NUCLEAR REGULATORY COMMISSION

Docket No. 50-293

Holtec Decommissioning International, LLC

Pilgrim Nuclear Power Station

Exemption

I. Background.

By letter dated November 10, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15328A053), Entergy Nuclear Operations, Inc. (ENOI) certified to the U.S. Nuclear Regulatory Commission (NRC) that it planned to permanently cease power operations at Pilgrim Nuclear Power Station (Pilgrim) no later than June 1, 2019. On May 31, 2019, ENOI permanently ceased power operations at Pilgrim. By letter dated June 10, 2019 (ADAMS Accession No. ML19161A033), ENOI certified to the NRC that the fuel was permanently removed from the Pilgrim reactor vessel and placed in the spent fuel pool (SFP) on June 9, 2019. Based on the docketing of these certifications for permanent cessation of operations and permanent removal of fuel from the reactor vessel, as specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.82(a)(2), the 10 CFR Part 50 license for Pilgrim no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel. The facility is still authorized to possess and store irradiated (i.e., spent) nuclear fuel. Spent fuel is currently stored onsite at the Pilgrim facility in the SFP and in a dry cask independent spent fuel storage installation (ISFSI).

Many of the accident scenarios postulated in the updated safety analysis reports (USARs) for operating power reactors involve failures or malfunctions of systems, which could affect the fuel in the reactor core and, in the most severe postulated accidents, would involve the release of large quantities of fission products. With the permanent cessation of power

operations at Pilgrim and the permanent removal of the fuel from the reactor vessel, many accidents are no longer possible. The reactor, reactor coolant system, and supporting systems are no longer in operation and have no function related to the storage of the spent fuel. Therefore, emergency planning (EP) provisions for postulated accidents involving failure or malfunction of the reactor, reactor coolant system, or supporting systems are no longer applicable.

The EP requirements of 10 CFR 50.47, "Emergency plans," and Appendix E to 10 CFR Part 50, "Emergency Planning and Preparedness for Production and Utilization Facilities," continue to apply to nuclear power reactors that have permanently ceased operation and have permanently removed all fuel from the reactor vessel. There are no explicit regulatory provisions distinguishing EP requirements for a power reactor that is permanently shut down and defueled from those for a reactor that is authorized to operate. To reduce or eliminate EP requirements that are no longer necessary due to the decommissioning status of the facility, the Pilgrim licensee must obtain exemptions from those EP regulations. Only then can the Pilgrim licensee modify the facility emergency plan to reflect the reduced risk associated with the permanently shutdown and defueled condition of Pilgrim.

II. Request/Action.

By letter dated July 3, 2018 (ADAMS Accession No. ML18186A635), as supplemented by letters dated November 30 and December 4, 2018, and February 14 and February 18, 2019 (ADAMS Accession Nos. ML18338A205, ML18341A219, ML19050A298, and ML19056A260, respectively), ENOI requested exemptions from certain EP requirements in 10 CFR Part 50 for Pilgrim. Specifically, ENOI requested exemptions from certain planning standards in 10 CFR 50.47(b) regarding onsite and offsite radiological emergency preparedness plans for nuclear power reactors; from certain requirements in 10 CFR 50.47(c)(2) that require

establishment of plume exposure and ingestion pathway EP zones for nuclear power reactors; and from certain requirements in 10 CFR Part 50, Appendix E, Section IV, which establish the elements that comprise the content of emergency plans. In the letters dated November 30 and December 4, 2018, and February 14 and February 18, 2019, ENOI provided supplemental information and responses to the NRC staff's requests for additional information concerning the proposed exemptions.

By letter dated November 16, 2018 (ADAMS Accession No. ML18320A031), ENOI, on behalf of itself and Entergy Nuclear Generation Company (ENGC) (to be known as Holtec Pilgrim, LLC), Holtec International (Holtec), and Holtec Decommissioning International, LLC (HDI, the licensee) (together, Applicants), requested that the NRC consent to: (1) the indirect transfer of control of Renewed Facility Operating License No. DPR-35 for Pilgrim, as well as the general license for the Pilgrim ISFSI (together, the Licenses), to Holtec; and (2) the direct transfer of ENOI's operating authority (i.e., its authority to conduct licensed activities at Pilgrim) to HDI. In addition, the Applicants requested that the NRC approve a conforming administrative amendment to the Licenses to reflect the proposed direct transfer of the Licenses from ENOI to HDI; a planned name change for ENGC from ENGC to Holtec Pilgrim, LLC; and deletion of certain license conditions to reflect satisfaction and termination of all ENGC obligations after the license transfer and equity sale.

By Order dated August 22, 2019 (ADAMS Accession No. ML19170A265), the NRC staff approved the direct and indirect transfers requested in the November 16, 2018, application. Additionally, on August 22, 2019, HDI informed the NRC (ADAMS Accession No. ML19234A357) that:

> HDI will assume responsibility for all ongoing NRC regulatory actions and reviews currently underway for Pilgrim Nuclear Power Station. HDI respectfully requests NRC continuation of these regulatory actions and reviews.

On August 26, 2019, ENOI informed the NRC that the license transfer transaction closed on August 26, 2019 (ADAMS Accession No. ML19239A037). On August 27, 2019 (ADAMS Accession No. ML19235A050), the NRC staff issued Amendment No. 249 to reflect the license transfer. Accordingly, HDI is now the licensee for decommissioning operations at Pilgrim.

The information provided by the licensee included justifications for each exemption requested. The exemptions requested would eliminate the requirements to maintain formal offsite radiological emergency preparedness plans reviewed by the Federal Emergency Management Agency (FEMA) under the requirements of 44 CFR, "Emergency Management and Assistance," part 350, "Review and Approval of State and Local Radiological Emergency Plans and Preparedness," and would reduce the scope of onsite EP activities at Pilgrim. The licensee stated that the application of all the standards and requirements in 10 CFR 50.47(b), 10 CFR 50.47(c), and 10 CFR Part 50, Appendix E is not needed for adequate emergency response capability, based on the substantially lower onsite and offsite radiological consequences of accidents still possible at the permanently shutdown and defueled facility, as compared to an operating facility. If offsite protective actions were needed for a highly unlikely beyond-design-basis accident that could challenge the safe storage of spent fuel at Pilgrim, provisions exist for offsite agencies to take protective actions using a comprehensive emergency management plan (CEMP) under the National Preparedness System to protect the health and safety of the public. A CEMP in this context, also referred to as an emergency operations plan, is addressed in FEMA's Comprehensive Preparedness Guide 101, "Developing and Maintaining Emergency Operations Plans," which is publicly available at http://www.fema.gov/pdf/about/divisions/npd/CPG_101_V2.pdf. Comprehensive Preparedness Guide 101 is the foundation for State, territorial, Tribal, and local EP in the United States. It promotes a common understanding of the fundamentals of risk-informed planning and decision-making and helps planners at all levels of government in their efforts to develop and maintain viable, all-hazards, all-threats emergency plans. An emergency operations plan is flexible

enough for use in all emergencies. It describes how people and property will be protected; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies and other resources available; and outlines how all actions will be coordinated. A CEMP is often referred to as a synonym for "all-hazards planning."

III. Discussion.

In accordance with 10 CFR 50.12, "Specific exemptions," the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50 when: (1) the exemptions are authorized by law, will not present an undue risk to public health and safety, and are consistent with the common defense and security; and (2) any of the special circumstances listed in 10 CFR 50.12(a)(2) are present. These special circumstances include, among other things, that the application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

As noted previously, the EP regulations contained in 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50 apply to both operating and shutdown power reactors. The NRC has consistently acknowledged that the risk of an offsite radiological release at a power reactor that has permanently ceased operations and permanently removed fuel from the reactor vessel is significantly lower, and the types of possible accidents are significantly fewer, than at an operating power reactor. However, the EP regulations do not recognize that once a power reactor permanently ceases operation, the risk of a large radiological release from credible emergency accident scenarios is significantly reduced. The reduced risk for any significant offsite radiological release is based on two factors. One factor is the elimination of accidents applicable only to an operating power reactor, resulting in fewer credible accident scenarios. The second factor is the reduced short-lived radionuclide inventory and decay heat production

due to radioactive decay. Due to the permanently defueled status of the reactor, no new spent fuel will be added to the SFP and the radionuclides in the current spent fuel will continue to decay as the spent fuel ages. The irradiated fuel will produce less heat due to radioactive decay, increasing the available time to mitigate a loss of water inventory from the SFP. The NRC's NUREG/CR-6451, "A Safety and Regulatory Assessment of Generic BWR [Boiling Water Reactor] and PWR [Pressurized Water Reactor] Permanently Shutdown Nuclear Power Plants," dated August 1997 (ADAMS Accession No. ML082260098), and the NRC's NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," dated February 2001 (ADAMS Accession No. ML010430066), confirmed that for permanently shutdown and defueled power reactors that are bounded by the assumptions and conditions in the report, the risk of offsite radiological release is significantly less than for an operating power reactor.

In the past, EP exemptions similar to those requested for Pilgrim, have been granted to permanently shutdown and defueled power reactor licensees. However, the exemptions did not relieve the licensees of all EP requirements. Rather, the exemptions allowed the licensees to modify their emergency plans commensurate with the credible site-specific risks that were consistent with a permanently shutdown and defueled status. Specifically, the NRC's approval of these prior exemptions was based on the licensee's demonstration that: (1) the radiological consequences of design-basis accidents would not exceed the limits of the U.S. Environmental Protection Agency (EPA) early phase Protective Action Guides (PAGs) of one roentgen equivalent man (rem) at the exclusion area boundary; and (2) in the highly unlikely event of a beyond-design-basis accident resulting in a loss of all modes of heat transfer from the fuel stored in the SFP, there is sufficient time to initiate appropriate mitigating actions, and if needed, for offsite authorities to implement offsite protective actions using a CEMP approach to protect the health and safety of the public.

With respect to design-basis accidents at Pilgrim, the licensee provided analysis demonstrating that 10 months following permanent cessation of power operations, the radiological consequences of the only remaining design-basis accident with potential for offsite radiological release (the fuel handling accident in the Auxiliary Building, where the SFP is located) will not exceed the limits of the EPA PAGs at the exclusion area boundary.

With respect to beyond-design-basis accidents at Pilgrim, the licensee analyzed a drain down of the SFP water that would effectively impede any decay heat removal. The analysis demonstrates that at 10 months after permanent cessation of power operations, there would be at least 10 hours after the assemblies have been uncovered until the limiting fuel assembly (for decay heat and adiabatic heatup analysis) reaches 900 degrees Celsius (°C), the temperature used to assess the potential onset of fission product release. The analysis conservatively assumed that the heat up time starts when the SFP has been completely drained, although it is likely that site personnel will start to respond to an incident when drain down starts. The analysis also does not consider the period of time from the initiating event causing loss of SFP water inventory until cooling is lost.

The NRC staff reviewed the licensee's justification for the requested exemptions against the criteria in 10 CFR 50.12(a) and determined, as described below, that the criteria in 10 CFR 50.12(a) will be met, and that the exemptions should be granted 10 months after Pilgrim has permanently ceased power operations. An assessment of the licensee's EP exemptions is described in SECY-19-0078, "Request by the Entergy Nuclear Operations, Inc. for Exemptions from Certain Emergency Planning Requirements for the Pilgrim Nuclear Power Station," dated August 9, 2019 (ADAMS Accession No. ML18347A717). The Commission approved the NRC staff's recommendation to grant the exemptions in the staff requirements memorandum to SECY-19-0078, dated November 4, 2019 (ADAMS Accession No. ML19308A034). Descriptions of the specific exemptions requested by the licensee and the NRC staff's basis for granting each exemption are provided in SECY-19-0078. The NRC staff's detailed review and

technical basis for the approval of the specific EP exemptions requested by the licensee are provided in the NRC staff's safety evaluation dated December 18, 2019 (ADAMS Accession No. ML19142A043).

A. The Exemption is Authorized by Law.

The licensee has proposed exemptions from certain EP requirements in 10 CFR 50.47(b), 10 CFR 50.47(c)(2), and 10 CFR Part 50, Appendix E, Section IV, that would allow the licensee to revise the Pilgrim Emergency Plan to reflect the permanently shutdown and defueled condition of the facility. As stated above, in accordance with 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50. The NRC staff has determined that granting of the licensee's proposed exemptions will not result in a violation of the Atomic Energy Act of 1954, as amended, or the NRC's regulations. Therefore, the exemptions are authorized by law.

B. The Exemption Presents no Undue Risk to Public Health and Safety.

As stated previously, the licensee provided analyses that show that the radiological consequences of design-basis accidents will not exceed the limits of the EPA early phase PAGs at the exclusion area boundary. Therefore, formal offsite radiological emergency preparedness plans required under 10 CFR Part 50 will no longer be needed for protection of the public beyond the exclusion area boundary, based on the radiological consequences of design-basis accidents still possible at Pilgrim 10 months after the plant has permanently ceased power operations.

Although highly unlikely, there is one postulated beyond-design-basis accident that might result in significant offsite radiological releases. However, NUREG-1738 confirms that the risk of beyond-design-basis accidents is greatly reduced at permanently shutdown and defueled reactors. The NRC staff's analyses in NUREG-1738 conclude that the event sequences important to risk at permanently shutdown and defueled power reactors are limited to large

earthquakes and cask drop events. For EP assessments, this is an important difference relative to operating power reactors, where typically a large number of different sequences make significant contributions to risk. As described in NUREG-1738, relaxation of offsite EP requirements in 10 CFR Part 50 a few months after shutdown resulted in only a small change in risk. The report further concludes that the change in risk due to relaxation of offsite EP requirements is small because the overall risk is low, and because even under current EP requirements for operating power reactors, EP was judged to have marginal impact on evacuation effectiveness in the severe earthquakes that dominate SFP risk. All other sequences including cask drops (for which offsite radiological emergency preparedness plans are expected to be more effective) are too low in likelihood to have a significant impact on risk.

Therefore, granting exemptions to eliminate the requirements of 10 CFR Part 50 to maintain offsite radiological emergency preparedness plans and to reduce the scope of onsite EP activities will not present an undue risk to the public health and safety.

C. The Exemption is Consistent with the Common Defense and Security.

The requested exemptions by the licensee only involve EP requirements under 10 CFR Part 50 and will allow the licensee to revise the Pilgrim Emergency Plan to reflect the permanently shutdown and defueled condition of the facility. Physical security measures at Pilgrim are not affected by the requested EP exemptions. The discontinuation of formal offsite radiological emergency preparedness plans and the reduction in scope of the onsite EP activities at Pilgrim will not adversely affect the licensee's ability to physically secure the site or protect special nuclear material. Therefore, the proposed exemptions are consistent with common defense and security.

D. Special Circumstances.

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The underlying purpose of 10 CFR 50.47(b),

10 CFR 50.47(c)(2), and 10 CFR Part 50, Appendix E, Section IV, is to provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency, to establish plume exposure and ingestion pathway emergency planning zones for nuclear power plants, and to ensure that licensees maintain effective offsite and onsite radiological emergency preparedness plans. The standards and requirements in these regulations were developed by considering the risks associated with operation of a power reactor at its licensed full-power level. These risks include the potential for a reactor accident with offsite radiological dose consequences.

As discussed previously in Section III, because Pilgrim is permanently shut down and defueled, there will no longer be a risk of a significant offsite radiological release from a design-basis accident exceeding EPA early phase PAGs at the exclusion area boundary and the risk of a significant offsite radiological release from a beyond-design-basis accident is greatly reduced when compared to an operating power reactor. The NRC staff has confirmed the reduced risks at Pilgrim by comparing the generic risk assumptions in the analyses in NUREG-1738 to site-specific conditions at Pilgrim and determined that the risk values in NUREG-1738 bound the risks presented at Pilgrim. As indicated by the results of the research conducted for NUREG-1738, and more recently for NUREG-2161, “Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor,” dated September 2014 (ADAMS Accession No. ML14255A365), while other consequences can be extensive, accidents from SFPs with significant decay time have little potential to cause offsite early fatalities, even if the formal offsite radiological EP requirements were relaxed. The licensee’s analysis of a beyond-design-basis accident involving a complete loss of SFP water inventory, based on an adiabatic heatup analysis of the limiting fuel assembly for decay heat, shows that within 10 months after permanent cessation of power operations, the time for the limiting fuel assembly to reach 900 °C is 10 hours after the assemblies have been uncovered assuming a loss of all cooling means.

The only analyzed beyond-design-basis accident scenario that progresses to a condition where a significant offsite release might occur, involves the highly unlikely event where the SFP drains in such a way that all modes of cooling or heat transfer are assumed to be unavailable, which is referred to as an adiabatic heatup of the spent fuel. The licensee's analysis of this beyond-design-basis accident shows that within 10 months after permanent cessation of power operations, more than 10 hours would be available between the time the fuel is initially uncovered (at which time adiabatic heatup is conservatively assumed to begin), until the fuel cladding reaches a temperature of 900 °C, which is the temperature associated with rapid cladding oxidation and the potential for a significant radiological release. This analysis conservatively does not include the period of time from the initiating event causing a loss of SFP water inventory until all cooling means are lost.

The NRC staff has verified the licensee's analyses and its calculations. The analyses provide reasonable assurance that in granting the requested exemptions to the licensee, there is no design-basis accident that will result in an offsite radiological release exceeding the EPA early phase PAGs at the exclusion area boundary. In the highly unlikely event of a beyond-design-basis accident affecting the SFP that results in a complete loss of heat removal via all modes of heat transfer, there will be over 10 hours available before an offsite release might occur and, therefore, at least 10 hours to initiate appropriate mitigating actions to restore a means of heat removal to the spent fuel. If a radiological release were projected to occur under this highly unlikely scenario, a minimum of 10 hours is considered sufficient time for offsite authorities to implement protective actions using a CEMP approach to protect the health and safety of the public.

Exemptions from the offsite EP requirements in 10 CFR Part 50 have previously been approved by the NRC when the site-specific analyses show that at least 10 hours is available following a loss of SFP coolant inventory with no air cooling (or other methods of removing decay heat) until cladding of the hottest fuel assembly reaches the rapid oxidation temperature.

The NRC staff concluded in its previously granted exemptions, as it does with the licensee's requested EP exemptions, that if a minimum of 10 hours is available to initiate mitigative actions consistent with plant conditions, or if needed, for offsite authorities to implement protective actions using a CEMP approach, then formal offsite radiological emergency preparedness plans, required under 10 CFR Part 50, are not necessary at permanently shutdown and defueled facilities.

Additionally, Pilgrim committed to maintaining SFP makeup strategies in its letters to the NRC dated November 30 and December 4, 2018, and February 14 and February 18, 2019. The multiple strategies for providing makeup to the SFP include: using existing plant systems for inventory makeup; an internal strategy that relies on the fire protection system with redundant pumps (one diesel-driven and electric motor-driven); and onsite diesel fire truck that can take suction from the Cape Cod Bay. These strategies will continue to be required as License Condition 3.K, "Mitigation Strategy License Condition," of Renewed Facility License No. DPR-35 for Pilgrim. Considering the very low probability of beyond-design-basis accidents affecting the SFP, these diverse strategies provide multiple methods to obtain additional makeup or spray to the SFP before the onset of any postulated offsite radiological release.

For all of the reasons stated above, the NRC staff finds that the licensee's requested exemptions meet the underlying purpose of all of the standards in 10 CFR 50.47(b), and requirements in 10 CFR 50.47(c)(2) and 10 CFR Part 50, Appendix E, and satisfy the special circumstances provision in 10 CFR 50.12(a)(2)(ii) in view of the greatly reduced risk of offsite radiological consequences associated with the permanently shutdown and defueled state of the Pilgrim facility 10 months after the facility permanently ceases operation.

The NRC staff has concluded that the exemptions being granted by this action will maintain an acceptable level of emergency preparedness at Pilgrim and, if needed, that there is reasonable assurance that adequate offsite protective measures can and will be taken by State and local government agencies using a CEMP approach in the highly unlikely event of a

radiological emergency at Pilgrim. Since the underlying purpose of the rules, as exempted, would continue to be achieved, even with the elimination of the requirements under 10 CFR Part 50 to maintain formal offsite radiological emergency preparedness plans and the reduction in the scope of the onsite EP activities at Pilgrim, the special circumstances required by 10 CFR 50.12(a)(2)(ii) exist.

E. Environmental Considerations.

In accordance with 10 CFR 51.31(a), the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment as discussed in the NRC staff's Finding of No Significant Impact and associated Environmental Assessment published in the *Federal Register* on December 18, 2019 (84 FR 69396).

IV. Conclusions.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the licensee's request for exemptions from certain EP requirements in 10 CFR 50.47(b), 10 CFR 50.47(c)(2), and 10 CFR Part 50, Appendix E, Section IV, and as summarized in Enclosure 2 to SECY-19-0078, are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants the licensee's exemptions from certain EP requirements in 10 CFR 50.47(b), 10 CFR 50.47(c)(2), and 10 CFR Part 50, Appendix E, Section IV, as discussed and evaluated in detail in the NRC staff's safety

evaluation dated December 18, 2019. The exemptions are effective as of 10 months after permanent cessation of power operations.

Dated at Rockville, Maryland, this 18th day of December, 2019.

For the Nuclear Regulatory Commission.

/RA/

Craig G. Erlanger, Director,
Division of Operating Reactor Licensing,
Office of Nuclear Reactor Regulation.