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Mandy K. Halter
Director, Nuclear Licensing

10 CFR 50.54

November 16, 2018

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

SUBJECT: Update to Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb)
Pilgrim Nuclear Power Station

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

LETTER NUMBER: 2.18.071

REFERENCES:

1. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Spent Fuel Management Plan Submittal in accordance with 10 CFR 50.54(bb)," 2.07.055, dated June 7, 2007 (ML071700121)

2. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Response to NRC Request for Additional Information (RAI) Regarding Pilgrim Nuclear Power Station Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb)," 2.08.018, dated April 9, 2008 (ML081060520)

3. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Response to Request for Additional Information to Support the Review of the Pilgrim Nuclear Power Station Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb) and the Preliminary Decommissioning Cost Estimate Pursuant to 10 CFR 50.75(f)(3)," 2.08.052, dated October 14, 2008 (ML082910039)

4. Letter, USNRC to Entergy Nuclear Operations, Inc., Pilgrim Nuclear Power Station - Safety Evaluation Re: Spent Fuel Management Program and Preliminary Decommissioning Cost Estimate (TAC Nos. MD8036 and MD9416), 1.09.001, dated January 7, 2009 (ML083190292)

5. Letter, Entergy Nuclear Operations, Inc. to USNRC, "Notification of Permanent Cessation of Power Operations," 2.15.080, dated November 10, 2015 (ML15328A053)

Dear Sir or Madam:

In accordance with 10 CFR 50.54(bb), Entergy Nuclear Operations, Inc. (ENOI) is hereby notifying the NRC of significant changes to the Pilgrim Nuclear Power Station (PNPS) Spent Fuel Management Plan.

Pursuant to 10 CFR 50.54(bb), ENOI initially submitted a Spent Fuel Management Plan on June 7, 2007 (Reference 1), as supplemented by its responses to the NRC staff's Requests for Additional Information, which ENOI submitted on April 9, 2008 (Reference 2) and October 14, 2008 (Reference 3). On January 7, 2009, the NRC staff approved the PNPS Spent Fuel Management Plan on a preliminary basis (Reference 4).

By letter dated November 10, 2015, ENOI notified the NRC of its intent to permanently cease power operations at PNPS no later than June 1, 2019 (Reference 5). As a result of its decision to permanently cease operations at PNPS and related changes to the anticipated schedule of decommissioning activities, spent fuel management activities, and decommissioning funding assumptions, ENOI is modifying the PNPS Spent Fuel Management Plan. This submittal provides the required Section 50.54(bb) notification. Attachment 1 provides the Updated Spent Fuel Management Plan (SFMP), which supersedes all prior versions of the SFMP.

There are no new regulatory commitments contained in this letter.

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

Sincerely,

Mandy K. Halter

MKH/shr

Attachment: 1. Pilgrim Nuclear Power Station Updated Spent Fuel Management Plan

cc:

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NRC Resident Inspector
Pilgrim Nuclear Power Station

Attachment 1

Letter 2.18.071

Pilgrim Nuclear Power Station

Updated Spent Fuel Management Plan

Pilgrim Nuclear Power Station
Updated Spent Fuel Management Plan

I. Background and Introduction

Entergy Nuclear Operations, Inc. (ENOI) submitted a Spent Fuel Management Plan on June 7, 2007 (Reference 1), as supplemented by its responses to the NRC staff's Requests for Additional Information, which ENOI submitted on April 9, 2008 (Reference 2) and October 14, 2008 (Reference 3). ENOI submitted its plan pursuant to 10 CFR 50.54(bb), which requires power reactor licensees to submit a spent fuel management and funding program for NRC review five years prior to the expiration of a reactor operating license. At the time, the PNPS operating license was set to expire on June 8, 2012. On January 7, 2009, the NRC staff approved the PNPS Spent Fuel Management Plan on a preliminary basis (Reference 4).

By letter dated November 10, 2015, ENOI notified the NRC of its intent to permanently cease power operations at PNPS no later than June 1, 2019 (Reference 5).

Pursuant to 10 CFR 50.54(bb), licensees are required to notify the NRC of any significant changes to their proposed spent fuel management plans. As a result of its decision to permanently cease operations at PNPS and related changes to the anticipated schedule of decommissioning activities, irradiated fuel management activities, and decommissioning funding assumptions, ENOI is modifying the PNPS Spent Fuel Management Plan (SFMP). This submittal provides the required Section 50.54(bb) notification, and this Updated SFMP supersedes all prior versions of the SFMP.

Pursuant to 10 CFR 50.82(a)(4)(i), on November 16, 2018, ENOI submitted a Post Shutdown Decommissioning Activities Report (PSDAR) for PNPS that included a site-specific decommissioning cost estimate (DCE) as an attachment (Reference 6). The DCE describes the bases for the assumptions regarding the U.S. Department of Energy's (DOE) acceptance of spent fuel from the industry and from PNPS. As discussed in the DCE (and subject to the assumptions, qualifications, and reservations stated therein), the SFMP is based on the assumption that DOE will commence acceptance of PNPS's spent fuel in 2030 and complete removal of all spent fuel from the site in 2062, consistent with the current DOE spent fuel management and acceptance strategy.[1] The DCE identifies the details, schedules, and costs of spent fuel management activities associated with the SFMP, along with license termination and site restoration activities and costs.

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[1] As noted in the DCE, DOE's repository program assumes that spent fuel is accepted for disposal from the nation's commercial nuclear plants in the order in which it was removed from service ("oldest fuel first"). The contracts that U.S. generators have with the DOE provide a number of mechanisms for altering the oldest fuel first allocation scheme, including emergency deliveries, exchanges of allocations amongst generators, and the option of providing priority acceptance from permanently shut down nuclear reactors. PNPS will seek the most expeditious means of removing fuel from the site when DOE commences performance. Given DOE's failure to accept fuel under its contracts, however, it is unclear how these mechanisms will operate once DOE begins accepting spent fuel from commercial reactors. Accordingly, for planning purposes only, this SFMP conservatively assumes that DOE will accept spent fuel in an oldest fuel first order.

II. Spent Fuel Management Strategy

At the time of shutdown, there will be a total of 4,114 spent fuel assemblies at the PNPS site, including 580 fuel assemblies residing in the reactor as part of the current operating cycle, 2,378 spent fuel assemblies stored in the spent fuel pool, and 1,156 assemblies stored in 17 dry storage casks on an independent spent fuel storage installation (ISFSI) facility. In 2014, construction of the ISFSI pad was completed, which PNPS operates under the General License in 10 CFR 72.210. PNPS uses the Holtec HI-STORM 100 dry cask storage system for the spent fuel that is currently stored on the ISFSI. The system consists of a multipurpose canister (MPC) with a nominal capacity of 68 fuel assemblies and a concrete storage overpack. The existing ISFSI pad was constructed with a capacity of 40 dry storage casks, which is administratively limited to a capacity of 38 casks to allow for cask movement and access. PNPS completed fuel loading campaigns to the ISFSI in 2015, 2016, and 2018.

As indicated in the PNPS PSDAR (Reference 6), PNPS owner Entergy Nuclear Generation Company (ENGC) has selected the SAFSTOR decommissioning option. The SFMP assumes that radiological decommissioning is completed within 60 years of permanent plant shutdown (i.e., by June 1, 2079). Following shutdown, the reactor building will be operated as an interim wet fuel storage facility for approximately three years after operations cease. During this time period, the spent fuel residing in the storage pool will be transferred to dry storage. The ISFSI will remain operational until DOE is able to complete the transfer of the fuel to a repository or interim storage facility.

The PSDAR and DCE describe three major phases related to spent fuel management at PNPS, which are summarized below.[2]

Table 1 - Spent Fuel Management Plan: Summary Schedule and Costs

Decommissioning Period	Start	End	Approximate Duration (Years)	Estimated Cost (thousands of 2018 dollars)
Periods 0 and 1: Planning and Preparations for Dormancy	2018	March 2020	1.84	$93,869
Period 2a: Dormancy with Wet Fuel Storage	March 2020	2022	2.8	$134,770
Period 2b: Dormancy with Dry Fuel Storage	2022	2062	40	$191,611
TOTAL			**44.64**	**$420,250**

[2] Appendix C to the DCE (Reference 6, Attachment 1) includes a detailed cost analysis of all decommissioning activities, including spent fuel management activities, by period.

1. Pre-Shutdown Planning and Preparations for SAFSTOR Dormancy

   Pre-shutdown spent fuel management planning activities include designing a consolidated ISFSI facility that will include a single storage pad that will have space to accommodate a total of 61 casks, which will allow for dry storage of all spent fuel assemblies generated during the plant's operational history. The planned location for the consolidated ISFSI facility is in an area of the site that is southwest of the power block.

   The estimated spent fuel management costs associated with ISFSI design, and other expenses during this initial phase, such as emergency planning and preparations for dormancy, total approximately $93.9 million.

2. Dormancy with Wet Fuel Storage

   The initial decommissioning activities to be performed after plant shutdown will focus primarily on preparing the plant for a period of safe-storage (also referred to as dormancy) and constructing the consolidated ISFSI facility. During this phase, spent fuel will remain in the spent fuel pool until it meets the criteria for transfer to dry storage. PNPS expects to begin construction of the consolidated ISFSI pad in 2019, assuming the timely receipt of required permits.

   PNPS expects to begin transferring the remaining spent fuel from the spent fuel pool to dry storage in 2020 and to complete the transfer of all fuel to the consolidated ISFSI by mid-2022. In addition, the 17 casks that are currently stored on the existing ISFSI pad will be relocated to the consolidated ISFSI facility. In total, 4,114 spent fuel assemblies will be stored in 61 dry cask systems on the new consolidated ISFSI pad. After the fuel transfer is completed, the pool will be drained and supporting systems will be de-energized for the remainder of the dormancy period.

   Costs in this phase total approximately $134.8 million and include: construction of the consolidated ISFSI facility (including the new storage pad, other ISFSI infrastructure, and related security modifications), 44 additional dry cask systems, and transferring fuel from the spent fuel pool to the ISFSI.

3. Dormancy with Dry Fuel Storage

   During this phase, the spent fuel will remain stored on the ISFSI until DOE accepts the fuel and removes it from the site. As discussed above and in the DCE (Reference 6, Attachment 1), for planning purposes, the SFMP assumes that DOE will begin removing fuel from PNPS in 2030 and will complete the removal of all spent fuel from the site in 2062, according to the schedule set forth in Table 2 below.

   During this phase, programs and procedures required to support safe operation of the ISFSI will be maintained in accordance with applicable requirements. Equipment maintenance, monitoring, and inspection will be performed as necessary. PNPS will also maintain a 24-hour security force, which will safeguard the spent fuel for as long as it remains on site. A security barrier, sensors, alarms, and other surveillance equipment will be maintained as required to provide security for the spent fuel. The estimated average annual cost to operate the ISFSI during this phase is

approximately $5 million, which reflects the portion of the total site caretaking costs that is allocated to the Spent Fuel Management cost category.

Late in the dormancy period, additional activities will include transferring the spent fuel from the ISFSI to the DOE. The estimated cost for the eventual transfer of the MPCs to a DOE-provided transport vehicle for off-site disposal is approximately $10.5 million.[3]

The total estimated spent fuel management cost associated with this phase is approximately $191.6 million.

Table 2 - Spent Fuel Management Schedule
(Fuel Assembly Totals by Location)

Year	Pool Inventory	ISFSI Inventory	DOE Acceptance
2018	2,378	1,156	
2019	2,958	1,156	
2020	2,958	1,156	
2021	2,958	1,156	
2022	0	4,114	
2023		4,114	
2024		4,114	
2025		4,114	
2026		4,114	
2027		4,114	
2028		4,114	
2029		4,114	
2030		4,094	20
2031		3,962	132
2032		3,534	428
2033		3,534	0
2034		3,442	92

[3] As noted in the DCE (Reference 6, Attachment 1), DOE has breached its obligations to remove fuel from reactor sites on the contracted schedule, and has also failed to provide plant owners with information about how it will ultimately perform and fulfill its obligation. DOE officials have stated that DOE does not have an obligation to accept already-canistered fuel without an amendment to the Standard Contract, but DOE has not explained what costs any such amendment would involve. Consequently, the plant owner has no information or expectations on how DOE will remove fuel from the site in the future. In the absence of information about how DOE will specifically deal with already-canistered fuel, and for purposes of the DCE only, the PNPS DCE assumes that there will be no additional costs associated with DOE's acceptance of such fuel, as such fuel will be contained in MPCs developed to be suitable for storage, transport and permanent disposal. If this assumption is incorrect, it is assumed that DOE will have liability for costs incurred to transfer the fuel to DOE-supplied containers, and to dispose of existing containers.

Table 2 - Spent Fuel Management Schedule (continued)
(Fuel Assembly Totals by Location)

Year	Pool Inventory	ISFSI Inventory	DOE Acceptance
2035		3,210	232
2036		2,986	224
2037		2,986	0
2038		2,794	192
2039		2,794	0
2040		2,794	0
2041		2,626	168
2042		2,486	140
2043		2,350	136
2044		2,350	0
2045		2,144	206
2046		2,128	16
2047		1,984	144
2048		1,840	144
2049		1,676	164
2050		1,676	0
2051		1,516	160
2052		1,356	160
2053		1,356	0
2054		1,200	156
2055		1,048	152
2056		1,048	0
2057		896	152
2058		896	0
2059		752	144
2060		580	172
2061		580	0
2062		0	580
Total			**4,114**

III. ISFSI Decommissioning

The ISFSI pads and facilities will be decommissioned at the time of plant decommissioning or after DOE has removed all spent fuel from the site. The bases and assumptions used to formulate the cost estimate are discussed in the DCE (Reference 6, Attachment 1). As detailed in Appendix D to the DCE, the estimated cost to decommission the ISFSI is approximately $9.4 million (assuming a 25% contingency).

IV. Funding Demonstration for License Termination and Spent Fuel Management Operations Costs

As shown in the DCE (Reference 6, Attachment 1), the projected total cost to decommission PNPS, after an extended period of safe storage, is estimated at $1.66 billion (in 2018 dollars). This amount includes estimated costs associated with license termination ($1.19 billion), spent fuel management ($420.25 million), and site restoration ($53.01 million) activities.

As of October 31, 2018, the PNPS decommissioning trust fund balance was $1,051,722,466. Tables 3.2a and 3.2b of the DCE (Reference 6, Attachment 1) set forth the estimated annual expenditures for license termination and spent fuel management, respectively. For convenience, those tables are reproduced below as Tables 3 and 4. This annual expenditure information is used in the cash flow analysis in Table 5 below.[4] The cash flow analysis demonstrates that the PNPS trust fund is sufficiently funded for all license termination, spent fuel management, and site restoration activities.

Thus, considering the fund balance of $1.05 billion (as of October 31, 2018) and projected fund earnings during the SAFSTOR period (assuming an annual 2% growth rate), the trust fund is expected to have an excess of approximately $152.87 million over the estimated license termination, spent fuel management costs, and site restoration costs.

[4] The same cash flow analysis table is reproduced as Table 4 of ENOI's November 16, 2018 Request for Exemption from 10 CFR 50.82(a)(8)(i)(A) (Reference 7).

Table 3 - License Termination Expenditures

(thousands, 2018 dollars)

Year	Labor	Equip. & Materials	Energy	Waste Disposal	Other	Total
2018	0	0	0	0	19,142	19,142
2019	45,256	1,040	1,409	276	52,043	100,024
2020	22,178	1,040	1,572	539	36,245	61,574
2021	13,526	454	1,157	323	30,572	46,032
2022	13,526	454	1,157	323	28,339	43,799
2023	2,276	130	524	7	11,579	14,516
2024	2,282	130	525	7	3,953	6,897
2025	2,276	130	524	7	3,322	6,259
2026	2,276	130	524	7	2,947	5,884
2027	2,276	130	524	7	2,947	5,884
2028	2,282	130	525	7	2,953	5,897
2029	2,276	130	524	7	2,947	5,884
2030	2,276	130	524	7	2,947	5,884
2031	2,276	130	524	7	2,947	5,884
2032	2,282	130	525	7	2,953	5,897
2033	2,276	130	524	7	2,947	5,884
2034	2,276	130	524	7	2,947	5,884
2035	2,276	130	524	7	2,947	5,884
2036	2,282	130	525	7	2,953	5,897
2037	2,276	130	524	7	2,947	5,884
2038	2,276	130	524	7	2,947	5,884
2039	2,276	130	524	7	2,947	5,884
2040	2,282	130	525	7	2,953	5,897
2041	2,276	130	524	7	2,947	5,884
2042	2,276	130	524	7	2,947	5,884
2043	2,276	130	524	7	2,947	5,884
2044	2,282	130	525	7	2,953	5,897
2045	2,276	130	524	7	2,947	5,884
2046	2,276	130	524	7	2,947	5,884
2047	2,276	130	524	7	2,947	5,884
2048	2,282	130	525	7	2,953	5,897
2049	2,276	130	524	7	2,947	5,884
2050	2,276	130	524	7	2,947	5,884
2051	2,276	130	524	7	2,947	5,884
2052	2,282	130	525	7	2,953	5,897
2053	2,276	130	524	7	2,947	5,884
2054	2,276	130	524	7	2,947	5,884
2055	2,276	130	524	7	2,947	5,884
2056	2,282	130	525	7	2,953	5,897
2057	2,276	130	524	7	2,947	5,884
2058	2,276	130	524	7	2,947	5,884

Table 3 - License Termination Expenditures (continued)
(thousands, 2018 dollars)

Year	Labor	Equip. & Materials	Energy	Waste Disposal	Other	Total
2059	2,276	130	524	7	2,947	5,884
2060	2,282	130	525	7	2,953	5,897
2061	2,276	130	524	7	2,947	5,884
2062	2,276	130	524	7	2,947	5,884
2063	1,663	298	216	6	2,514	4,697
2064	1,668	298	217	6	2,521	4,710
2065	1,663	298	216	6	2,514	4,697
2066	1,663	298	216	6	2,514	4,697
2067	1,663	298	216	6	2,514	4,697
2068	1,668	298	217	6	2,521	4,710
2069	1,663	298	216	6	2,514	4,697
2070	1,663	298	216	6	2,514	4,697
2071	1,663	298	216	6	2,514	4,697
2072	1,668	298	217	6	2,521	4,710
2073	22,411	1,183	1,324	21	3,694	28,634
2074	38,252	8,293	2,154	5,384	7,668	61,751
2075	47,682	24,256	2,053	68,469	17,586	160,046
2076	63,341	15,092	1,775	41,144	16,992	138,344
2077	66,082	10,159	1,621	26,451	16,606	120,920
2078	56,725	7,373	1,230	17,765	13,112	96,205
2079	15,548	693	178	12	2,457	18,888
2080	137	0	0	0	0	137
Total	**512,400**	**78,223**	**38,769**	**161,050**	**397,552**	**1,187,994**

Table 4 - Spent Fuel Management Expenditures

(thousands, 2018 dollars)

Year	Labor	Equip. & Materials	Energy	Waste Disposal	Other	Total
2018	4,033	12,100	0	0	0	16,133
2019	11,838	35,513	0	0	12,665	60,016
2020	12,611	28,315	0	0	13,768	54,694
2021	12,272	24,230	0	0	12,396	48,898
2022	12,272	24,230	0	0	12,396	48,898
2023	4,188	0	0	0	8,694	12,882
2024	4,200	0	0	0	122	4,322
2025	4,188	0	0	0	122	4,310
2026	4,188	0	0	0	122	4,310
2027	4,188	0	0	0	122	4,310
2028	4,200	0	0	0	122	4,322
2029	4,188	0	0	0	122	4,310
2030	4,188	0	0	0	122	4,310
2031	4,274	259	0	0	122	4,655
2032	4,501	906	0	0	122	5,529
2033	4,188	0	0	0	122	4,310
2034	4,231	129	0	0	122	4,482
2035	4,361	518	0	0	122	5,000
2036	4,329	388	0	0	122	4,839
2037	4,188	0	0	0	122	4,310
2038	4,317	388	0	0	122	4,827
2039	4,188	0	0	0	122	4,310
2040	4,200	0	0	0	122	4,322
2041	4,317	388	0	0	122	4,827
2042	4,274	259	0	0	122	4,655
2043	4,274	259	0	0	122	4,655
2044	4,200	0	0	0	122	4,322
2045	4,317	388	0	0	122	4,827
2046	4,188	0	0	0	122	4,310
2047	4,274	259	0	0	122	4,655
2048	4,286	259	0	0	122	4,667
2049	4,317	388	0	0	122	4,827
2050	4,188	0	0	0	122	4,310
2051	4,274	259	0	0	122	4,655
2052	4,286	259	0	0	122	4,667
2053	4,188	0	0	0	122	4,310
2054	4,274	259	0	0	122	4,655
2055	4,274	259	0	0	122	4,655
2056	4,200	0	0	0	122	4,322
2057	4,274	259	0	0	122	4,655
2058	4,188	0	0	0	122	4,310

Table 4 - Spent Fuel Management Expenditures (continued)
(thousands, 2018 dollars)

Year	Labor	Equip. & Materials	Energy	Waste Disposal	Other	Total
2059	4,274	259	0	0	122	4,655
2060	4,329	388	0	0	122	4,839
2061	4,188	0	0	0	122	4,310
2062	4,576	1,164	0	0	122	5,862
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0
2076	0	0	0	0	0	0
2077	0	0	0	0	0	0
2078	0	0	0	0	0	0
2079	0	0	0	0	0	0
2080	0	0	0	0	0	0
Total	**223,294**	**132,279**	**0**	**0**	**64,677**	**420,250**

Table 5 - Annual Cash Flow Analysis

Pilgrim Nuclear Power Station - SAFSTOR Methodology

Annual Cash Flow Analysis - Total License Termination, Spent Fuel Management, and Site Restoration Costs

(In Thousands, 2018 Dollars)

		Date	Amount
Total Trust Fund Balance as of		10/31/2018	$ 1,051,722
Start of Decommissioning		06/01/2019	
Decommissioning Funds value at Calculation Date		10/31/2018	$ 1,051,722
Total Estimated Costs at Calculation Date		10/31/2018	$ 1,661,258
0.000%	Cost Escalation Rate	Start of Decom to end of Decom - Assumes 0.0% Decom cost escalation rate	
2.000%	Fund Earnings Rate	Start of Decom to end of Decom - Assumes 2.0% Earnings Rate	

Pilgrim Nuclear Power Station - SAFSTOR Methodology

Annual Cash Flow Analysis - Total License Termination, Spent Fuel Management, and Site Restoration Costs

(In Thousands in 2018 Dollars)

Year	Column 1 50.75 License Termination Cost	Column 2 50.54 (bb) Spent Fuel Management Cost	Column 3 Site Restoration	Column 4 Total Cost	Column 5 Beginning of Year Trust Fund Balance	Column 6 Withdraw	Column 7 Contribute	Column 8 Balance for Earnings Calculation	Column 9 Trust Fund Earnings	Column 10 Year Ending Trust Fund Balance
2018	19,142	16,133	0	35,275	1,051,722	0	0	1,051,722	3,506	1,055,228
2019	100,024	60,016	0	160,040	1,055,228	195,315	0	859,913	17,198	877,112
2020	61,574	54,694	0	116,268	877,112	116,268	0	760,844	15,217	776,061
2021	46,032	48,898	0	94,930	776,061	94,930	0	681,131	13,623	694,753
2022	43,799	48,898	0	92,697	694,753	92,697	0	602,056	12,041	614,097
2023	14,516	12,882	0	27,398	614,097	27,398	0	586,699	11,734	598,433
2024	6,897	4,322	0	11,219	598,433	11,219	0	587,214	11,744	598,958
2025	6,259	4,310	0	10,569	598,958	10,569	0	588,390	11,768	600,158
2026	5,884	4,310	0	10,194	600,158	10,194	0	589,964	11,799	601,763
2027	5,884	4,310	0	10,194	601,763	10,194	0	591,570	11,831	603,401
2028	5,897	4,322	0	10,219	603,401	10,219	0	593,182	11,864	605,046
2029	5,884	4,310	0	10,194	605,046	10,194	0	594,852	11,897	606,749

Year	Column 1 50.75 License Termination Cost	Column 2 50.54 (bb) Spent Fuel Management Cost	Column 3 Site Restoration	Column 4 Total Cost	Column 5 Beginning of Year Trust Fund Balance	Column 6 Withdraw	Column 7 Contribute	Column 8 Balance for Earnings Calculation	Column 9 Trust Fund Earnings	Column 10 Year Ending Trust Fund Balance
2030	5,884	4,310	0	10,194	606,749	10,194	0	596,556	11,931	608,487
2031	5,884	4,655	0	10,539	608,487	10,539	0	597,948	11,959	609,907
2032	5,897	5,529	0	11,427	609,907	11,427	0	598,481	11,970	610,450
2033	5,884	4,310	0	10,194	610,450	10,194	0	600,257	12,005	612,262
2034	5,884	4,482	0	10,366	612,262	10,366	0	601,896	12,038	613,934
2035	5,884	5,000	0	10,884	613,934	10,884	0	603,050	12,061	615,111
2036	5,897	4,839	0	10,737	615,111	10,737	0	604,375	12,087	616,462
2037	5,884	4,310	0	10,194	616,462	10,194	0	606,268	12,125	618,394
2038	5,884	4,827	0	10,711	618,394	10,711	0	607,683	12,154	619,837
2039	5,884	4,310	0	10,194	619,837	10,194	0	609,643	12,193	621,836
2040	5,897	4,322	0	10,219	621,836	10,219	0	611,617	12,232	623,849
2041	5,884	4,827	0	10,711	623,849	10,711	0	613,138	12,263	625,401
2042	5,884	4,655	0	10,539	625,401	10,539	0	614,862	12,297	627,159
2043	5,884	4,655	0	10,539	627,159	10,539	0	616,621	12,332	628,953
2044	5,897	4,322	0	10,219	628,953	10,219	0	618,734	12,375	631,109
2045	5,884	4,827	0	10,711	631,109	10,711	0	620,398	12,408	632,806
2046	5,884	4,310	0	10,194	632,806	10,194	0	622,612	12,452	635,065
2047	5,884	4,655	0	10,539	635,065	10,539	0	624,526	12,491	637,017
2048	5,897	4,667	0	10,564	637,017	10,564	0	626,452	12,529	638,981
2049	5,884	4,827	0	10,711	638,981	10,711	0	628,270	12,565	640,836
2050	5,884	4,310	0	10,194	640,836	10,194	0	630,642	12,613	643,255
2051	5,884	4,655	0	10,539	643,255	10,539	0	632,717	12,654	645,371
2052	5,897	4,667	0	10,564	645,371	10,564	0	634,807	12,696	647,503
2053	5,884	4,310	0	10,194	647,503	10,194	0	637,309	12,746	650,056
2054	5,884	4,655	0	10,539	650,056	10,539	0	639,517	12,790	652,307
2055	5,884	4,655	0	10,539	652,307	10,539	0	641,769	12,835	654,604
2056	5,897	4,322	0	10,219	654,604	10,219	0	644,385	12,888	657,273
2057	5,884	4,655	0	10,539	657,273	10,539	0	646,734	12,935	659,669
2058	5,884	4,310	0	10,194	659,669	10,194	0	649,476	12,990	662,465

Year	Column 1 50.75 License Termination Cost	Column 2 50.54 (bb) Spent Fuel Management Cost	Column 3 Site Restoration	Column 4 Total Cost	Column 5 Beginning of Year Trust Fund Balance	Column 6 Withdraw	Column 7 Contribute	Column 8 Balance for Earnings Calculation	Column 9 Trust Fund Earnings	Column 10 Year Ending Trust Fund Balance
2059	5,884	4,655	0	10,539	662,465	10,539	0	651,927	13,039	664,965
2060	5,897	4,839	0	10,737	664,965	10,737	0	654,228	13,085	667,313
2061	5,884	4,310	0	10,194	667,313	10,194	0	657,119	13,142	670,262
2062	5,884	5,862	0	11,746	670,262	11,746	0	658,516	13,170	671,686
2063	4,697	0	0	4,697	671,686	4,697	0	666,989	13,340	680,329
2064	4,710	0	0	4,710	680,329	4,710	0	675,619	13,512	689,131
2065	4,697	0	0	4,697	689,131	4,697	0	684,434	13,689	698,122
2066	4,697	0	0	4,697	698,122	4,697	0	693,425	13,869	707,294
2067	4,697	0	0	4,697	707,294	4,697	0	702,596	14,052	716,648
2068	4,710	0	0	4,710	716,648	4,710	0	711,938	14,239	726,177
2069	4,697	0	0	4,697	726,177	4,697	0	721,480	14,430	735,909
2070	4,697	0	0	4,697	735,909	4,697	0	731,212	14,624	745,836
2071	4,697	0	0	4,697	745,836	4,697	0	741,139	14,823	755,962
2072	4,710	0	0	4,710	755,962	4,710	0	751,252	15,025	766,277
2073	28,634	0	325	28,959	766,277	28,959	0	737,318	14,746	752,065
2074	61,751	0	713	62,464	752,065	62,464	0	689,601	13,792	703,393
2075	160,046	0	261	160,307	703,393	160,307	0	543,086	10,862	553,947
2076	138,344	0	339	138,683	553,947	138,683	0	415,264	8,305	423,570
2077	120,920	0	379	121,298	423,570	121,298	0	302,271	6,045	308,317
2078	96,205	0	254	96,460	308,317	96,460	0	211,857	4,237	216,094
2079	18,888	0	19,836	38,724	216,094	38,724	0	177,371	3,547	180,918
2080	137	0	30,907	31,044	180,918	31,044	0	149,874	2,997	152,872
Total	**1,187,994**	**420,250**	**53,014**	**1,661,258**		**1,661,258**	**0**	**38,996,799**	**762,407**	**152,872**

Table 5 Definitions:

Column 1: **50.75 License Termination Cost**

Reflects the total annual License Termination costs in 2018 dollars at a 0.0% escalation rate

Column 2: **50.54 (bb) Spent Fuel Management Cost**

Reflects the total annual Spent Fuel Management costs in 2018 dollars at a 0.0% escalation rate

Column 3: **Site Restoration Cost**

Reflects the total annual Site Restoration costs in 2018 dollars at a 0.0% escalation rate

Column 4: **Total Cost**

Reflects the total annual License Termination costs plus total annual Spent Fuel Management costs plus total annual Site Restoration costs, all in 2018 dollars at a 0.0% escalation rate (Column 1 + Column 2 + Column 3)

Column 5: **Beginning of Year Trust Fund Balance**

Reflects the beginning of year Trust Fund balance in 2018 dollars at a 0.0% escalation rate and 2.0% Fund Earnings

Column 6: **Withdraw**

Reflects the annual expenditures from the Trust Fund in 2018 dollars at a 0.0% escalation rate

Column 7: **Contribute**

Reflects the annual contributions to the Trust Fund in 2018 dollars at a 0.0% escalation rate

Column 8: **Balance for Earnings Calculation**

Reflects the Trust Fund balance in 2018 dollars used to calculate the Trust Fund Earnings (Column 5 – Column 6)

Column 9: **Trust Fund Earnings**

Reflects earnings on funds remaining in the Trust Fund. A 2.0% earnings rate is used over a 0.0% cost escalation rate. The annual 2.0% earnings are calculated on the balance after the annual expenditures are removed (Column 8 * 2.0%)

Column 10: **Year Ending Trust Fund Balance**

Reflects the end of year Trust Fund balance after all projected earnings are added and all projected expenditures are deducted for year-end, specified at a 0.0% escalation rate and 2.0% fund earnings in 2018 dollars (Column 5 – Column 6 + Column 9)

V. Regulatory Activities

The SFMP assumes withdrawals from the PNPS decommissioning trust fund for spent fuel management. ENOI is making a separate submittal to request an exemption in accordance with 10 CFR 50.12 from the requirements of 10 CFR 50.82(a)(8)(i)(A), which if approved, would permit the use of decommissioning trust funds for spent fuel management and site restoration expenses (Reference 7). The availability of decommissioning funding sources will be periodically revisited to ensure that withdrawals from the fund do not inhibit the ability to complete license termination and spent fuel management activities.

In addition, in accordance with 10 CFR 50.82(a)(8)(vii), ENOI will submit a report on the status of spent fuel management funding by March 31 of each year. The report will include, current through the end of the previous calendar year, the amount of funds accumulated to cover the cost of managing spent fuel, the projected cost of managing spent fuel until it is transferred to DOE, and if the funds accumulated do not cover the projected cost, a plan to provide additional funding assurance using one of the methods allowed by NRC regulations.

VI. Summary

The spent fuel management activities described in this Updated SFMP must be performed in conjunction with license termination activities. The annual cash flow analysis provided in Table 5 demonstrates that the PNPS decommissioning trust fund with projected earnings is sufficient to cover the estimated license termination and spent fuel management costs.

VII. References

1. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Spent Fuel Management Plan Submittal in accordance with 10 CFR 50.54(bb),” 2.07.055, dated June 7, 2007 (ML071700121)

2. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Response to NRC Request for Additional Information (RAI) Regarding Pilgrim Nuclear Power Station Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb),” 2.08.018, dated April 9, 2008 (ML081060520)

3. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Response to Request for Additional Information to Support the Review of the Pilgrim Nuclear Power Station Spent Fuel Management Plan Pursuant to 10 CFR 50.54(bb) and the Preliminary Decommissioning Cost Estimate Pursuant to 10 CFR 50.75(f)(3),” 2.08.052, dated October 14, 2008 (ML082910039)

4. Letter, USNRC to Entergy Nuclear Operations, Inc., Pilgrim Nuclear Power Station - Safety Evaluation Re: Spent Fuel Management Program and Preliminary Decommissioning Cost Estimate (TAC Nos. MD8036 and MD9416), 1.09.001, dated January 7, 2009 (ML083190292)

5. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Notification of Permanent Cessation of Power Operations,” 2.15.080, dated November 10, 2015 (ML15328A053)

6. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Pilgrim Nuclear Power Station Post-Shutdown Decommissioning Activities Report,” 2.18.070, dated November 16, 2018

7. Letter, Entergy Nuclear Operations, Inc. to USNRC, “Request for Exemption from 10 CFR 50.82(a)(8)(i)(A),” 2.18.069, dated November 16, 2018