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10 CFR 72.30

CNRO2021-00025

December 15, 2021

ATTN: Document Control Desk  
Director, Division of Fuel Management  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D. C. 20555-0001

Subject: ISFSI Decommissioning Funding Plans (10 CFR 72.30)

Big Rock Point  
Docket No. 72-043

Palisades Nuclear Plant  
Docket No. 72-007

The NRC Final Rule on Decommissioning Planning was published in 76 FR 35512 on June 17, 2011 with an effective date of December 17, 2012. The final rule includes a requirement (10 CFR 72.30) for each holder of a 10 CFR Part 72 License to submit, for NRC review and approval, a decommissioning funding plan for purposes of decommissioning the licensee's Independent Spent Fuel Storage Installation (ISFSI), and to resubmit those plans with adjustments as necessary to account for changes in costs and the extent of contamination. Entergy Nuclear Operations, Inc. (Entergy) is hereby submitting (Enclosures 1 and 2) the required Funding Plans for the subject plants.

The enclosure for each plant shows that the surpluses in the 10 CFR 50.75 Decommissioning Trust Funds exceed the estimated costs of ISFSI decommissioning, as summarized in the following table. The Trust Fund balances account for the 10 CFR Part 50 license expiration dates and the ISFSI decommissioning cost estimates (DCE) assume all costs are incurred in the year following the year in which spent fuel has been fully removed from the ISFSI. The values are reported in 2021 dollars. The fund value for Big Rock Point is in the form of a Parent Guarantee, since the 10 CFR 50.75 Decommissioning Trust Fund is no longer applicable for that site. This letter constitutes a certification that financial assurance is provided to cover the estimated cost of ISFSI decommissioning, as indicated in the following table:

Plant Site	Trust Fund Surplus	DCE
Big Rock Point	\$ 5M <sup>1</sup>	\$ 2.79M
Palisades	\$ 110.485M	\$ 8.85M

This letter contains no new regulatory commitments.

Should you have any questions or require additional information, please contact me at (601) 368-5102.

Respectfully,



Philip L. Couture

PLC/chm

Enclosures:

1. 10 CFR 72.30 ISFSI Decommissioning Funding Plan  
Big Rock Point
2. 10 CFR 72.30 ISFSI Decommissioning Funding Plan  
Palisades Nuclear Plant

cc: NRC Region III Regional Administrator  
NRC Senior Resident Inspector – Palisades  
NRC Project Manager – Big Rock Point  
NRC Project Manager – Palisades

State of Michigan

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<sup>1</sup> Parent company guarantee.

**ENCLOSURE 1**

**CNRO2021-00025**

**10 CFR 72.30 ISFSI Decommissioning Funding Plan  
Big Rock Point**

## **10 CFR 72.30 ISFSI DECOMMISSIONING FUNDING PLAN BIG ROCK POINT**

### **1. Background and Introduction**

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,<sup>[2]</sup> with the rule becoming effective on December 17, 2012. Subpart 72.30, "Financial assurance and recordkeeping for decommissioning," requires that each holder of, or applicant for, a license under this part must submit for NRC review and approval a decommissioning funding plan that contains information on how reasonable assurance will be provided that funds will be available to decommission the Independent Spent Fuel Storage Installation (ISFSI).

The rule also requires resubmittal of the decommissioning funding plan at intervals not to exceed 3 years, with adjustments as necessary to account for changes in costs and the extent of contamination. This document is intended to update the funding plans previously submitted by Entergy Nuclear Operations, Inc. in December 2018.<sup>[3]</sup>

In accordance with the rule, this letter provides a detailed cost estimate for decommissioning the ISFSI at the Big Rock Point site, in an amount reflecting:

1. The work performed by an independent contractor;
2. An adequate contingency factor; and
3. Release of the facility and dry storage systems for unrestricted use, as specified in 10 CFR Part 20.1402

This letter also provides:

1. Identification of and justification for using the key assumptions contained in the cost estimate;
2. A description of the method of assuring funds for decommissioning; and
3. The volume of onsite subsurface material containing residual radioactivity, if any, that will require remediation to meet the criteria for license termination.

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<sup>2</sup> U.S. Code of Federal Regulations, Title 10, Parts 20, 30, 40, 50, 70 and 72 "Decommissioning Planning," Nuclear Regulatory Commission, Federal Register Volume 76, Number 117 (p 35512 et seq.), June 17, 2011.

<sup>3</sup> "ISFSI Decommissioning Funding Plans (10 CFR 72.30) for Big Rock Point, Indian Point Generating Stations 1, 2, & 3, Pilgrim Nuclear Power Station, Palisades Nuclear Plant, and Vermont Yankee Nuclear Power Station," CNRO2018-00050, (NRC Accession No. ML18351A478), dated December 17, 2018.

## 2. Spent Fuel Management Strategy

The Big Rock Point nuclear plant was located in Charlevoix County, Michigan. The boiling water reactor operated from 1962 to 1997, when it was permanently shut down on August 29, 1997. The plant was decommissioned and the structures demolished, with all site work completed in 2006.

Approximately 441 spent fuel assemblies were generated over the life of the plant. Because of the breach by the Department of Energy (DOE) of its contract to remove fuel from the site, an ISFSI was constructed for interim storage and fuel casks have been emplaced thereon. The operating license for the ISFSI was subsequently transferred from Consumers Energy to Entergy Nuclear Palisades and site operator Entergy Nuclear Operations, Inc. (Entergy) in April of 2007.<sup>[4]</sup> The ISFSI is operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K<sup>[5]</sup>).

Completion of the ISFSI decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site. DOE's repository program assumes that spent fuel allocations will be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor. Entergy's current spent fuel management plan for the Big Rock Point spent fuel is based in general upon: 1) a 2030 start date for DOE initiating transfer of commercial spent fuel to a federal facility (not necessarily a final repository), and 2) expectations for spent fuel receipt by the DOE for the Big Rock Point fuel. The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. Assuming a maximum rate of transfer of 3,000 metric tons of uranium/year,<sup>[6]</sup> the spent fuel is projected to be fully removed from the Big Rock Point site in 2043.

Entergy believes that one or more monitored retrievable storage facilities could be put into place within a reasonable time. In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Obama administration's Blue Ribbon Commission and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..."<sup>[7]</sup>

The report stated that "[W]ith the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that: Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down

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<sup>4</sup> News release "NRC Staff Approves Big Rock Point ISFSI License Transfer," (Accession Number ML071000477), dated April 10, 2007.

<sup>5</sup> U.S. Code of Federal Regulations, Title 10, Part 72, Subpart K, "General License for Storage of Spent Fuel at Power Reactor Sites."

<sup>6</sup> "Acceptance Priority Ranking & Annual Capacity Report," DOE/RW-0567, July 2004.

<sup>7</sup> "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013.

reactor sites." [8] Therefore, in 2013, DOE assumed it could begin fuel acceptance within 8 years of its report at an interim facility. While as in 2013 no further progress has currently been made on a disposal facility, its estimate of an 8-year development time for an interim facility would still allow fuel to be removed beginning in 2030.

The DOE has taken the position that under the Standard Contract, it does not have an obligation to accept canistered fuel from licensees. This position, coupled with the DOE's failure to perform, has increased the difficulty of estimating future requirements under 10 CFR 72.30. The estimates presented in this report are for budgeting purposes only, and do not represent any conclusion by the licensee about how the DOE will actually perform in the future. This report should not be taken as any indication that the licensee knows how the DOE will eventually perform its obligations, or has any specific expectation concerning that performance. If DOE's failure to perform results in specific additional costs beyond those reflected in this report, it is expected that the DOE will compensate the licensee for those costs.

Entergy's position is that the DOE has a contractual obligation to accept the spent fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim.

### **3. ISFSI Decommissioning Strategy**

For purposes of this funding plan, at the conclusion of the spent fuel transfer process the ISFSI will be promptly decommissioned (similar to the power reactor DECON alternative).

### **4. ISFSI Description**

The Big Rock Point ISFSI consists of 7 British Nuclear Fuels, Ltd. (BNFL) FuelSolutions™ W-150 modular concrete overpacks (each containing the spent fuel canister) and a 75 foot by 99 foot reinforced concrete pad. There is also one additional overpack containing Greater-than-Class C (GTCC) waste.

The storage overpack used for the GTCC canister is not expected to have any interior contamination from residual activation and can be reused or disposed of by conventional means after a final status survey.

Table 1 provides the significant quantities and physical dimensions used as the basis in developing the ISFSI decommissioning estimate.

### **5. Key Assumptions / Estimating Approach**

The decommissioning estimate is based on the current configuration of the ISFSI, once all spent fuel and GTCC material has been removed from the site.

The dry storage vendor, BNFL, does not expect the overpacks to have any interior or exterior radioactive surface contamination (that could not be easily removed). Any

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<sup>8</sup> *Ibid.* at page 2.

neutron activation of the steel and concrete is expected to be minimal.<sup>[9]</sup> The decommissioning estimate is based on the premise that some of the inner steel liners and the concrete overpacks will contain low levels of neutron-induced residual radioactivity that would necessitate remediation at the time of decommissioning. As an allowance, 2 of the 7 overpacks are assumed to be affected, i.e., contain residual radioactivity. The allowance quantity is based upon the number of casks required for the final core off-load (i.e., 84 off-loaded assemblies, 64 assemblies per cask) which results in 2 overpacks.

The dry storage vendor, BNFL, expects that any activation of the concrete ISFSI pad would be significantly less than of the storage casks.<sup>[10]</sup> It would be expected that this assumption would be confirmed as a result of good radiological practice of surveying potentially impacted areas after each spent fuel transfer campaign. It is assumed for this analysis that a small portion of the ISFSI pad (directly underneath the two impacted casks) will be activated to a level that would require remediation for termination of the license. Verification surveys are included for the remainder of the pad. An allowance is also included for surveying any transfer equipment.

The estimate is limited to costs necessary to terminate the ISFSI's NRC license and meet the §20.1402 criteria for unrestricted use. Disposition of released material and structures is outside the scope of the estimate.

Prior to ISFSI pad construction, the NRC took radiological samples of the ground and fill upon which the ISFSI pad was constructed. No significant or unexpected radiological conditions were found, and no nuclear plant-related isotopes were identified in any sample.<sup>[11]</sup> As such, the decommissioning estimate contains no cost allowance for soil remediation.

Waste volumes are based on estimates provided by FuelSolutions™<sup>[12]</sup>. Low-level radioactive waste disposal costs are based on Entergy's negotiated rates with EnergySolutions.

Decommissioning is assumed to be performed by an independent contractor. As such, labor, equipment, and material costs are based on national averages, i.e., costs from national publications such as R.S. Means' Building Construction Cost Data (adjusted for regional variations), and laboratory service costs are based on vendor price lists. Entergy, as licensee, will oversee the site activities.

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<sup>9</sup> FuelSolutions™ Storage System FSAR, Document No. WSNF-220, Rev. 3, June 2005, at page 14.1-2, (Accession Number ML073610500).

<sup>10</sup> FuelSolutions™ Storage System FSAR, Document No. WSNF-220, Rev. 3, June 2005, at page 14.1-2, (Accession Number ML073610500).

<sup>11</sup> Big Rock Point Restoration Project, NRC Inspection Report 05000155/2001-003 (DNMS), (Accession Number ML011730211), dated June 2001.

<sup>12</sup> FuelSolutions™ Storage System FSAR, Document No. WSNF-220, Rev. 3, June 2005, at page 14.3-1 (Accession Number ML073610500).

Contingency has been added at an overall rate of 25%. This is consistent with the contingency evaluation criteria referenced by the NRC in NUREG-1757.<sup>13</sup> Costs are reported in 2021 dollars and based upon an internal decommissioning analysis prepared for Palisades in 2015.

The effects, if any, since the last submittal of the ISFSI decommissioning funding plan from the following events listed in 10 CFR 72.30(c)(1)-(4) have been specifically considered in the decommissioning cost estimate:

- (1) Spills of radioactive material producing additional residual radioactivity in onsite subsurface material: There have been no spills at the ISFSI.
- (2) Facility modifications: There have been no facility modifications in the past three years that affect the decommissioning cost estimate.
- (3) Changes in authorized possession limits: There are no changes in authorized possession limits that affect the decommissioning cost estimate.
- (4) Actual remediation costs that exceed the previous cost estimate: No actual remediation costs have been incurred, so no actual remediation costs exceed the previous cost estimate.

## **6. Cost Considerations**

The estimated cost to decommission the ISFSI and release the facility for unrestricted use is provided in Table 2. The cost includes an initial planning phase. During this phase the empty overpacks, ISFSI pad, and surrounding environs are characterized and the activity specifications and work procedures for the decontamination (overpack disposition) developed.

The next phase includes the cost for craft labor to demolish the activated overpacks, package in certified waste containers, transportation to the Clive, Utah site, disposal, as well as the costs for the supporting equipment, materials and supplies.

The final phase includes the cost for the license termination survey, verification survey, and the associated equipment and laboratory support.

The estimate also contains costs for the NRC (and NRC contractor to perform the verification survey), Entergy's oversight staff, site security (industrial), and other site operating costs.

For estimating purposes, it is conservatively assumed that all expenditures will be incurred in the year 2044, the year following all spent fuel removal.

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<sup>13</sup> "Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness," U.S. Nuclear Regulatory Commission's Office of Nuclear Material Safety and Safeguards, NUREG-1757, Volume 3, Revision 1, February 2012.



## **7. Financial Assurance**

ISFSI operations at Big Rock Point are in response to the DOE's failure to remove spent nuclear fuel from the site in a timely manner. The costs for management of the spent fuel are costs for which the DOE is responsible, according to the Standard Contract. It is therefore expected that, once the ISFSI is no longer needed, the cost to decommission the ISFSI would be a DOE-reimbursable expense. Until such time that the costs can be recovered from the DOE, Entergy will rely upon a Parent Guarantee established in the amount of \$5 million<sup>[14]</sup> to terminate the ISFSI license and release the facility for unrestricted use.

The Guarantee is more than sufficient to complete the decommissioning of the ISFSI (estimated cost provided in Table 2).

This certifies that, based on the trust fund balance and costs as shown as of the dates reflected in this report, financial assurance has been provided in the amount of the cost estimate for decommissioning of the ISFSI.

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<sup>14</sup> Status of Decommissioning Funding for Plants Operated by Entergy Nuclear Operations, Inc. for Year Ending December 31, 2020, (Accession Number ML21084A811), dated March 25, 2021.

**Table 1**  
**Significant Quantities and Physical Dimensions**

ISFSI Pad

Item	Length (ft)	Width (ft)	Residual Radioactivity
ISFSI Pad	99	75	No

ISFSI Storage Overpack

Item	Value	Notes
Overall Height (inches)	230	Dimensions are nominal
Outside Diameter (inches)	138	Dimensions are nominal
Inside Diameter (inches)	73	Dimensions are nominal
Inner Liner Thickness (inches)	2.0	Dimensions are nominal
Quantity (total)	8	7 spent fuel + 1 GTCC
Quantity (with residual radioactivity)	2	Equivalent to the number of overpacks used to store last complete core offload
Low-Level Radioactive Waste (total packaged volume)	2,512	Cubic feet
Low-Level Radioactive Waste (packaged density)	95	Average weight density

Other Potentially Impacted Items

Item	Value	Notes
Transfer Cask	1	
Number of Overpacks used for GTCC storage	1	No residual radioactivity

**Table 2**  
**ISFSI Decommissioning Costs and Waste Volumes**

	Costs (thousands, 2021 dollars)						Waste Volume	Person-Hours	
	Removal	Packaging	Transport	Disposal	Other	Total	Class A (cubic feet)	Craft	Oversight and Contractor
<b>Decommissioning Contractor</b>									
Planning (characterization, specs and procedures)	-	-	-	-	168	168	-	-	928
Decontamination/Demolition (activated cask disposition)	14	33	156	435	-	636	2,512	228	-
License Termination (radiological surveys)	-	-	-	-	633	633	-	4,056	-
<b>Subtotal</b>	<b>14</b>	<b>33</b>	<b>156</b>	<b>435</b>	<b>801</b>	<b>1,437</b>	<b>2,512</b>	<b>4,284</b>	<b>928</b>
<b>Supporting Costs</b>									
NRC and NRC Contractor Fees and Costs	-	-	-	-	526	526	-	-	1,153
Insurance	-	-	-	-	43	43	-	-	-
Property Taxes	-	-	-	-	-	-	-	-	-
Plant Energy Budget	-	-	-	-	18	18	-	-	-
Non-Labor Overhead	-	-	-	-	11	11	-	-	-
Corporate A&G	-	-	-	-	5	5	-	-	-
Security	-	-	-	-	36	36	-	-	4,999
Entergy Oversight Staff	-	-	-	-	154	154	-	-	3,792
<b>Subtotal</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>793</b>	<b>793</b>	<b>-</b>	<b>-</b>	<b>9,945</b>
<b>Total (w/o contingency)</b>	<b>14</b>	<b>33</b>	<b>156</b>	<b>435</b>	<b>1,594</b>	<b>2,230</b>	<b>2,512</b>	<b>4,284</b>	<b>10,873</b>
<b>Total (w/25% contingency)</b>	<b>17</b>	<b>41</b>	<b>195</b>	<b>543</b>	<b>1,993</b>	<b>2,788</b>			

**ENCLOSURE 2**

**CNRO2021-00025**

**10 CFR 72.30 ISFSI Decommissioning Funding Plan  
Palisades Nuclear Plant**

## **10 CFR 72.30 ISFSI DECOMMISSIONING FUNDING PLAN PALISADES NUCLEAR PLANT**

### **1. Background and Introduction**

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,<sup>[1]</sup> with the rule becoming effective on December 17, 2012. Subpart 72.30, "Financial assurance and recordkeeping for decommissioning," requires that each holder of, or applicant for, a license under this part must submit for NRC review and approval a decommissioning funding plan that contains information on how reasonable assurance will be provided that funds will be available to decommission the Independent Spent Fuel Storage Installation (ISFSI).

The rule also requires resubmittal of the decommissioning funding plan at intervals not to exceed 3 years, with adjustments as necessary to account for changes in costs and the extent of contamination. This document is intended to update the funding plans previously submitted by Entergy Nuclear Operations, Inc. in December 2018.<sup>[2]</sup>

In accordance with the rule, this letter provides a detailed cost estimate for decommissioning the ISFSI at the Palisades Nuclear Plant (Palisades), in an amount reflecting:

1. The work performed by an independent contractor;
2. An adequate contingency factor; and
3. Release of the facility and dry storage systems for unrestricted use, as specified in 10 CFR Part 20.1402

This letter also provides:

1. Identification of and justification for using the key assumptions contained in the cost estimate;
2. A description of the method of assuring funds for decommissioning; and
3. The volume of onsite subsurface material containing residual radioactivity, if any, that will require remediation to meet the criteria for license termination.

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<sup>1</sup> U.S. Code of Federal Regulations, Title 10, Parts 20, 30, 40, 50, 70 and 72 "Decommissioning Planning," Nuclear Regulatory Commission, Federal Register Volume 76, Number 117 (p 35512 et seq.), June 17, 2011.

<sup>2</sup> "ISFSI Decommissioning Funding Plans (10 CFR 72.30) for Big Rock Point, Indian Point Generating Stations 1, 2, & 3, Pilgrim Nuclear Power Station, Palisades Nuclear Plant, and Vermont Yankee Nuclear Power Station," CNRO2018-00050, (NRC Accession No. ML18351A478), dated December 17, 2018.

## 2. Spent Fuel Management Strategy

Palisades Nuclear Power Plant will permanently cease power operations during the spring of 2022. Approximately 2,082 spent fuel assemblies are currently projected to be generated over the life of the plant. Because of the breach by the Department of Energy (DOE) of its contract to remove fuel from the site, two ISFSI pads have been constructed and fuel casks have been emplaced thereon to support continued plant operations. The ISFSIs are operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K<sup>[3]</sup>).

Because of the DOE's breach, it is envisioned that the spent fuel pool will contain a significant number of spent fuel assemblies at the time Palisades Nuclear Power Plant will cease power operations, including assemblies off-loaded from the reactor vessel. To facilitate immediate dismantling operations or safe-storage operations, the fuel that cannot be transferred directly to the DOE from the pool is assumed to be packaged in dry storage casks for interim storage at the ISFSI. Once the spent fuel pool is emptied, the spent fuel pool systems and fuel pool areas can be either decontaminated and dismantled or prepared for long-term storage.

Completion of the ISFSI decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site. DOE's repository program assumes that spent fuel allocations will be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor. Entergy Nuclear Palisades' (Entergy) current spent fuel management plan for the Palisades spent fuel is based in general upon: 1) a 2030 start date for DOE initiating transfer of commercial spent fuel to a federal facility (not necessarily a final repository), and 2) expectations for spent fuel receipt by the DOE for the Palisades fuel. The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. Assuming a maximum rate of transfer of 3,000 metric tons of uranium/year,<sup>[4]</sup> the spent fuel is projected to be fully removed from the Palisades site in 2066.

Entergy believes that one or more monitored retrievable storage facilities could be put into place within a reasonable time. In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Obama administration's Blue Ribbon Commission and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..."<sup>[5]</sup>

The report stated that "[W]ith the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that: Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down

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<sup>3</sup> U.S. Code of Federal Regulations, Title 10, Part 72, Subpart K, "General License for Storage of Spent Fuel at Power Reactor Sites."

<sup>4</sup> "Acceptance Priority Ranking & Annual Capacity Report," DOE/RW-0567, July 2004.

<sup>5</sup> "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013.

reactor sites." Therefore, in 2013, DOE assumed it could begin fuel acceptance within 8 years of its report at an interim facility. While as in 2013 no further progress has currently been made on a disposal facility, its estimate of an 8-year development time for an interim facility would still allow fuel to be removed beginning in 2030.

The DOE has taken the position that under the Standard Contract, it does not have an obligation to accept canistered fuel from licensees. This position, coupled with the DOE's failure to perform, has increased the difficulty of estimating future requirements under 10 CFR 72.30. The estimates presented in this report are for budgeting purposes only, and do not represent any conclusion by the licensee about how the DOE will actually perform in the future. This report should not be taken as any indication that the licensee knows how the DOE will eventually perform its obligations, or has any specific expectation concerning that performance. If DOE's failure to perform results in specific additional costs beyond those reflected in this report, it is expected that the DOE will compensate the licensee for those costs.

Entergy's position is that the DOE has a contractual obligation to accept the spent fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim.

### **3. ISFSI Decommissioning Strategy**

At the conclusion of the spent fuel transfer process the ISFSI will be promptly decommissioned (similar to the power reactor DECON alternative).

For purposes of the funding plan, financial assurance is provided on the basis of a prompt ISFSI decommissioning scenario, i.e., independent of other station decommissioning strategies. ISFSI decommissioning is considered an independent project, regardless of the decommissioning alternative identified for the nuclear power plant.

### **4. ISFSI Description**

There are two ISFSI pads on the Palisades site. The original pad was used to store 18 Sierra Nuclear VSC-24 Ventilated Storage Casks (VSCs). Consumers Power transferred 432 assemblies into the VSCs between 1995 and 1999. It is possible that the spent fuel in these casks will have to be repackaged before it can be shipped off-site. Repackaging is currently assumed to occur immediately after the cessation of plant operations, while the spent fuel pool is still available and the associated fuel handling systems are operable. As such, the VSCs are not expected to be on the pad when it is decommissioned (and not considered in this funding plan).

A horizontal dry storage system is currently in use at the second ISFSI pad. There are 24 modules loaded with spent fuel; 10 NUHOMS®-32PT modules and 14 NUHOMS®-24PTH modules. The system consists of a dry storage canister, with a nominal capacity of 24 or 32 fuel assemblies, and a horizontal concrete storage module. Entergy began using Holtec's HI-STORM FW System (with a 37 spent fuel assembly capacity) for storing new spent fuel on-site in 2016. The Holtec dry storage system consists of an inner multi-purpose canister (containing the spent fuel) and an outer concrete and steel overpack.

The current spent fuel management plan for the Palisades spent fuel would result in 63 spent fuel storage modules/casks (24 NUHOMS® and 39 Holtec FW) being placed on the storage pad(s) at the site. This projected configuration is based upon the 2030 DOE spent fuel program start with a 2032 DOE start date for Palisades spent fuel, a 3,000 MTU / year pickup rate, and the current cask capacity (including expansion capability) for the ISFSI pad(s) built to support plant operations. This scenario would allow the spent fuel storage pool to be emptied within approximately five and one-half years following the permanent cessation of operations.

The 63 modules/casks projected to be on the ISFSI pad(s) after shutdown excludes any additional casks that may be used for Greater-than-Class-C (GTCC) storage. The storage overpacks used for the GTCC canisters (estimated quantity of 5) are not expected to have any interior contamination of residual activation and can be reused or disposed of by conventional means after a final status survey.

Table 1 provides the significant quantities and physical dimensions used as the basis in developing the ISFSI decommissioning estimate.

## 5. Key Assumptions / Estimating Approach

The decommissioning estimate is based on the configuration of the ISFSI expected after all spent fuel and GTCC material has been removed from the site. The configuration of the ISFSI is based on the station operating until the spring of 2022 and the DOE's spent fuel acceptance assumptions, as previously described.

The dry storage vendor, Holtec International, does not expect the overpacks to have any interior or exterior radioactive surface contamination. Any neutron activation of the steel and concrete is expected to be extremely small.<sup>[6]</sup> The decommissioning estimate is based on the premise that some of the inner steel liners and concrete overpacks will contain low levels of neutron-induced residual radioactivity that would necessitate remediation at the time of decommissioning. As an allowance, 6 of the 39 Holtec FW overpacks are assumed to be affected, i.e., contain residual radioactivity. The allowance quantity is based upon the number of casks required for the final core off-load (i.e., 204 offloaded assemblies, 37 assemblies per cask which results in 6 overpacks). It is assumed that these are the final casks offloaded; consequently, they have the least time for radioactive decay of the neutron activation products. The older NUHOMS® modules are not expected to be activated to a level requiring remediation.

The dry storage vendor, Holtec International, does not expect any residual contamination to be left on the concrete ISFSI pad.<sup>[7]</sup> It would be expected that this assumption would be confirmed as a result of good radiological practice of surveying potentially impacted areas after each spent fuel transfer campaign. It is assumed for this analysis that the ISFSI pad will not be contaminated. As such, only verification surveys

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<sup>6</sup> HI-STORM FW FSAR, Holtec International, Report HI-2114830, Rev.0 , at page 2-83 (Accession Number ML15075A203).

<sup>7</sup> HI-STORM FW FSAR, Holtec International, Report HI-2114830, Rev. 0, at page 2-84 (Accession Number ML15075A203).



are included for the pad in the decommissioning estimate. An allowance is also included for surveying any transfer equipment.

The estimate is limited to costs necessary to terminate the ISFSI's NRC license and meet the §20.1402 criteria for unrestricted use. Disposition of released material and structures is outside the scope of the estimate.

There is no indication the soil in the immediate vicinity of the ISFSI pads would require remediation to meet the criteria for license termination. As such, there is no allowance for soil remediation in the estimate.

Low-level radioactive waste disposal costs are based on Entergy's currently negotiated rates with EnergySolutions.

Decommissioning is assumed to be performed by an independent contractor. As such, labor, equipment, and material costs are based on national averages, i.e., costs from national publications such as RSMeans' Building Construction Cost Data (adjusted for regional variations), and laboratory service costs are based on vendor price lists. Entergy, as licensee, will oversee the site activities.

Contingency has been added at an overall rate of 25%. This is consistent with the contingency evaluation criteria referenced by the NRC in NUREG-1757.<sup>[8]</sup>

Costs are reported in 2021 dollars and based upon an internal decommissioning analysis prepared for Palisades in 2015.

The effects, if any, since the last submittal of the ISFSI decommissioning funding plan of the following events listed in 10 CFR 72.30(c)(1)-(4) have been specifically considered in the decommissioning cost estimate:

- (1) Spills of radioactive material producing additional residual radioactivity in onsite subsurface material: There have been no spills at the ISFSIs.
- (2) Facility modifications: There have been no facility modifications in the past three years that affect the decommissioning cost estimate.
- (3) Changes in authorized possession limits: There are no changes in authorized possession limits that affect the decommissioning cost estimate.
- (4) Actual remediation costs that exceed the previous cost estimate: No actual remediation costs have been incurred, so no actual remediation costs exceed the previous cost estimate.

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<sup>8</sup> "Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness," U.S. Nuclear Regulatory Commission's Office of Nuclear Material Safety and Safeguards, NUREG-1757, Volume 3, Revision 1, February 2012.

## 6. Cost Considerations

The estimated cost to decommission the ISFSI and release the facility for unrestricted use is provided in Table 2. The cost includes an initial planning phase. During this phase the empty overpacks, ISFSI pad(s), and surrounding environs are characterized and the activity specifications and work procedures for the decontamination (overpack disposition) developed.

The next phase includes the cost for craft labor to remove the activated overpacks, package in certified waste containers, transportation to the Clive, Utah site, disposal, as well as the costs for the supporting equipment, materials and supplies. The final phase includes the cost for the license termination survey, verification survey, and the associated equipment and laboratory support.

The estimate also contains costs for the NRC (and NRC contractor to perform the verification survey), Entergy's oversight staff, site security (industrial), and other site operating costs.

For estimating purposes, it is conservatively assumed that all expenditures will be incurred in the year 2067, the year following all spent fuel removal.

## 7. Financial Assurance

ISFSI operations at the second Palisades ISFSI are in response to the DOE's failure to remove spent nuclear fuel from the site in a timely manner. The costs for management of the spent fuel are costs for which the DOE is responsible under federal law and the Standard Contract. It is therefore expected that, once the second ISFSI is no longer needed, the cost to decommission the ISFSI would be a DOE-reimbursable expense. Until such time that the costs can be recovered from the DOE, Entergy will rely upon the money available in its decommissioning trust fund to terminate the ISFSI license and release the facility for unrestricted use.

Using the decommissioning trust fund is reasonable based on the following:

- Although the decommissioning trust fund is for radiological decommissioning costs only, the ISFSI decommissioning is a radiological cost. Also, to the extent that the trust fund balance exceeds costs required for Part 50 radiological decommissioning, these funds would be available to address costs incurred by Entergy, including ISFSI decommissioning costs.
- The projected amount necessary for decommissioning Palisades is \$501.132 million, based upon the NRC's latest financial assurance funding determination.<sup>[9]</sup>
- Based upon Palisades' decommissioning trust fund balance as of September 30, 2021 and considering the allowed real rate of return on the fund between October 1, 2021 and the assumed end of Palisades decommissioning, the trust fund will contain a \$110.485 million surplus (refer to Table 3) beyond the NRC minimum funding formula provided in 10 CFR 50.75(e). This surplus is more than

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<sup>9</sup> "Report on Waste Burial Charges," U.S. Nuclear Regulatory Commission's Office of Nuclear Reactor Regulation, NUREG-1307, Rev. 18, January 2021.

sufficient to complete the decommissioning of the ISFSI (estimated cost provided in Table 2).

This certifies that, based on the trust fund balance and costs as shown as of the dates reflected in this report, financial assurance has been provided in the amount of the cost estimate for decommissioning of the ISFSI.

**Table 1**  
**Significant Quantities and Physical Dimensions**

ISFSI Pad

Item	Length (ft)	Width (ft)	Residual Radioactivity
ISFSI Pad No. 1 (old)	200	30	No
ISFSI Pad No. 2 (new)	607	33	No

ISFSI Storage Overpack (Holtec FW)

Item	Value	Notes
Overall Height (inches)	207.8	Dimensions are nominal
Outside Diameter (inches)	139	Dimensions are nominal
Inside Diameter (inches)	81	Dimensions are nominal
Quantity (total, excluding VSCs)	68	63 Spent fuel (24 NUHOMS + 39 Holtec FW) + 5 GTCC (Holtec FW)
Quantity (with residual radioactivity)	6	Equivalent to the number of MPC's used to store last complete core offload
Low-Level Radioactive Waste (total packaged volume)	15,193	Cubic feet
Low-Level Radioactive Waste (packaged density)	119	Average weight density

Other Potentially Impacted Items

Item	Value	Notes
Transfer Cask	1	
Number of Overpacks used for GTCC storage	5	No residual radioactivity

**Table 2**  
**ISFSI Decommissioning Costs and Waste Volumes**

	Costs (thousands, 2021 dollars)						Waste Volume	Person-Hours	
	Removal	Packaging	Transport	Disposal	Other	Total	Class A (cubic feet)	Craft	Oversight and Contractor
<b>Decommissioning Contractor</b>									
Planning (characterization, specs and procedures)	-	-	-	-	298	298	-	-	1,072
Decontamination/Demolition (activated cask disposition)	130	167	877	2,713	47	3,933	15,193	1,589	-
License Termination (radiological surveys)	-	-	-	-	1,519	1,519	-	10,722	-
<b>Subtotal</b>	<b>130</b>	<b>167</b>	<b>877</b>	<b>2,713</b>	<b>1,863</b>	<b>5,749</b>	<b>15,193</b>	<b>12,310</b>	<b>1,072</b>
<b>Supporting Costs</b>									
NRC and NRC Contractor Fees and Costs	-	-	-	-	536	536	-	-	1,153
Insurance	-	-	-	-	78	78	-	-	-
Property Taxes	-	-	-	-	37	37	-	-	-
Plant Energy Budget	-	-	-	-	73	73	-	-	-
Non-Labor Overhead	-	-	-	-	22	22	-	-	-
Corporate A&G	-	-	-	-	135	135	-	-	-
Security (industrial)	-	-	-	-	140	140	-	-	3,457
Entergy Oversight Staff	-	-	-	-	310	310	-	-	3,803
<b>Subtotal</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,330</b>	<b>1,330</b>	<b>-</b>	<b>-</b>	<b>8,413</b>
<b>Total (w/o contingency)</b>	<b>130</b>	<b>167</b>	<b>877</b>	<b>2,713</b>	<b>3,194</b>	<b>7,079</b>	<b>15,193</b>	<b>12,310</b>	<b>9,485</b>
<b>Total (w/25% contingency)</b>	<b>163</b>	<b>208</b>	<b>1,096</b>	<b>3,391</b>	<b>3,992</b>	<b>8,849</b>			

**Table 3**  
**Financial Assurance**

**Plant name:** **Palisades Nuclear Plant**

**Year of Biennial:** **Month** **Day** **Year**  
**Termination of Operation:** **9** **30** **2021**  
**5** **31** **2022**

	MWth	1986\$	ECI	Base Lx		Lx	Px	Fx		Ex		Bx
PWR	2565	\$97,572,000	143.5	2.08	0.65	2.98	2.300	3.810	0.13	2.93	0.22	12.793

**NRC Minimum:** **\$501,132,329** **Site Specific:**

Licensee:	% Owned:	Amount of NRC Minimum/Site Specific:	Amount in Trust Fund:
Entergy	100.00%	\$501,132,329	\$561,787,745

**Step 1:**  
**Earnings Credit:**

Trust Fund Balance:	Real Rate of Return per	Years Left in License	Total Real Rate of	Total Earnings:	
\$561,787,745	2%	0.67	1.01336	\$569,293,229	Total Earnings = Trust Fund balance x (1+RRR)^Years left in license

**Step 2:**

**Accumulation:**

Value of Annuity per year	Real Rate of Return per	Years of Annuity:	Total Annuity:
\$0	2%	0	\$0

**Step 3:**  
**Decom Period:**

Total Earnings:	Real Rate of Return per	Decom Period:	Total Real Rate of	Total Earnings for Decom:	
\$569,293,229	2%	7	0.14869	\$42,324,105	Total Earnings for Decom = (1/2) x Total Earnings x [(1+RRR)^Decom period - 1]

Total of Steps 1 - 3:	
\$611,617,334	Total = Total Earnings + Total Earnings for Decom

Excess (Shortfall)	\$	110,485,006	to NRC minimum
	\$	(8,849,100)	Less ISFSI
	\$	101,635,906	Total Excess Financial Assurance