



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 18, 2019

Ms. Pamela B. Cowan
Senior Vice President
and Chief Operating Officer
Holtec Decommissioning International, LLC
Krishna P. Singh Technology Campus
1 Holtec Blvd.
Camden NJ 08104

SUBJECT: PILGRIM NUCLEAR POWER STATION – EXEMPTIONS FROM CERTAIN
EMERGENCY PLANNING REQUIREMENTS AND RELATED SAFETY
EVALUATION (EPID L-2018-LLE-0011)

Dear Ms. Cowan:

The U.S. Nuclear Regulatory Commission (NRC) has approved the enclosed exemptions from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.47, "Emergency plans," and Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50. This action is in response to the application for exemptions dated July 3, 2018, as supplemented by letters dated November 30 and December 4, 2018, and February 14 and February 18, 2019.

A copy of the NRC staff's safety evaluation is also enclosed. The exemptions will be forwarded to the Office of the Federal Register for publication.

Sincerely,

A handwritten signature in black ink that reads "Scott P. Wall".

Scott P. Wall, Senior Project Manager
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-293

Enclosures:

1. Exemptions
2. Safety Evaluation

cc: Listserv

ENCLOSURE 1

EXEMPTIONS

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 (ENGCO) (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 ENGCO from ENGCO to Holtec Pilgrim, LLC; and deletion of certain license conditions to reflect satisfaction and termination of all ENGCO 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 ($^{\circ}\text{C}$), 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).

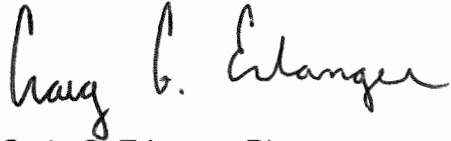
IV. Conclusions.

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.

A handwritten signature in black ink that reads "Craig G. Erlanger". The signature is written in a cursive style with a large initial 'C' and 'E'.

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

ENCLOSURE 2

SAFETY EVALUATION RELATED TO
HOLTEC DECOMMISSIONING INTERNATIONAL, LLC
PILGRIM NUCLEAR POWER STATION
REQUEST FOR EXEMPTIONS FROM PORTIONS OF
10 CFR 50.47 AND 10 CFR PART 50, APPENDIX E



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO REQUEST FOR EXEMPTIONS FROM PORTIONS OF

10 CFR 50.47 AND 10 CFR PART 50, APPENDIX E

HOLTEC DECOMMISSIONING INTERNATIONAL, LLC

PILGRIM NUCLEAR POWER STATION

DOCKET NO. 50-293

1.0 INTRODUCTION

The Pilgrim Nuclear Power Station (Pilgrim) is a power reactor located on the western shore of Cape Cod Bay within the Commonwealth of Massachusetts. The facility site, approximately 517 acres, is in the town of Plymouth, Plymouth County, Massachusetts. The nearest major population centers to the site are Boston, Massachusetts (36 miles to the northwest) and Providence, Rhode Island (44 miles to the west).

By letter dated November 10, 2015 (Reference 1), pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.82(a)(1)(i), Entergy Nuclear Operations, Inc. (ENOI), certified to the U.S. Nuclear Regulatory Commission (NRC) that it planned to permanently cease power operations at Pilgrim no later than June 1, 2019. ENOI permanently ceased power operations at Pilgrim on May 31, 2019. By letter dated June 10, 2019 (Reference 2), pursuant to 10 CFR 50.82(a)(1)(ii), 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 10 CFR 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. Spent fuel is currently stored onsite at the Pilgrim facility in the SFP and in a dry cask independent spent fuel storage installation (ISFSI).

By letter dated July 3, 2018 (Reference 3), as supplemented by letters dated November 30 and December 4, 2018, and February 14 and February 18, 2019 (References 4, 5, 58, and 6, respectively), ENOI requested exemptions for Pilgrim from certain emergency preparedness/planning (EP) requirements in 10 CFR Part 50. Specifically, ENOI requested exemptions from certain planning standards in 10 CFR 50.47(b) regarding onsite and offsite radiological emergency preparedness (REP) plans for nuclear power reactors; from certain requirements in 10 CFR 50.47(c)(2) for establishment of plume exposure pathway and ingestion pathway emergency planning zones (EPZs) for nuclear power reactors; and from certain requirements in 10 CFR Part 50, Appendix E, Section IV, "Content of Emergency Plans."

ENOI's requested exemptions would eliminate the requirements to maintain formal offsite¹ REP plans in accordance with 44 CFR Part 350, "Review and Approval of State and Local Radiological Emergency Plans and Preparedness," and would reduce the scope of the onsite EP activities at Pilgrim, based on the reduced risks of an offsite radiological release at Pilgrim 10 months after the reactor is permanently shut down and defueled. The exemptions would maintain the requirements for an onsite radiological emergency plan and would continue to ensure the capability to communicate and coordinate with offsite response authorities. The NRC staff found the application complete, and ENOI's associated technical justification provided a basis for the Commission's consideration of the requested exemptions.

In accordance with 10 CFR 50.12, "Specific exemptions," ENOI stated that this exemption request: (1) is authorized by law; (2) will not present an undue risk to the public health and safety; (3) is consistent with the common defense and security; and (4) meets the requirement for special circumstances in 10 CFR 50.12(a)(2).

By letter dated November 16, 2018 (Reference 7), ENOI, on behalf of itself and Entergy Nuclear Generation Company (ENG) (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 ENG from ENG to Holtec Pilgrim, LLC; and deletion of certain license conditions to reflect satisfaction and termination of all ENG obligations after the license transfer and equity sale.

By Order dated August 22, 2019 (Reference 8), 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 (Reference 9) 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 (Reference 10). On August 27, 2019 (Reference 11), the NRC staff issued Amendment No. 249 to reflect the license transfer. Accordingly, HDI is now the licensee for decommissioning operations at Pilgrim. On October 28, 2019 (Reference 12), the NRC staff issued Amendment No. 250 to revise the license and technical specifications to reflect the permanently shutdown and defueled condition at Pilgrim.

¹ The offsite standards are reproduced in the Federal Emergency Management Agency (FEMA) regulations at 44 CFR 350.5 and are based on the standards established by the Commission in 10 CFR 50.47.

2.0 DISCUSSION

The regulations governing EP for a nuclear power reactor are set forth in 10 CFR 50.47, 10 CFR 50.54(q), (s), and (t), and Appendix E to 10 CFR Part 50. Every nuclear power reactor licensee must establish and maintain emergency plans and preparedness in accordance with these regulations. The EP regulations for a nuclear power reactor include standards for both onsite and offsite emergency response plans. These regulations and the planning basis for EP are based upon an anticipated prompt response to a wide spectrum of events. However, for a nuclear power reactor that is no longer operating and is in decommissioning, the spectrum of accidents that can have significant offsite consequences is greatly reduced. At a decommissioning nuclear power reactor site, the only accident scenario that might lead to a significant radiological release is a highly unlikely, beyond-design-basis event resulting in a potential spent fuel zirconium cladding fire. This event involves a postulated major loss of water inventory from the SFP resulting in a loss of cooling to the spent fuel, where preplanned SFP mitigation measures were unsuccessful, generating a significant heat-up of the spent fuel to the point where substantial zirconium cladding oxidation and fuel damage can occur. The amount of decay heat present in irradiated fuel in the SFP is directly related to the amount of time that has passed after the reactor is shut down. As such, the potential for the conditions needed for a zirconium cladding fire to occur continues to decrease as a function of the time since the reactor was permanently shut down. However, current regulations do not reflect that: (1) considerably more time is available during decommissioning to respond to a postulated zirconium cladding fire event than is available for many postulated operating power reactor accidents, and (2) comprehensive SFP mitigation measures and on-shift staff remain in place following the permanent cessation of power operations.

Since there are no explicit regulatory provisions distinguishing EP requirements for a nuclear power reactor that has permanently ceased operating from those for an operating nuclear power reactor, licensees transitioning to or already in the decommissioning phase usually seek to establish a level of EP commensurate with the risk of a radiological emergency at a decommissioning site. Exemptions from certain EP requirements are typically requested early in the decommissioning process. The NRC reviews each request on a case-by-case basis and grants exemptions only after conducting a thorough analysis of each request. Historically, given the significant reduction in radiological risk for a decommissioning site, the NRC has approved exemptions from EP requirements based on site-specific evaluations and the objectives of the regulations. Between 1987 and 1999, the NRC issued exemptions from EP requirements for 10 licensees in decommissioning. More recently, exemptions from EP requirements during decommissioning have been granted for the Kewaunee Power Station, Crystal River Unit 3 Nuclear Generating Plant, San Onofre Nuclear Generating Station, Units 2 and 3, Vermont Yankee Nuclear Power Station, Fort Calhoun Station, Unit 1, and the Oyster Creek Nuclear Generating Station (References 13, 14, 15, 16, 17, and 18 respectively).

Previously granted exemptions from EP regulations reduced the requirements for decommissioning power reactors to those consistent with these standards:

(1) 10 CFR 50.47(d),² which states the requirements for a license authorizing only fuel loading

² 10 CFR 50.47(d) states, in part, "Notwithstanding the requirements of paragraphs (a) and (b) of this section, and except as specified by this paragraph, no NRC or FEMA review, findings, or determinations concerning the state of offsite emergency preparedness or the adequacy of and capability to implement State and local or utility offsite emergency plans are required prior to issuance of an operating license authorizing only fuel loading or low power testing and training (up to 5 percent of the rated thermal power)."

and low power testing, and (2) 10 CFR 72.32(a),³ which establishes the information required in an emergency plan for an ISFSI. Examples of previously granted exemptions from EP regulations for decommissioning power reactors include: setting the highest emergency classification level as an "Alert"; extending the timing requirements for notification of offsite authorities; requiring only onsite exercises with the opportunity for offsite response organization (ORO) participation; and only maintaining arrangements for OROs (i.e., law enforcement, fire, and medical services) that might support the licensee's response to onsite emergencies.⁴ The EP exemptions also relieve the licensee from the requirement to maintain formal offsite REP plans, including the 10-mile plume exposure pathway and 50-mile ingestion pathway EPZs.

Licensees that have been granted EP exemptions must continue to maintain an onsite emergency plan addressing the classification of an emergency, notification of emergencies to licensee personnel and offsite authorities, and coordination with designated offsite government officials following an event declaration.

In evaluating the EP exemptions requested by the licensee, specifically in relation to relieving the licensee from the requirement to maintain formal offsite REP plans, the NRC staff considered the conclusions from recent SFP studies completed since the publication of NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants," February 2001 (Reference 19), which served as the technical basis for SECY-01-0100, "Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools" (Reference 20). In addition, the NRC staff considered enhancements put into place as a result of the events of September 11, 2001, and the accident at the Fukushima Dai-ichi site on March 11, 2011.

The studies, described in more detail below, helped to inform NRC staff positions that only a highly unlikely, beyond-design-basis event (e.g., extreme earthquake or large aircraft impact) would cause sufficient damage to the SFP structure, resulting in a rapid SFP water draindown and potential zirconium cladding fire. In addition, there would be a significant amount of time between the initiating event and the possible onset of conditions that could result in a zirconium cladding fire. This time provides a substantial opportunity for event mitigation. Licensees are required to maintain effective strategies, sufficient resources, and adequately trained personnel to mitigate such an event. If State or local governmental officials determine that offsite protective actions are warranted, then sufficient time and capability would be available for OROs

³ The Final Rule for 10 CFR Part 72, "Emergency Planning Licensing Requirements for Independent Spent Fuel Storage Facilities (ISFSI) and Monitored Retrievable Storage Facilities (MRS)" (60 *Federal Register* (FR) 32430, June 22, 1995), states that "the postulated worst-case accident involving an ISFSI has insignificant consequences to public health and safety. Therefore, the final requirements to be imposed on most ISFSI licensees reflect this fact, and do not mandate formal offsite components to their onsite emergency plans." It also states, "based on the potential inventory of radioactive material, potential driving forces for distributing that amount of radioactive material, and the probability of the initiation of these events, the Commission concludes that the offsite consequences of potential accidents at an ISFSI or a MRS would not warrant establishing Emergency Planning Zones."

⁴ Requirements for licensees to maintain agreements for fire-fighting and local law enforcement services exist outside of EP (i.e., the requirement for licensees to maintain a fire protection plan in 10 CFR 50.48, "Fire protection," and physical security requirements in 10 CFR Part 73).

to implement these measures using a comprehensive emergency management plan (CEMP), or “all-hazards,” approach.⁵

Spent Fuel Pool Study Considerations

Following the permanent removal of spent fuel from the reactor vessel, the principal radiological risks are associated with the storage of spent fuel onsite. Generally, a few months after the reactor has been permanently shut down, there are no possible design-basis events that could result in a radiological release exceeding the U.S. Environmental Protection Agency (EPA), EPA-400/R-17/001, “PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents,” January 2017 (Reference 22), early phase protective action guide (PAG) limit of one roentgen equivalent man (rem) at the exclusion area boundary (EAB). The only potential accident that might lead to a significant radiological release at a decommissioning reactor is a zirconium cladding fire, which is a postulated, but highly unlikely, beyond-design-basis accident scenario that involves a major loss of water inventory from the SFP, resulting in a significant heat-up of the spent fuel due to the loss of all cooling, and culminating in substantial zirconium cladding oxidation and fuel damage. The significance of spent fuel heat-up scenarios that might result in a zirconium cladding fire depends on the decay heat of the irradiated fuel stored in the SFP. The amount of decay heat in the spent fuel is directly associated with the amount of time since the reactor permanently ceased operations. Therefore, the probability of a zirconium cladding fire scenario continues to decrease as a function of the time that the decommissioning reactor has been permanently shutdown.

The NRC staff assessed the risk of an SFP accident at decommissioning nuclear power plants in the late 1990s to support development of a risk-informed technical basis for review of exemption requests and a regulatory framework for integrated rulemaking. 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,” August 1997 (Reference 23), and NUREG-1738 confirmed that for permanently shutdown and defueled power reactors that are bounded by the assumptions and conditions in the report, the risk of an offsite radiological release is significantly less than for an operating power reactor.

The NRC staff’s assessment, published in NUREG-1738, conservatively assumed that if the water level in the SFP did drop below the top of the spent fuel, a zirconium cladding fire involving all of the spent fuel would occur, and thereby bounded those conditions associated with air cooling of the fuel (including partial draindown scenarios) and fire propagation. The study used simplified and sometimes bounding assumptions and models to characterize the likelihood and consequences of beyond-design-basis SFP accidents. Even with these conservative assumptions, the study found the risk of an SFP fire to be low and well within the Commission’s safety goals. The amount of time available (after complete fuel uncover) before onset of a zirconium cladding fire also depends on various factors, including decay heat rate, fuel burnup, fuel storage configuration, building ventilation rates and air flow paths, and fuel cladding oxidation rates. Although NUREG-1738 did not completely rule out the possibility of a zirconium fire, it did demonstrate that storage of spent fuel in a high-density configuration in SFPs is safe, and that the risk of accidental release of a significant amount of radioactive material to the environment is low.

⁵ A CEMP, in this context also referred to as an emergency operations plan, is addressed in the FEMA’s Comprehensive Preparedness Guide 101, “Developing and Maintaining Emergency Operations Plans,” Version 2.0, dated November 2010 (Reference 21).

After the events of September 11, 2001, Sandia National Laboratories conducted studies (collectively referred to as the "Sandia studies"), which considered spent fuel loading patterns and other aspects for an SFP at both a PWR and a BWR, including the role that the circulation of air plays in the cooling of spent fuel. These studies are not publicly available because they contain security-related information. The Sandia studies indicated that there is a significant amount of time between the initiating event (i.e., the event that causes the SFP water level to drop) and the spent fuel assemblies becoming partially or completely uncovered. In addition, the Sandia studies indicated that for those hypothetical conditions where air cooling may not be effective in preventing a zirconium cladding fire, there is a significant amount of time between the spent fuel becoming uncovered and the possible onset of such a zirconium cladding fire, thereby providing a substantial opportunity for event mitigation. The Sandia studies, which account for relevant heat transfer and fluid flow mechanisms, also indicated that air-cooling of spent fuel could be sufficient to prevent SFP zirconium fires at a point much earlier following fuel offload from the reactor than previously considered (e.g., in NUREG-1738).

In 2013, the NRC documented a regulatory analysis of expediting the transfer of spent fuel assemblies in COMSECY-13-0030, "Staff Evaluation and Recommendation for Japan Lessons-Learned Tier 3 Issue on Expedited Transfer of Spent Fuel" (Reference 24). The NRC staff concluded that SFPs are robust structures with large safety margins and recommended to the Commission that possible regulatory actions to require the expedited transfer of spent fuel from SFPs to dry cask storage were not warranted. The Commission subsequently approved the NRC staff's recommendation in the Staff Requirements Memorandum to COMSECY-13-0030 (Reference 25).

In 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 (Reference 26), the NRC evaluated the potential benefits of strategies required in 10 CFR 50.54(hh)(2). The study results for the analyzed severe earthquake at the reference plant are consistent with conclusions in past studies that SFPs are robust structures and likely to withstand severe earthquakes without leaking. The study showed that the likelihood of a radiological release from the spent fuel resulting from a severe earthquake at the reference plant to be about one time in 10 million years or lower. If a radiological release were to occur, this study shows that the individual cancer fatality risk for a member of the public is several orders of magnitude lower than the Commission's Quantitative Health Objective of 2 in 1 million per year (2×10^{-6} /year). As explained in NUREG-2161, successful implementation of mitigation strategies significantly reduces the likelihood of a release from the SFP in the event of a loss of cooling water. Additionally, the NRC found that the placement of spent fuel in a dispersed configuration in the SFP, such as the 1 x 4 pattern, more effectively used the heat capacity of the stored fuel and available cooling mechanisms to extend the heat-up time and reduce the likelihood of a release from a completely drained SFP.

To inform its current integrated decommissioning rulemaking effort, the NRC staff conducted an applied research study, as documented in a memorandum "Transmittal of Reports to Inform Decommissioning Plant Rulemaking for User Need Request NSIR-2015-001," dated May 31, 2016 (Reference 27), and concluded:

- The representative plant staff can reliably implement mitigation strategies to timely mitigate cask-drop events and prevent spent fuel heat-up damage;

- Only the events causing a rapid SFP water draindown (e.g., extreme earthquake and large aircraft impact) would challenge the successful mitigation of fuel heat-up; and
- In the unlikely, worst case beyond-design-basis accident leading to a rapid draindown of the SFP and subsequent zirconium cladding fire, there exists additional time margin on the order of several hours beyond the 10-hour heat-up time during which protective actions can be taken to protect the public before the dose levels associated with EPA early phase PAGs would be exceeded offsite.

In addition, for the hypothetical event sequence considered in the study above, acute fatal effects offsite appear to be unlikely from the source term evaluated, provided that individuals can be relocated within a reasonable time after plume arrival. In most cases, this time was longer than 24 hours.

As previously stated, these studies (NUREG-1738, the Sandia studies, COMSECY-13-0030, NUREG-2161, and studies supporting the decommissioning rulemaking efforts) support the NRC staff positions that:

- There would be sufficient time between the initiating event and the possible onset of conditions that could result in a zirconium cladding fire, which would provide a substantial opportunity for successful mitigation measures; and
- Only a highly unlikely, beyond-design-basis event (e.g., extreme earthquake or large aircraft impact) could cause sufficient damage to the SFP structure to result in a potential zirconium cladding fire and, even in such cases, the fuel may be air coolable following a complete drain down.

As such, the NRC staff finds that for all but the most unlikely events, any offsite protective actions would be taken by governmental officials as a precautionary measure. In the highly unlikely event of a beyond-design-basis accident resulting in a loss of the SFP water inventory, there would be time to initiate appropriate SFP mitigating actions. If State or local governmental officials determine that offsite protective actions are warranted, then sufficient time and capability would be available for OROs to implement these measures using a CEMP approach.

Hostile Action-Based Event Considerations

Licensees develop strategies in order to protect against the NRC design-basis threat (DBT)⁶ for radiological sabotage and are required to maintain these strategies under the provisions of 10 CFR 73.55(b) until the termination of their Part 50 (or Part 52) license. In addition, other Federal agencies, such as the Federal Aviation Administration, the Federal Bureau of Investigation, and the Department of Homeland Security have taken aggressive steps to prevent terrorist attacks in the United States. Taken as a whole, these systems, personnel, and procedures provide reasonable assurance that public health and safety, the environment, and the common defense and security will be adequately protected (73 FR 46204, 46207; August 8, 2008).

⁶ The DBT represents the largest threat against which a private sector facility can be reasonably expected to defend, with high assurance. The NRC's DBT rule was published in the *Federal Register* on March 19, 2007 (72 FR 12705).

NRC regulatory activities and studies have reaffirmed the safety and security of spent fuel stored in pools and have shown that SFPs are effectively designed to prevent accidents and minimize damage from malevolent attacks. In the wake of the terrorist attacks of September 11, 2001, the NRC took several actions to further reduce the possibility of an SFP zirconium cladding fire. On February 25, 2002, the NRC issued Order EA-02-026 (Reference 28), which required licensees to immediately implement additional security measures, including increased patrols, augmented security forces and capabilities, and more restrictive site-access controls to, among other things, reduce the likelihood of an SFP accident, resulting from a terrorist-initiated event. Through the NRC's issuance of the "Power Reactor Security Requirements" final rule on March 27, 2009 (74 FR 13926), the agency codified generically applicable security requirements that had been previously issued by orders. Subsequently, by letter dated November 28, 2011 (Reference 29), the NRC partially rescinded Order EA-02-026. The requirements of Order EA-02-026 that were addressed by Interim Compensatory Measure (ICM) B.1.a, involved operator training for specific security-initiated events that were not covered by proposed or existing regulations and remained in effect after the NRC rescinded part of the Order in November 2011.

By letter dated October 31, 2018 (Reference 30), ENOI requested that the NRC rescind ICM B.1.a, in Order EA-02-026 for Pilgrim based on Pilgrim's transition from an operating reactor to a decommissioning reactor. ENOI stated that once Pilgrim is permanently shut down and defueled, the primary security focus would be the protection of the spent fuel. As such, the specific security-initiated event addressed in ICM B.1.a would not have any immediate effect on the storage or cooling of spent fuel. On July 2, 2019, the NRC rescinded ICM B.1.a in Order EA-02-026 for Pilgrim (Reference 31), but recognized that Pilgrim will maintain mitigation strategies for the protection of spent fuel under License Condition 3.K of its license, which requires Pilgrim to develop and maintain strategies and staff training to address large fires and explosions (as discussed in the Mitigative Action Considerations section, below), including the protection of the spent fuel.

Mitigative Action Considerations

The NRC Order EA-02-026 also established new requirements for licensees to have mitigating strategies for the potential loss of SFP water inventory and for large fires or explosions at nuclear power plants. In response, the Nuclear Energy Institute (NEI) provided detailed guidance in NEI 06-12, Revision 2, "B.5.b Phase 2 & 3 Submittal Guideline," dated December 2006 (Reference 32), which the NRC endorsed on December 22, 2006 (Reference 33). The NRC found the NEI guidance to be an effective means for mitigating the potential loss of large areas of the plant due to fires or explosions. In addition, these strategies enhanced spent fuel coolability and the potential to recover SFP water level and cooling prior to a potential SFP zirconium cladding fire, which further reduced the probability of a radiological release from an SFP zirconium cladding fire.

Through NRC's issuance of the final rule, "Power Reactor Security Requirements," on March 27, 2009 (74 FR 13926), the requirements in NRC Order EA-02-026 were made generically applicable. In that final rule, the NRC added 10 CFR 50.54(hh)(2) to require licensees to implement mitigating measures to maintain or restore SFP cooling capability in the event of loss of large areas of the plant due to fires or explosions, which further decreases the probability of an SFP zirconium cladding fire. Under 10 CFR 50.54(hh)(2), nuclear power reactor

licensees are required to implement strategies such as those provided in NEI-06-12.⁷ Pilgrim mitigative strategies will continue to be maintained in accordance with License Condition 3.K of the Pilgrim license.

Furthermore, other organizations, such as Sandia National Laboratories, as discussed previously under "Spent Fuel Pool Considerations," have confirmed the effectiveness of the additional mitigation strategies to maintain spent fuel cooling in the event that the pool is drained and its initial water inventory is reduced or lost entirely. The findings of the Sandia studies are sensitive security-related information and are not publicly available.

In response to the Fukushima Dai-ichi Accident, the NRC implemented regulatory actions to further enhance reactor and SFP safety. On March 12, 2012, the NRC issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (Reference 34), which requires licensees to develop, implement, and maintain guidance and strategies to maintain or restore SFP cooling capabilities, independent of normal alternating current power systems, following a beyond-design-basis external event. In addition, on March 12, 2012, the NRC issued Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" (Reference 35), which requires that licensees install reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a beyond-design-basis external event. Although the primary purpose of the order was to ensure that operators were not distracted by uncertainties related to SFP conditions during the accident response, the improved monitoring capabilities will help in the diagnosis and response to potential losses of SFP integrity. These requirements ensure a more reliable and robust mitigation capability is in place to address degrading conditions in SFPs resulting from certain significant but highly unlikely events.

Offsite Radiological Emergency Preparedness Considerations

The NRC staff determined, based on the EP exemption evaluation criteria discussed in Section 3.0 of this safety evaluation, that in the event of a beyond-design-basis event impacting SFP integrity, or the ability to cool spent fuel, the licensee will maintain sufficient resources and adequately trained personnel available on-shift to promptly initiate mitigative actions without the support of OROs. In the highly unlikely event of a zirconium cladding fire in the SFP, due to a beyond-design-basis event that results in the loss of all spent fuel cooling, sufficient time would exist for offsite government officials to implement protective measures, if they deem warranted, using a CEMP approach. Therefore, the NRC staff concluded, consistent with previous exemption requests, that formal offsite REP plans, required under 10 CFR Part 50, are not necessary for permanently shutdown and defueled nuclear power reactor licensees once the evaluation criteria outlined in Section 5, "Evaluation of Exemptions to EP Regulations," of the Office of Nuclear Security and Incident Response (NSIR), Division of Preparedness and Response (DPR) Interim Staff Guidance (ISG) document NSIR/DPR-ISG-02, "Emergency Planning Exemption Requests for Decommissioning Nuclear Power Plants," dated May 11, 2015 (Reference 36), have been satisfied.

⁷ The guidance in NEI-06-12 specifies that portable, power-independent pumping capabilities must be able to provide at least 500 gallons per minute (gpm) of bulk water makeup to the SFP, and at least 200 gpm of water spray to the SFP. Recognizing that the SFP is more susceptible to a release when the spent fuel is in a non-dispersed configuration, the guidance also specifies that the portable equipment is to be capable of being deployed within 2 hours for a non-dispersed configuration.

In addition, consistent with the December 7, 2015, "Memorandum of Understanding Between the Department of Homeland Security/Federal Emergency Management Agency and Nuclear Regulatory Commission Regarding Radiological Emergency Response, Planning, and Preparedness" (Reference 37), by letter dated December 20, 2018 (Reference 38), the NRC staff documented the transmittal to FEMA, by electronic mail, a draft of the proposed SECY paper and offered the opportunity for FEMA to ask questions, obtain clarification, and comment on the draft SECY paper before the Commission received it for review. In a letter dated February 20, 2019 (Reference 39), FEMA provided comments. Responses to the FEMA comments are included in Enclosure 1 to SECY-19-0078, "Request by Entergy Nuclear Operations, Inc. for Exemptions from Certain Emergency Planning Requirements for the Pilgrim Nuclear Power Station," dated August 9, 2019 (Reference 40), and via letter to FEMA dated August 26, 2019 (Reference 41).

The licensee would still be required to maintain an onsite emergency plan, which would provide for the notification of and coordination with offsite organizations to an extent commensurate with the approved exemptions. Licensee requirements for offsite fire services and law enforcement responding onsite will continue to be maintained under the licensee's fire protection plan and physical security plan in accordance with 10 CFR 50.48 and 10 CFR Part 73, respectively.

The NRC staff recommended that the Commission approve the licensee's requested EP exemptions in SECY-19-0078, which was approved by the Commission in the SRM to SECY-19-0078, dated November 4, 2019 (Reference 42).

3.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.12 provide, in part, that the NRC may, on application by a licensee or on its own initiative, grant exemptions from the requirements of the regulations in 10 CFR Part 50 in circumstances in which application of the regulation would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.⁸

As discussed in the Statements of Consideration (SOC) for the Final Rule for EP requirements for 10 CFR Parts 50 and 70 (45 FR 55402, August 19, 1980), the underlying purposes of the planning standards in 10 CFR 50.47(b), the requirements in 10 CFR 50.47(c)(2), and certain requirements of Section IV of Appendix E to 10 CFR Part 50, are to: (1) ensure that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency, and (2) ensure that licensees maintain effective offsite and onsite radiological emergency response plans.

The NRC staff relied on past precedent to assess whether the licensee request for EP exemptions satisfied the underlying purposes of the EP regulations. As discussed previously, the exemptions requested by the licensee for Pilgrim that eliminate requirements for formal offsite REP plans are consistent with those recently approved by the NRC for the Kewaunee Power Station, Crystal River Unit 3 Nuclear Generating Plant, San Onofre Nuclear Generating Station, Units 2 and 3, Vermont Yankee Nuclear Power Station, Fort Calhoun Station, Unit 1, and Oyster Creek Nuclear Generating Station. Prior to these sites, the last approved exemption

⁸ Notwithstanding the special circumstances of the exemption request, 10 CFR 50.12(a)(1) requires that the exemption must be authorized by law, not present an undue risk to the public health and safety, and be consistent with the common defense and security.

that eliminated the requirements for formal offsite REP planning was for the Zion Nuclear Power Station in 1999 (Reference 43).

The NRC staff recognizes that the planning standards in 10 CFR 50.47(b), the requirements in 10 CFR 50.47(c)(2), and certain requirements in Section IV of Appendix E to 10 CFR Part 50, were developed taking into consideration the risks associated with accidents that have the potential for significant offsite radiological dose consequences during operation of a nuclear power reactor at its licensed full-power level. As discussed previously, the NRC staff has concluded that after a reactor has permanently shut down and removed all fuel from the reactor vessel to the SFP, the risks associated with accidents that have a potential for offsite radiological release are significantly reduced for those licensees that are reasonably aligned with the analyses presented in NUREG-1738. This position has been further informed by recent SFP studies provided in NUREG-2161.

Based on the highly unlikely nature of postulated beyond-design-basis events resulting in a loss of SFP integrity or cooling to the spent fuel that may result in significant offsite radiological consequences, the NRC staff considers that the special circumstances condition of 10 CFR 50.12(a)(2)(ii) can be met by demonstrating that Pilgrim satisfies the two criteria provided below.

Specifically, the planning standards in 10 CFR 50.47(b), the requirements in 10 CFR 50.47(c)(2), and certain requirements in Section IV of Appendix E to 10 CFR Part 50, from which the licensee has requested exemptions, would not serve, or be necessary to achieve, the underlying purpose of the EP regulations if the Pilgrim site-specific analyses demonstrate that:

1. An offsite radiological release for a design-basis accident (DBA) will not exceed the EPA early phase PAGs of 1 rem at the EAB;⁹ and
2. In the highly unlikely event of a beyond-design-basis event resulting in a loss of all modes of cooling for the spent fuel stored in the SFP, there is a minimum of 10 hours for the hottest fuel assembly to reach 900 degrees Celsius (°C), which is the critical temperature threshold for a self-sustained oxidation of zirconium cladding in air. This time provides a substantial opportunity for event mitigation. Licensees are required to maintain effective strategies, sufficient resources, and adequately trained personnel to mitigate such an event.

Previously granted exemptions from EP regulations reduced the level of EP consistent with the regulations for a licensee authorizing fuel loading and low power testing only, as specified in the standards of 10 CFR 50.47(d), and is consistent with the information requirements for an ISFSI emergency plan, as required by 10 CFR 72.32(a). Examples of the reduced EP requirements include: setting the highest emergency classification level as an "Alert"; extending the timing requirements for notification of offsite authorities; requiring only onsite exercises with the opportunity for ORO participation; and only maintaining arrangements for the OROs (i.e., law enforcement, fire, and medical services) that may respond to onsite emergencies. No formal

⁹ Use of EPA PAGs as a threshold is consistent with the planning basis for the 10-mile EPZ provided in NUREG-0396 (EPA 520/1-78-016), "Planning Basis for the Development of State and Local Government Radiological Emergency Response Plans in Support of Light Water Nuclear Power Plants," dated December 1978 (Reference 45), and endorsed by the Commission in a policy statement published on October 23, 1979 (44 FR 61123).

offsite REP plans, in accordance with 44 CFR Part 350, were required after the exemptions were granted for these licensees.

As part of the review of the licensee's exemption request, the NRC staff used NSIR/DPR-ISG-02, the EP regulations in 10 CFR 72.32, and the "Spent Fuel Project Office Interim Staff Guidance - 16, Emergency Planning," dated June 14, 2000 (Reference 44), as references to ensure consistency between specific-licensed and general-licensed ISFSIs. Furthermore, the licensee addressed the Industry Decommissioning Commitments (IDCs) and Staff Decommissioning Assumptions (SDAs)¹⁰ that formed the basis of the analyses presented in NUREG-1738.

4.0 TECHNICAL EVALUATION

The following NRC staff evaluation verified that the licensee provided the analyses suggested in Section 5 of NSIR/DPR-ISG-02, and that these analyses meet the criteria in the ISG to justify elimination of the requirement on the licensee to maintain EPZs and formal offsite REP plans and preparedness.

1. The licensee has performed an analysis indicating that any radiological release from applicable DBAs would be within 10 CFR 50.67 dose limits and Regulatory Guide 1.183 (Reference 46), "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," dose acceptance criteria. The licensee evaluated the maximum 2-hour total effective dose equivalent (TEDE) to an individual located at the EAB, the 30-day TEDE to an individual at the outer boundary of the low population zone and the control room. The resulting doses would not approach the EPA early phase PAGs recommendation for protection of the public.

The licensee has stated, and the NRC staff confirmed, that while spent fuel remains in the SFP, the only postulated DBA that would remain applicable to the permanently shutdown and defueled Pilgrim that could contribute a significant dose would be a fuel handling accident (FHA) in the Reactor Building, where the SFP is located. For completeness, the NRC staff also evaluated the applicability of other DBAs documented in the Pilgrim Updated Final Safety Analysis Report (UFSAR) (Reference 49) to ensure that these accidents would not have consequences that could potentially exceed the 10 CFR 50.67 dose limits and Regulatory Guide 1.183 dose acceptance criteria or approach the EPA early phase PAGs.

Fuel Handling Accident – In its analysis, the licensee has determined that within 46 days after permanent cessation of power operations, FHA doses would decrease to a level that would not warrant protective actions under the EPA early phase PAG framework.

The NRC staff notes that the doses from an FHA are dominated by the isotope Iodine-131. The licensee has based its application for revision to the emergency plan and emergency action level (EAL) scheme on an effective implementation date no

¹⁰ Refers to IDCs proposed by NEI in a letter to the NRC dated November 12, 1999 (Reference 47), and several additional SDAs identified through the NRC staff's risk assessment and the NRC staff's evaluation of the safety principles for decommissioning plants in Regulatory Guide 1.174, Revision 2, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated May 2011 (Reference 48). The IDCs and SDAs are summarized in Tables 4.2-1 and 4.2-2 to NUREG-1738.

earlier than 10 months after shutdown. Therefore, by the date of implementation of the revised emergency plan and EAL scheme, the fuel will have decayed for 10 months. With 10 months of decay, the thyroid dose from an FHA would be negligible. After 10 months of decay, the only isotope remaining in significant amounts, among those postulated to be released in a DBA FHA, would be Krypton-85. Since Krypton-85 primarily decays by beta emission, the calculated skin dose from an FHA release would make an insignificant contribution to the TEDE, which is the parameter of interest in the determination of the EPA early phase PAGs for sheltering or evacuation. Therefore, based on review of the licensee's analysis, the NRC staff concludes that the dose consequence from an FHA for the permanently shutdown and defueled Pilgrim would not approach the EPA early phase PAGs.

2. The licensee has performed an analysis demonstrating that a complete loss of SFP water inventory with no heat loss (adiabatic heat-up) 10 months after permanent cessation of power operations, a minimum of 10 hours would be available before any fuel cladding temperature reaches 900 °C from the time all cooling is lost.

The 10-hour criterion, conservatively, does not take into account the fuel uncover time and assumes instantaneous loss of cooling to the fuel. The 10-hour time period is also not intended to represent the time that it would take to repair key safety systems or to repair a large SFP breach. The 10 hours is a conservative period of time in which pre-planned mitigation measures to provide makeup water or spray to the SFP can be reliably implemented before the onset of a zirconium cladding ignition; and, if a release is projected to occur, 10 hours would provide sufficient time for offsite agencies to take appropriate action protect the health and safety of the public.

The licensee performed a site-specific quantitative analysis of an adiabatic heat-up of a representative fuel assembly stored in the Pilgrim SFP. In Attachment 2, "Calculation No. PNPS-EC-73355-M1418, Adiabatic Heatup Analysis for Drained Spent Fuel Pool," to its application dated July 3, 2018, the licensee provided the analysis used to evaluate the length of time it takes for an uncovered spent fuel assembly in the SFP to reach the temperature where the zirconium cladding would fail and determine the time for the hottest fuel assembly to heat adiabatically from its normal storage temperature to a temperature of 900°C. The licensee calculated the time to reach temperatures of 565°C, associated with the 10-hour creep rupture time and where incipient cladding failure might occur, and 900°C as the temperature where "runaway oxidation" (zirconium fire) is expected to occur, as defined in NUREG-1738.

This criterion considers the time for the hottest assembly to heat up from 30°C to 900°C adiabatically. Based on the limiting fuel assembly for decay heat and adiabatic heat-up analysis presented in its application, as supplemented by letters dated December 4, 2018 and February 18, 2019, at 10 months after permanent cessation of power operations under 10 CFR 50.82(a)(1) (i.e., 10 months decay time), the time for the hottest fuel assembly to reach 900°C is 10 hours after the assemblies have been uncovered. As stated in NUREG-1738, 900°C is an acceptable temperature to use for assessing the onset of fission product release under transient conditions (to establish the critical decay time for determining availability of 10 hours for deployment of mitigation equipment, and for offsite agencies, if deemed warranted, to take appropriate precautionary action to protect the health and safety of the public, if fuel and cladding oxidation occurs in air).

Attachment 2 to the application contains the adiabatic heat-up analysis for a drained SPF. In the attachment, Table 2, "Fuel Bundle Inputs for GNF2 [Global Nuclear Fuel 2] 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 pounds mass, 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.

In the supplemental letter dated February 18, 2019, the licensee submitted a revised adiabatic calculation which replaced, in its entirety, the previous version of the calculation. The adiabatic heat-up analysis was revised to incorporate a redefined adiabatic envelope boundary that removed the upper and lower plenums and included only the fuel rods, water rods, spacers, and part of the mass of the GNF2 channel box surrounding the fuel over the active fuel length. The revised analysis also incorporated temperature dependent material properties. In the revised adiabatic heat-up analysis, only the masses within the active fuel region (fuel rods, water rods, and spacers) are initially credited. When the bulk temperature reaches 304.44°C, the channel mass in the active fuel region is added to the adiabatic envelope. Radiative heat transfer between the fuel rods and the channel is a function of the surface area of the fuel rods that is viewed by the channel, the emissivity of the fuel rods, and the difference in temperatures raised to the fourth power between the fuel rods and the channel. With multiple rods in the 10x10 fuel array providing an adequate viewing factor of the channel, and emissivity values typical for Zircaloy-2, the entire bundle decay heat can be transferred to the channel at temperatures significantly less than 304.44°C. As such, the licensee determined that the channel box could be considered thermally connected to the active fuel region and included in the adiabatic envelope at temperatures exceeding 304.44°C. Thus, heat transfer could occur to all components within the proposed adiabatic envelope.

The NRC staff concluded that the adiabatic heat-up calculation provided an acceptable method for determining the minimum time necessary for heat-up to temperatures that would support runaway oxidation of the zircaloy cladding. The revised analysis employed specified dimensions of fuel assembly components, accurate thermal properties of the fuel assembly materials, and the maximum decay heat rate to ensure a bounding result. The NRC staff found that after 10 months, more than 10 hours would be available before a significant offsite release could begin.

3. The licensee has performed an analysis demonstrating that radiation exposure resulting from sky shine due to a loss of SFP water inventory indicates less than EPA early phase PAGs at the EAB and the control room.

The licensee analyzed the radiological consequences of a beyond-design-basis scenario to evaluate the effects of a loss of water inventory from the SFP. The primary purpose of this calculation is to determine the dose rates as a function of time at the EAB and in the control room due to loss of shielding for an event in which the spent fuel assemblies are uncovered following drain down. The dose rates determined by this calculation are due to direct and indirect radiation from spent fuel assemblies. The NRC staff notes that while the direct dose rate above the unshielded fuel would be high, radiation protection

personnel would restrict access to ensure that no one was subjected to the direct dose from the unshielded fuel.

The SFP water and the concrete pool structure serve as radiation shielding. A loss of water shielding above the fuel could increase the offsite radiation levels because of the gamma radiation emitted skyward interacting with air molecules and subsequently scattered back down to the ground where it can expose members of the public (known as "sky shine"). Attachment 3, "Calculation No. PNPS-EC-73355-M1417, Dose at Exclusion Area Boundary and Control Room Due to Shine from Drained Spent Fuel Pool During SAFSTOR," to the application provides the offsite and control room radiological impacts of a postulated complete loss of SFP water. The licensee determined that the sky shine dose rate at the EAB would be limited to small fractions of the EPA early phase PAGs. The extended period of time that would be required to exceed an integrated EPA early phase PAG of 1 rem TEDE would allow sufficient time to develop and implement onsite mitigative actions and provide confidence that additional offsite measures could be taken without formal offsite REP plans, if efforts to re-establish shielding over the fuel are delayed. The licensee determined that 10 months after shutdown, the gamma radiation dose rate at the EAB would be limited to small fractions of the EPA early phase PAG exposure levels and the control room dose rate would be less than 0.02 millirem (mrem)/hour. The NRC staff reviewed the licensee's evaluation and performed independent analyses which confirmed the licensee's results. Therefore, the NRC staff concludes that the dose consequence from sky shine emitted from the SFP due to a loss of SFP normal cooling would not exceed a level that would warrant protective actions under the EPA early phase PAG framework.

4. Considering the site-specific seismic hazard, the licensee has performed either an evaluation demonstrating a high confidence of a low probability (less than 1×10^{-5} per year) of seismic failure of the SFP storage structure, or an analysis demonstrating the fuel has decayed sufficiently that natural air flow in a completely drained pool would maintain peak cladding temperature below 565°C (the point of incipient cladding damage).

The licensee conducted a structural integrity seismic risk assessment of the Pilgrim SFP to assess seismically-induced structural failure and the potential for a rapid loss of coolant inventory. The licensee stated that this assessment was performed using Electric Power Research Institute (EPRI) document 3002009564, "Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation" (Reference 50), which the NRC staff has endorsed for the performance of SFP seismic re-evaluations. The assessment is comprised of several complementary seismic evaluations of the Pilgrim SFP, which satisfy the expectations and intent of the guidance in NUREG-1738.

In addition to the primary seismic evaluation, the licensee completed a structural drawing review of the Pilgrim SFP. The review was based on the Enhanced Seismic Checklist in Appendix 2B, "Structural Integrity of Spent Fuel Pools Subject to Seismic Loads," of NUREG-1738 and used the as-built drawings of the Pilgrim Reactor Building and SFP. The structural drawing review did not identify any specific design or detail any vulnerability of the Pilgrim SFP that would challenge its seismic capacity. The licensee also performed a seismic walkdown to confirm the conclusions of the structural drawing review.

The results of the NRC staff evaluation documented in NUREG-2161 support the licensee's conclusion of a low risk of challenge to a BWR SFP seismic integrity. This study included a detailed evaluation of a representative SFP in a BWR Mark I containment, which is the design class of the Pilgrim Reactor Building. The NRC staff evaluation determined that the SFP is a robust structure with a low probability of seismic structural failure. Furthermore, the study concluded that the fuel in a drained SFP could be effectively cooled by air after a 10-month decay time. Therefore, the NRC staff concludes that the Pilgrim SFP structure supports a high confidence of a low probability of structural failure due to seismic challenges.

5. If the licensee is storing fuel in an SFP, the licensee should address, for the decommissioning site, the risk reduction measures identified in NUREG-1738 as IDCs and SDAs.

In accordance with the safety analysis in NUREG-1738, the beyond design-basis event sequences that dominate risk at a decommissioning power reactor are large earthquake and cask-drop events. This is an important difference relative to an operating power reactor, where typically a large number of different initiating events make significant contributions to risk.

Assurance that the results of the NUREG-1738 analysis are representative of the plant-specific conditions at Pilgrim can be established by assessing the facility against certain design and operational characteristics that were assumed in the NUREG-1738 analysis. These characteristics were identified in the NUREG-1738 study as recovery, mitigation, and emergency response activities assumptions that were relied on to evaluate the likelihood of success in event sequences. In Section 4.2, "Comparison to NUREG-1738 Industry Decommissioning Commitments and Staff Decommissioning Assumptions;" Table 4, "PNPS Compliance with NSIR/DPR-ISG-02 Industry Decommissioning Commitments (IDCs)," and Table 5, "PNPS Compliance with NSIR/DPR-ISG-02 Staff Decommissioning Assumptions (SDAs)," of Attachment 1, "Request for Exemptions from Portions of 10 CFR 50.47(b), 10 CFR 50.47(c)(2) and 10 CFR Part 50, Appendix E," to the application dated July 3, 2018, the licensee described the conformance of the Pilgrim facility and operations with the IDCs and the SDAs. In its discussion of the IDCs and SDAs, the licensee addressed measures in place to minimize the potential risk from event sequences that dominate risk at a decommissioning reactor with fuel stored in an SFP (for example, those IDCs and SDAs related to fuel cask handling activities and seismic events).

The NRC staff's evaluation focused on the licensee's conformance with IDCs and SDAs that are related to the design and operation of structures, systems, and components associated with SFPs. The following provides a summary of the NRC staff's findings, based on an assessment of the licensee's IDC and SDA items:

- IDC #1:** Cask drop analyses will be performed or single-failure-proof cranes will be used for handling of heavy loads (i.e., phase II of NUREG-0612, ["Control of Heavy Loads at Nuclear Power Plants: Resolution of Generic Technical Activity A-36"] (Reference 51), will be implemented).

The licensee stated that the Pilgrim crane design is consistent with this commitment. The licensee further stated that heavy load lifts in and around the area of the SFP are performed by the Reactor Building Overhead Crane

(RBOC) and that the design of the crane is single failure-proof. Therefore, the likelihood of dropping the spent fuel casks in and around the SFP is extremely low. The design meets the requirements of NUREG-0554, "Single-Failure-Proof Cranes for Nuclear Power Plants," dated May 1979 (Reference 52) and Appendix C, "Modification of Existing Cranes," of NUREG-0612. Pilgrim procedures provide instructions for lifting activities to meet the guidance provided in NUREG-0612. Therefore, based on review of the licensee's procedures and the design of the RBOC, the NRC staff found that the qualification and operation of the RBOC as a single-failure-proof handling system satisfies the conditions assumed in the analysis presented in NUREG-1738 with respect to protection from potential cask drop events.

- IDC #2:** Procedures and training of personnel will be in place to ensure that onsite and offsite resources can be brought to bear during an event.
- IDC #3:** Procedures will be in place to establish communication between onsite and offsite organizations during severe weather and seismic events.
- IDC #4:** An offsite resource plan will be developed which will include access to portable pumps and emergency power to supplement onsite resources. The plan would principally identify organizations or suppliers where offsite resources could be obtained in a timely manner.

For IDC 2, 3, and 4, the licensee listed and described how various plant procedures would provide for deployment of onsite resources and access to offsite resources, including provisions for training, communications, and coordination to obtain offsite resources. Therefore, the NRC staff found that the licensee has adequate procedures to satisfy the conditions assumed in the NUREG-1738 analysis regarding the effective use of onsite and offsite resources to respond to events affecting the SFP.

- IDC #5:** SFP instrumentation will include readouts and alarms in the control room (or where personnel are stationed) for SFP temperature, water level, and area radiation levels.

The licensee described that the SFP instrumentation includes instruments, indicators, and alarms for SFP water level, temperature, and radiation levels. SFP water level is monitored via two independent level channels that were added to meet the requirements of NRC Order EA-12-051. Two independent indicators are installed on the North wall in the control room and provide indication via digital indication LI-4816A and LI-4816B. These indicators utilize Mohr instrumentation that utilize a guided wave radar method for measuring level. The devices have a range of 93 feet (') 3 inches (") to 116' 7". These indicators do not provide any inputs to the plant computer or the plant annunciator. A low-level alarm is provided via LS-4801A and LS-4801B on panels C39 and C903. The set point for these alarms is 115' decreasing. There is also a local level indicator (ruler) to provide an alternate means for determining SFP level. TS-4807, which alarms on Panel C2 in the control room at a temperature value of 115°F increasing, is located in the SFP. TE-4831, installed in the skimmer surge tank discharge line, provides temperature indication via a local recorder on panel C39 (TRU-4830). Area

radiation monitors are located at the new fuel storage racks, refuel floor area/spent fuel area, and refuel area/shield plug area. Area radiation monitor alarms are provided on panel C903 in the control room. The NRC staff found that the licensee will maintain adequate SFP monitoring instrumentation to satisfy the conditions assumed in the NUREG-1738 analysis regarding monitoring events affecting the SFP.

IDC #6: SFP seals that could cause leakage leading to fuel uncover in the event of seal failure shall be self-limiting to leakage or otherwise engineered so that drainage could not occur.

The licensee stated that the Pilgrim SFP gates are designed with static seals and the licensee stated that there is no credible catastrophic failure mechanism for these seals. If SFP inventory were to leak due to seal rupture or degradation, the SFP water level would not go below the top of the spent fuel racks. The fixed top elevation of the refueling slot between the SFP and reactor vessel (where the removal gates are located) is above the top of fuel. As such, leakage by the gates could not lead to fuel uncover. The NRC staff found that the described design features that limit the potential for drainage through the gate openings are consistent with the assumptions used in the analysis presented in NUREG-1738.

IDC #7: Procedures or administrative controls to reduce the likelihood of rapid draindown events will include (1) prohibitions on the use of pumps that lack adequate siphon protection, and (2) controls for pump suction and discharge points. The functionality of anti-siphon devices will be periodically verified.

The licensee described procedures and design elements that reduce the likelihood of a rapid draindown event. Pilgrim procedures allow specified volumes to be pumped to, or letdown from, the SFP for cooling, makeup, or to support dry cask operations. The procedures satisfy this IDC by controlling the suction and discharge points. The SFP is designed such that there is no drain piping tied to the SFP, and the only lines that enter the SFP are two 6" inlet lines which enter the SFP from the top. The SFP cooling pump suction flow path is from weirs at elevation 116', through the skimmer surge tanks. Due to this arrangement, pump suction cannot draw the water level down below the elevation of the weirs. Each line is outfitted with a siphon break, which consists of a 1/2" nominal pipe welded to the inlet line. The normal SFP level is below the elevation of the siphon break. As such, a siphon event is not possible because the presence of the 1/2" pipe prevents the development of any vacuum in the line. The inlet lines and associated siphon breaks are routinely inspected as part of normal operator tours. These inspections ensure that there is no degradation or otherwise undesirable condition associated with the siphon break piping. The NRC staff found that the described procedures, administrative controls, and design features minimize the potential for rapid drainage through permanent systems and are consistent with the assumptions used in the analysis presented in NUREG-1738.

The licensee stated that during dry cask operations, plant procedures also note that the displacement of the Holtec International Transfer Cask

(HI-TRAC) will raise the SFP level by approximately 8.5" and provide instructions to preemptively lower the SFP level to accommodate this displacement by pumping water from the SFP directly into the skimmer surge tanks via a portable pump/hose arrangement. The procedures include a prerequisite activity to establish communications with the control room just prior to this evolution. The procedures also include instructions to establish abort criteria based on SFP level and temperature. The use of a siphon break is not required since the portable equipment used to lower the SFP level is continuously monitored during its operation.

Pilgrim plant procedures control additional dry cask operations in the SFP, and a review of these procedures confirmed that there are no dry-cask-related SFP operations which could result in a rapid draindown event. This complies with the Technical Specifications requirement that the SFP be maintained to prevent inadvertent draining below the 115' elevation.

IDC #8: An onsite restoration plan will be in place to provide repair of the SFP cooling systems or to provide access for makeup water to the SFP. The plan will provide for remote alignment of the makeup source to the SFP without requiring entry to the refuel floor.

The licensee stated that procedures are in place to restore the SFP cooling systems, provide normal makeup to the SFP, and provide an alternate path for makeup water to the SFPs without requiring entry to the refueling floor. The licensee stated that Pilgrim plant procedures provide multiple methods to align makeup sources to the SFP, none of which require entry to the refueling floor. These methods include:

- Condensate transfer system with either of two condensate transfer pumps;
- Demineralized water transfer system;
- Fire Protection System via hose station; and
- Fire Protection System via a cross-tie to the Residual Heat Removal System.

The NRC staff found the planned SFP cooling and make-up water capability conformed to the capabilities assumed for the NRC staff analysis presented in NUREG-1738.

IDC #9: Procedures will be in place to control SFP operations that have the potential to rapidly decrease SFP inventory. These administrative controls may require additional operations or management review, management physical presence for designated operations, or administrative limitations such as restrictions on heavy load movements.

The licensee described that plant procedures govern SFP operations, such as water transfer or dry cask operations for ISFSI activities that could have the potential to rapidly decrease SFP inventory. Procedures control water inventory during ISFSI operations, to include a prerequisite activity to establish an SFP level control team in assigned locations. This team

establishes communication with the control room and ensures that the single-failure-proof attributes of the heavy load handling system are maintained.

Pilgrim plant procedures, which satisfy this IDC by controlling the suction and discharge points, allow specified volumes to be pumped to or letdown from the SFP for cooling, makeup, or to support dry cask operations. The SFP design ensures that there is no drain piping tied to the SFP, and that the only lines that enter the SFP are two 6" inlet lines that enter the top of the SFP. The SFP cooling pump suction flow path is from weirs at elevation 116' through the skimmer surge tanks. Pump suction cannot draw the water level down below the elevation of the weirs due to system arrangement.

During dry cask operations, plant procedures note that the displacement of the HI-TRAC will raise the SFP level by approximately 8.5" and provide instructions to preemptively lower the SFP level to accommodate this displacement by pumping water from the SFP directly into the skimmer surge tanks via a portable pump/hose arrangement. The plant procedures also include a prerequisite activity to establish an SFP level control team in assigned locations, which establishes communications with the control room just prior to this evolution. The plant procedures also include instructions to establish abort criteria based on SFP level and temperature. The licensee stated that the use of a siphon break is not required since the portable equipment used to lower the SFP level is continuously monitored during its operation. The NRC staff found that the described procedures conformed to the administrative controls considered in the NRC staff analysis presented in NUREG-1738.

IDC #10: Routine testing of the alternative fuel pool makeup system components will be performed and administrative controls for equipment out of service will be implemented to provide added assurance that the components would be available, if needed.

The licensee described that plant procedures provide multiple methods to align makeup sources to the SFP without requiring entry to the refueling floor. If access to the refueling floor is available, an additional option includes the Fire Protection System via a hose station. For the pumps necessary to provide makeup sources to the SFP, preventive maintenance will be in place to ensure that the pumps will perform as required when placed in service. This preventive maintenance must be implemented and scheduled in accordance with the preventative maintenance program. The NRC staff found that the described administrative controls conform to those considered in the NRC staff analysis presented in NUREG-1738.

SDA #1: SFP cooling design will be at least as capable as that assumed in the risk assessment, including instrumentation. Licensees will have at least one motor-driven and one diesel-driven fire pump capable of delivering inventory to the SFP.

The licensee stated that the SFP structure and siphon breaks on the SFP cooling return piping are classified as safety-related. The return piping inside

the SFP is seismically analyzed using criteria applicable for a Class I structure, system, or component. Appendix C, "Structural Loading Criteria," to the Pilgrim Final Safety Analysis Report (ADAMS Accession No. 16335A144), Section C.3, "Components," defines the Class I criteria applicable to piping and equipment. Piping analysis methods and allowable stress limits were drawn from the American Society of Mechanical Engineers Standard B31.1.0, "Power Piping." Likewise, the SFP structure has been analyzed for seismic loads as part of a seismic risk assessment further described in response to SDA-5. The seismic risk assessment included a physical walk-down validating that the seismic design has been maintained and remains capable of sustaining its inventory boundary considering today's excitation values. The instrumentation includes dual, independent level monitors with indications and alarms in the control room, including those for temperature. The SFP has redundant cooling pumps, redundant heat exchangers, and multiple make-up sources, in addition to the normal condensate transfer system. The additional sources include tie-ins to the Firewater System, with jockey pump P-146, electric pump P-135, and diesel-driven pump P-140. The make-up source for the firewater is a municipal water system. Instrumentation was described in the discussion of IDC #5. The licensee stated that any changes to the SFP cooling configuration as a result of permanent cessation of operations will be evaluated to confirm that the resulting configuration is at least as capable as the design assumed in Section 3.0, "Risk Assessment of Spent Fuel Pools at Decommissioning Plants," of NUREG-1738. The NRC staff found that the described cooling and makeup capabilities are comparable to the capabilities considered in the NRC staff analysis presented in NUREG-1738.

SDA #2: Walk-downs of SFP systems will be performed at least once per shift by the operators. Procedures will be developed for and employed by the operators to provide guidance on the capability and availability of onsite and offsite inventory makeup sources and time available to initiate these sources for various loss-of-cooling or inventory events.

The licensee stated that personnel will perform a walk-down of SFP systems once each shift. As described later in the response to SDA #3, there are various methods available to the control room for monitoring the SFP. As such, walk-downs may not be as frequent as originally described in NUREG-1738. Procedures provide the necessary guidance to address loss of SFP cooling and loss-of-level conditions. Pilgrim plant procedures specifically require an SFP inspection following a seismic event and include methods to diagnose the loss of cooling and/or inventory with description of steps required to establish make up. The NRC staff found that the proposed monitoring of the SFP systems would be comparable to the capability assumed for the analysis presented in NUREG-1738.

SDA #3: Control room instrumentation that monitors SFP temperature and water level will directly measure the parameters involved. Level instrumentation will provide alarms at levels associated with calling in offsite resources and with declaring an emergency.

The licensee described that Pilgrim maintains a Technical Specification value that the SFP be maintained at an elevation of 111' 3". Two independent indicators are installed on the North wall in the control room and provide indication via digital indication LI-4816A and LI-4816B that utilize a guided wave radar method for measuring level. The devices have a range of 93' 3" to 116' 7". A low-level alarm is provided via LS-4801A and LS-4801B on panels C39 and C903. The set point for these alarms is 115' decreasing. TS-4807, which alarms on Panel C2 in the control room at a value of 115°F increasing, is located in the SFP. TE-4831, installed in the skimmer surge tank discharge line, provides temperature indication via a local recorder on panel C39. The licensee stated that the facility will employ permanently defueled EALs using an NRC-approved EAL scheme based on the NEI document NEI 99-01, "Development of Emergency Action Levels for Non-Passive Reactors," Revision 6 (Reference 53). Revision 6 of NEI 99-01 was endorsed by the NRC in a letter dated March 28, 2013 (Reference 54). The NRC staff finds that the SFP monitoring capability is consistent with the assumptions in the analysis presented in NUREG-1738.

SDA #4: Licensee determines that there are no drain paths in the SFP that could lower the pool level (by draining, suction, or pumping) more than 15 feet below the normal pool operating level and that licensee must initiate recovery using offsite sources.

The licensee described potential drain or siphon paths within the SFP. The SFP is designed such that there is no drain piping tied to the SFP, and the only lines to enter the SFP are two 6" inlet lines that enter the SFP from the top. The SFP cooling pump suction flow path is from weirs at elevation 116' through the skimmer surge tanks. Due to this arrangement, it is not possible to drain or pump water from the SFP below the level of the weirs at elevation 116'. Each 6" line that enters the SFP from the top is outfitted with a siphon break, which consists of a ½" nominal pipe welded to the inlet line. The normal SFP level is below the elevation of the siphon break. As such, a siphon event is not possible because the presence of the ½" pipe prevents the development of any vacuum in the line. The passage between the fuel storage pool and the refueling cavity above the reactor vessel is provided with two double-sealed gates with a monitored drain between the gates. This arrangement permits detection of leaks from the passage and repair of the gates in the event of such leakage. If SFP inventory were to leak due to seal rupture or degradation, the level would not go below the top of the spent fuel racks. Therefore, the SFP design reasonably protects against drainage that results in fuel uncover consistent with the assumptions used in the analysis presented in NUREG-1738. As discussed previously in IDC #4, the licensee listed how various plant procedures would provide for deployment of onsite resources and access to offsite resources. The NRC staff finds that the potential drain or siphon paths within the SFP are consistent with the assumptions in the analysis presented in NUREG-1738.

SDA #5: Load drop consequence analysis will be performed for facilities with non-single, failure-proof systems. The analyses and any mitigative actions necessary to preclude catastrophic damage to the SFP that would lead to a

rapid pool draining would be sufficient to demonstrate that there is high enough confidence in the facility's ability to withstand a heavy load drop.

As discussed under IDC #1, the licensee committed to use single-failure-proof cranes for such loads. Therefore, the protection against heavy load drops is consistent with the assumptions considered in the analysis presented in NUREG-1738.

SDA #6: Each decommissioning plant will successfully complete the seismic checklist provided in Appendix 2B to NUREG-1738. If the checklist cannot be successfully completed, the decommissioning plant will perform a plant-specific seismic risk assessment of the SFP and demonstrate that SFP seismically induced structural failure and rapid loss of inventory is less than the generic bounding estimates provided in NUREG-1738 ($<1 \times 10^{-5}$ per year including non-seismic events).

The licensee conducted a structural integrity seismic risk assessment of the SFP to assess seismically induced structural failure and rapid loss of inventory. The NRC staff reviewed the assessment and found that it demonstrates that the risk of an SFP seismically induced structural failure and rapid loss of inventory is 6.6×10^{-6} per year, which is less than the generic bounding estimates provided in NUREG-1738 ($<1 \times 10^{-5}$ per year including non-seismic events).

Additionally, Section 4.3, "Consequences of a Beyond Design-Basis Earthquake," of Attachment 1 to the application compares Pilgrim spent fuel storage characteristics with those of the reference plant evaluated in NUREG-2161. The NRC staff concluded that Pilgrim spent fuel storage characteristics are comparable to those of the reference plant evaluated in NUREG-2161.

SDA #7: Licensees will maintain a program to provide surveillance and monitoring of Boraflex in high-density spent fuel racks until such time as spent fuel is no longer stored in these high-density racks.

The licensee stated that nine SFP racks utilize sheets of Boraflex poison material sandwiched between stainless steel sheets. The licensee made a commitment in response to NRC Generic Letter 96-04, "Boraflex Degradation in Spent Fuel Pool Storage," dated June 26, 1996 (Reference 55), to perform periodic inspection of the Boraflex material. UFSAR license renewal commitments include implementation of the Pilgrim Boraflex Monitoring Program, excerpted as follows:

The Boraflex Monitoring Program assures that degradation of the Boraflex panels in the spent fuel racks does not compromise the criticality analysis in support of the design of the spent fuel storage racks. The program relies on (1) neutron attenuation testing, (2) determination of boron loss through correlation of silica levels in spent fuel pool water samples and periodic areal density measurements, and (3)

analysis of criticality to assure that the required 5% subcriticality margin is maintained.

The licensee stated that the Pilgrim Boraflex Monitoring Program will remain in place and the commitment as written continues to apply until spent fuel is no longer stored in racks outfitted with Boraflex panels or until the Boraflex panels are no longer credited for neutron absorption in the SFP criticality analysis.

Based on its review of the licensee's description of the SFP racks and the Pilgrim Boraflex Monitoring Program, the NRC staff concludes that the design and operation of structures, systems, and components associated with SFP storage provide for safe storage of spent fuel and are consistent with the capabilities assumed in the analysis presented in NUREG-1738.

6. Verification that the licensee presents a determination that there are sufficient resources and adequately trained personnel available on-shift to promptly initiate mitigative actions within the 10-hour minimum time period that will prevent an offsite radiological release that exceeds the EPA early phase PAGs at the EAB.

Pilgrim mitigative strategies are maintained in accordance with License Condition 3.K of the Pilgrim license. The licensee stated that the mitigating strategies for a catastrophic loss of SFP water inventory can be performed by the proposed on-shift staffing of a control room supervisor, non-certified operator, and radiation protection technician. The licensee further stated that Pilgrim performed a validation exercise that demonstrated the ability to perform the required actions with the designated personnel. Pilgrim plant procedures are in place to ensure onsite and offsite resources can be brought to bear during an event. The procedures and associated training will be updated as necessary to reflect the permanently shutdown and defueled condition. Following permanent shut down and permanent removal of fuel from the reactor vessel, the licensee stated that the on-shift plant operators, including certified fuel handlers and non-certified operators, will be appropriately trained on the relevant procedures and on the various actions needed to provide makeup to the SFP. The licensee will ensure appropriate personnel receive initial and continuing training on procedures and strategies that are needed to respond to the loss of large areas of the plant due to explosions or fire and are credited in applicable License Conditions required by 10 CFR 50.54(hh)(2). The NRC staff concludes that the identified plant personnel will be appropriately trained on the relevant procedures and on the various actions needed to provide makeup to the SFP and are consistent with the capabilities assumed in the analysis presented in NUREG-1738.

7. Verification that mitigation strategies are consistent with that required by the permanently defueled technical specifications or by retained license conditions.

The licensee stated that Pilgrim maintains procedures and mitigative strategies for the movement of any necessary portable equipment that will be relied upon for mitigating the loss of SFP water inventory. These mitigative strategies were developed in response to 10 CFR 50.54(hh)(2) and are maintained in accordance with applicable License Conditions of the Pilgrim license. The licensee stated that these diverse strategies provide defense-in-depth and ample time to provide makeup water or spray to the SFP prior to the onset of zirconium cladding ignition when considering very low probability beyond design-basis events affecting the SFP. The NRC staff concludes that the

identified procedures and strategies for the movement of any necessary portable equipment that will be relied upon for mitigating the loss of SFP water are consistent with the capabilities assumed in the analysis presented in NUREG-1738.

5.0 EXEMPTIONS

Pursuant to 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: (1) when 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) when special circumstances are present.

Special circumstances exist, in part, when 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 (10 CFR 50.12(a)(2)(ii)). The underlying purpose of the planning standards in 10 CFR 50.47(b), the requirements in 10 CFR 50.47(c)(2), and certain requirements of Section IV of Appendix E to 10 CFR Part 50, are: to ensure that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency; and to ensure that licensees maintain effective offsite and onsite radiological emergency response plans.

This section reflects the NRC staff's technical evaluation of the licensee's exemption requests, as provided to the Commission in SECY-19-0078, which was approved by the Commission in the SRM to SECY-19-0078.

5.1 **Specific Exemptions for 10 CFR 50.47**

The July 3, 2018, letter requested an exemption from certain sections (as indicated by ~~strikeout~~ and **bolded text**) of 10 CFR 50.47 for Pilgrim.

5.1.1 10 CFR 50.47(b)

The onsite ~~and, except as provided in paragraph (d) of this section, offsite~~ emergency response plans for nuclear power reactors must meet the following standards:

The NRC requires a level of licensee EP commensurate with the potential consequences to public health and safety, and common defense and security at the licensee's site. The licensee's exemption request included radiological analyses to show that, as of 46 days after the final reactor shutdown, the radiological consequences of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs at the EAB. The licensee also concluded, and the NRC staff confirmed, as of 10 months after the permanent cessation of power operations, in the highly unlikely event all cooling is lost to the spent fuel and a heat up under adiabatic conditions results, 10 hours would be available to take mitigative actions before the hottest fuel assembly reached 900°C.

NUREG-1738, and enhancements put into place as a result of the events of September 11, 2001, and the Fukushima Dai-ichi Accident, support staff assumptions that: only a highly unlikely, beyond-design-basis event (e.g., extreme earthquake or large aircraft impact) could result in an SFP fire. In addition, there would be a significant amount of time between the initiating event and the possible onset of conditions that could result in an SFP zirconium

cladding fire. This time provides a substantial opportunity for event mitigation. Licensees are required to maintain effective strategies, sufficient resources, and adequately trained personnel to mitigate such an event. If State or local governmental officials determine that offsite protective actions are warranted, then sufficient time and capability would be available for OROs to implement these measures using a CEMP, "all-hazards," approach.

Considering the very low probability of beyond-design-basis events affecting SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor.

Based on the above analysis, the NRC staff concludes that the exempted language from 10 CFR 50.47(b) above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.1.2 10 CFR 50.47(b)(1)

Primary responsibilities for emergency response by the nuclear facility licensee and by State and local organizations ~~within the Emergency Planning Zones~~ have been assigned, the emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis.

NUREG-0396 provided that emergency response plans should be useful for responding to any accident that would produce offsite radiological doses in excess of the EPA early phase PAGs. Additionally, it introduced the concept of generic plume exposure pathway zones as a basis for the planning of response actions, which would result in dose savings in the environs of nuclear facilities in the event of a serious power reactor accident. As previously discussed, the licensee has provided radiological analyses, which show that as of 10 months after permanent cessation of power operations, the radiological consequences for DBAs at Pilgrim will not exceed the limits of the EPA early phase PAGs at the EAB. In addition, reactor core melt (Class 9) scenarios, which were also considered in NUREG-0396, are no longer applicable to a permanently shutdown and defueled power reactor.

In the SOC for the Final Rule for EP requirements for ISFSIs and for MRS facilities (60 FR 32430; June 22, 1995), the Commission responded to comments concerning an EPZ for an ISFSI and MRS, and concluded that, "based on the potential inventory of radioactive material, potential driving forces for distributing that amount of radioactive material, and the probability of the initiation of these events, the Commission concludes that the offsite consequences of potential accidents at an ISFSI or a MRS would not warrant establishing Emergency Planning Zones."

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low probability of beyond-design-basis events affecting SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset

of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, designated plume exposure and ingestion pathway EPZs are no longer needed.

Based on the above analysis, the NRC staff concludes that the exempted language from 10 CFR 50.47(b)(1), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.1.3 10 CFR 50.47(b)(3)

Arrangements for requesting and effectively using assistance resources have been made, ~~arrangements to accommodate State and local staff at the licensee's Emergency Operations Facility have been made,~~ and other organizations capable of augmenting the planned response have been identified.

With the termination of reactor power operations at Pilgrim and the permanent removal of the fuel from the reactor vessel to the SFP, most of the accident scenarios postulated for operating reactors are no longer possible. The spent fuel will be stored in the SFP and the ISFSI, and will remain onsite until it can be moved offsite for long-term storage or disposal. The reactor, reactor coolant system (RCS), and supporting systems are no longer in operation and have no function related to the storage of the spent fuel. Therefore, postulated accidents involving failure or malfunction of the reactor, RCS, or supporting systems are no longer applicable. During reactor decommissioning, the principal public safety concerns involve the radiological risks associated with the storage of spent fuel onsite.

The emergency operations facility (EOF) is a support facility for the purpose of managing the overall licensee emergency response (including coordination with Federal, State, and local officials), coordination of radiological and environmental assessments, and determination of recommended public protective actions. The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low probability of beyond-design-basis events affecting SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, an EOF would not be needed to coordinate these types of assessments for determining public protective actions. Onsite staff will continue to maintain, and provide for, communication and coordination capabilities with offsite authorities for the purpose of notification and for the level of support required for remaining DBAs and the prompt implementation of mitigative actions in response to an event affecting the SFP.

Based on the above analysis and the analysis provided in Section 5.1.1 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR 50.47(b)(3), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.1.4 10 CFR 50.47(b)(4)

A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, ~~and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low probability of beyond-design-basis events affecting SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement for minimum initial offsite response measures is not required.

Based on the above analysis and the analysis provided in Section 5.1.1 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR 50.47(b)(4), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.1.5 10 CFR 50.47(b)(5)

Procedures have been established for notification, by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and follow-up messages to response organizations ~~and the public~~ has been established; ~~and means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone have been established.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low probability of beyond-design-basis events affecting SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, a means to provide early notification and clear instruction to the populace within a designated plume exposure pathway EPZ is no longer required.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.1.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR 50.47(b)(5), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.1.6 10 CFR 50.47(b)(6)

Provisions exist for prompt communications among principal response organizations to emergency personnel ~~and to the public~~.

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low probability of beyond-design-basis events affecting SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement to provide prompt communication to the public within a designated plume exposure pathway EPZ in regard to initial or pre-determined protective actions is no longer needed.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.1.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR 50.47(b)(6), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.1.7 10 CFR 50.47(b)(7)

~~Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station and remaining indoors), [T]he principal points of contact with the news media for dissemination of information during an emergency (including the physical location or locations) are established in advance, and procedures for coordinated dissemination of information to the public are established.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low probability of beyond-design-basis events affecting SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement to provide periodic information to the public within a designated plume exposure pathway EPZ on how they will be notified and what their initial or predetermined protective actions should be in an emergency is not needed.

Based on the above analysis and the analyses provided in Section 5.1.1 and 5.1.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR 50.47(b)(7), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.1.8 10 CFR 50.47(b)(9)

Adequate methods, systems, and equipment for assessing and monitoring actual or potential ~~offsite~~ consequences of a radiological emergency condition are in use.

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement for assessing or monitoring offsite consequences beyond the EAB is not needed.

Based on the above analysis and the analysis provided in Section 5.1.1 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR 50.47(b)(9), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.1.9 10 CFR 50.47(b)(10)

~~A range of protective actions has been developed for the plume exposure pathway EPZ for emergency workers and the public. In developing this range of actions, consideration has been given to evacuation, sheltering, and, as a supplement to these, the prophylactic use of potassium iodide (KI), as appropriate. Evacuation time estimates have been developed by applicants and licensees. Licensees shall update the evacuation time estimates on a periodic basis. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed.~~

The Commission provided its view on evacuation planning for an ISFSI (not at an operating reactor site) in its SOC for the Final Rule for EP requirements for an ISFSI and an MRS (60 FR 32430; June 22, 1990) stating: "The Commission does not agree that as a general matter emergency plans for an ISFSI must include evacuation planning."

The NRC staff has determined that no credible events within the design basis would result in doses to the public that would exceed the EPA early phase PAGs beyond the EAB. Therefore, EPZs beyond the EAB and the associated protective actions developed from evacuation time estimates (ETEs) are no longer required. Additionally, in the unlikely event of an SFP accident, the iodine isotopes, which contribute to an offsite dose from an operating reactor power accident, are not present, so KI distribution would no longer serve as an effective, or necessary, supplemental protective action. As such, the NRC staff concludes that the licensee provides for an acceptable level of emergency planning at Pilgrim in its permanently shutdown and defueled condition, and also provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency at Pilgrim.

Although formal offsite REP plans (in accordance with 44 CFR Part 350) have typically been exempted for decommissioning sites, OROs will continue to be relied upon for firefighting, law enforcement, ambulance and medical services in support of the licensee's (onsite) emergency plan. The licensee is responsible for providing protective measures for any emergency workers responding onsite. Additionally, the licensee is responsible for control of activities within the EAB, including public access. The licensee actions that are necessary to protect the health and safety of members of the public who are in the EAB may include, but are not limited to, evacuation, sheltering, and decontamination in the unlikely event of a release of radioactive materials.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.1.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR 50.47(b)(10), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.1.10 10 CFR 50.47(c)(2)

~~Generally, the plume exposure pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 km) in radius and the ingestion pathway EPZ shall consist of an area about 50 miles (80 km) in radius. The exact size and configuration of the EPZs surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes, and jurisdictional boundaries. The size of the EPZs also may be determined on a case-by-case basis for gas-cooled nuclear reactors and for reactors with an authorized power level less than 250 MW thermal. The plans for the ingestion pathway shall focus on such actions as are appropriate to protect the food ingestion pathway.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement for an EPZ is not required.

Section 50.47(c)(2) and footnote 1 to Appendix E to 10 CFR Part 50 both state, in part: "The size of the EPZs also may be determined on a case-by-case basis for gas-cooled nuclear reactors and for reactors with an authorized power level less than 250 MW [megawatt] thermal." This is not applicable to Pilgrim and, therefore, requires no exemption.

Based on the above analysis and the analysis provided in Section 5.1.9 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR 50.47(c)(2), above, is not necessary to achieve the underlying purpose of this requirement as it applies to

Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2 Specific Exemptions for 10 CFR Part 50, Appendix E, Section IV

The July 3, 2018, letter requested an exemption from certain sections (as indicated by ~~strikeout~~ and **bolded** text) of Appendix E to 10 CFR Part 50 for Pilgrim.

5.2.1 10 CFR Part 50, Appendix E, Section IV.1

The applicant's emergency plans shall contain, but not necessarily be limited to, information needed to demonstrate compliance with the elements set forth below, i.e., organization for coping with radiological emergencies, assessment actions, activation of emergency organization, notification procedures, emergency facilities and equipment, training, maintaining emergency preparedness, recovery, ~~and onsite protective actions during hostile action~~. In addition, the emergency response plans submitted by an applicant for a nuclear power reactor operating license under this part, or for an early site permit (as applicable) or combined license under 10 CFR part 52, shall contain information needed to demonstrate compliance with the standards described in § 50.47(b), and they will be evaluated against those standards.

After the terrorist attacks of September 11, 2001, NRC evaluated the EP planning basis to ensure that it continued to protect the public health and safety in the current threat environment. In 2002, the NRC issued Orders requiring compensatory measures, which include nuclear security and EP. The NRC staff determined that the EP planning basis continues to protect public health and safety; however, the NRC staff recognized that enhancements were desirable to ensure effective plan implementation during security-related events at nuclear power reactors (e.g., more timely NRC notification; additional onsite protective action considerations, and revision of emergency action levels to identify security-related emergencies more succinctly).

The NRC issued NRC Bulletin (BL) 2005-02, "Emergency Preparedness and Response Actions for Security-Based Events," dated July 18, 2005 (Reference 56), to obtain information from licensees on progress in implementing security-event-related EP program enhancements. The 2011 EP Final Rule, "Enhancements to Emergency Preparedness Regulations," (76 FR 72560; November 23, 2011) made generically applicable the security-based response elements of NRC BL 2005-02. The enhancements of NRC BL 2005-02 were not applicable to holders of operating licenses for power reactors that had permanently ceased operations and had certified that fuel had been removed from the reactor vessel. Therefore, the enhancements for hostile actions, as required by the 2011 EP Final Rule, are not necessary for Pilgrim in a permanently shutdown and defueled status.

Additionally, the NRC excluded non-power reactors from the definition of "hostile action" at the time of the 2011 EP Final Rule because, as defined in 10 CFR 50.2, a non-power reactor is not considered a nuclear power reactor and a regulatory basis had not been developed to support the inclusion of non-power reactors in the definition of "hostile action." Similarly, a decommissioning power reactor or ISFSI is not a "nuclear reactor" as defined in the NRC's regulations. Like a non-power reactor, a decommissioning nuclear reactor also has a lower likelihood of a credible accident resulting in radiological releases requiring offsite protective measures than does an operating nuclear reactor. For all of the above reasons, the NRC staff concludes that a decommissioning nuclear power reactor is not a facility that falls within the

definition of "hostile action." However, although this analysis provides a justification for exempting Pilgrim from "hostile action" related requirements, some EP requirements for security-based events are maintained. The classification of security-based events, notification of offsite authorities, and coordination with offsite agencies are still required.

Based on the above analysis, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.1, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.2 10 CFR Part 50, Appendix E, Section IV.2

~~**This nuclear power reactor license applicant shall also provide an analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations using the most recent U.S. Census Bureau data as of the date the applicant submits its application to the NRC.**~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirements for an EPZ and ETEs are not required.

Based on the above analysis and the analyses provided in Section 5.1.9 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.2, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.3 10 CFR Part 50, Appendix E, Section IV.3

~~**Nuclear power reactor licensees shall use NRC approved evacuation time estimates (ETEs) and updates to the ETEs in the formulation of protective action recommendations and shall provide the ETEs and ETE updates to State and local governmental authorities for use in developing offsite protective action strategies.**~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled

nuclear power reactor. Since formal offsite REP plans are not needed, the requirement to have an ETE and to perform an update to the ETE is not needed.

Based on the above analysis and the analysis provided in Section 5.2.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.3, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.4 10 CFR Part 50, Appendix E, Section IV.4

~~Within 365 days of the later of the date of the availability of the most recent decennial census data from the U.S. Census Bureau or December 23, 2011, nuclear power reactor licensees shall develop an ETE analysis using this decennial data and submit it under § 50.4 to the NRC. These licensees shall submit this ETE analysis to the NRC at least 180 days before using it to form protective action recommendations and providing it to State and local governmental authorities for use in developing offsite protective action strategies.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Since formal offsite REP plans are not needed, the requirement to have an ETE and to perform an update to the ETE is not needed.

Based on the above analysis and the analysis provided in Section 5.2.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.4, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.5 10 CFR Part 50, Appendix E, Section IV.5

~~During the years between decennial censuses, nuclear power reactor licensees shall estimate EPZ permanent resident population changes once a year, but no later than 365 days from the date of the previous estimate, using the most recent U.S. Census Bureau annual resident population estimate and State/local government population data, if available. These licensees shall maintain these estimates so that they are available for NRC inspection during the period between decennial censuses and shall submit these estimates to the NRC with any updated ETE analysis.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs

beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Since formal offsite REP plans are not needed, the requirement to have an ETE and to perform an update to the ETE is not needed.

Based on the above analysis and the analysis provided in Section 5.2.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.5, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.6 10 CFR Part 50, Appendix E, Section IV.6

~~If at any time during the decennial period, the EPZ permanent resident population increases such that it causes the longest ETE value for the 2-mile zone or 5-mile zone, including all affected Emergency Response Planning Areas, or for the entire 10-mile EPZ to increase by 25 percent or 30 minutes, whichever is less, from the nuclear power reactor licensee's currently NRC approved or updated ETE, the licensee shall update the ETE analysis to reflect the impact of that population increase. The licensee shall submit the updated ETE analysis to the NRC under § 50.4 no later than 365 days after the licensee's determination that the criteria for updating the ETE have been met and at least 180 days before using it to form protective action recommendations and providing it to State and local governmental authorities for use in developing offsite protective action strategies.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Since formal offsite REP plans are not needed, the requirement to have an ETE and to perform an update to the ETE is not needed.

Based on the above analysis and the analysis provided in Section 5.2.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.6, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.7 10 CFR Part 50, Appendix E, Section IV.A.1

A description of the normal plant ~~operating~~ organization.

Since docketing of the certifications of permanent cessation of operations and permanent removal of fuel from the reactor vessel has been completed, the 10 CFR Part 50 license for Pilgrim no longer authorizes operation of the Pilgrim reactor, or emplacement or retention of fuel into the reactor vessel, as specified in 10 CFR 50.82(a)(2). Because the licensee is no longer authorized to operate the reactor, the licensee does not have a plant "operating" organization. A description of the plant organization, as it relates to the requirements in Section IV.A.1 of Appendix E to 10 CFR Part 50 is still required.

Based on the above analysis, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.A.1, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.8 10 CFR Part 50, Appendix E, Section IV.A.3

~~A description, by position and function to be performed, of the licensee's headquarters personnel who will be sent to the plant site to augment the onsite emergency organization.~~

The number of staff at decommissioning sites is generally small but is commensurate with the need to safely store spent fuel at the facility in a manner that is protective of public health and safety. The licensee furnished information concerning its SFP inventory makeup strategies that could be used in the event of a catastrophic loss of SFP water inventory and stated that designated on-shift personnel are trained to implement such strategies with equipment maintained onsite. The licensee has site personnel designated to respond within two hours of the declaration of an Alert classification level to assist the on-shift staff. As such, designation of specific licensee headquarters personnel is not necessary for the augmentation of the on-shift staffing and, therefore, is not described.

Based on the above analysis and the analysis provided in Section 5.1.1 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.A.3, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.9 10 CFR Part 50, Appendix E, Section IV.A.4

Identification, by position and function to be performed, of persons within the licensee organization who will be responsible for making ~~offsite~~ dose projections, and a description of how these projections will be made and the results transmitted to State and local authorities, NRC, and other appropriate governmental entities.

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs

beyond the EAB. While it is unlikely that a beyond-design-basis event would result in doses in excess of the EPA early phase PAGs to the public beyond the EAB, the licensee still must be able to determine if a radiological release is occurring, thereby achieving the underlying purpose of the rule. If a release is occurring, then the licensee's staff is still required to communicate that information to offsite authorities for their consideration. The offsite authorities are responsible for deciding what, if any, protective actions should be taken that they consider appropriate to protect public health and safety.

Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement for offsite dose projections is not required.

Based on above analysis and the analysis provided in Section 5.1.1 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.A.4, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.10 10 CFR Part 50, Appendix E, Section IV.A.5

~~**Identification, by position and function to be performed, of other employees of the licensee with special qualifications for coping with emergency conditions that may arise. Other persons with special qualifications, such as consultants, who are not employees of the licensee and who may be called upon for assistance for emergencies shall also be identified. The special qualifications of these persons shall be described.**~~

The number of licensee staff at decommissioning sites is generally smaller than that for an operating power reactor but is still commensurate with the need to operate the facility in a manner that is protective of public health and safety. The NRC staff considered the similarity between the staffing levels at a permanently shutdown and defueled reactor, and staffing levels at an operating power reactor site. The spectrum of accidents at a decommissioning facility is greatly reduced requiring less specialized qualifications. The limited number of systems and equipment needed to maintain the spent fuel in a safe condition in the SFP or in an ISFSI requires only minimal personnel, which is governed by the Pilgrim Technical Specifications.

The licensee furnished information concerning its SFP inventory makeup strategies that could be used in the event of a catastrophic loss of SFP water inventory and stated that designated on-shift personnel are trained to implement such strategies with equipment maintained onsite. The licensee has site personnel designated to respond within two hours of the declaration of an Alert classification level to assist the on-shift staff. As such, additional employees or other persons with special qualifications are not anticipated.

Considering the very low-probability of beyond-design-basis events affecting the SFP, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel and before the onset of a postulated fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement for

personnel with special qualifications, as directed in 10 CFR Part 50, Appendix E, Section IV.A.5, is not required.

Based on above analysis and the analyses provided in Sections 5.1.1 and 5.2.8 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.A.5, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.11 10 CFR Part 50, Appendix E, Section IV.A.7

~~By June 23, 2014, identification of, and a description of the assistance expected from, appropriate State, local, and Federal agencies with responsibilities for coping with emergencies, including hostile action at the site. For purposes of this appendix, "hostile action" is defined as~~ an act directed toward a nuclear power plant or its personnel that includes the use of violent force to destroy equipment, take hostages, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, projectiles, vehicles, or other devices used to deliver destructive force.

In the 2011 EP Final Rule, the Commission defined "hostile action" as, in part, "an act directed toward a nuclear power plant or its personnel." The 2011 EP Final Rule made generically applicable the security-based response elements of NRC BL 2005-02. The enhancements from NRC BL 2005-02 were applicable to all holders of operating licenses for nuclear power reactors, except those who have permanently ceased operation and have certified that fuel has been removed from the reactor vessel.

With the certifications of 10 CFR 50.82(a)(1), 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, as specified by 10 CFR 50.82(a)(2). Therefore, the enhancements for hostile actions required by the 2011 EP Final Rule are not applicable for Pilgrim in a permanently shutdown and defueled status.

Although the "hostile action" enhancements in the 2011 EP Final Rule are not applicable to a decommissioning reactor, the licensee's physical security plan must continue to provide high assurance against a potential security event impacting a designated target set. Therefore, some EP requirements for security-based events are maintained, such as the classification of security-based events, notification of offsite authorities, and coordination for the response of OROs (i.e., law enforcement, firefighting, medical assistance) onsite.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.2.1 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.A.7, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.12 10 CFR Part 50, Appendix E, Section IV.A.8

~~Identification of the State and/or local officials responsible for planning for, ordering, and controlling appropriate protective actions, including evacuations when necessary.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, identification of the State and/or local officials responsible for planning for, ordering, and controlling appropriate offsite protective actions, including evacuations when necessary, is no longer required as part of the Pilgrim Emergency Plan. If State or local governmental officials determine that offsite protective actions are warranted, then sufficient time and capability would be available for OROs to implement these measures using a CEMP approach.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.1.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.A.8, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.13 10 CFR Part 50, Appendix E, Section IV.A.9

~~By December 24, 2012, for nuclear power reactor licensees, a detailed analysis demonstrating that on-shift personnel assigned emergency plan implementation functions are not assigned responsibilities that would prevent the timely performance of their assigned functions as specified in the emergency plan.~~

The number of staff required at decommissioning sites is significantly reduced commensurate with the need to safely store spent fuel at the facility in a manner that is protective of public health and safety. The duties of the on-shift personnel at a decommissioning reactor facility are not as complicated and diverse as those for an operating power reactor. The systems and equipment needed to maintain the spent fuel in a safe condition in an SFP or in an ISFSI requires minimal personnel and are governed under the Pilgrim Technical Specifications. In the 2011 EP Final Rule, the NRC required nuclear power plant licensees to provide a detailed analysis to show that on-shift personnel assigned emergency plan implementation functions were not assigned any responsibilities that would prevent them from performing their assigned emergency plan functions. As part of the 2011 EP Final Rule, the NRC concluded that the staffing analysis requirement was not necessary for non-power reactor licensees due to the small staffing levels required to operate the facility. Therefore, based on similarities of non-power reactors and decommissioning reactors with regard to staffing, and as discussed in Section 5.2.1, a detailed staffing analysis is not needed for a decommissioning reactor.

Based on the above analysis, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.A.9, above, is not necessary to achieve the underlying purpose of the rule as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.14 10 CFR Part 50, Appendix E, Section IV.B.1

The means to be used for determining the magnitude of, and for continually assessing the impact of, the release of radioactive materials shall be described, including emergency action levels that are to be used as criteria for determining the need for notification and participation of local and State agencies, the Commission, and other Federal agencies, and the emergency action levels that are to be used for determining when and what type of protective measures should be considered within ~~and outside~~ the site boundary to protect health and safety. The emergency action levels shall be based on in-plant conditions and instrumentation in addition to onsite ~~and offsite~~ monitoring. ~~By June 20, 2012, for nuclear power reactor licensees, these action levels must include hostile action that may adversely affect the nuclear power plant.~~ The initial emergency action levels shall be discussed and agreed on by the applicant or licensee and State and local governmental authorities and approved by the NRC. Thereafter, emergency action levels shall be reviewed with the State and local governmental authorities on an annual basis.

NEI 99-01, Revision 6, is an acceptable method for development of an EAL scheme for a non-passive operating nuclear power reactor, a permanently defueled power reactor, and an ISFSI. Since a radiological release from any remaining applicable DBA is not estimated to exceed EPA early phase PAGs beyond the EAB, event classification above the Alert classification level is no longer required, which is consistent with exemptions for previous decommissioning power reactors. The licensee will still be required to maintain EALs for the classification of security-based events to the Alert classification level, which was requested by ENOI in a letter dated August 1, 2018 (Reference 57). In the EP Final Rule, the Commission defined "hostile action" as, in part, "an act directed toward a nuclear power plant or its personnel." The 2011 EP Final Rule made generically applicable the security-based response elements of NRC BL 2005-02, which provided numerous enhancements to licensee emergency plans including security-based EALs. The NRC staff is maintaining the requirement for security-based EALs similar to power reactors as they were required by the NRC Order. Exemption from hostile action enhancements for decommissioning reactors was previously discussed in Section 5.2.1 of this safety evaluation.

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, a decommissioning reactor is not required to have EALs to determine protective measures offsite. With respect to EALs for hostile action, refer to the basis for 10 CFR Part 50, Appendix E, Section IV.1.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.2.1 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.B.1, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.15 10 CFR Part 50, Appendix E, Section IV.C.1

The entire spectrum of emergency conditions that involve the alerting or activating of progressively larger segments of the total emergency organization shall be described. The communication steps to be taken to alert or activate emergency personnel under each class of emergency shall be described. Emergency action levels (based not only on onsite ~~and offsite~~ radiation monitoring information but also on readings from a number of sensors that indicate a potential emergency, ~~such as the pressure in containment and the response of the Emergency Core Cooling System~~) for notification of offsite agencies shall be described. The existence, but not the details, of a message authentication scheme shall be noted for such agencies. The emergency classes defined shall include: (1) Notification of unusual events, (2) alert, ~~(3) site area emergency, and (4) general emergency~~. These classes are further discussed in NUREG-0654/FEMA-REP-1.

Containment and emergency core cooling system parameters no longer provide an indication of a potential emergency for a permanently shutdown and defueled power reactor, and emergency core cooling systems are no longer required. Other available indications, such as SFP level, SFP temperature, and area radiation monitors, will remain at Pilgrim and will continue to indicate the conditions of spent fuel stored in the SFP.

In the SOC for the Final Rule for EP requirements for ISFSIs and for MRS facilities (60 FR 32430; June 22, 1995), the Commission responded to comments concerning a General Emergency classification level at an ISFSI and MRS, and concluded, "An essential element of a General Emergency is that [a] release can be reasonably expected to exceed EPA Protective Action Guidelines exposure levels off site for more than the immediate site area. As previously discussed, NRC studies have concluded that the maximum offsite dose would be less than 1 rem which is within the EPA Protective Action Guides." The SOC further provides a response to comments concerning an EPZ for an ISFSI and MRS: "[B]ased on the potential inventory of radioactive material, potential driving forces for distributing that amount of radioactive material, and the probability of the initiation of these events, the Commission concludes that the offsite consequences of potential accidents at an ISFSI or a MRS would not warrant establishing Emergency Planning Zones."

The licensee's exemption request provided an analysis that demonstrates that there are no remaining applicable design-basis accidents that would reach the dose criteria for the declaration of a Site Area Emergency or a General Emergency classification level. As discussed previously, the probability of a beyond-design-basis accident condition that could reach a Site Area Emergency or a General Emergency classification level is very low. In the highly unlikely event of a beyond-design-basis event resulting in the loss of all cooling to spent fuel stored in the SFP, as of 10 months after permanent cessation of power operations, it would take at least 10 hours from the time the fuel is uncovered until it reaches a temperature of 900 °C. The licensee is required to maintain the capability to initiate prompt mitigative actions consistent with plant conditions. Considering the very low probability of beyond-design-basis

events occurring that would affect SFP structural integrity, as well as the time available to initiate SFP mitigative measures before the onset of a postulated zirconium cladding fire, the need for an event classification level above an Alert is no longer required.

Based on the above analysis and the analysis provided in Section 5.1.1 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.C.1, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.16 10 CFR Part 50, Appendix E, Section IV.C.2

~~By June 20, 2012, nuclear power reactor~~ licensees shall establish and maintain the capability to assess, classify, and declare an emergency condition ~~within 15 minutes~~ after the availability of indications to plant operators that an emergency action level has been exceeded and shall promptly declare the emergency condition as soon as possible following identification of the appropriate emergency classification level. Licensees shall not construe these criteria as a grace period to attempt to restore plant conditions to avoid declaring an emergency action due to an emergency action level that has been exceeded. Licensees shall not construe these criteria as preventing implementation of response actions deemed by the licensee to be necessary to protect public health and safety provided that any delay in declaration does not deny the State and local authorities the opportunity to implement measures necessary to protect the public health and safety.

In the 2011 EP Final Rule (76 FR 72560; November 23, 2011), nuclear power reactor licensees were required to assess, classify, and declare an emergency condition within 15 minutes. Non-power reactors do not have the same potential impact on public health and safety as do power reactors, and as such, non-power reactor licensees are not required to establish or maintain complex offsite emergency response activities nor to assess, classify, and declare an emergency condition within 15 minutes. Similarly, a decommissioning power reactor has a lower likelihood of a credible accident resulting in radiological releases requiring offsite protective measures than does an operating power reactor. Unlike operating reactor accident sequences potentially leading to large early releases, accident scenarios at decommissioning plants' SFPs evolve much more slowly and provide a longer time period to initiate SFP mitigative actions or, if deemed warranted by governmental officials, appropriate offsite protective actions for the public. Because a decommissioning power reactor, like a non-power reactor, does not have the same potential radiological impact on public health and safety as a power reactor, the NRC staff concludes that it is not necessary for a decommissioning power reactor licensee to assess, classify, and declare an emergency condition within 15 minutes. The licensee proposes in its exemption request to assess, classify, and declare an emergency condition within 30 minutes. The NRC staff finds that 30 minutes to assess, classify, and declare an emergency condition is reasonable given the slower progression of a credible event resulting in a radiological release.

Based on the above analysis, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.C.2, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.17 10 CFR Part 50, Appendix E, Section IV.D.1

Administrative and physical means for notifying local, State, and Federal officials and agencies ~~and agreements reached with these officials and agencies for the prompt notification of the public and for public evacuation or other protective measures, should they become necessary,~~ shall be described. This description shall include identification ~~of the appropriate officials, by title and agency,~~ of the State and local government agencies ~~within the EPZs.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirements for prompt notification of the public and an EPZ are not needed.

Based on the above analysis and the analyses provided in Sections 5.1.1, 5.1.2 and 5.1.5 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.D.1, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.18 10 CFR Part 50, Appendix E, Section IV.D.2

~~Provisions shall be described for yearly dissemination to the public within the plume exposure pathway EPZ of basic emergency planning information, such as the methods and times required for public notification and the protective actions planned if an accident occurs, general information as to the nature and effects of radiation, and a listing of local broadcast stations that will be used for dissemination of information during an emergency. Signs or other measures shall also be used to disseminate to any transient population within the plume exposure pathway EPZ appropriate information that would be helpful if an accident occurs.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirements for dissemination of emergency planning information to the public and an EPZ are not needed.

Based on the above analysis and the analyses provided in Sections 5.1.1, 5.1.2, and 5.1.5 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.D.2, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.19 10 CFR Part 50, Appendix E, Section IV.D.3

~~A licensee shall have the capability to notify responsible State and local governmental agencies within 15 minutes after declaring an emergency. The licensee shall demonstrate that the appropriate governmental authorities have the capability to make a public alerting and notification decision promptly on being informed by the licensee of an emergency condition. Prior to initial operation greater than 5 percent of rated thermal power of the first reactor at the site, each nuclear power reactor licensee shall demonstrate that administrative and physical means have been established for alerting and providing prompt instructions to the public with the plume exposure pathway EPZ. The design objective of the prompt public alert and notification system shall be to have the capability to essentially complete the initial alerting and notification of the public within the plume exposure pathway EPZ within about 15 minutes. The use of this alerting and notification capability will range from immediate alerting and notification of the public (within 15 minutes of the time that State and local officials are notified that a situation exists requiring urgent action) to the more likely events where there is substantial time available for the appropriate governmental authorities to make a judgment whether or not to activate the public alert and notification system. The alerting and notification capability shall additionally include administrative and physical means for a backup method of public alerting and notification capable of being used in the event the primary method of alerting and notification is unavailable during an emergency to alert or notify all or portions of the plume exposure pathway EPZ population. The backup method shall have the capability to alert and notify the public within the plume exposure pathway EPZ but does not need to meet the 15 minute design objective for the primary prompt public alert and notification system. When there is a decision to activate the alert and notification system, the appropriate governmental authorities will determine whether to activate the entire alert and notification system simultaneously or in a graduated or staged manner. The responsibility for activating such a public alert and notification system shall remain with the appropriate governmental authorities.~~

In the permanently shutdown and defueled condition of the reactor, the rapidly developing scenarios associated with events initiated during reactor power operation are no longer credible. The slow progression of SFP events allows greater time for the licensee to successfully mitigate the accidents and, if deemed necessary by offsite authorities, to implement appropriate protective measures using a CEMP approach.

The licensee proposes in its exemption request to complete emergency notifications within 60 minutes after an emergency declaration or a change in emergency classification level.

Although Pilgrim is a general licensed ISFSI and the Pilgrim Emergency Plan is based on 10 CFR Part 50, the NRC staff considered the requirements in 10 CFR 72.32(a) to ensure consistency between general and specific-licensed ISFSIs. The 60-minute notification timeliness is consistent with the notification time requirements for emergency plans based on the requirements in 10 CFR 72.32.

In the SOC for the Final Rule for EP requirements for ISFSIs and for MRS facilities (60 FR 32430; June 22, 1995), the Commission responded to comments concerning a notification time of 15 minutes, and concluded that, "[t]he Commission has established a reasonable time limit for notification which has proven to be adequate in the past. 'The licensee shall also commit to notify the NRC Operations Center immediately after notifications of the appropriate offsite response organizations and not later than one hour after the licensee declares an emergency.'"

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. The NRC's research and analysis shows that a decommissioning power reactor licensee would have sufficient time to implement mitigation measures consistent with plant conditions and, if deemed warranted, for OROs to initiate protective actions offsite. The NRC staff concludes that notifying OROs as soon as possible, and within 60 minutes, would not significantly impact the time available for OROs to initiate appropriate response actions.

Decommissioning-related emergency plan submittals for Pilgrim have been discussed with cognizant offsite response organizations since ENOI provided notification that it would permanently cease power operations. These meetings have included discussions of the regulatory exemption requests. Pilgrim will continue to meet with representatives from the Commonwealth of Massachusetts, local emergency preparedness personnel, and Regional leadership from FEMA. These discussions have addressed changes to onsite and offsite emergency preparedness throughout the decommissioning process, including the proposed 30-minute declaration time and the 60-minute notification time. Emergency management officials have not objected to the proposed changes. Based on the above analysis, the NRC staff agrees that one hour (60 minutes) to notify the State of an emergency condition is reasonable. Additionally, the requirements for prompt notification of the public and an EPZ are not needed.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.1.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.D.3, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.20 10 CFR Part 50, Appendix E, Section IV.D.4

~~If FEMA has approved a nuclear power reactor site's alert and notification design report, including the backup alert and notification capability, as of~~

~~December 23, 2011, then the backup alert and notification capability requirements in Section IV.D.3 must be implemented by December 24, 2012. If the alert and notification design report does not include a backup alert and notification capability or needs revision to ensure adequate backup alert and notification capability, then a revision of the alert and notification design report must be submitted to FEMA for review by June 24, 2013, and the FEMA-approved backup alert and notification means must be implemented within 365 days after FEMA approval. However, the total time period to implement a FEMA-approved backup alert and notification means must not exceed June 22, 2015.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirements for prompt notification of the public and an EPZ, including backup alert and notification capabilities, are not needed.

Based on the above analysis and the analysis provided in Section 5.2.19 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.D.4, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.21 10 CFR Part 50, Appendix E, Section IV.E.8.a.(i)

A licensee ~~onsite technical support center and an emergency operations~~ facility from which effective direction can be given and effective control can be exercised during an emergency;

The guidance in NUREG-0696, "Functional Criteria for Emergency Response Facilities," dated February 1981 (Reference 58), provides that the technical support center (TSC) is an onsite facility located close to the control room that shall provide plant management and technical support to the reactor operating personnel located in the control room during emergency conditions. Onsite actions may be directed from the control room or other onsite location, without the requirements imposed on a TSC.

In addition, as there are no remaining applicable DBAs that would exceed the EPA early phase PAGs at the EAB, and there would be available time to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel and before the onset of a postulated zirconium cladding fire, an EOF would not be required to support interface with offsite agencies. Coordination with offsite authorities and response organizations can occur from the control room or another onsite location.

Due to the reduced size of on-shift and emergency response organization (ERO) staff for a permanently shutdown and defueled power reactor, separate facilities to accommodate

emergency response staff are no longer required. As such, greater efficiency and coordination is gained by locating staff in a central onsite facility.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.1.3, of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.E.8a.(i), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.22 10 CFR Part 50, Appendix E, Section IV.E.8.a.(ii)

~~For nuclear power reactor licensees, a licensee onsite operational support center;~~

The operational support center (OSC) is an onsite area separate from the control room and the TSC where licensee operations support personnel will assemble in an emergency. The OSC should provide a location where plant logistic support can be coordinated during an emergency and restrict control room access to those support personnel specifically requested by the control room supervisor. The licensee provides that the control room is where plant systems and equipment parameters are monitored. The control room is the onsite center for emergency command and control. Control room personnel assess plant conditions, evaluate the magnitude and potential consequences of abnormal conditions, initiate preventative, mitigating, and corrective actions, and perform notifications.

With the permanently shutdown and defueled status of the Pilgrim reactor and the storage of the spent fuel in the SFP and the ISFSI, an OSC will no longer be required to meet its original purpose during an emergency or to support initial SFP mitigation actions if needed. When activated, the ERO reports to the emergency director to assist the on-shift staff in the assessment, mitigation, and response to an emergency and to support the dispatch of emergency teams. An onsite facility will continue to be maintained, from which effective direction can be given and effective control may be exercised during an emergency.

Based on the above analysis and the analysis provided in Section 5.2.21 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.A.8.a.(ii), above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii)

5.2.23 10 CFR Part 50, Appendix E, Section IV.E.8.b.

~~For a nuclear power reactor licensee's emergency operations facility required by paragraph 8.a of this section, either a facility located between 10 miles and 25 miles of the nuclear power reactor site(s), or a primary facility located less than 10 miles from the nuclear power reactor site(s) and a backup facility located between 10 miles and 25 miles of the nuclear power reactor site(s). An emergency operations facility may serve more than one nuclear power reactor site. A licensee desiring to locate an emergency operations facility more than 25 miles from a nuclear power reactor site shall request prior Commission approval by submitting an application for an amendment to its license. For an emergency operations facility located more than 25 miles from a nuclear power reactor site,~~

~~provisions must be made for locating NRC and offsite responders closer to the nuclear power reactor site so that NRC and offsite responders can interact face-to-face with emergency response personnel entering and leaving the nuclear power reactor site. Provisions for locating NRC and offsite responders closer to a nuclear power reactor site that is more than 25 miles from the emergency operations facility must include the following:~~

- ~~(1) — Space for members of an NRC site team and Federal, State, and local responders;~~
- ~~(2) — Additional space for conducting briefings with emergency response personnel;~~
- ~~(3) — Communication with other licensee and offsite emergency response facilities;~~
- ~~(4) — Access to plant data and radiological information; and~~
- ~~(5) — Access to copying equipment and office supplies;~~

Based on the analyses provided in Sections 5.1.1, 5.1.3, and 5.2.21 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.A.8.b, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.24 10 CFR Part 50, Appendix E, Section IV.E.8.c.

~~By June 20, 2012, for a nuclear power reactor licensee's emergency operations facility required by paragraph 8.a of this section, a facility having the following capabilities:~~

- ~~(1) — The capability for obtaining and displaying plant data and radiological information for each reactor at a nuclear power reactor site and for each nuclear power reactor site that the facility serves;~~
- ~~(2) — The capability to analyze plant technical information and provide technical briefings on event conditions and prognosis to licensee and offsite response organizations for each reactor at a nuclear power reactor site and for each nuclear power reactor site that the facility serves; and~~
- ~~(3) — The capability to support response to events occurring simultaneously at more than one nuclear power reactor site if the emergency operations facility serves more than one site; and~~

Based on the analyses provided in Sections 5.1.1, 5.1.3, and 5.2.21 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.E.8.c, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.25 10 CFR Part 50, Appendix E, Section IV.E.8.d.

~~For nuclear power reactor licensees, an alternative facility (or facilities) that would be accessible even if the site is under threat of or experiencing hostile action, to function as a staging area for augmentation of emergency response staff and collectively having the following characteristics: the capability for communication with the emergency operations facility, control room, and plant security; the capability to perform offsite notifications; and the capability for engineering assessment activities, including damage control team planning and preparation, for use when onsite emergency facilities cannot be safely accessed during hostile action. The requirements in this paragraph 8.d must be implemented no later than December 23, 2014, with the exception of the capability for staging emergency response organization personnel at the alternative facility (or facilities) and the capability for communications with the emergency operations facility, control room, and plant security, which must be implemented no later than June 20, 2012.~~

Based on the analyses provided in Sections 5.1.1, 5.2.1, and 5.2.11 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.E.8.d, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.26 10 CFR Part 50, Appendix E, Section IV.E.8.e.

~~A licensee shall not be subject to the requirements of paragraph 8.b of this section for an existing emergency operations facility approved as of December 23, 2011;~~

Based on the analyses provided in Sections 5.1.1, 5.1.3, and 5.2.21 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.E.8.e, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.27 10 CFR Part 50, Appendix E, Section IV.E.9.a

Provision for communications with contiguous State/local governments **within the plume exposure pathway EPZ**. Such communications shall be tested monthly.

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled

nuclear power reactor. Therefore, provisions for communications with contiguous State/local governments within the plume exposure pathway EPZ are not needed. The licensee proposes in its exemption request to complete emergency notifications within one hour after an emergency declaration or a change in emergency classification level. A description of the communications systems and the testing frequencies is included in the Permanently Defueled Emergency Plan.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.1.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR 50, Appendix E, Section IV.E.9.a, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.28 10 CFR Part 50, Appendix E, Section IV.E.9.c.

~~**Provision for communications among the nuclear power reactor control room, the onsite technical support center, and the emergency operations facility, and among the nuclear facility, the principal State and local emergency operations centers, and the field assessment teams. Such communications systems shall be tested annually.**~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, as discussed in Sections 5.2.21 and 5.2.22 of this safety evaluation, there is no need for a TSC, EOF, or offsite field assessment teams to meet the underlying purpose of the rule. With the elimination of the requirements for a TSC, EOF, and the field assessment teams, the requirement to perform annual testing is no longer required.

Based on the above analysis and the analyses provided in Sections 5.2.21 and 5.2.22 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.E.9.c, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.29 10 CFR Part 50, Appendix E, Section IV.E.9.d.

~~**Provisions for communications by the licensee with NRC Headquarters and the appropriate NRC Regional Office Operations Center from the nuclear power reactor control room, the onsite technical support center, and the near-site emergency operations facility. Such communications shall be tested monthly.**~~

As discussed in Section 5.2.21 and 5.2.22 of this safety evaluation, the need for a separate TSC and EOF no longer exists, given the smaller facility staffing and the greatly reduced required interaction with State and local emergency response facilities. The NRC staff concludes that the functions of the control room, EOF, TSC, and the OSC may be combined into one or more

locations. As a result, communications between the EOF and TSC, and the NRC, and monthly testing of these capabilities are no longer needed. The Emergency Notification System, used to communicate with the NRC, will continue to be tested monthly.

Based on the above analysis and the analyses provided in Sections 5.2.21, and 5.2.22 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.E.9.d, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent operations of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.30 10 CFR Part 50, Appendix E, Section IV.F.1

The program to provide for: (a) The training of employees and exercising, by periodic drills, of radiation emergency plans to ensure that employees of the licensee are familiar with their specific emergency response duties, and (b) the participation in the training and drills by other persons whose assistance may be needed in the event of a radiation emergency shall be described. This shall include a description of specialized initial training and periodic retraining programs to be provided to each of the following categories of emergency personnel:

- i. Directors and/or coordinators of the plant emergency organization;
- ii. Personnel responsible for accident assessment, including control room shift personnel;
- iii. Radiological monitoring teams;
- iv. Fire control teams (fire brigades);
- v. Repair and damage control teams;
- vi. First aid and rescue teams;
- vii. Medical support personnel;
- viii. Licensee's headquarters support personnel;**
- ix. Security personnel.

In addition, a radiological orientation training program shall be made available to local services personnel; e.g., local emergency services/~~Civil Defense~~, local law enforcement personnel, ~~local news media persons~~.

The number of staff required at decommissioning sites is generally small but is commensurate with the need to safely store spent fuel at the facility in a manner that ensures public health and safety. Decommissioning sites typically have a level of emergency response that does not require additional response by licensee headquarters personnel, therefore training of these personnel is not needed. Training for licensee personnel responding from company locations offsite will still be required based on ERO positions specified above.

“Civil Defense” is an outdated term and no longer used. The category of offsite responders, which could be expected to respond onsite, is captured under “local emergency services” and “local law enforcement.” Local news media are not included in the category of local services personnel requiring periodic radiological orientation training since they will not be called upon to support a formal Joint Information Center.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.2.8 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.F.1, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.31 10 CFR Part 50, Appendix E, Section IV.F.2

The plan shall describe provisions for the conduct of emergency preparedness exercises as follows: Exercises shall test the adequacy of timing and content of implementing procedures and methods, test emergency equipment and communications networks, ~~test the public alert and notification system~~, and ensure that emergency organization personnel are familiar with their duties.

Based on the analyses provided in Sections 5.1.1 and 5.2.19 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.F.2, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.32 10 CFR Part 50, Appendix E, Section IV.F.2.a.

~~**A full participation exercise which tests as much of the licensee, State, and local emergency plans as is reasonably achievable without mandatory public participation shall be conducted for each site at which a power reactor is located. Nuclear power reactor licensees shall submit exercise scenarios under § 50.4 at least 60 days before use in a full participation exercise required by this paragraph 2.a.**~~

The licensee’s exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement to conduct a full participation exercise with State and local agencies is not needed. The licensee proposes in its exemption request to continue to invite the Commonwealth of Massachusetts and Town of Plymouth to participate in the periodic drills and exercise conducted at Pilgrim.

Based on above analysis and the analysis provided in Section 5.1.1 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.F.2.a, above, is not necessary to achieve the underlying purpose of this requirement as it

applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.33 10 CFR Part 50, Appendix E, Section IV.F.2.b.

Each licensee at each site shall conduct a subsequent exercise of its onsite emergency plan every 2 years. ~~Nuclear power reactor licensees shall submit exercise scenarios under § 50.4 at least 60 days before use in an exercise required by this paragraph 2.b. The exercise may be included in the full participation biennial exercise required by paragraph 2.c. of this section.~~ In addition, the licensee shall take actions necessary to ensure that adequate emergency response capabilities are maintained during the interval between biennial exercises by conducting drills, including at least one drill involving a combination of some of the principal functional areas of the licensee's onsite emergency response capabilities. The principal functional areas of emergency response include activities such as management and coordination of emergency response, accident assessment, event classification, notification of offsite authorities, assessment of the onsite ~~and offsite~~ impact of radiological releases, ~~protective action recommendation development, protective action decision making, plant~~ system repair and mitigative action implementation. During these drills, activation of all of the licensee's emergency response facilities ~~(Technical Support Center (TSC), Operations Support Center (OSC), and the Emergency Operations Facility (EOF))~~ would not be necessary, licensees would have the opportunity to consider accident management strategies, supervised instruction would be permitted, operating staff in all participating facilities would have the opportunity to resolve problems (success paths) rather than have controllers intervene, and the drills may focus on the onsite exercise training objectives.

The intent of submitting exercise scenarios at an operating power reactor site in advance is to ensure that licensees utilize different scenarios in order to prevent the preconditioning of responders at power reactors. For decommissioning power reactor sites, there are limited events that could occur, and as such, the submittal of exercise scenarios for the purpose of ensuring that responders do not get preconditioned to certain scenarios is not necessary to achieve the underlying purpose of the rule.

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, drills involving principle functional areas associated with formal offsite REP are not needed. As discussed previously in Sections 5.2.21 and 5.2.22 of this safety evaluation, there is no need for an OSC, TSC, or EOF to meet the underlying purpose of the rule.

Based on the above analysis and the analyses provided in Sections 5.1.1, 5.2.21, 5.2.22, and 5.2.32 of this safety evaluation, the NRC staff concludes that the exempted language from

10 CFR Part 50, Appendix E, Section IV.F.2.b, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.34 10 CFR Part 50, Appendix E, Section IV.F.2.c.

~~Offsite plans for each site shall be exercised biennially with full participation by each offsite authority having a role under the radiological response plan. Where the offsite authority has a role under a radiological response plan for more than one site, it shall fully participate in one exercise every two years and shall, at least, partially participate in other offsite plan exercises in this period. If two different licensees each have licensed facilities located either on the same site or on adjacent, contiguous sites, and share most of the elements defining co-located licensees, then each licensee shall:~~

- ~~(1) Conduct an exercise biennially of its onsite emergency plan;~~
- ~~(2) Participate quadrennially in an offsite biennial full or partial participation exercise;~~
- ~~(3) Conduct emergency preparedness activities and interactions in the years between its participation in the offsite full or partial participation exercise with offsite authorities, to test and maintain interface among the affected State and local authorities and the licensee. Co-located licensees shall also participate in emergency preparedness activities and interaction with offsite authorities for the period between exercises;~~
- ~~(4) Conduct a hostile action exercise of its onsite emergency plan in each exercise cycle; and~~
- ~~(5) Participate in an offsite biennial full or partial participation hostile action exercise in alternating exercise cycles.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement to conduct a full participation exercise with State and local agencies is not needed.

Based on the above analysis and the analyses provided in Sections 5.2.1 and 5.2.32 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.F.2.c, above, is not necessary to achieve the underlying purpose of this

requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.35 10 CFR Part 50, Appendix E, Section IV.F.2.d.

~~Each State with responsibility for nuclear power reactor emergency preparedness should fully participate in the ingestion pathway portion of exercises at least once every exercise cycle. In States with more than one nuclear power reactor plume exposure pathway EPZ, the State should rotate this participation from site to site. Each State with responsibility for nuclear power reactor emergency preparedness should fully participate in a hostile action exercise at least once every cycle and should fully participate in one hostile action exercise by December 31, 2015. States with more than one nuclear power reactor plume exposure pathway EPZ should rotate this participation from site to site.~~

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, the requirement to ensure that the State fully participate in the ingestion pathway portion of an exercise is not needed. As noted in Section 5.1.2 of this safety evaluation, designated plume exposure and ingestion pathway EPZs are no longer needed.

Additionally, the NRC excluded non-power reactors from the definition of "hostile action" at the time of the 2011 EP Final Rule because, as defined in 10 CFR 50.2, a non-power reactor is not considered a nuclear power reactor and a regulatory basis had not been developed to support the inclusion of non-power reactors in the definition of "hostile action." Similarly, a decommissioning power reactor or ISFSI is not a "nuclear reactor" as defined in the NRC's regulations. Like a non-power reactor, a decommissioning nuclear reactor also has a lower likelihood of a credible accident resulting in radiological releases requiring offsite protective measures than does an operating nuclear reactor. For all of the above reasons, the NRC staff concludes that a decommissioning nuclear power reactor is not a facility that falls within the definition of "hostile action."

Based on the above analysis and the analyses provided in Sections 5.1.1, 5.1.2, 5.2.1, and 5.2.32 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.F.2.d, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.36 10 CFR Part 50, Appendix E, Section IV.F.2.e.

Licensees shall enable any State or local Government **located within the plume exposure pathway EPZ** to participate in the licensee's drills when requested by such State or local Government.

The licensee's exemption request provided radiological analyses to show that, as of 46 days after permanent cessation of power operations, the radiological consequences to the public of the only remaining applicable DBA would not exceed the limits of the EPA early phase PAGs beyond the EAB. Considering the very low-probability of beyond-design-basis events affecting the SFP integrity, and with the time available to initiate mitigative actions consistent with plant conditions, between the loss of both water and air cooling to the spent fuel, and before the onset of a postulated zirconium cladding fire, formal offsite REP plans (in accordance with 44 CFR Part 350) and their associated EPZs are not considered necessary for a permanently shutdown and defueled nuclear power reactor. Therefore, identifying State and local governments in relation to a plume exposure pathway EPZ that is no longer required is not needed. The licensee will continue to invite the Commonwealth of Massachusetts and the Town of Plymouth to participate in the periodic drills and exercises conducted to assess its ability to perform responsibilities related to an emergency at Pilgrim, to the extent defined by the Pilgrim Emergency Plan.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.1.2 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.F.2.e, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.37 10 CFR Part 50, Appendix E, Section IV.F.2.f.

Remedial exercises will be required if the emergency plan is not satisfactorily tested during the biennial exercise, such that NRC, ~~in consultation with FEMA,~~ cannot (1) find reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency or (2) determine that the Emergency Response Organization (ERO) has maintained key skills specific to emergency response. ~~The extent of State and local participation in remedial exercises must be sufficient to show that appropriate corrective measures have been taken regarding the elements of the plan not properly tested in the previous exercises.~~

As discussed previously in Section 5.2.32 of this safety evaluation, the requirement to conduct a full participation exercise with State and local agencies is not needed. Since full participation emergency plan exercises are not required and FEMA does not have responsibilities related to onsite emergency preparedness, NRC consultation with FEMA is not necessary.

Based on the above analysis and the analyses provided in Sections 5.1.1 and 5.2.32 of this safety evaluation, the NRC staff concludes that the exempted language from 10 CFR Part 50, Appendix E, Section IV.F.2.f, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.38 10 CFR Part 50, Appendix E, Section IV.F.2.i.

Licensees shall use drill and exercise scenarios that provide reasonable assurance that anticipatory responses will not result from preconditioning of participants. ~~Such scenarios for nuclear power reactor licensees must include a wide spectrum of radiological releases and events, including hostile action.~~ Exercise and drill scenarios as appropriate must emphasize coordination among onsite and offsite response organizations.

The NRC staff previously evaluated the issues of preconditioning drill scenarios and including hostile action scenarios at decommissioning plants in Sections 5.2.1, 5.2.33, and 5.2.34 of this safety evaluation. In each instance, the NRC staff concluded that the exempted language from 10 CFR Part 50, Appendix E, Section IV.F.2.i, above, was not needed to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.39 10 CFR Part 50, Appendix E, Section IV.F.2.j.

~~The exercises conducted under paragraph 2 of this section by nuclear power reactor licensees must provide the opportunity for the ERO to demonstrate proficiency in the key skills necessary to implement the principal functional areas of emergency response identified in paragraph 2.b of this section. Each exercise must provide the opportunity for the ERO to demonstrate key skills specific to emergency response duties in the control room, TSC, OSC, EOF, and joint information center. Additionally, in each eight calendar year exercise cycle, nuclear power reactor licensees shall vary the content of scenarios during exercises conducted under paragraph 2 of this section to provide the opportunity for the ERO to demonstrate proficiency in the key skills necessary to respond to the following scenario elements: hostile action directed at the plant site, no radiological release or an unplanned minimal radiological release that does not require public protective actions, an initial classification of or rapid escalation to a Site Area Emergency or General Emergency, implementation of strategies, procedures, and guidance developed under § 50.54(hh)(2), and integration of offsite resources with onsite response. The licensee shall maintain a record of exercises conducted during each eight year exercise cycle that documents the content of scenarios used to comply with the requirements of this paragraph. Each licensee shall conduct a hostile action exercise for each of its sites no later than December 31, 2015. The first eight-year exercise cycle for a site will begin in the calendar year in which the first hostile action exercise is conducted. For a site licensed under Part 52, the first eight-year exercise cycle begins in the calendar year of the initial exercise required by Section IV.F.2.a.~~

In the SOC for the 2011 EP Final Rule, the NRC discussed the addition of a new Section IV.F.2.j to Appendix E to require all nuclear power reactor licensees to provide an opportunity for the ERO to demonstrate proficiency in response to a wide spectrum of scenarios, including a "hostile action" and a loss of large areas of the plant due to fire or explosion. The NRC staff previously evaluated the need for hostile action enhancements in Section 5.2.1 of this safety evaluation. Section IV.F.2.j further provides that the ERO must

demonstrate key skills specific to emergency response duties in the control room, TSC, OSC, EOF, and joint information center. The NRC staff previously concluded that the functions of the control room, EOF, TSC, and the OSC may be combined into one or more locations in Sections 5.2.21, 5.2.22, and 5.2.29 of this safety evaluation. A dedicated joint information center is also not needed based on the analysis in Section 5.2.30 of this safety evaluation. At a decommissioning site, where only the SFP and its related support systems, structures, and components remain, there are no other facilities in which ERO personnel could demonstrate proficiency.

Based on the above analysis and the analyses provided in Sections 5.1.1, 5.2.1, 5.2.30, and 5.2.33 of this safety evaluation, the NRC staff concludes that the exempted language 10 CFR Part 50, Appendix E, Section IV.F.2.j, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

5.2.40 10 CFR Part 50, Appendix E, Section IV.I.

~~**By June 20, 2012, for nuclear power reactor licensees, a range of protective actions to protect onsite personnel during hostile action must be developed to ensure the continued ability of the licensee to safely shut down the reactor and perform the functions of the licensee's emergency plan.**~~

Based on the analysis provided in Section 5.2.1 of this safety evaluation, the NRC staff concludes that the enhancements for hostile actions, as required by the 2011 EP Final Rule, are not necessary for Pilgrim in its permanently shutdown and defueled status. Therefore, the exempted language from 10 CFR Part 50, Appendix E, Section IV.I, above, is not necessary to achieve the underlying purpose of this requirement as it applies to Pilgrim 10 months after permanent cessation of power operations and, therefore, meets the special circumstances provision of 10 CFR 50.12(a)(2)(ii).

6.0 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).

7.0 CONCLUSION

The NRC staff has completed its review of the licensee's request for an exemption from certain requirements of 10 CFR 50.47(b), 10 CFR 50.47(c), and Appendix E to 10 CFR Part 50, as specified in this safety evaluation. On the basis of its review, the NRC staff concludes that the postulated dose from any remaining applicable DBA would not exceed the EPA early phase PAG limits to the public at the EAB and, for any highly unlikely beyond-design-basis events impacting SFP integrity or the ability to cool spent fuel, the length of time available to implement pre-planned mitigation measures consistent with plant conditions and, should offsite authorities deem warranted, to implement protective actions using a CEMP approach, provides confidence that offsite measures for the public could be taken without preplanning. The conclusion is

consistent with the NRC staff's evaluation, as provided to the Commission in SECY-19-0078, which was approved by the Commission in the SRM to SECY-19-0078.

Accordingly, the NRC staff has determined that, pursuant to 10 CFR 50.12, the exemptions evaluated above 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. Specifically, the NRC staff finds that the licensee's requested exemptions meet the underlying purpose of the planning standards in 10 CFR 50.47 and requirements in Appendix E to 10 CFR Part 50, in view of the reduced risk of offsite radiological consequences associated with a permanently shutdown and defueled condition at Pilgrim and, therefore, satisfy the special circumstances in 10 CFR 50.12(a)(2)(ii) and can be implemented 10 months after the permanent cessation of power operations.

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