



Entergy Nuclear Operations, Inc.
Vermont Yankee
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Christopher J. Wamser
Site Vice President

BVY 15-054

10 CFR 140.8
10 CFR 140.11(a)(4)

November 23, 2015

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Request for Exemption from 10 CFR 140.11(a)(4) - Supplement 1
(TAC No. MF3980)
Vermont Yankee Nuclear Power Station
Docket No. 50-271
License No. DPR-28

- REFERENCES:
1. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Request for Exemption from 10 CFR 140.11(a)(4)," BVY 14-027, dated April 17, 2014 (ML14111A400) (TAC No. MF3980)
 2. Email, NRC to Entergy Nuclear Operations, Inc. "VY RAI for Off-site Insurance Exemption (10 CFR 140.11) - MF3980," dated October 21, 2015 (ML15295A213)

Dear Sir or Madam:

By letter dated April 17, 2014 (Reference 1), Entergy Nuclear Operations, Inc. (ENO) requested a permanent exemption from 10 CFR 140.11(a)(4) for Vermont Yankee Nuclear Power Station (VY). The requested exemption would reduce the required level of primary off-site liability insurance to \$100,000,000 and eliminate the requirement for VY to carry secondary financial protection.

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 questions on this transmittal, please contact Mr. Coley Chappell at 802-451-3374.

Sincerely,

CJW/plc

Attachment: 1. Response to Request for Additional Information (2 pages)

M001
NRR

cc: Mr. Daniel H. Dorman
Regional Administrator, Region 1
U.S. Nuclear Regulatory Commission
2100 Renaissance Blvd, Suite 100
King of Prussia, PA 19406-2713

Mr. James S. Kim, Project Manager
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
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Mr. Christopher Recchia, Commissioner
Vermont Department of Public Service
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Attachment 1

Vermont Yankee Nuclear Power Station
Response to Request for Additional Information

REQUEST FOR ADDITIONAL INFORMATION
ENTERGY NUCLEAR OPERATIONS, INC.
REQUEST FOR EXEMPTION FROM OFF-SITE LIABILITY INSURANCE REQUIREMENTS
SPECIFIED IN 10 CFR 140.11(a)(4)
DOCKET NO. 50-271
TAC MF3980

By letter dated April 17, 2014 (Agency-wide Documents Access and Management System (ADAMS) Accession No. ML14111A400), Entergy Nuclear Operations, Inc. (ENO) requested an exemption from the requirements of 10 CFR 140.11(a)(4) for the Vermont Yankee Nuclear Power Station (VY). This regulation requires licensees to have and maintain two levels of financial protection against off-site liability for each nuclear reactor that is licensed to operate. The requested exemption would reduce the level of primary off-site liability insurance to \$100 million and eliminate the requirement for VY to carry secondary financial protection. In the exemption request, the licensee stated that the proposed reduced level of financial protection is commensurate with the reduced potential for and consequences of a nuclear incident associated with the permanently defueled reactor at VY. Following review of the exemption request, the staff has determined that the following additional information is necessary to complete the staff's technical review:

RAI-01:

Attachment 1 to the Exemption Request letter dated April 17, 2014, contains an evaluation of the consequences of design basis and beyond design basis events affecting the fuel stored in the spent fuel pool. This evaluation included calculated times to reach specific cladding temperatures associated with a potential release of radioactivity and estimated frequencies of severe events that could result in a release based in part on the findings of a pre-publication version of NUREG 2161, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor," September 2014 (ADAMS Accession No. ML14255A365). In its Staff Requirements Memorandum for SECY-93-0127 dated July 13, 1993, the Commission approved a policy that would permit reductions in commercial liability insurance coverage when a licensee was able to demonstrate that the spent fuel could be air-cooled if the spent fuel pool was drained of water. The analysis in NUREG-2161 demonstrates that spent fuel could be air-cooled under certain conditions if the spent fuel was drained of water, and ENO noted the similarity of the plant configuration used in the study to the configuration of the VY plant. However, the exemption request did not explain that the fuel distribution in the VY pool is and would be maintained consistent with the fuel configuration described in Section 6.2.2 of NUREG-2161 for later portions of the operating cycle when the fuel was shown to be air coolable. Please explain how the fuel distribution within the VY spent fuel pool will be controlled and describe its consistency with the NUREG-2161 assumed fuel distribution to support the conclusion that the fuel will be air coolable after the requested effective date of the exemption.

Response

VY is a GE Type 4 Boiling Water Reactor with a Mark I containment, which is the same as the reference plant used in the NUREG-2161 study. Section 6.2.2 of NUREG-2161 assumes that the fuel assemblies in the spent fuel pool (SFP) are stored in a 1x4 array, meaning that a recently discharged assembly is surrounded by four older, lower decay heat assemblies, as depicted in Figure 34 of NUREG-2161. VY maintains the fuel assemblies in a 1x4 array, consistent with the Section 6.2.2 assumption, with the most recently discharged fuel surrounded by older fuel or empty cells. The 1x4 array was established when the reactor was defueled and is planned to be maintained until the fuel off-loading activities are commenced. As fuel with decay time greater than 5 years is relocated within the SFP (e.g., to facilitate re-channeling activities) or transferred from the SFP to dry fuel storage, fuel assemblies from the final operating cycle may be surrounded by empty cells which contain only water. This scenario is consistent with an approach to the low-density loading pattern described in Table 15 and shown in Figure 48 of the study.

NUREG-2161 analysis shows that for the scenarios and SFP studied, which are applicable to VY, spent fuel is only susceptible to a radiological release within a few months after the fuel is moved from the reactor into the SFP. After that time, the spent fuel is coolable by air. The exemption request is based on an effective date of April 15, 2016. By then, the decay time (time since shutdown) for the fuel most recently removed from the reactor and placed in the SFP will be more than 468 days (15.4 months). This decay time is significantly greater than the decay time of "a few months" upon which the study conclusion is based.

Since VY has been shutdown for greater than 270 days, the corresponding Operating Cycle Phase (OCP) is OCP5 (240-700 days since defueling of the reactor) as defined in Table 16 of NUREG-2161. Figures 52 through 57 of the study show that the heat-up rates for the high-density cases (1x4) and the low density cases (1x4 empty cells) are similar for the OCP5 leak scenarios. These cases together account for the condition of the VY SFP where recently discharged fuel assemblies may be surrounded by older fuel, empty cells, or a combination of these, as older fuel is relocated within or removed from the SFP. Therefore the heat-up rate for the 1x4 configuration of the VY SFP, maintained as described above, is also similar. Without crediting successful deployment of mitigation, the leakage will eventually drain all water in the SFP, leading to natural circulation of air through the fuel assemblies.