

NUCLEAR REGULATORY COMMISSION
DOCKET NOS. 72-1014, 72-59, and 50-271
January 11, 2018

ENVIRONMENTAL ASSESSMENT FOR THE EXEMPTION REQUEST FOR
ENTERGY NUCLEAR OPERATIONS, INC.'S
VERMONT YANKEE NUCLEAR POWER STATION
INDEPENDENT SPENT FUEL STORAGE INSTALLATION
IN VERNON, VERMONT

1. INTRODUCTION

By letter dated May 16, 2017 (Entergy 2017a), Entergy Nuclear Operations, Inc. (ENO) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for an exemption, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 72.7, from the requirements of 10 CFR 72.212(a)(2), 72.212(b)(3), 72.212(b)(5)(i), 72.214, and the portion of 72.212(b)(11) that requires compliance with the terms, conditions, and specifications of the Certificate of Compliance (CoC) No. 1014 for spent fuel storage at the Vermont Yankee Nuclear Power Station (VYNPS) Independent Spent Fuel Storage Installation (ISFSI). ENO supplemented the exemption request in letters dated September 7, 2017 (Entergy 2017b) and December 7, 2017 (Entergy 2017c). Specifically, ENO is requesting an exemption from certain requirements in Amendment No. 10 of the Holtec International (Holtec) CoC No. 1014 for the HI-STORM 100 Cask System. This exemption would allow 1) the use of an optional regionalized loading pattern for the multipurpose canister (MPC)-68M; 2) the loading of fuel that has been cooled for at least 2 years to be loaded into the MPC-68M, as compared to the current minimum cooling time of 3 years; and 3) the establishment of a per-cell maximum average burnup limit at 65,000 megawatt days per metric ton of uranium (MWD/MTU), as compared to the current condition of calculating from an equation. In its September 7 letter, ENO proposed to limit the total aggregate heat load for each cask to 36.9 kW as allowed in CoC No. 1014, Amendment No. 10 (NRC 2016).

The NRC staff performs both a safety evaluation and an environmental review to determine whether to grant this exemption request. The NRC staff will prepare a separate safety evaluation report (SER) to document its safety review and analysis. The NRC's safety review will evaluate the proposed changes to assure continued protection of public health and safety, common defense and security, and the environment. Specifically, the NRC staff will evaluate the potential safety impacts of granting the exemption to ENO, assess the potential for any danger to life or property or the common defense and security, and perform thermal, materials, shielding, and structural evaluations for this exemption request.

The environmental review is documented in this environmental assessment (EA), which the NRC staff prepared in accordance with 10 CFR 51.21 and 51.30(a). Additionally, the preparation of this EA is being coordinated with the development of the SER. This EA defines the NRC's proposed action in Section 2 and the purpose and need for the proposed action in Section 3. The evaluation of the potential environmental impacts of the proposed action is presented in Section 4, and the environmental impacts of the alternatives to the proposed action are found in Section 5. The NRC's conclusion is summarized in Section 7. The NRC's decision whether to grant the exemption will be based on the results of the NRC staff's review as documented in this EA and the staff's safety review to be documented in the SER.

1.1 Background

VYNPS began operation in 1972, and the reactor was permanently shut down on December 29, 2014. VYNPS currently stores spent BWR fuel assemblies at its ISFSI in thirteen (13) HI-STORM 100 casks under CoC No. 1014, Amendment No. 2. The remaining spent fuel assemblies were removed from the reactor and transferred to the spent fuel pool. ENO submitted the VYNPS Post-Shutdown Decommissioning Activities Report (PSDAR) (Entergy 2014) to the NRC on December 19, 2014, and supplemented (Entergy 2017d) on April 12, 2017. In the PSDAR, as supplemented, ENO stated loading spent fuel into dry fuel storage casks and transferring casks to the ISFSI will begin in mid-2017 with plans to complete the work by late 2018, and then put the plant into SAFSTOR¹ until it is ready to fully decommission the facility.

ENO's exemption request involves portions of the proposed changes in Holtec's applications to the NRC for Amendment Nos. 11 and 12 of CoC No. 1014 by letters dated January 29, 2016 (Holtec 2016a), and dated June 14, 2016 (Holtec 2016b), respectively. Both applications are currently under NRC staff's review. In its exemption request, ENO stated that it plans to use Holtec's HI-STORM 100 cask system under CoC No. 1014, Amendment No. 10 (NRC 2016), with exemptions from certain requirements, for the dry storage of spent nuclear fuel in MPC-68M canisters at VYNPS. Specifically, ENO's exemption request would:

- 1) Allow the use of a new regionalized loading pattern for the MPC-68M as described in Holtec's Amendment No. 12 application, Appendix B, Figure 2.4-1. The current allowed regionalized loading pattern is shown in CoC Appendix B, Figure 2.1-4. The new regionalized loading pattern would allow VYNPS to load hotter fuel from its final operating cycle with cooler fuel, as well as damaged fuel or fuel debris in a damaged fuel container (DFC), in an optimized manner. ENO would limit the total aggregate heat load for each cask to 36.9 kW.
- 2) Allow loading fuel that has been cooled for at least 2 years into the MPC-68M as described in Holtec's Amendment No. 12 application, Appendix B, Table 2.1-1, Section VI. The current minimum cooling time is 3 years, as specified in CoC Appendix B, Section 2.4.3 and Table 2.4-4, for calculating burnup limit, based on the specified range of minimum cooling times. This change would allow VYNPS to load fuel assemblies from its final operating cycle, which has minimum cooling times ranging from 2.83 to 2.99 years (as of October 2017).
- 3) Allow the use of a per-cell maximum average burnup limit at 65,000 MWD/MTU as described in Holtec's Amendment No. 11 application, Appendix B, Table 2.1-1, Section VI. Currently, CoC Appendix B, Section 2.4.3 describes the method and provides an equation to calculate maximum allowable fuel assembly average burnup based on fuel decay heat, enrichment, and cooling time. This is an accompanying change for the above two changes. Section 2.4.3 does not apply to the new regionalized pattern, and the equations and tables associated with Section 2.4.3 are specifically for fuel that has been cooled for at least 3 years.

¹ SAFSTOR is a method of decommissioning in which a nuclear facility is placed and maintained in a condition that allows the facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use.

ENO provided justifications in thermal, structural, and shielding to support the storage of shorter cooled fuel (at least 2 years of cooling), as well as damaged fuel and fuel debris, in the new regionalized loading pattern. ENO referenced Holtec's application for CoC No. 1014, Amendment No. 12, which evaluated the new loading pattern under normal, off-normal, and accident conditions. In addition, ENO proposed to limit the total aggregate cask heat load to 36.9 kW. The NRC staff reviewed the requested exemption and determined that the proposed action is not requesting a change to the fundamental design, components, or safety features of the dry cask storage system. The NRC staff will consider the safety evaluation and this EA in its decision on whether to approve this exemption.

2. THE PROPOSED ACTION

As requested by ENO, the proposed action is for the NRC to grant ENO an exemption from the requirements of 10 CFR 72.212(a)(2), 72.212(b)(3), 72.212(b)(5)(i), 72.214, and the portion of 72.212(b)(11), which state the general licensee shall comply with the terms, conditions, and specifications of the CoC.

ENO stated that it plans to use Holtec's HI-STORM 100 cask system under CoC No. 1014, Amendment No. 10, with exemption from certain requirements as noted, for the dry storage of spent nuclear fuel in MPC-68M canisters at VYNPS. ENO proposed the following actions:

- 1) Use a new regionalized loading pattern for the MPC-68M, as described in Holtec's Amendment No. 12 application to CoC No. 1014, Appendix B, Figure 2.4-1. The current allowed regionalized loading pattern is shown in CoC Appendix B, Figure 2.1-4. ENO would also limit the total aggregate heat load for each cask to 36.9 kW.
- 2) Allow loading fuel that has been cooled for at least 2 years into the MPC-68M, as described in Holtec's Amendment No. 12 application to CoC No. 1014, Appendix B, Table 2.1-1, Section VI. The current minimum cooling time is 3 years, as specified in CoC Appendix B, Section 2.4.3 and Table 2.4-4, for calculating burnup limit, based on the specified range of minimum cooling times. This would allow VYNPS to load fuel assemblies which have not been cooled for at least 3 years, as approved in the current CoC, but have been cooled for 2 years, into the MPC-68M.
- 3) Establish a per-cell maximum average burnup limit at 65,000 MWD/MTU, as described in Holtec's Amendment No. 11 application to CoC No. 1014, Appendix B, Table 2.1-1, Section VI. Currently, CoC Appendix B, Section 2.4.3 describes the method and an equation to calculate maximum allowable fuel assembly average burnup based on fuel decay heat, enrichment, and cooling time (for a minimum of 3 years).

3. NEED FOR THE PROPOSED ACTION

Holtec submitted applications to the NRC for Amendment Nos. 11 and 12 of CoC No. 1014 by letters dated January 29, 2016 (Holtec 2016a), and June 14, 2016 (Holtec 2016b), respectively. Both amendments are currently under review by the NRC staff, and the staff will not complete its review of either amendment prior to the time that VYNPS plans to load the affected fuel.

ENO requests the exemption in order to maintain its revised decommissioning schedule through its optimized loading campaigns. The exemption will allow VYNPS to use a more optimized regionalized loading pattern for MPC-68M, so that VYNPS could store hotter fuel from its final

operating cycle, as well as for storing damaged fuel or fuel debris in a DFC, with cooler fuel in the same cask. The exemption will also allow VYNPS to load fuel that has been cooled for at least 2 years into the MPC-68M. Approval of the exemption request will allow the applicant to maintain its continuous loading campaign without interruption to wait for the fuel to meet both the heat loading and cooling time requirements. This could also avoid potential higher personal exposure and human errors due to loss of experienced workers. In addition, the proposed new loading pattern contained in this exemption places the low-burned, long-cooled assemblies on the periphery of the cask acts as shielding and blocks the radiation from the shorter-cooled, higher-burned fuels stored in the center of the cask. As the result, it would reduce dose rate to VYNPS onsite workers and at its site boundary.

The optimized loading plan would allow VYNPS to complete the transfer of spent fuel to ISFSI within a shorter timeframe. VYNPS would then be able to remove certain structures, systems, and components from service, as well as reduce staffing to a level commensurate with the dry fuel storage operations. In time, the exemption would reduce operational costs and preserve the decommissioning trust fund.

4. ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

This EA evaluates the potential environmental impacts of granting the exemption to allow VYNPS to use a new regionalized loading pattern, load fuel that has been cooled for at least 2 years, and establish a per-cell maximum average burnup limit at 65,000 MWD/MTU in the HI-STORM 100 MPC-68M under CoC No. 1014, Amendment No. 10. The potential environmental impacts of Amendment No. 10 to the CoC for the HI-STORM 100 were evaluated by the staff prior to being added to the list of approved spent fuel storage casks in 10 CFR 72.214 (81 *FR* 13265).

On July 18, 1990 (55 *FR* 29181), the NRC amended 10 CFR Part 72 to provide for the storage of spent fuel under a general license in cask designs approved by the NRC. The EA for the 1990 final rule analyzed the potential environmental impact of using NRC-approved storage casks. The EA for HI-STORM 100, Amendment No. 10 (81 *FR* 13265), tiers off of the EA issued for the July 18, 1990, final rule. The EA for this exemption tiers off of the EA for HI-STORM 100, Amendment No. 10. Tiering off earlier EAs is a standard process under NEPA by which the impact analyses of previous EAs can be cited by a subsequent EA, such as this one, to include the impacts of the proposed action within the scope of the previous EA.

This exemption does not involve the disturbance of land, the construction of new facilities, or modifications to current operating practices. The EA for Holtec HI-STORM 100, Amendment No. 10, analyzed the effects of design basis accidents that could occur during storage. Design basis accidents account for human-induced events and the most severe natural phenomena reported for the site and surrounding area. ENO's proposed exemption request does not reflect any change in cask design or fabrication requirements, therefore no loss of structure or confinement will occur.

Accordingly, NRC staff finds that ENO's requested action is bounded by CoC No. 1014, Amendment No. 10. NRC staff also find that occupational exposure and offsite dose rates from this exemption request will not increase the occupational exposure and offsite dose rates and that the dose rates will remain within applicable 10 CFR part 20 limits. No change in the types or amounts of any effluent released, no significant increase in individual or cumulative radiation exposures, and no significant increase in the potential for or consequences of radiological accidents will occur from this proposed action. Therefore, the proposed exemption request will

not result in radiological or non-radiological environmental impacts that significantly differ from impacts evaluated in the EA supporting the HI-STORM 100, Amendment No. 10 direct final rule. For these reasons, the NRC concludes there are no significant environmental impacts associated with the exemption request for the HI-STORM 100 cask system.

5. ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES TO THE PROPOSED ACTION

In addition to the proposed action, the staff also considered the no-action alternative, NRC denial of the proposed exemption request. Denial of the exemption request would require the licensee to load and store spent fuel in accordance with the conditions of Amendment No. 10 of CoC No. 1014. The environmental impacts of storing fuel according to Amendment No. 10 of the CoC have already been evaluated in a previous EA. Therefore, the NRC staff has determined that the environmental impact of the proposed action and no action alternative are similar.

6. AGENCIES CONSULTED

The NRC provided the Vermont Department of Health (VDOH) a copy of this Draft EA for review in an email dated October 16, 2017 (NRC 2017a). In an email dated December 18, 2017 (VDOH 2017), the VDOH stated that its questions were answered during a conference call with the NRC staff on December 11, 2017. VDOH has no comment on this exemption request.

Endangered Species Act (ESA) Section 7 Consultation

The ESA was enacted to prevent further decline of endangered and threatened species and restore those species and their critical habitat. Section 7 of the ESA requires Federal agencies to consult with the U.S. Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS) (collectively, “the Services”) regarding actions that may affect listed species or designated critical habitats.

Pursuant to ESA Section 7, the NRC staff consulted with the Services during the NRC staff’s license renewal review in 2006 regarding the potential impacts of continued operation of VYNPS pursuant to ESA Section 7. In communications with these agencies, both FWS and NMFS indicated that continued operation of VYNPS would not affect listed species (NRC 2007). Because the proposed exemption is a new federal action and because the Services regularly update the federal list of endangered species, the NRC staff conducted a search of federally listed species and critical habitats that are currently listed and have the potential to occur in Windham County using the FWS’s Environmental Conservation Online System Information for Planning and Conservation system. Three Federally-listed species occur in this county: Dwarf wedgemussel (*Alasmidonta heterodon*), Northern Long-Eared Bat (*Myotis septentrionalis*), and Northeastern bulrush (*Scirpus ancistrochaetus*). However, as stated previously in this EA, the requested exemption request would not change the fundamental design, components, or safety features of the dry cask storage system. Additionally, fuel loading activities are conducted within an existing building and, therefore, have no direct nexus to the natural environment that could affect federally listed species.

The NRC staff, therefore, concludes that the proposed exemption request would have no effect on federally listed species or critical habitats. Federal agencies are not required to consult with the FWS if they determine that an action will not affect listed species or critical habitats

(FWS 2016). The ESA does not require consultation for the proposed exemption, and thus the NRC staff considers its obligations under ESA Section 7 to be fulfilled for the proposed action.

National Historic Preservation Act (NHPA) Section 106 Consultation

Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on historic properties. As stated in the Act, historic properties are any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the National Register of Historic Places (NRHP).

NRC staff consulted with the Vermont State Historic Preservation Office during the staff's license renewal review in 2006 regarding the potential impacts of continued operation of VYNPS. As described in the supplemental environmental impact statement for the VYNPS license renewal review, no prehistoric archaeological sites have been identified on the VYNPS property. However, the Governor Hunt House is a historically significant property owned and managed by the plant operator. Further, the area around the house has the potential to contain buried remains associated with the Governor Hunt House (NRC 2007).

The NRC has determined that the scope of activities described in this exemption request do not have the potential to cause effects on historic properties as the NRC's approval of this exemption request will not authorize new construction or land disturbance activities. The fuel loading activities will be the same and will be done within the existing reactor building. Therefore, in accordance with 36 CFR 800.3(a)(1), no consultation is required under Section 106 of the NHPA. The NRC staff, however, informed the Vermont State Historic Preservation Office (SHPO) by an email dated September 14, 2017 of its "no effects" determination (NRC 2017b).

7. CONCLUSION

The environmental impacts of the proposed action have been reviewed under the requirements in 10 CFR Part 51. The exemption request, if granted, would allow VYNPS to load fuels in MPC-68M using a new regionalized loading pattern to load hotter fuel than currently allowed, load fuel with a minimal cooling time of 2 years, and establish a per-cell maximum average burnup limit at 65,000 MWD/MTU.

In this EA, the NRC determined that the environmental impacts of granting this exemption will be no greater than those described in the EA for the HI-STORM 100, Amendment No. 10 direct final rule. No changes are being made in the types or quantities of effluents that may be released offsite, and there is no significant increase in occupational or public radiation exposures in granting this exemption request for VYNPS. Accordingly, NRC has determined that a Finding of No Significant Impact (FONSI) is appropriate and an EIS is not warranted. The NRC will publish the FONSI in the *Federal Register*.

8. REFERENCES

The documents referenced in this EA are all publically available. The references are available for public inspection and copying at NRC's Public Document Room, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. Documents available through the NRC's electronic reading room (ADAMS) at <http://www.nrc.gov/reading-rm/adams.html> have an Accession No. provided.

10 CFR Part 20. *Code of Federal Regulations*, Title 10, Energy, Part 20, “Standards for Protection Against Radiation.” Washington, D.C.

10 CFR Part 51. *Code of Federal Regulations*, Title 10, Energy, Part 51, “Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions.” Washington, D.C.

10 CFR Part 72. *Code of Federal Regulations*, Title 10, Energy, Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste.” Washington, D.C.

55 *FR* 29181. Final Rule: Storage of Spent Fuel in NRC-Approved Storage Casks at Power Reactor Sites. *Federal Register* Volume 55, Issue 138. July 18, 1990.

81 *FR* 13265. Direct Final Rule: List of Approved Spent Fuel Storage Casks: Holtec International HI-STORM 100 Cask System; Certificate of Compliance No. 1014, Amendment No. 10. *Federal Register* Volume 81, Issue 49. March 14, 2016.

Endangered Species Act of 1973, as amended. 16 USC §1531 et seq.

Entergy 2014. Vermont Yankee Post-Shutdown Decommissioning Activities Report. December 29, 2014. ADAMS Accession No. ML14357A110.

Entergy 2017a. Letter from Entergy Nuclear Operations, Inc. to NRC, “Exemption Request from Certain Requirements of 10 CFR 72.212 and 10 CFR 72.214 to Support the Dry Fuel Loading Campaign, Vermont Yankee Nuclear Power Station, License No. DPR-28, Docket Nos. 50-271, 72-59 and 72-1014.” May 16, 2017. ADAMS Accession No. ML17142A354.

Entergy 2017b. Letter from Entergy Nuclear Operations, Inc. to NRC, “Response to Request for Additional Information Related to Exemption Request from Certain Requirements of 10 CFR 72.212 and 10 CFR 72.214 to Support the Dry Fuel Loading Campaign (CAC No. L25219) Vermont Yankee Nuclear Power Station License No. DPR-28 Docket Nos. 50-271, 72-59 and 72-1014.” September 7, 2017. ADAMS Accession No. ML17255A236.

Entergy 2017c. Letter from Entergy Nuclear Operations, Inc. to NRC, “Supplement to Exemption Request from Certain Requirements of 10 CFR 72.212 and 10 CFR 72.214 to Support the Dry Fuel Loading Campaign (EPID No. L-2017-LLE-0005), Vermont Yankee Nuclear Power Station, License No. DPR-28, Docket Nos. 50-271, 72-59 and 72-1014.” December 7, 2017. ADAMS Accession No. ML17346A685.

Entergy 2017d. Letter from Entergy Nuclear Operations, Inc. to NRC, “Notification of Schedule Change for Dry Fuel Loading Campaign, Vermont Yankee Nuclear Power Station, Docket No. 50-271, License No. DPR-28” April 12, 2017, ADAMS Accession No. ML17104A050.

FWS 2016. Endangered Species Consultations Frequently Asked Questions. ADAMS Accession No. ML16120A505.

Holtec 2016a. Letter from Holtec International to NRC, “Holtec International HI-STORM 100 Multipurpose Canister Storage System Amendment Request 1014-11.” January 19, 2016. ADAMS Accession No. ML16029A529.

Holtec 2016b. Letter from Holtec International to NRC, "Holtec International HI-STORM 100 Multipurpose Canister Storage System Amendment Request 1014-12." June 14, 2016. ADAMS Accession No. ML16169A363.

National Historic Preservation Act of 1966. 16 USC §470 et seq.

NRC 2007. NUREG-1437, Supplement 30, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Vermont Yankee Nuclear Power Station – Final Report." August 2007. ADAMS Accession Nos. ML072050012 and ML072050013.

NRC 2016. Letter from NRC to Holtec International, "Certificate of Compliance No. 1014, Amendment No. 10 for the HI-STORM 100 Cask System (CAC No. L24979)." May 25, 2016. ADAMS Accession No. ML16144A177.

NRC 2017a. Email from NRC to Vermont Department of Health, "Draft Environmental Assessment: Exemption Request for Vermont Yankee Independent Spent Fuel Storage Installation." October 16, 2017. ADAMS Accession No. ML17289A422.

NRC 2017b. Email from NRC to State Historic Preservation Office, "FYI: No effects determination for NRC's exemption request review at Vermont Yankee Nuclear Power Station." September 14, 2017. ADAMS Accession No. ML17257A002.

VDOH 2017. Email from Vermont Department of Health to NRC, "RE: Draft Environmental Assessment: Exemption Request for Vermont Yankee Independent Spent Fuel Storage Installation." December 18, 2017. ADAMS Accession No. ML17353A009.

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POWER STATION INDEPENDENT SPENT FUEL STORAGE INSTALLATION
IN VERNON, VERMONT, DOCUMENT DATE: JANUARY 11, 2018

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