



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. ML15013A426).

By letter dated December 19, 2014 (ADAMS Accession No. ML14358A251), 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. ML14357A110). As approved by exemption dated June 17, 2015 (ADAMS Accession No. ML15128A219), ENO uses the nuclear decommissioning trust fund (DTF) for license termination, irradiated fuel management and site restoration expenditures. While costs associated with all of 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.

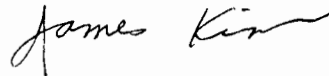
Based on its review of ENO's submittal, the NRC staff finds that the licensee's updated program to manage and provide funding for the management of all irradiated fuel is adequate and provides sufficient detail regarding the associated funding mechanisms. Further, the staff has determined that the elected 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

cc w/enclosure: Distribution via Listserv



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. ML15013A426). 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. ML15128A219), ENO uses the nuclear decommissioning trust fund (DTF) for license termination, irradiated fuel management, and site restoration expenditures. While costs associated with all of 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 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, where applicable, 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 in accordance with the NRC regulations and the provisions of the specific 10 CFR Part 50 license for the facility.

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 three major categories of the decommissioning process (i.e., license termination, irradiated fuel management, and site restoration), 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
Radiological Decontamination, Spent Fuel Management, and Site Restoration**

Year	Opening Balance	Cash Injection	Radiological Decontamination	Spent Fuel Management	Site Restoration	2% Interest	Closing Balance
2014	\$654,960	\$4,753	\$15,165	\$0	\$0	\$12,796	\$657,439
2015	\$657,439	\$10,001	\$81,198	\$4,753	\$0	\$11,430	\$593,119
2016	\$593,119	\$7,613	\$36,126	\$14,319	\$0	\$10,853	\$561,292
2017	\$561,292	\$28,873	\$10,823	\$29,506	\$0	\$10,419	\$560,833
2018	\$560,833	\$41,644	\$9,548	\$49,049	\$0	\$10,045	\$554,758
2019	\$554,758	\$39,516	\$8,173	\$62,330	\$0	\$9,685	\$534,246
2020	\$534,246	\$10,420	\$17,763	\$59,684	\$0	\$9,136	\$476,564
2021	\$476,564		\$5,241	\$20,745	\$0	\$9,012	\$459,589
2022	\$459,589		\$5,191	\$3,996	\$0	\$9,008	\$459,410
2023	\$459,410		\$5,191	\$3,996	\$0	\$9,004	\$459,228
2024	\$459,228		\$3,650	\$4,007	\$0	\$9,031	\$460,602
2025	\$460,602		\$3,591	\$3,996	\$0	\$9,060	\$462,075
2026	\$462,075	\$0	\$3,733	\$3,996	\$0	\$9,087	\$463,433
2027	\$463,433		\$3,783	\$3,996	\$0	\$9,113	\$464,767
2028	\$464,767		\$3,742	\$4,007	\$0	\$9,140	\$466,159
2029	\$466,159		\$3,733	\$3,996	\$0	\$9,169	\$467,598
2030	\$467,598		\$3,783	\$3,996	\$0	\$9,196	\$469,016
2031	\$469,016		\$3,733	\$3,996	\$0	\$9,226	\$470,512
2032	\$470,512		\$3,742	\$4,007	\$0	\$9,255	\$472,019
2033	\$472,019		\$3,783	\$3,996	\$0	\$9,285	\$473,525
2034	\$473,525		\$3,733	\$3,996	\$0	\$9,316	\$475,111
2035	\$475,111		\$3,733	\$3,996	\$0	\$9,348	\$476,730
2036	\$476,730		\$3,792	\$4,007	\$0	\$9,379	\$478,310
2037	\$478,310		\$3,733	\$3,996	\$0	\$9,412	\$479,992
2038	\$479,992		\$3,733	\$3,996	\$0	\$9,445	\$481,709
2039	\$481,709		\$3,783	\$3,996	\$0	\$9,479	\$483,408
2040	\$483,408		\$3,742	\$4,007	\$0	\$9,513	\$485,172
2041	\$485,172		\$3,733	\$3,996	\$0	\$9,549	\$486,992
2042	\$486,992		\$3,783	\$3,996	\$0	\$9,584	\$488,798
2043	\$488,798		\$3,733	\$3,996	\$0	\$9,621	\$490,690
2044	\$490,690		\$3,742	\$4,007	\$0	\$9,659	\$492,600
2045	\$492,600		\$3,783	\$3,996	\$0	\$9,696	\$494,517
2046	\$494,517		\$3,733	\$3,996	\$0	\$9,736	\$496,524
2047	\$496,524		\$3,733	\$3,996	\$0	\$9,776	\$498,571
2048	\$498,571		\$3,792	\$4,007	\$0	\$9,815	\$500,587
2049	\$500,587		\$3,733	\$3,996	\$0	\$9,857	\$502,715
2050	\$502,715		\$3,733	\$3,996	\$0	\$9,900	\$504,886
2051	\$504,886		\$3,783	\$3,996	\$0	\$9,942	\$507,049
2052	\$507,049		\$3,742	\$4,007	\$0	\$9,986	\$509,286
2053	\$509,286		\$3,583	\$0	\$0	\$10,114	\$515,817
2054	\$515,817		\$3,633	\$0	\$0	\$10,244	\$522,428
2055	\$522,428		\$3,583	\$0	\$0	\$10,377	\$529,222
2056	\$529,222		\$3,591	\$0	\$0	\$10,513	\$536,144
2057	\$536,144		\$3,633	\$0	\$0	\$10,650	\$543,161

2058	\$543,161		\$3,583	\$0	\$0	\$10,792	\$550,369
2059	\$550,369		\$3,583	\$0	\$0	\$10,936	\$557,722
2060	\$557,722		\$3,641	\$0	\$0	\$11,082	\$565,163
2061	\$565,163		\$3,583	\$0	\$0	\$11,232	\$572,811
2062	\$572,811		\$3,583	\$0	\$0	\$11,385	\$580,613
2063	\$580,613		\$3,633	\$0	\$0	\$11,540	\$588,519
2064	\$588,519		\$3,591	\$0	\$0	\$11,699	\$596,627
2065	\$596,627		\$3,583	\$0	\$0	\$11,861	\$604,905
2066	\$604,905		\$3,633	\$0	\$0	\$12,025	\$613,297
2067	\$613,297		\$3,583	\$0	\$0	\$12,194	\$621,909
2068	\$621,909		\$43,277	\$0	\$578	\$11,561	\$589,615
2069	\$589,615		\$92,030	\$0	\$466	\$9,942	\$507,061
2070	\$507,061		\$104,519	\$0	\$396	\$8,043	\$410,189
2071	\$410,189		\$84,524	\$0	\$1,674	\$6,480	\$330,471
2072	\$330,471		\$84,953	\$0	\$1,678	\$4,877	\$248,717
2073	\$248,717		\$50,139	\$0	\$1,403	\$3,943	\$201,118
2074	\$201,118		\$512	\$0	\$34,308	\$3,326	\$169,624
2075	\$169,624		\$295	\$0	\$16,642	\$3,054	\$155,741
Totals		\$142,820	\$817,232	\$364,350	\$57,145		

- Notes: (1) All costs are in 2014 dollars (in thousands)
(2) VY Opening Balance as of October 31, 2014
(3) This spreadsheet eliminates \$127 million cash injection in FY2026

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,

/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

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Safety Evaluation

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ADAMS Accession No.: ML15274A379

*Memo dated

**Concurred via email

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DATE	10/01/2015	10/01/2015	9/25/2015
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NAME	SUttal*	MKhanna**	JKim
DATE	9/25/2015	10/02/2015	10/05/2015

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