the associated funding mechanisms. Further, the staff has determined that the elected actions within the program are consistent with NRC requirements for licensed possession of irradiated nuclear fuel and that these actions will be implemented in a

timely basis. Therefore, the staff concludes that the updated VY IFMP complies with 10 CFR 50.54(bb) and approves the updated plan on a preliminary basis. Further, based on the staff's calculated positive ending balance (as provided in the Attachment of the safety evaluation), the staff finds that the licensee has demonstrated reasonable assurance that funding will be available to maintain the IFMP until the fuel is transferred to the Department of Energy for permanent disposal.

The NRC staff recognizes that the IFMP analysis is based on a reported DTF balance that may fluctuate over time. Should a material decline in the DTF balance occur, the staff's analysis and findings may be impacted. However, in accordance with 10 CFR 50.82(a)(8)(vii), the licensee must annually submit to the NRC, by March 31, a report on the status of its funding for managing irradiated fuel. Further, in accordance with 10 CFR 50.54(bb), the licensee shall notify the NRC of any significant changes to the IFMP. Accordingly, the regulations provide a means of informing the NRC staff of fluctuations in the reported DTF balance and significant changes to the IFMP.

If you have any questions, please contact me at 301-415-4125 or James.Kim@nrc.gov.

Sincerely,



James Kim, Project Manager
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-271

Enclosure:
Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

IRRADIATED FUEL MANAGEMENT PLAN

ENTERGY NUCLEAR OPERATIONS, INC.

VERMONT YANKEE NUCLEAR POWER STATION

DOCKET NO. 50-271

1.0 INTRODUCTION

By letter dated December 19, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14358A251), Entergy Nuclear Operations, Inc. (ENO, the licensee), submitted its update to the Vermont Yankee Nuclear Power Station (VY) Irradiated Fuel Management Plan (IFMP) to the U.S. Nuclear Regulatory Commission (NRC). ENO concurrently submitted the Post-Shutdown Decommissioning Activities Report (PSDAR) and the Site Specific Decommissioning Cost Estimate (DCE), under a separate cover letter (ADAMS Accession No. ML14357A110), which are currently under NRC staff review.

2.0 BACKGROUND

As stated in the VY PSDAR, the VY site is located in the town of Vernon, Vermont, in Windham County on the west shore of the Connecticut River immediately upstream of the Vernon Hydroelectric Station.

VY is a General Electric boiling water reactor nuclear steam supply system licensed to generate 1,912 megawatts-thermal. The current facility operating license for VY expires at midnight, March 21, 2032. The principal structures at VY include a reactor building, primary containment, control building, radwaste building, intake and discharge structures, turbine building, cooling towers, and main stack.

The major milestones related to the VY construction and operational history are as follows:

- Construction Permit Issued: December 11, 1967
- Operating License Issued: March 21, 1972
- Commercial Operation: November 30, 1972
- Initial Operating License Expiration: March 21, 2012
- Renewed Operating License Expiration: March 21, 2032

Enclosure

By letter dated January 12, 2015, ENO informed the NRC that it had permanently ceased operations and removed fuel from the reactor vessel at VY (ADAMS Accession No. ML 15013A426). Pursuant to 10 CFR 50.51(b), "Continuation of license," it states, in part, that "the license for a facility that has permanently ceased operations continues in effect beyond the expiration date to authorize ownership and possession of the ... utilization facility until the Commission notifies the licensee in writing that the license has been terminated."

The NRC staff notes that as approved by exemption dated June 17, 2015 (ADAMS Accession No. ML 15128A219), ENO uses the nuclear decommissioning trust fund (DTF) for license termination and irradiated fuel management expenditures. While costs associated with these activities are discussed in the IFMP, this review focuses on the costs associated with the management of irradiated fuel. A separate review of the PSDAR and the site-specific DCE is currently being performed by the NRC staff.

During the period that the license remains in effect, 10 CFR 50.51(b) requires that ENO:

1. Take actions necessary to decommission and decontaminate the facility and continue to maintain the facility including the storage, control, and maintenance of the spent fuel in a safe condition and
2. Conduct activities in accordance with restrictions applicable to the facility pursuant to NRC regulations and the 10 CFR Part 50 facility license.

In addition, the regulation at 10 CFR 50.82(a)(9) states that a power reactor licensee must submit an application for termination of the license at least two years prior to the license termination date and that the application must be accompanied or preceded by a license termination plan to be submitted for NRC approval.

3.0 REGULATORY EVALUATION

3.1 Regulatory Requirements

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(bb) states, in part:

For nuclear power reactors licensed by the NRC, the licensee shall, within 2 years following permanent cessation of operation ... submit written notification to the Commission for its review and preliminary approval of the program by which the licensee intends to manage and provide funding for the management of all irradiated fuel at the reactor following permanent cessation of the operation of the reactor until title to the irradiated fuel and possession of the fuel is transferred to the Secretary of Energy for its ultimate disposal in a repository.

Section 50.54(bb) of 10 CFR further states:

The licensee must demonstrate to NRC that the elected actions will be consistent with NRC requirements for licensed possession of irradiated nuclear fuel and that the actions

will be implemented on a timely basis. Where implementation of such actions requires NRC authorizations, the licensee shall verify in the notification that submittals for such actions have been or will be made to NRC and shall identify them. A copy of the notification shall be retained by the licensee as a record until expiration of the reactor operating license. The licensee shall notify the NRC of any significant changes in the proposed waste management program as described in the initial notification.

In addition, 10 CFR 50.82(a)(4)(i) states, in part, that the site-specific DCE that is submitted as part of the PSDAR includes the projected costs of managing irradiated fuel.

3.2 Information Submitted in Support of the IFMP Review

The NRC staff reviewed the following information submitted in support of the VY IFMP:

- Estimated cost to isolate the spent fuel pool (SFP) and fuel handling systems. For the decontamination (DECON) option, the cost to isolate the SFP and fuel handling systems may be considered as part of the preparation for DECON;
- Estimated cost to construct an independent spent fuel storage installation (ISFSI) or a combination of wet/dry storage;
- Estimated annual cost for the operation of the selected option (wet or dry storage or a combination of the two) until the Department of Energy (DOE) takes possession of the fuel;
- Estimated cost for the preparation, packaging, and shipping of the fuel to DOE;
- Estimated cost to decommission the spent fuel storage facility; and
- Brief discussion of the selected storage method or methods, and the estimated time for these activities.

4.0 TECHNICAL EVALUATION

ENO submitted a program for the management of irradiated fuel (Program) on March 21, 2007, and a revised Program on October 14, 2008, pursuant to 10 CFR 50.54(bb). This regulation requires power reactor licensees to submit a spent fuel management and funding program for NRC review five years prior to the expiration of a reactor operating license. At that time, the VY operating license was set to expire on March 21, 2012. On February 3, 2009, the NRC staff approved the VY Program on a preliminary basis and determined that the preliminary DCE was reasonable.

Pursuant to 10 CFR 50.54(bb), licensees are required to notify the NRC of any significant changes to their proposed spent fuel management programs. As a result of its decision to permanently cease operations at VY, and related changes to the anticipated schedule of decommissioning and irradiated fuel management activities, and decommissioning funding

assumptions, ENO modified the VY Program and submitted it for review and preliminary approval to the NRC on December 19, 2014. This updated Program supersedes all prior versions of the Program.

Pursuant to 10 CFR 50.82(a)(4)(i), on December 19, 2014, ENO also submitted to the NRC a PSDAR for VY that included a site-specific DCE as an attachment. The site-specific DCE describes the bases for the assumptions regarding the DOE's acceptance of spent fuel from VY. As discussed in the site-specific DCE, the Program is based on the assumption that DOE will commence acceptance of VY's spent fuel in 2026 and complete removal of all spent fuel from the site in 2052, consistent with the current DOE spent fuel management and acceptance strategy.

The site-specific DCE identifies the details, schedules, and costs of spent fuel management activities, along with license termination and site restoration activities and costs.

At the time of shutdown, there were 368 fuel assemblies residing in the reactor as part of the last operating cycle, 2,628 spent fuel assemblies stored in the SFP, and 884 assemblies stored in 13 dry storage casks on an ISFSI pad. The current ISFSI pad was constructed to support 36 dry storage casks (the pad has four additional unused storage locations to allow ENO to move the casks, if needed). VY completed fuel loading campaigns to the ISFSI in 2008, 2011, and 2012.

Following the permanent cessation of operations, the reactor building will be operated as an interim wet fuel storage facility for approximately 5-1/2 years. During this time, the spent fuel residing in the SFP will be transferred to the ISFSI. The ISFSI will remain operational until DOE is able to accept the title to the fuel and completes the transfer of the fuel offsite. Spent fuel management is estimated to cost \$368 million, in nominal 2014 dollars.

According to the licensee's updated Program, the current DTF balance of \$655 million (as of October 31, 2014), along with the projected fund earnings during the SAFSTOR period (assuming an annual 2-percent growth rate) and \$145 million from the two planned external credit facilities to fund the transfer to dry fuel storage costs, are expected to provide reasonable assurance for funding from the DTF for the estimated license termination and spent fuel management plan.

The attached spreadsheet incorporates the annual costs associated with the two major categories of the decommissioning process (i.e., license termination and irradiated fuel management), as described in the DCE of the VY PSDAR and the IFMP. In addition, annual calculations allowing for a 2-percent real rate of return have been added. All values are in thousands of 2014 dollars.

5.0 CONCLUSION

Based on its review of ENO's submittal, the NRC staff finds that the licensee's updated program to manage and provide funding for the management of all irradiated fuel is adequate and provides sufficient detail regarding the associated funding mechanisms. Further, the staff has determined that the elected actions within the program are consistent with NRC requirements for licensed possession of irradiated nuclear fuel and that these actions will be implemented in a

timely basis. Therefore, the staff concludes that the updated VY IFMP complies with 10 CFR 50.54(bb) and approves the updated plan on a preliminary basis. Further, based on the staff's calculated positive ending balance (as provided in the Attachment of this safety evaluation), the staff finds that the licensee has demonstrated reasonable assurance that funding will be available to maintain the IFMP until the fuel is transferred to the Department of Energy for permanent disposal.

Principal Contributor: Michael Dusaniwskyj

Date: October 5, 2015

**Vermont Yankee Nuclear Power Station - SAFSTOR Methodology
Radiological Decontamination and Spent Fuel Management**

Year	Opening DTF Balance	Radiological Decontamination	Spent Fuel Management	Site Restoration	2% Interest	Closing DTF Balance
2014	\$654,960	\$15,165	\$0	\$0	\$2,133	\$641,928
2015	\$641,928	\$81,198	\$4,318	\$0	\$11,128	\$567,540
2016	\$567,540	\$36,126	\$21,893	\$0	\$10,190	\$519,711
2017	\$519,711	\$10,823	\$20,176	\$0	\$9,774	\$498,487
2018	\$498,487	\$9,548	\$20,686	\$0	\$9,365	\$477,618
2019	\$477,618	\$8,173	\$20,168	\$0	\$8,986	\$458,262
2020	\$458,262	\$17,763	\$10,325	\$0	\$8,603	\$438,778
2021	\$438,778	\$5,241	\$3,996	\$0	\$8,591	\$438,131
2022	\$438,131	\$5,191	\$3,996	\$0	\$8,579	\$437,523
2023	\$437,523	\$5,191	\$3,996	\$0	\$8,567	\$436,903
2024	\$436,903	\$3,650	\$4,007	\$0	\$8,585	\$437,831
2025	\$437,831	\$3,591	\$3,996	\$0	\$8,605	\$438,849
2026	\$438,849	\$3,733	\$3,996	\$0	\$8,622	\$439,742
2027	\$439,742	\$3,783	\$3,996	\$0	\$8,639	\$440,603
2028	\$440,603	\$3,742	\$4,007	\$0	\$8,657	\$441,511
2029	\$441,511	\$3,733	\$3,996	\$0	\$8,676	\$442,457
2030	\$442,457	\$3,783	\$3,996	\$0	\$8,694	\$443,372
2031	\$443,372	\$3,733	\$3,996	\$0	\$8,713	\$444,356
2032	\$444,356	\$3,742	\$4,007	\$0	\$8,732	\$445,339
2033	\$445,339	\$3,783	\$3,996	\$0	\$8,751	\$446,311
2034	\$446,311	\$3,733	\$3,996	\$0	\$8,772	\$447,354
2035	\$447,354	\$3,733	\$3,996	\$0	\$8,792	\$448,417
2036	\$448,417	\$3,792	\$4,007	\$0	\$8,812	\$449,430
2037	\$449,430	\$3,733	\$3,996	\$0	\$8,834	\$450,535
2038	\$450,535	\$3,733	\$3,996	\$0	\$8,856	\$451,663
2039	\$451,663	\$3,783	\$3,996	\$0	\$8,878	\$452,761
2040	\$452,761	\$3,742	\$4,007	\$0	\$8,900	\$453,913
2041	\$453,913	\$3,733	\$3,996	\$0	\$8,924	\$455,107
2042	\$455,107	\$3,783	\$3,996	\$0	\$8,947	\$456,275
2043	\$456,275	\$3,733	\$3,996	\$0	\$8,971	\$457,517
2044	\$457,517	\$3,742	\$4,007	\$0	\$8,995	\$458,763
2045	\$458,763	\$3,783	\$3,996	\$0	\$9,020	\$460,004
2046	\$460,004	\$3,733	\$3,996	\$0	\$9,045	\$461,320
2047	\$461,320	\$3,733	\$3,996	\$0	\$9,072	\$462,663
2048	\$462,663	\$3,792	\$4,007	\$0	\$9,097	\$463,961
2049	\$463,961	\$3,733	\$3,996	\$0	\$9,125	\$465,357
2050	\$465,357	\$3,733	\$3,996	\$0	\$9,153	\$466,781
2051	\$466,781	\$3,783	\$3,996	\$0	\$9,180	\$468,182
2052	\$468,182	\$3,742	\$4,007	\$0	\$9,209	\$469,641
2053	\$469,641	\$3,583	\$0	\$0	\$9,321	\$475,379
2054	\$475,379	\$3,633	\$0	\$0	\$9,435	\$481,181
2055	\$481,181	\$3,583	\$0	\$0	\$9,552	\$487,150

2056	\$487,150	\$3,591	\$0	\$0	\$9,671	\$493,230
2057	\$493,230	\$3,633	\$0	\$0	\$9,792	\$499,389
2058	\$499,389	\$3,583	\$0	\$0	\$9,916	\$505,723
2059	\$505,723	\$3,583	\$0	\$0	\$10,043	\$512,182
2060	\$512,182	\$3,641	\$0	\$0	\$10,171	\$518,712
2061	\$518,712	\$3,583	\$0	\$0	\$10,303	\$525,432
2062	\$525,432	\$3,583	\$0	\$0	\$10,437	\$532,286
2063	\$532,286	\$3,633	\$0	\$0	\$10,573	\$539,226
2064	\$539,226	\$3,591	\$0	\$0	\$10,713	\$546,347
2065	\$546,347	\$3,583	\$0	\$0	\$10,855	\$553,620
2066	\$553,620	\$3,633	\$0	\$0	\$11,000	\$560,986
2067	\$560,986	\$3,583	\$0	\$0	\$11,148	\$568,552
2068	\$568,552	\$43,277	\$0	\$0	\$10,505	\$535,780
2069	\$535,780	\$92,030	\$0	\$0	\$8,875	\$452,625
2070	\$452,625	\$104,519	\$0	\$0	\$6,962	\$355,068
2071	\$355,068	\$84,524	\$0	\$0	\$5,411	\$275,955
2072	\$275,955	\$84,953	\$0	\$0	\$3,820	\$194,822
2073	\$194,822	\$50,139	\$0	\$0	\$2,894	\$147,577
2074	\$147,577	\$512	\$0	\$0	\$2,941	\$150,006
2075	\$150,006	\$295	\$0	\$0	\$2,994	\$152,705
Totals		\$817,232	\$225,526	\$0		

- Notes: (1) All costs are in 2014 dollars (in thousands)
(2) DTF Opening Balance as of 10/31/2014, so the Year 2014 interest earned was based on 2 months.
(3) Does not assume Site Restoration expenditures from DTF
(4) Spent Fuel Management amounts for 2014 thru 2020 represent the Net Effect of \$145 Million from External Credits to fund the Transfer of Spent Fuel to Dry Fuel Storage Costs.

Please contact me at 301-415-4125 or James.Kim@nrc.gov if you have any questions.

Sincerely,

/RA/

James Kim, Project Manager
Plant licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor licensing
Office of Nuclear Reactor Regulation

Docket No. 50-271

Enclosure:
As stated

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NAME	JKim	PBlechman	ABower	AGhosh	MKhanna
DATE	10/19/2015	10/27/2015	10/29/2015	10/27/2015	11/02/2015

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