

## Gallardy, Vivian

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**From:** Chen, Yen-Ju  
**Sent:** Tuesday, May 23, 2017 12:11 PM  
**To:** Irwin, William  
**Subject:** Response: Draft Environmental Assessment: Exemption Request for Vermont Yankee Independent Spent Fuel Storage Installation  
**Attachments:** Letter Address Vermont Department of Health Comments on EA.docx

Dear Mr. Irwin:

Thank you for providing the Vermont Department of Health's (Department's) comments on the Environmental Assessment for Entergy Nuclear Operations, Inc.'s exemption request. Please see the attachment where NRC staff addresses the Department's comments.

Please contact me if you have additional questions.

Sincerely,

Yen-Ju Chen  
Sr. Project Manager  
Division of Spent Fuel Management  
U.S. Nuclear Regulatory Commission  
(301) 415-1018  
[Yen-Ju.Chen@nrc.gov](mailto:Yen-Ju.Chen@nrc.gov)

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**From:** Irwin, William [mailto:William.Irwin@vermont.gov]  
**Sent:** Thursday, March 16, 2017 5:46 PM  
**To:** Chen, Yen-Ju <Yen-Ju.Chen@nrc.gov>  
**Cc:** Garcia Santos, Norma <Norma.GarciaSantos@nrc.gov>  
**Subject:** [External\_Sender] RE: Followup: Draft Environmental Assessment: Exemption Request for Vermont Yankee Independent Spent Fuel Storage Installation

Dear Ms. Chen,

The Vermont Department of Health has read the pre-decisional information for NRC Docket Number 72-1014, 72-59 and 50-271 you sent to me, as well as BVY 16-030 dated 9 November 2016 and BVY 17-001 dated 9 January 2017. All of these documents are related to an environmental assessment for the exemption request by Entergy Nuclear Operations for Holtec International MPC-68M spent fuel casks to be used at its independent spent fuel storage installation (ISFSI) at the Vermont Yankee Nuclear Power Station (VYNPS).

The Vermont Department of Health appreciates reading that Entergy, Holtec and the NRC have all concluded that the mixing of higher enriched fuel with lower enriched undamaged fuel is likely to reduce dose rates to the public. We are also glad to hear that the NRC has determined that the exemption will meet the criticality safety requirements of 10 CFR Part 72, and that the exemption will not significantly impact the cask design and fabrication required for confinement of spent fuel hazards and shielding of spent fuel assemblies.

While the Department appreciates descriptions of occupational and public radiation dose rate reductions with the proposed fuel arrangements, our greatest concern is the rigorous demonstration of criticality control over the full range

of accident conditions. We expect that the NRC is as well, and is closely analyzing the data submitted by Entergy related to criticality control and the exemption. The data in Tables 6.III.4.9 and 6.III.4.10 reproduced from the Final Safety Analysis Report in BVY 16-030 describe effects in reactivity. The Department is interested in how these effects in reactivity result in zero reductions in safety margin as described in BVY 16-030. As with other issues related to the VYNPS, the Department of Health believes the NRC evaluation of consequences from postulated accidents for this exemption request include evaluation for beyond design basis accidents, especially those that are the result of hostile actions.

The Department has interest as well when reading in BVY 16-030 that "Vermont Yankee would like to rely on the technical review performed or in progress by the NRC staff...to provide the basis for approval of the specific exemption request." Specifically, we expect that the technical review would run its full course in time and effort, and, should the exemption be granted and any condition not appropriate to approval of the exemption be found during or after the full technical review, we expect the NRC would take the appropriate action to completely correct the condition.

Finally, in reading BVY 17-001 Table 2, the Department appreciates seeing the summed dose rates from two casks, one with a higher dose rate when loaded with mixed fuel and one with lower dose rates when loaded with mixed fuel, are lower when summed together. Not knowing the actual placement of these two casks, and all other casks loaded with mixed fuel and unmixed fuel, it seems difficult to verify that the sum of dose rates from all 58 casks at VYNPS meet either the dose limits of 10 CFR 20 or the Health Department's Radiological Health Rule. The Department would appreciate the demonstration of this summation and assessment of dose rates based on actual and planned dry fuel storage at the ISFSI.

William Irwin, Sc.D., CHP  
Radiological and Toxicological Sciences Program Chief

*Please note my new email: [William.irwin@vermont.gov](mailto:William.irwin@vermont.gov)*

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**From:** Chen, Yen-Ju [<mailto:Yen-Ju.Chen@nrc.gov>]  
**Sent:** Wednesday, February 22, 2017 4:32 PM  
**To:** Irwin, William <[William.Irwin@vermont.gov](mailto:William.Irwin@vermont.gov)>  
**Cc:** Garcia Santos, Norma <[Norma.Garcia-Santos@nrc.gov](mailto:Norma.Garcia-Santos@nrc.gov)>  
**Subject:** Followup: Draft Environmental Assessment: Exemption Request for Vermont Yankee Independent Spent Fuel Storage Installation

Dear Mr. Irwin:

This is a followup to my email regarding the attached draft Environmental Assessment for Vermont Yankee's exemption request. If you have any question, please feel free to contact me at (301) 415-1018. We would appreciate your comments by March 9, 2017.

As I mentioned in the previous email, I will be out of the office from March 1 through 17. During my absence, please contact Norma Garcia-Santos, who is on cc to this email. Ms. Garcia-Santos can be reached at (301) 415-6999 or [Norma.Garcia-Santos@nrc.gov](mailto:Norma.Garcia-Santos@nrc.gov).

Sincerely,

*Yen*

Yen-Ju Chen  
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**From:** Chen, Yen-Ju  
**Sent:** Tuesday, February 07, 2017 2:10 PM  
**To:** 'william.irwin@vermont.gov' <[william.irwin@vermont.gov](mailto:william.irwin@vermont.gov)>  
**Cc:** Garcia Santos, Norma <[Norma.Garcia-Santos@nrc.gov](mailto:Norma.Garcia-Santos@nrc.gov)>  
**Subject:** Draft Environmental Assessment: Exemption Request for Vermont Yankee Independent Spent Fuel Storage Installation

Dear Mr. Irwin:

The U.S. Nuclear Regulatory Commission (NRC) staff is currently reviewing Entergy's exemption request for using the HI-STORM 100 cask system (NRC Certificate of Compliance (CoC) No. 72-1014, Amendment 10) at the Vermont Yankee Nuclear Power Station (VYNPS) Independent Spent Fuel Storage Installation (ISFSI). Entergy is requesting an exemption from 10 CFR 72.214 to allow loading of higher enriched fuel assemblies with certain lower enriched fuel assemblies in the same multi-purpose canister. As part of our review of this exemption request, the NRC staff prepared the attached draft environmental assessment (EA), in accordance with NRC regulations in 10 CFR Part 51, which implement the National Environmental Policy Act of 1969, as amended. We conclude in the draft EA that approval of the exemption request will not significantly affect the quality of the human environment.

As we discussed on February 2, 2017, we are providing your office with the opportunity to review our draft EA and comment on environmental issues prior to public issuance of the EA. We request that the distribution and use of the draft EA be limited only to those staff involved in the review and comment process. We further request that your office provide any comments to the NRC staff by March 9, 2017. You can provide your comments to us, via email, if that is convenient for you. We will consider your timely comments and will revise the EA, as appropriate, before its final issuance.

If you have any questions as you review the draft EA, please contact me at (301) 415-1018 or [Yen-Ju.Chen@nrc.gov](mailto:Yen-Ju.Chen@nrc.gov). I will be out of the office from March 1 through 17. During my absence, please contact Norma Garcia-Santos, who is on cc to this email. Ms. Garcia-Santos can be reached at (301) 415-6999 or [Norma.Garcia-Santos@nrc.gov](mailto:Norma.Garcia-Santos@nrc.gov).

Thank you in advance for your review.

Sincerely,

Yen-Ju Chen  
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Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission

(301) 415-1018  
[Yen-Ju.Chen@nrc.gov](mailto:Yen-Ju.Chen@nrc.gov)

Dear Mr. Irwin:

Thank you for providing the Vermont Department of Health's (Department) comments on the Environmental Assessment (EA) for Entergy Nuclear Operations, Inc.'s (Entergy) exemption request dated November 9, 2016, and supplemented on January 9, 2017. The exemption request concerns the HI-STORM 100 cask system (NRC Certificate of Compliance (CoC) No. 1014, Amendment No. 10) at the Vermont Yankee Nuclear Power Station (VYNPS) Independent Spent Fuel Storage Installation (ISFSI). The NRC staff addresses the Department's comments below.

The exemption request seeks authorization to load low-enriched, channeled, undamaged fuel and higher enriched fuel in the same HI-STORM 100 multi-purpose canister at the VYNPS. In the EA, the NRC staff reviewed the requested exemption and determined that it does not change the fundamental design, components, or safety features of the dry cask storage system. The NRC staff evaluated the applicable potential safety impacts of granting the exemption and assessed the potential for any danger to life or property or the common defense and security. Specifically, the NRC staff reviewed the criticality and shielding and radiation protection evaluations for the proposed action. The NRC staff addresses these safety issues more fully in the safety evaluation report (SER), which is in preparation. The EA on which the Department commented, considered potential environmental impacts of the proposed action. The staff will base its decision on whether to approve this exemption on both the SER and the EA.

The Department raised three sets concerns. In its first set, the Department raised three related issues which the staff responds below.

First, the Department asked whether criticality control was evaluated by the NRC staff over the full range of accident conditions. The answer is yes. The NRC's regulations in Title 10 of the Code of Federal Regulations (CFR) Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste," require that spent nuclear fuel storage systems be designed to withstand normal, off-normal, and postulated design basis accident conditions. Accident conditions typically considered include flooding, tsunamis, earthquake, lightning strikes, fires, explosions, tornado winds, and tornado missiles. Criteria for nuclear criticality safety can be found in 10 CFR 72.124, and specific requirements for spent fuel storage cask approval and fabrication can be found in 10 CFR 72.236.

Second, the Department asked if the NRC's evaluation of consequences from postulated accidents evaluates beyond design basis accidents, including hostile actions. The staff points out that beyond design basis accidents related to hostile actions normally are not part of the NRC's evaluation of licensing actions. In NUREG-2157, "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel," the NRC staff considers a full range of potential environmental impacts from the storage of spent fuel at reactor sites and at off-site ISFSIs during the time from the termination of licensed operations until a permanent repository becomes available. NUREG-2157 at Section 4.19.2 specifically discusses the environmental impacts of a terrorist attack on continued storage of spent fuel, including at an ISFSI. The NRC determined that the security measures of 10 CFR Part 72, the physical protection measures required by 10 CFR Part 73, and national anti-terrorist measures to prevent, for example, aircraft hijackings, coupled with the robust nature of dry cask storage systems, make the probability of a successful terrorist attack, although numerically indeterminable, very low. The physical protection system at all facilities, including VYNPS, must protect against the loss of control of the ISFSI that could be sufficient to cause a radiation exposure exceeding the dose

limitation in 10 CFR 72.106.<sup>1</sup> The NRC in NUREG-2157 at Section 4.19.3, found that even though the environmental consequences of a terrorist attack on operational ISFSIs during continued storage would be large, the very low probability of a successful attack ensures that the environmental risk is SMALL.

Third, the Department asked about the evaluation of Entergy's statements that the safety margin for criticality accidents is not reduced by the storage of higher and lower enriched fuel assemblies. This question was tied to statements concerning criticality and environmental effects made in the Final Safety Analysis Report submitted with VYNPS's exemption request. The NRC staff is reviewing and evaluating Entergy's proposed exemption request to determine whether the spent fuel storage system will maintain subcriticality under loading conditions and after the spent fuel is loaded. This is addressed in the SER in preparation for this exemption request.

As part of its review, the NRC staff evaluated the proposed fuel arrangements under credible normal, off-normal, and accident conditions. The staff determined the HI-STORM 100 cask system will remain subcritical under credible normal, off-normal, and accident conditions and found the system provides reasonable assurance for the safe storage of spent fuel. In addition, Entergy's proposed fuel arrangement is bounded by the reactivity of undamaged fuel stored in a normal fuel arrangement. In the SER certifying CoC No. 1014, Amendment No. 8, the NRC staff finds that the criticality design features are in compliance with 10 CFR Part 72, and that the applicable design and acceptance criteria have been satisfied, and thus, approved the storage of fuel in the normal arrangement. See Agencywide Documents Access and Management System (ADAMS) Accession No. ML112160627 (2012), SER at Section 7.

The Department in its second set of concerns, correctly assumed that the NRC staff is conducting a technical review of the VYNPS safety analyses as part of the exemption review and this will be published as an SER. The Department raised concerns about how the NRC staff would deal with changed circumstances after the grant of an exemption. If NRC staff grants the exemption request and significant, new information relevant to staff's determination is identified, the NRC will evaluate such information. The NRC would reassess whether the public health and safety and the environment are protected. In addition, because the VYNPS is subject to the NRC's continued oversight, which includes periodic inspections, changed circumstances would be routinely evaluated. Furthermore, Entergy is obligated to report any significant information to the NRC under 10 CFR 50.9(b) and 10 CFR 72.11(b). These regulations require notification of the NRC when information is identified by a licensee as having, for the regulated activity, a significant implication for public health and safety or common defense and security. The notification must be provided to the Administrator of the appropriate Regional Office within two working days of identifying the information.

NRC's regulations in 10 CFR 50.36a(a)(2) requires VYNPS to submit a report to the Commission annually that specifies the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous 12 months, including any other information as may be required by the Commission to estimate maximum potential annual radiation doses to the public resulting from effluent releases. VYNPS's Technical Specifications 6.6.D, 6.6.E, and 6.7.B provide details on the content of Radioactive Effluent Release Report, the Annual Radiological Environmental Operating Report, and the Off-Site

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<sup>1</sup> See Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation. ADAMS Accession No. ML072400511.

Dose Calculation Manual. See NRC's ADAMS Accession No. ML15117A551. In situations where the quantities of radioactive materials released during the reporting period are significantly above design objectives, this must be addressed in the annual report. On the basis of these annual reports and any additional information the Commission may obtain from the licensee or others, the Commission may require the licensee to take action as the Commission deems appropriate. The annual radioactive environmental operating reports are publicly available. See ADAMS Accession Nos. ML16138A566 and ML17135A292 for 2015 and 2016 reports, respectively.

In its third set of concerns, the Department noted that Entergy provided in BVY 17-001, Table 2, the summed dose rates from two casks, one with a higher dose rate when loaded with mixed fuel and one with lower dose rates when loaded with mixed fuel. Because the Department was not able to verify that the sum of dose rates from all 58 casks at VYNPS meet either the dose limits of 10 CFR 20 or the Health Department's Radiological Health Rule, the Department asked for the sums of dose rates and the assessments of dose rates for actual and planned dry fuel storage at the ISFSI.

The staff recognizes that the Department needs additional information to verify the dose rates. VYNPS's planned dose rate assessment was marked proprietary and therefore withheld from public ADAMS. VYNPS will make the proprietary information available to the State of Vermont for review or inspection.

The staff points out that VYNPS is required to comply with both the NRC's requirements in 10 CFR Part 20 and Sections 72.104 and 72.106 and the State of Vermont's requirements for dose limits. VYNPS's technical specifications at 6.7.D, Radioactive Effluent Controls Program (ADAMS Accession No. ML15117A551) also provide the limits on the release of radioactive materials for compliance with 10 CFR Part 20. As discussed above, VYNPS provides the actual dose rates obtained in conducting its environmental monitoring program in an annual report to both the NRC and to the State. In addition, prior to loading fuel into the HI-STORM 100 cask system, VYNPS is required to conduct surveys to confirm compliance with the dose rate limits in Part 72.

The NRC appreciates Vermont's comments on these important issues. The NRC did not change this EA as a result of State's comments because the issues are considered and discussed in the SER for the exemption request, which is currently in preparation.

Please contact me if you have additional questions.

Sincerely,

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