Entergy

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10 CFR 50.12
10 CFR 50.47
10 CFR 50, Appendix E

Letter Number: 2.18.074

December 4, 2018

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

SUBJECT: Response to Request for Additional Information – Exemption from the Requirements of 10 CFR 50.47 and Appendix E to 10 CFR Part 50, Entergy Nuclear Operations, Inc. Pilgrim Nuclear Power Station

Pilgrim Nuclear Power Station
Docket 50-293
Renewed License No. DPR-35

REFERENCES:

1. Entergy Nuclear Operations, Inc. letter to NRC, "Request for Exemptions from Portions of 10 CFR 50.47 and 10 CFR Part 50 Appendix E," dated July 3, 2018 (ADAMS Accession No. ML18186A635)

2. NRC email to Entergy Nuclear Operations, Inc., "RAI – Pilgrim EP Exemption (EPID: L-2018-LLE-0011)," dated November 6, 2018 (ADAMS Accession No. ML18310A021)

In Reference 1, Entergy Nuclear Operations, Inc. (Entergy) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for exemption from portions of Title 10 Code of Federal Regulations (CFR) 50.47 and 10 CFR Part 50, Appendix E for the Pilgrim Nuclear Power Station (PNPS).

In Reference 2, the NRC requested additional information concerning the exemption request.

Attachment 1 to this letter provides the Entergy response to the NRC request for additional information (RAI).

This RAI response does not impact the conclusions of the evaluation presented in Reference 1.

This letter contains no new commitments and no revisions to existing commitments.

If you have any questions or require additional information, please contact Mr. Peter J. Miner at (508) 830-7127.

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NRR

A copy of this submittal has been provided to the designated Commonwealth of Massachusetts officials.

Respectfully,

Mandy K. Halter

MKH/dd/mp

Attachments:

1. Response to Request for Additional Information – Exemption from the Requirements of 10 CFR 50.47 and Appendix E to 10 CFR Part 50, Entergy Nuclear Operations, Inc., Pilgrim Nuclear Power Station

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NRC Senior Resident Inspector
Pilgrim Nuclear Power Station

Attachment 1

Letter Number 2.18.074

Response to Request for Additional Information - Exemption from the Requirements of 10 CFR 50.47 and Appendix E to 10 CFR Part 50, Entergy Nuclear Operations, Inc. Pilgrim Nuclear Power Station

A U.S. Nuclear Regulatory Commission (NRC) request for additional information (RAI) regarding a request for exemptions from portions of Title 10 Code of Federal Regulations (CFR) 50.47 and 10 CFR Part 50, Appendix E for the Pilgrim Nuclear Power Station (PNPS) was received by Entergy Nuclear Operations, Inc. (Entergy) via electronic mail (email) dated November 6, 2018. An Entergy response to the RAI request is provided below.

NRC REQUEST

By letter dated July 3, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18186A635), Entergy Nuclear Operations, Inc. requested an exemption from specific emergency planning requirements of Title 10 of the Code of Federal Regulations (10 CFR) Part 50 for the Pilgrim Nuclear Power Station (PNPS), based on the proposed permanent cessation of power operations and removal of fuel from the reactor vessel, which is expected no later than June 1, 2019. The exemption request has been reviewed against the requirements in 10 CFR 50.47, "Emergency plans," and Appendix E to 10 CFR Part 50, "Emergency Planning and Preparedness for Production and Utilization Facilities," using the guidance provided in Interim Staff Guidance (ISG) NSIR/DPR-ISG-02, "Emergency Planning Exemption requests for Decommissioning Nuclear Power Plants" (ADAMS Accession No. ML14106A057). The review considered the storage of the spent nuclear fuel in the spent fuel pool (SFP) and the onsite independent spent fuel storage installation, and the low likelihood of any credible accident resulting in radiological releases requiring offsite protective measures.

Based on the NRC staff's initial review of PNPS's EP exemption request, the following requests for additional information (RAIs) are required to facilitate completion of the staff's technical review.

NRR-SCPB-01

Applicable Regulation and Guidance
The current 10 CFR 50 regulatory requirements for emergency planning, developed for operating reactors, ensure protection of the health and safety of the public. However, once a power plant is permanently shutdown and defueled, some of these requirements exceed what is necessary to protect the health and safety of the public. Therefore, pursuant to 10 CFR 50.12 "Specific Exemptions", Entergy Nuclear Operations (Entergy) requested exemptions from certain emergency planning regulations in 10 CFR 50.47 and 10 CFR Part 50, Appendix E, for the Pilgrim Nuclear Power Station (PNPS).

Guidance for the staff review of Emergency Plan Exemption Requests can be found in Interim Staff Guidance (ISG) NSIR/DPR-ISG-02, "Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants." This guidance notes that the provisions of 10 CFR 50.12 permit the NRC to grant exemptions from the requirements of 10 CFR Part 50 regulations in circumstances where the application of the regulation is not necessary to achieve the underlying purpose of the rule. The staff concluded that a minimum of 10 hours would provide adequate time to initiate mitigative actions to cool the fuel or, if needed, for offsite authorities to implement protective actions using a comprehensive emergency management plan (CEMP) approach. Thus, a formal offsite radiological emergency plan would not be necessary for permanently shutdown and defueled nuclear power reactor

licensees when at least 10 hours would be necessary for the fuel to heat-up to the cladding ignition temperature following a complete loss of coolant.

Issue
Attachment 2 of Entergy's submittal contains the Adiabatic Heatup Analysis for Drained Spent Fuel Pool. In the attachment, Table 2 "Fuel Bundle Inputs for GNF2 Fuel" lists the geometry inputs for the GNF2 fuel bundles evaluated in the analysis. The mass of the upper and lower plenums, 13.217 and 14.612 lbms respectively, are listed. These values are then added to the calculated mass of zircaloy-2, which are used to calculate the total heat capacity of the fuel assembly. This heat capacity was used to demonstrate that a 10 hour heat up time to the ignition temperature (900°C) would be available with a 10 month decay time, assuming the fuel assembly heats uniformly.

Request for Additional Information
Based on the construction of a GNF2 fuel assembly, describe how the heat up rates of the plenums would be the same as the rest of the fuel assembly. Specifically, describe how the heat originating in the fuel gets to the upper and lower plenums under the assumed adiabatic conditions (when temperatures within the fuel bundle are assumed to maintain uniformity).

Entergy Response to NRR-SCPB-01

The adiabatic heatup analysis is conservatively based on the limiting (lowest enrichment, highest burnup) GNF2 fuel assembly discharged from the last cycle at Pilgrim Nuclear Power Station (PNPS) (Reference 1). The analysis defines an adiabatic envelope that incorporates the entire GNF2 fuel assembly, including the metallic mass of the upper and lower plenum, as well as the partial mass of the GNF2 channel. GNF2 is a 10x10 array that utilizes the classical tie rod construction for structural support of the bundle. This design utilizes 8 tie rods to connect the upper and lower tie plates providing the structural support of the bundle. The fuel rods, including the 8 tie rods, are all in direct metal contact with the upper and lower plenums, which are in turn in direct metal contact with the channel and the water rods (References 2 and 3). Direct metal contact provides a thermal pathway for the decay heat generated in the active region of the fuel rods to be conducted via the fuel cladding to these components. Under adiabatic conditions, there is no radiative, convective, or conductive heat transfer to the surrounding environment. Therefore, temperature differences between fuel assembly components are negligible and the components within the adiabatic envelope, including the upper and lower plenum regions, heat up at the same rate (Reference 4).

References

1. Entergy Nuclear Operations, Inc. letter to NRC, "Request for Exemptions from Portions of 10 CFR 50.47 and 10 CFR Part 50 Appendix E," Attachment 2, dated July 3, 2018 (ADAMS Accession No. ML18186A635)

2. DB-0011.03, Rev. 8, "GNF2 Design Basis," dated February 2013 (Proprietary)

3. GNF Drawing No: 105E2561, Rev 0, "Fuel Bundle," dated June 2008 (Proprietary)

4. RES/DSA/FSCB 2016-03, "Spent Fuel Assembly Heat Up Calculations in Support of Task 2 of User Need NSIR-2015-001, dated April 2016 (ADAMS Accession No. ML16110A431)