UNITED STATES
NUCLEAR REGULATORY COMMISSION
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June 5, 2026

MEMORANDUM TO: Michelle Sutherland, Acting Branch Chief
Reactor Decommissioning Branch
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety and Safeguards

FROM: Marlayna Doell, Project Manager
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Office of Nuclear Material Safety and Safeguards

Signed by Doell, Marlayna
on 06/05/26

SUBJECT: PILGRIM NUCLEAR POWER STATION LICENSE TERMINATION PLAN READINESS ASSESSMENT – SUMMARY FROM WRITTEN CORRESPONDENCE, CLARIFICATION CALLS ON AUGUST 7 AND DECEMBER 10, 2025, AND SITE VISIT AND IN PERSON MEETING ON MARCH 23, 2026 (EPID: L-2024-LRM-0067)

On April 2, 2025 (Agencywide Documents and Management System (ADAMS) Accession No. ML25092A230), Holtec Decommissioning International, LLC (HDI) submitted a request for the U.S. Nuclear Regulatory Commission (NRC) to conduct a Preapplication Readiness Assessment of the Draft License Termination Plan (LTP) for the Pilgrim Nuclear Power Station (PNPS). This request was the second phase of a similar PNPS LTP readiness assessment request made on April 22, 2024 (ML24113A209).

On August 7, 2025, and December 10, 2025, the NRC staff held clarification calls with HDI on aspects of Chapter 2 of the Draft LTP. Additional discussions took place during a site visit and in person meeting that took place on March 23, 2026. Several readiness assessment observations had also been addressed in earlier correspondence via a secure online portal as part of the readiness assessment process. A summary of the NRC staff's clarification questions and observations, as well as HDI's responses to the NRC comments, is documented in Enclosure 1. A list of attendees is documented in Enclosure 2. The NRC staff made no regulatory decisions during these interactions but found the licensee's answers responsive to the observations. The NRC will fully evaluate the PNPS LTP upon formal submittal.

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In accordance with 10 CFR 2.390, a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's ADAMS. ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html.

Docket No.: 50-293
License No.: DPR-35

Enclosures:
1. Clarification Questions and Observations
2. List of Attendees

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PILGRIM NUCLEAR POWER STATION (PNPS)
LICENSE TERMINATION PLAN (LTP) READINESS ASSESSMENT
SUMMARY FROM WRITTEN CORRESPONDENCE, CLARIFICATION CALLS
ON AUGUST 7, 2025, AND DECEMBER 10, 2025, AND SITE VISIT
AND IN PERSON MEETING ON MARCH 23, 2026

Pilgrim LTP Draft Chapter 2, "Site Characterization," Questions and Observations

Radionuclides of Concern (ROCs)

General NRC Observations:

The NRC raised questions about inconsistencies in the radionuclide lists across various documents, including the presence of Np-237 in the LTP but not in supporting documents. There was inquiry into the selection of activity values from NUREG/CR-3474 for determining ROC fractions, specifically why only the "shroud" values were used instead of combined totals. Additionally, the NRC questioned the deselection of radionuclides such as Ni-59, Cs-134, and Pu-240, which were identified in waste stream analyses but excluded from ROC consideration without clear explanation. HDI responded that some radionuclides were not observed in certain analyses, but the NRC sought clarification to resolve discrepancies between different reports.

Summary of HDI Response:

- Np-237 was added proactively as a site-specific ROC.
- The licensee clarified the basis for selecting activity values from NUREG/CR-3474 and the rationale for using shroud values.
- Some radionuclides (e.g., Ni-59, Cs-134, Pu-240) were deselected due to:
  - Extremely low activity (<1 percent of total)
  - Not detected in waste streams
  - Analytical limitations (e.g., combined isotopic reporting of Pu-239/240).

ROC Analysis and Sample Testing

General NRC Observations:

The NRC requested that for samples selected for Hard-to-Detect (HTD) radionuclide analysis, results should include the full suite of radionuclides listed in LTP Table 2-3 or provide justification if not. It was noted that some HTD radionuclides like H-3, C-14, and Np-237 were not included in the analysis plans. Furthermore, gamma-emitting ROCs besides Co-60 and Cs-137 appeared absent from sample results. HDI's quality assurance section indicated selective offsite laboratory analysis for certain beta- and alpha-emitting radionuclides but did not cover the full ROC suite.

Summary of HDI Response:

- The licensee confirmed that 10 percent of samples from applicable survey areas are sent offsite for HTD radionuclide analysis.
- Several clarifications acknowledge updates are needed to the LTP (e.g., Pu-241 is a beta emitter, not alpha), which will be incorporated into the final version.

- Gamma ROCs not exceeding MDAs were omitted from summary tables but will be included in future FSS reporting.

Radionuclide Fractions

General NRC Observations:

The LTP Chapter 2 lacked discussion on radionuclide fractions necessary for evaluating ROCs, insignificant contributors, surrogate ratios, and instrument efficiency. The NRC requested this data, including characterization information used to derive fractions, especially if separate radionuclide mixes are planned for different contaminated media or site areas. It was also noted that volumetric analysis was limited primarily to surface soils, with minimal subsurface or embedded materials analyzed.

Summary of HDI Response:

- The licensee confirmed that nuclide fractions will be further discussed in Chapter 5 of the PNPS LTP.
- The licensee further explained that:
  - ~140 concrete core bores were collected in 2025.
  - Depth profiling was conducted with 0.5-inch slicing.
  - Results will support nuclide fractions used in DCGL development.

Land Area Characterization

General NRC Observations:

Clarifications were sought regarding the classification and characterization of certain survey areas, including the addition of the NWA Survey Area late in LTP Chapter 2 without explanation of its Class III designation or related characterization data. Questions were raised about incomplete sampling in areas such as the main parking lot and the storm drain system, which were designated Class III but lacked clear sampling or final classification information.

Summary of HDI Response:

- North Water Area (NWA): Classified as Class 3; ten samples showed no detectable plant-related isotopes.
- Parking lot and stormwater systems:
  - Parking lot scans completed in 2025 with no anomalies.
  - Storm drain system classification pending due to accessibility limits.
- The licensee confirmed that the final version of Chapter 2 of the LTP will be updated as appropriate once these results are finalized

Structural Characterization

General NRC Observations:

The NRC noted that only ten concrete samples were taken across four buildings, with limited analysis for HTD radionuclides and mostly qualitative onsite gamma spectroscopy. The NRC emphasized the need for volumetric concrete core sampling and full suite radionuclide analysis to determine contamination depth and support radionuclide fraction calculations before final

status surveys and license termination. The NRC suggested that if this data is not submitted with the LTP, a license condition should require it before final status survey implementation.

Summary of HDI Response:

- The licensee confirmed that 10 percent of samples from applicable survey areas are sent offsite for HTD radionuclide analysis.
- The licensee confirmed that nuclide fractions, insignificant contributors and surrogate ratios will be further discussed in Chapter 5 and Chapter 6 of the PNPS LTP.
- The licensee further explained that:
  - ~140 concrete core bores were collected in 2025.
  - Depth profiling was conducted with 0.5-inch slicing.
  - Results will support nuclide fractions used in DCGL development.

Subsurface Characterization

General NRC Observations:

The NRC questioned whether subsurface sampling adequately covered areas with known leaks or spills, noting that some inaccessible subsurface soils were deferred and plans for further characterization were unclear. The basis for the depths and locations of “deep soil samples” was also requested. HDI indicated ongoing collection of approximately 140 core bores to inform contamination extent and radionuclide fractions, and plans for continuing characterization in areas of interest. HDI also described plans for groundwater contamination investigations, including monitoring wells and sampling, which will be detailed in forthcoming LTP chapters.

Summary of HDI Response:

- The licensee clarified that:
  - Past spills/leaks were evaluated through surface, subsurface, and deep soil sampling.
  - “Deep soil” = >1 ft depth; subsurface = >6 inches to 1 ft.
  - Additional subsurface sampling will be performed where leaks could have occurred at depth.

Minor Comments: Maps, Classifications, and Action Levels

General NRC Observations:

The NRC recommended improvements to maps in the LTP to show all site areas with clear boundaries, scan and sample locations, and survey area sizes. Several survey areas (PERA-1, PERA-2, PERA-3) were discussed but not shown in figures. Sub-areas with differing MARSSIM classifications were not clearly designated on maps. The NRC also noted inconsistencies in MARSSIM classifications for some facilities and unclear information about the 144 areas of interest referenced. The rationale for random versus biased sampling in Class II and III areas needed justification. Clarifications on how gross measurements in structures were compared to radionuclide-specific Derived Concentration Guideline Levels (DCGLs) were requested, including examples from the SOCA-2 survey area. Additionally, the list of Minimum Detectable Concentrations (MDCs) reported by the offsite laboratory appeared incomplete, covering only 7 of the 18 initial ROCs.

Summary of HDI Response:

- Licensee commits to:
  - Updating LTP maps with clearer boundaries, spill areas, and scan coverages.
  - Reconciling inconsistencies in WOCA-2 classifications.
- Licensee clarified that:
  - Action levels are radionuclide-specific and tied to bounding DCGLs.
  - Instruments were selected to achieve MDCs at ≤50 percent of action levels.

Groundwater Comments

Conceptual Site Model (CSM)

General NRC Observations:

The NRC sought clarification on how hydraulic properties of construction fill and subsurface concrete structures were considered in the conceptual site model for groundwater flow and radionuclide transport. Questions addressed whether groundwater contours implied influence by these materials, differences between construction fill and natural glacial sediments, and the rationale for radionuclide mobility differences, particularly for tritium and cesium. The NRC also requested information on annual and seasonal water table fluctuations, their impact on site structures, and confirmation regarding tidal effects. HDI provided responses indicating understanding of these concerns and plans to include definitions and descriptions in the updated version of LTP Chapter 2.

Summary of HDI Response:

The licensee noted that:

- Concrete structures were not found to significantly alter groundwater flow.
- Seasonal/tidal groundwater variability is limited and localized.
- Groundwater typically lies 15–20 ft below ground surface; remaining structures will extend down to 3 ft below grade at license termination.
- Groundwater will continue to be analyzed per the Offsite Dose Calculation Manual.

Radionuclide Measurements

General NRC Observations:

Clarifications were requested on the set of radionuclides to be measured and reported in groundwater analyses, including whether the groundwater ROC set differs from the initial suite in LTP Table 2-3. The NRC highlighted the need to reconcile these with current monitoring programs and Annual Radiological Effluent Release Reports (ARERRs), noting some radionuclides like C-14 are not routinely measured. The NRC also sought confirmation on adherence to MARLAP guidance for laboratory result reporting and interpretation and requested a broad plan for groundwater data use in final status surveys, including trend monitoring and contamination extent assessment. HDI indicated that these issues are addressed in forthcoming LTP chapters and ongoing planning.

- Additional Clarification from December 10, 2025, call: LTP Chapter 6 is not yet available, but recent LTPs from other sites did not initially reconcile the

characterization measurements (e.g., reported in past ARERRs) with the needs of any dose calculation in Chapter 6. This question illustrates an unavoidable problem when reviewing LTP chapters one by one. However, since draft LTP Chapter 2 provided a table with the site-specific radionuclides, the NRC decided to ask the question now rather than wait for Chapter 6 to become available. Once Chapter 6 is made available, the NRC can comment on the suite of radionuclides for groundwater (whether the entire suite or a deselected list of groundwater radionuclides of concern, ROCs, and the supporting basis for deselection) and the precision needed for measurements. The plan to utilize measurements from the construction dewatering is a useful example of what could be a more generic plan in developing groundwater ROCs that include likely and potential radionuclides.

- Additional Clarification during March 23, 2026, meeting at Pilgrim: Staff and HDI discussed the meaning of "reconciling" the inputs needed for the dose calculation of existing groundwater contamination in the LTP with the onsite groundwater monitoring program as reported in the Annual Radiological Effluent Release Reports. Staff indicated that a data quality objective analysis (DQO) be performed for groundwater inputs needed for the LTP dose calculation and modify the onsite groundwater monitoring program accordingly. Staff indicated that DQOs for groundwater are discussed in section 4.2 of DUWP-ISG-02.[1] Specifically, the DQOs assessment will address list of radionuclides (radionuclides of concern) and precision required for measurements used as input to the dose calculation of the LTP for existing groundwater contamination. Chapter 2 of the LTP may need to revised to include the plan for modifying the characterization of groundwater derived from monitoring program, if warranted by the DQO analysis.

Summary of HDI Response:

The licensee noted that:
- ARERR analyses include tritium and gamma emitters routinely; other isotopes less routinely.
- Inclusion of additional radionuclides (e.g., C-14) depends on findings from 2025 core analyses.

1 DUWP-ISG-02, "Radiological Survey and Dose Modeling of the Subsurface to Support License Termination," Division of Decommissioning, Uranium Recovery, and Waste Recovery Programs Interim Staff Guidance DUWP-ISG-02, September 2024, ML24197A219.

LIST OF ATTENDEES AT THE AUGUST 7 AND DECEMBER 10, 2025, CLARIFICATION CALLS ON PILGRIM NUCLEAR POWER STATION (PNPS) LICENSE TERMINATION PLAN READINESS ASSESSMENT

Nuclear Regulatory Commission (NRC):
Marlayna Doell
Ossy Font
Karen Pinkston
Nate Fuguet
Randy Fedors

Holtec Decommissioning International, Pilgrim and its Contractors:
David Noyes
Frank McGinnis
Tom Williamson
Sarah Roberts
Ed Mercer
Gordon Madison
Chris Messier
Mark Lawson
Bill Noval