



Entergy Nuclear Operations, Inc.  
1340 Echelon Parkway  
Jackson, MS 39213  
Tel 601-368-5573

Mandy K. Halter  
Director, Nuclear Licensing

2.18.075

January 10, 2019

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

SUBJECT: Response to Request for Additional Information – License Amendment  
Request to Revise the Pilgrim Nuclear Power Station Technical  
Specifications – Permanently Defueled Technical Specifications

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

- REFERENCES:
1. Entergy Nuclear Operations, Inc. letter to NRC, "Technical Specifications Proposed Change - Permanently Defueled Technical Specifications" dated September 13, 2018 (ADAMS Accession No. ML18260A085)
  2. NRC email to Entergy Nuclear Operations, Inc., "Pilgrim: Request for Additional Information (RAI) – Pilgrim Post-Decommissioning Technical Specifications (PDTS) License Amendment Request (LAR) (EPID: L-2018-LLA-0268), dated November, 16, 2018 (ADAMS Accession No. ML18320A129)

In Reference 1, Entergy Nuclear Operations, Inc. (Entergy) submitted a license amendment request to the U.S. Nuclear Regulatory Commission (NRC) for approval of the Permanently Defueled Technical Specifications.

In Reference 2, the NRC requested additional information concerning the LAR.

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

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.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 10, 2019.

ADD  
NRR

Respectfully,

A handwritten signature in cursive script that reads "Mandy K. Halter".

MKH/sd/mp

Attachments:

1. Response to Request for Additional Information – License Amendment Request to Revise the Pilgrim Nuclear Power Station Technical Specifications – Permanently Defueled Technical Specifications

cc:

USNRC Regional Administrator, Region I  
USNRC Project Manager, Pilgrim  
USNRC Resident Inspector, Pilgrim  
Planning and Preparedness Section Chief, Massachusetts Emergency Management Agency  
Director, Massachusetts Department of Public Health, Radiation Control Program

**Attachment 1**

Letter Number 2.18.075

Response to Request for Additional Information – License Amendment Request  
to Revise the Pilgrim Nuclear Power Station Technical Specifications –  
Permanently Defueled Technical Specifications

**ARCB - RAI #1 a)**

"Please provide the following information regarding the radioactive waste handling accident:

- a) Which section of the UFSAR describes the radioactive waste handling accident and what changes are proposed to this section that reflect the permanently shut down and defueled condition of the reactor?"

**ENTERGY RESPONSE**

- a) Currently, Section 14.5.6 of the Pilgrim Nuclear Power Station (PNPS) Updated Final Safety Analysis Report (UFSAR) evaluates the potential effects resulting from condenser hotwell or radwaste system tank failures inside the Radwaste and Turbine Building. In addition, it evaluates the failure of the offgas piping, an air ejector discharge line break, and the rupture of the Condensate Storage Tanks (CST). In general, this section addresses radwaste system failures. Section 14.5.6 of the PNPS UFSAR does not include the analysis of the radwaste handling event addressing the drop of a High Integrity Container (HIC).

After the certifications are submitted for permanent cessation of operations and removal of fuel from the reactor vessel for PNPS in accordance with Title 10 of the Code of Federal Regulations (CFR) 50.82(a)(1)(i) and (ii), and docketed pursuant to 10 CFR 50.82(a)(2), power operations can no longer occur. As a result, another event will become the limiting event regarding the radwaste system accident when the Permanently Defueled Technical Specifications (PDTs) are implemented. This event will involve a radioactive waste handling event (i.e., a HIC drop event) (see the response to NRC ARCB - RAI #1 e). The discussions in Section 14.5.6 of the PNPS UFSAR will be replaced with a discussion of the HIC drop event as described in Calculation No. M1421, Offsite Doses Following the Drop of a High Integrity Container. This section will be retitled Radwaste System Accident – HIC Drop Event. It will include the following subsections: Analytical Methodology, Assumptions, Inputs, Radiological Consequences/Results, and References. In addition, a new table will be provided to address the HIC Drop Source Term Release Activity. These changes to the PNPS UFSAR will be reviewed under the provisions of 10 CFR 50.59.

The addition of the HIC drop event into the PNPS UFSAR will be beneficial during the active decommissioning phase. Following the transfer of all of the spent fuel to the Independent Spent Fuel Storage Installation, the Fuel Handling Accident will no longer be possible and the analysis will be removed from the PNPS UFSAR. At that time, the analysis of the HIC drop event will become the sole remaining event addressed in Section 14 of the PNPS UFSAR.

**ARCB - RAI #1 b)**

"Please provide the following information regarding the radioactive waste handling accident:

- b) Is the licensee proposing a new, or different kind of, DBA from any accident previously evaluated? If so, which TS(s) is added or does it impact?"

**ENTERGY RESPONSE**

- b) No. Currently, Section 14.5.6 of the PNPS UFSAR evaluates the failure of the condenser hotwell or a radwaste system tank with the primary release of radionuclides to the environment due to the release of gaseous iodine in chemical equilibrium with iodine in the liquid phase of the spillage. In addition, it evaluates the failure of the offgas piping, an air ejector discharge line break, and the rupture of the CST. In general, this section addresses radwaste system failures. While the HIC drop event is not currently addressed in Section 14.5.6 of the PNPS UFSAR, it was an event that could occur during normal operations that was considered bounded by the events presented in Section 14.5.6 of the PNPS UFSAR.

The HIC drop event will become the new bounding radwaste system accident after the plant is permanently shut down and defueled (see the response to NRC ACRC - RAI #1 e) when the PDTs are implemented. The event description was provided in the PDTs license amendment request (LAR) to demonstrate that the analysis does not impact any technical specifications or require any new technical specifications.

The HIC drop event occurs in the open air. Thus, the releases involve an unfiltered, ground level release that takes no credit for the operation of any systems, structures, or components (SSCs) to mitigate the consequences of the event. As such, it is not considered a design basis accident (DBA) as defined in Chapter 15 of NUREG-0800. The radioactive waste handling accident does not impact existing technical specifications or require the addition of new technical specifications.

**ARCB - RAI #1 c)**

"Please provide the following information regarding the radioactive waste handling accident:

- c) Is the radioactive waste handling accident maintained in a licensee-controlled document? If so, what is the name of the document? If not, will the radioactive waste handling accident be added to the Pilgrim UFSAR?"

**ENTERGY RESPONSE**

- c) The HIC drop event is not currently addressed in Section 14.5.6 of the PNPS UFSAR, it was an event that could occur during normal operations that was considered bounded by the events presented in Section 14.5.6 of the PNPS UFSAR.

After the certifications are submitted for permanent cessation of operations and removal of fuel from the reactor vessel for PNPS in accordance with 10 CFR 50.82(a)(1)(i) and (ii), and docketed pursuant to 10 CFR 50.82(a)(2), power operations can no longer occur. As a result, the HIC drop event will become the most limiting event for radwaste system failure when the PDTS are implemented. As part of the implementation of the PDTS, the discussions in Section 14.5.6 of the PNPS UFSAR will be replaced with a discussion of the HIC drop event as described in Calculation No. M1421, Offsite Doses Following the Drop of a High Integrity Container. This section will be retitled Radwaste System Accident – HIC Drop Event, and will contain the information described in the response to NRC ARCB - RAI #1 a). These changes to the PNPS UFSAR will be reviewed under the provisions of 10 CFR 50.59.

**ARCB - RAI #1 d)**

"Please provide the following information regarding the radioactive waste handling accident:

- d) Is it the licensee's intent of including the radioactive waste handling accident as "general information" of "other accidents considered" and not a proposed new, or [different] kind of, DBA?"

**ENTERGY RESPONSE**

- d) The radioactive waste handling event was included in the PDTs LAR as general information of other accidents considered and not a proposed new, or different kind, of DBA. As discussed in the response to ARCB - RAI #1 b), the HIC drop event does not meet the definition of a DBA since there are no SSCs that are credited to mitigate the event.

**ARCB - RAI #1 e)**

"Please provide the following information regarding the radioactive waste handling accident:

- e) Does the radioactive waste handling accident bound the radiological consequences of the Radwaste System Accident DBAs found in Pilgrim UFSAR Section 14.5.6 when Pilgrim is in a permanently shutdown and defueled condition?"

**ENTERGY RESPONSE**

- e) Yes. After the certifications are submitted for permanent cessation of operations and removal of fuel from the reactor vessel for PNPS in accordance with 10 CFR 50.82(a)(1)(i) and (ii), and docketed pursuant to 10 CFR 50.82(a)(2), power operations can no longer occur. As a result, the HIC drop event will become the most limiting event for radwaste system failure when the PDTs are implemented. It will be the radwaste system accident that is addressed in Section 14.5.6 of the PNPS UFSAR. The table below provides a comparison of the 2-Hour Exclusion Area Boundary (EAB) and 30-Day Low Population Zone (LPZ) thyroid doses for the limiting liquid radwaste tank accident and the HIC drop event.

Table - Dose Consequences – Failure of a Condensate Storage Tank and HIC Drop Event

| Event  | 2-Hour EAB<br>– Thyroid<br>(rem) | 30-Day LPZ<br>– Thyroid<br>(rem) | 2-Hour and 30-Day<br>EAB and LPZ<br>Thyroid Limit (rem) |
|--|----------------------------------|----------------------------------|---|
| Calculation M1424 - Failure of CST   | 2.08E-02                         | 2.06E-04                         | 30  |
| Calculation M1421 - HIC Drop<br>Event – Limiting Distance within the<br>Protected Area Fence | 2.7E-02                          | 1.58E-03                         | 30  |

As discussed in the PDTs LAR, Calculation No. M1421, Offsite Doses Following the Drop of a High Integrity Container, analyzes a design basis waste handling event involving a drop of a HIC. The table above shows the 2-hour EAB and 30-day LPZ inhalation doses to the thyroid for the HIC drop event.

Calculation No. M1424, Radiological Consequence of a Liquid Radwaste Tank Accident, analyzes a design basis liquid radwaste system accident involving the failure of a storage tank that contains a significant quantity of liquid radioactive material. The event considered in this analysis is a liquid radwaste system accident where the entire contents of a storage tank are lost. The analysis conservatively assumes that the contents of the tank were at the Technical Specifications 3.6.B maximum limit of  $20 \mu\text{Ci}/\text{cm}^3$  of iodine isotopes at shutdown. The same isotopic distribution as the design basis main steam line break accident is assumed. Credit is taken for the 46 days decay post-shutdown prior to the implementation of the PDTs. The iodine release fraction is conservatively calculated based on NUREG/CR-5950, Rev. 3, Iodine Evolution and pH Control, and the released fraction of the total contents is instantaneously released to the atmosphere. Therefore, the mixing or dilution of iodine isotopes within the Radwaste or Turbine Building is not credited, nor is the additional decay during the time period of dose accumulation, 2-hours for the EAB and 30 days for the LPZ. For each offsite dose location, the bounding



atmospheric dispersion factor ( $X/Q$ ) and breathing rate are used to determine the inhalation dose to the thyroid.

Calculation No. M1424 determined the dose rates for the limiting tank failure (CST) following 46 days of decay post-shutdown prior to the implementation of the PDTS. The table above shows the 2-hour EAB and 30-day LPZ inhalation doses to the thyroid for the failure of a CST, and demonstrates that these results will be bounded by the HIC drop event.

**ARCB - RAI #1 f)**

"Please provide the following information regarding the radioactive waste handling accident:

- f) Please explain why the Radwaste System Accident DBAs found in Pilgrim UFSAR Section 14.5.6 are no longer applicable when Pilgrim is in a permanently shutdown and defueled condition?"

**ENTERGY RESPONSE**

- f) Currently, Section 14.5.6 of the PNPS UFSAR evaluates the failure of the condenser hotwell or a radwaste system tank with the primary release of radionuclides to the environment due to the release of gaseous iodine in chemical equilibrium with iodine in the liquid phase of the spillage. In addition, it evaluates the failure of the offgas piping, an air ejector discharge line break, and the rupture of the CST. After the certifications are submitted for permanent cessation of operations and removal of fuel from the reactor vessel for PNPS in accordance with 10 CFR 50.82(a)(1)(i) and (ii), and docketed pursuant to 10 CFR 50.82(a)(2), power operations can no longer occur. As a result, the offgas piping and air ejector discharge line will no longer perform a function in the permanently shut down and defueled state. Thus, the failure of those components is not required to be addressed since those SSCs will no longer be required to be operable or functional to support decommissioning activities, such as spent fuel pool storage, cooling and transfer operations.

The radwaste tanks and CST will continue to be utilized for some time following the permanent shut down and defueling of the reactor. A radioactive spill from these tanks will still be possible until the tanks are drained of their contents. However, as described above in the response to ARCB - RAI #1 e), the consequences of a failure of a liquid radwaste storage tank (i.e., the most bounding was determined to be the failure of the CST) 46 days following permanent shutdown of the reactor is bounded by the HIC drop event. Therefore, the analysis of the HIC drop event will be the new bounding radwaste system accident when the PDTs are implemented.