Entergy Nuclear Operations, Inc.
1340 Echelon Parkway
Jackson, MS 39213
Tel 601-368-5102

Philip L. Couture
Manager, Fleet Licensing Programs

10 CFR 72.30

CNRO 2018-00050

December 17, 2018

ATTN: Document Control Desk
Director, Division of Spent 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

Indian Point Nuclear
Generating Stations 1, 2, & 3
Docket 72-051

Pilgrim Nuclear Power Station
Docket No. 72-1044

Palisades Nuclear Plant
Docket No. 72-007

Vermont Yankee Nuclear Power Station
Docket No. 72-059

Dear Sir or Madam:

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 through 5) 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 2018 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Parent Guarantee, since the 10 CFR 50.75 Decommissioning Trust Fund is no longer applicable for that site.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[1]	$ 2.57M
Palisades	$ 76.2M	$ 8.0M
Indian Point	Unit 1 & 2: $ 256.7M Unit 3: $ 507M	$ 20.3M (Units 1, 2 & 3)
Pilgrim	$ 549M	$ 9.42M
Vermont Yankee	$ 349M	$ 6.56M

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

3A. 10 CFR 72.30 ISFSI Decommissioning Funding Plan - Indian Point Nuclear Generating Station, Units 1 & 2

3B. 10 CFR 72.30 ISFSI Decommissioning Funding Plan - Indian Point Nuclear Generating Station, Unit 3

4. 10 CFR 72.30 ISFSI Decommissioning Funding Plan - Pilgrim Nuclear Power Station
5. 10 CFR 72.30 ISFSI Decommissioning Funding Plan - Vermont Yankee Nuclear Power Station

[1] Parent company guarantee.

cc: NRC Region I Regional Administrator
NRC Region III Regional Administrator
NRC Senior Resident Inspector – Indian Point
NRC Senior Resident Inspector – Palisades
NRC Senior Resident Inspector – Pilgrim
NRC Project Manager – Indian Point 1
NRC Project Manager – Indian Point 2/3
NRC Project Manager – Big Rock Point
NRC Project Manager – Palisades
NRC Project Manager – Pilgrim
NRC Project Manager – Vermont Yankee

State of New York
State of Michigan
State of Vermont
Commonwealth of Massachusetts

ENCLOSURE 1

CNRO 2018-00050

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Big Rock Point

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Big Rock Point
ISFSI Docket 72-043

1. Background and Introduction

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,[2] 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 2015.[3]

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.

---

2 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.

3 "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, James A. FitzPatrick and Vermont Yankee Nuclear Power Station," ENOC-12-00039, dated December 17, 2015 (NRC Accession No. ML15351A524).

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.[4] The ISFSI is operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[5]).

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,[6] 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..."[7]

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: …[A]dvances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste

---

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

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

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

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

management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities."

Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE's 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report. Because of this continued delay, this estimate revises the assumed start date for DOE fuel acceptance from 2025 to 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 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

neutron activation of the steel and concrete is expected to be minimal.[8] 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.[9] 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.[10] As such, the decommissioning estimate contains no cost allowance for soil remediation.

Waste volumes are based on estimates provided by FuelSolutions™[11]. Low-level radioactive waste disposal costs are based on Entergy's negotiated rates with Energy*Solutions*.

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.

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.[12]

---

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

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

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

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

Costs are reported in 2018 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.

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

---

[12] "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.

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[13] 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.

13 Status of Decommissioning Funding for Plants Operated by Entergy Nuclear Operations, Inc. for Year Ending December 31, 2014, dated March 30, 2015 (Accession Number ML15092A141).

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, 2018 dollars)						Waste Volume	Person-Hours	
	Removal	Packaging	Transport	Disposal	Other	Total	Class A (cubic feet)	Craft	Oversight and Contractor
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	164	164	-	-	928
Decontamination/Demolition (activated cask disposition)	13	41	136	404	-	593	2,512	202	-
License Termination (radiological surveys)	-	-	-	-	573	573	-	4,056	-
Subtotal	**13**	**41**	**136**	**404**	**737**	**1,330**	**2,512**	**4,258**	**928**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	474	474	-	-	1,153
Insurance	-	-	-	-	40	40	-	-	-
Property Taxes	-	-	-	-	-	-	-	-	-
Plant Energy Budget	-	-	-	-	17	17	-	-	-
Non-Labor Overhead	-	-	-	-	10	10	-	-	-
Corporate A&G	-	-	-	-	5	5	-	-	-
Security	-	-	-	-	34	34	-	-	4,999
Entergy Oversight Staff	-	-	-	-	143	143	-	-	3,792
Subtotal	**-**	**-**	**-**	**-**	**722**	**722**	**-**	**-**	**9,945**
Total (w/o contingency)	**13**	**41**	**136**	**404**	**1,459**	**2,052**	**2,512**	**4,258**	**10,873**
Total (w/25% contingency)	**16**	**52**	**170**	**504**	**1,824**	**2,565**			

ENCLOSURE 2

CNRO 2018-00050

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Palisades Nuclear Plant

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Palisades Nuclear Plant
ISFSI Docket 72-007

1. Background and Introduction

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,[1] 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 2015.[2]

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.

---

1 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.

2 "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, James A. FitzPatrick and Vermont Yankee Nuclear Power Station," ENOC-12-00039, dated December 17, 2015 (NRC Accession No. ML15351A524).

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[3]).

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,[4] 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..."[5]

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: …[A]dvances toward the siting and licensing of a larger interim storage facility to be

---

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

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

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

available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities."

Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE's 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report. Because of this continued delay, this estimate revises the assumed start date for DOE fuel acceptance from 2025 to 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 intends to use Holtec's HI-STORM FW System (with a 37 spent fuel assembly capacity) for storing all future spent fuel on-site. 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 27 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.[6] 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.

---

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

The dry storage vendor, Holtec International, does not expect any residual contamination to be left on the concrete ISFSI pad.[7] 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 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 Energy*Solutions*.

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.

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.[8]

Costs are reported in 2018 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.

---

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

8 "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.

(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(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 $474.193 million, based upon the NRC's latest financial assurance funding determination.[9]

---

9 "Report on Waste Burial Charges," U.S. Nuclear Regulatory Commission's Office of Nuclear Reactor Regulation, NUREG-1307, Rev. 16, November 2016.

- Based upon Palisades' decommissioning trust fund balance as of September 30, 2018 and considering the allowed real rate of return on the fund between October 1, 2018 and the assumed end of Palisades decommissioning, the trust fund will contain a $76.203 million surplus (refer to Table 3) beyond the NRC minimum funding formula provided in 10CFR50.75(e). This surplus 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.

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)	44	39 Spent fuel + 5 GTCC
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, 2018 dollars)						Waste Volume	Person-Hours	
	Removal	Packaging	Transport	Disposal	Other	Total	Class A (cubic feet)	Craft	Oversight and Contractor
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	280	280	-	-	1,072
Decontamination/Demolition (activated cask disposition)	120	160	761	2,519	2	3,562	15,193	1,563	-
License Termination (radiological surveys)	-	-	-	-	1,335	1,335	-	10,722	-
Subtotal	**120**	**160**	**761**	**2,519**	**1,616**	**5,177**	**15,193**	**12,284**	**1,072**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	483	483	-	-	1,153
Insurance	-	-	-	-	73	73	-	-	-
Property Taxes	-	-	-	-	34	34	-	-	-
Plant Energy Budget	-	-	-	-	68	68	-	-	-
Non-Labor Overhead	-	-	-	-	21	21	-	-	-
Corporate A&G	-	-	-	-	125	125	-	-	-
Security (industrial)	-	-	-	-	130	130	-	-	3,457
Entergy Oversight Staff	-	-	-	-	287	287	-	-	3,803
Subtotal	-	**-**	**-**	**-**	**1,220**	**1,220**	**-**	**-**	**8,413**
Total (w/o contingency)	**120**	**160**	**761**	**2,519**	**2,837**	**6,397**	**15,193**	**12,284**	**9,485**
Total (w/25% contingency)	**150**	**200**	**951**	**3,148**	**3,546**	**7,996**			

Table 3
Financial Assurance

Plant name: **Palisades Nuclear Plant**

	Month	Day	Year
Year of Biennial:	9	30	2018
Termination of Operation:	5	31	2022

	MWth	1986$	ECI	Base Lx		Lx	Px	Fx		Ex		Bx
PWR	2565	$97,572,000	131.6	2.08	0.65	2.74	2.247	3.071	0.13	2.59	0.22	12.471

NRC Minimum: **$474,193,370** **Site Specific:**

Licensee:	% Owned:	Amount of NRC Minimum/Site Specific:	Amount in Trust Fund:
Entergy	100.00%	$474,193,370	$476,403,890

Step 1:
Earnings Credit:

Trust Fund Balance:	Real Rate of Return per	Years Left in License	Total Real Rate of	Total Earnings:	
$476,403,890	2%	3.67	1.07537	**$512,309,989**	**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:	
$512,309,989	2%	7	0.14869	$38,086,576	**Total Earnings for Decom = (1/2) x Total Earnings x [(1+RRR)^Decom period - 1]**

Total of Steps 1 - 3:	
$550,396,566	**Total = Total Earnings + Total Earnings for Decom**

Excess (Shortfall)	**$**	**76,203,196**	**to NRC minimum**
	$	**(7,996,000)**	**Less ISFSI**
	$	**-**	**Parent Co Guaranty**
	$	**68,207,196**	**Total Excess Financial Assurance**

ENCLOSURE 3A

CNRO 2018-00050

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Indian Point Nuclear Generating Station, Units 1 & 2

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Indian Point Nuclear Power Plant, Units 1 and 2
ISFSI Docket 72-051

1. Background and Introduction

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,[1] 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 2015.[2]

In accordance with the rule, this letter provides a detailed cost estimate for decommissioning the ISFSI constructed at Indian Point Energy Center (Indian Point), 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.

---

1 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.

2 "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, James A. FitzPatrick and Vermont Yankee Nuclear Power Station," ENOC-12-00039, dated December 17, 2015 (NRC Accession No. ML15351A524).

2. Spent Fuel Management Strategy

There are three nuclear units on the Indian Point site, two operating (IP-2 and IP-3) and one permanently shutdown (IP-1). This funding plan addresses the disposition of IP-1 and IP-2 spent fuel, as it relates to on site dry storage (the IP-3 spent fuel is addressed in a separate funding plan).

IP-1 ceased operation on October 31, 1974, generating 404 spent fuel assemblies over its operating life. The operating license for Indian Point Two will cease operations by April 30, 2020 and Indian Point Three will cease operations by April 30, 2021.

Approximately 1,982 spent fuel assemblies are projected to be generated when IP-2 ceases operation at April 30, 2020. Because of the breach by the Department of Energy (DOE) of its contract to remove fuel from the site, an ISFSI has been constructed and fuel casks have been emplaced thereon to support continued plant operations of IP-2 as well as IP-3. Based upon the current projection of the DOE's ability to remove spent fuel from the site, a second pad will need to be constructed to support decommissioning. Since the projected spent fuel storage requirements for both IP-2 and IP-3 are similar, and the casks will be comingled on the two pads, the funding requirements are assumed to be allocated equally between the two nuclear units (the IP-1 casks are included with the IP-2 inventory). The ISFSI is assumed to be operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[3]).

The IP-1 spent fuel on site (160 assemblies), has been relocated to the current ISFSI pad (in 5 dry storage casks). The remaining 244 assemblies had previously been shipped to West Valley for reprocessing.

Because of the DOE's breach, it is envisioned that the IP-2 spent fuel pool will contain a significant number of spent fuel assemblies at the time operations cease, including assemblies off-loaded from the reactor vessel. To facilitate immediate dismantling operations or safe-storage operations, the IP-2 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 Indian Point 2, LLC's (Entergy) current spent fuel management plan for the IP-2 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 IP-2 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

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

metric tons of uranium/year,[4] the spent fuel is projected to be fully removed from the Indian Point site in 2061.

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..."[5]

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: …[A]dvances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities."

Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE's 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report. Because of this continued delay, this estimate revises the assumed start date for DOE fuel acceptance from 2025 to 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).

---

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

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

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

The design and capacity of the current Indian Point ISFSI is based upon the Holtec HI-STORM 100S dry cask storage system (IP-1 fuel is stored in a shorter version of the cask). The system consists of a multi-purpose canister, with a nominal capacity of 32 fuel assemblies, and a steel-lined concrete storage overpack.

Entergy's current spent fuel management plan for the IP-2 spent fuel would result in 62 spent fuel storage casks (in addition to the 5 casks for IP-1 spent fuel) 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 2031 DOE start date for Indian Point spent fuel, a 3,000 MTU / year pickup rate, currently the ISFSI Pad has a 75 cask capacity and a future expansion is planned for additional casks.

The 67 casks (62 IP-2 + 5 IP-1 casks) projected to be on the ISFSI pads 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 7, including 1 for IP-1) 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 cessation of operation of Unit 3.

The existing ISFSI pad is approximately 96 feet by 208 feet, and has a maximum capacity of 75 casks. The supplemental pad (future) is assumed to have a capacity of 65 casks.

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.[6] 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

---

6 HI-STORM FSAR, Holtec International, Report HI-2002444, Rev. 13, at page 2.204 (Accession Number ML16138A100).

necessitate remediation at the time of decommissioning. As an allowance, 7 of the 67 IP-2 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., 193 assemblies and 32 assemblies per cask) which results in 7 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. Due to the age of the IP-1 spent fuel when it was placed in dry storage, the IP-1 casks 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.[7] 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 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.

The latest decommissioning cost studies for IP-1 and IP-2 (issued in 2013) included the cost for the remediation of contaminated (radiological) soil, based upon a detailed characterization of the site and affected areas. The ISFSI was constructed at the north end of the site which was previously undeveloped and outside the existing Protected Area.[8] Therefore, there is no allowance for the remediation any additional contaminated soil in the estimate to decommissioning the ISFSI.

Low-level radioactive waste disposal costs are based on Entergy's negotiated rates with Energy*Solutions*.

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.

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.[9]

Costs are reported in 2018 dollars and based upon internal decommissioning analyses prepared in 2012. The original spent fuel management plan for IP-2 was revised to

---

7 Ibid. page 2.205.

8 Indian Point Energy Center, Applicant's Environmental Report, Operating License Renewal Stage, p. 3-6 (Accession Number ML071210530).

9 "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.

reflect a 2020 cessation of plant operations. Activity costs were updated to 2018 dollars.

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 ISFSI.

(2) Facility modifications: There have been no facility modifications in the past three years that affect the decommissioning cost estimate. However, for purposes of bounding the decommissioning cost estimate, future expansion of the ISFSI is assumed in the current estimate based upon continuing delays by the DOE in removing the spent fuel from the site.

(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 IP-1/IP-2 casks and the IP-1/IP-2 allocated cost to decommissioning the ISFSI pads (the remaining portion will be funded by IP-3) 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 2062, the year following all spent fuel removal (including any from IP-3 stored on the pads).

7. Financial Assurance

ISFSI operations at Indian 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 a judgment entered against the DOE under federal law and the Standard Contract.[10] 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 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.
- Since the 5 IP-1 casks are not expected to be activated due to the age of the spent fuel when placed into storage, IP-1's contribution to the ISFSI decommissioning liability is very small. For purposes of this filing, the licensee assumes that the surplus in the IP-2 trust would be used for ISFSI decommissioning purposes.
- The projected amount necessary for decommissioning IP-2 is $515.341 million, based upon the NRC's latest financial assurance funding determination. [11]
- Based upon IP-2's decommissioning trust fund balance as of September 30, 2018 and considering the allowed real rate of return on the fund between October 1, 2018 and the assumed end of IP-2 decommissioning, the trust fund will contain a $256.729 million surplus (refer to Table 3) beyond the NRC minimum funding formula provided in 10CFR50.75(e). This surplus 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.

---

10 Entergy Nuclear Indian Point 2, LLC v. United States, Court of Federal Claims, No. 03-2622-C (2005).

11 "Report on Waste Burial Charges," U.S. Nuclear Regulatory Commission's Office of Nuclear Reactor Regulation, NUREG-1307, Rev. 16, November 2016.

Table 1
Significant Quantities and Physical Dimensions

ISFSI Pad

Item	Length (ft)	Width (ft)	Residual Radioactivity
ISFSI Pad (dimensions are for current pad)	208	96	No
New ISFSI Pad (conceptual design)	148	132	No

ISFSI Storage Overpack

Item	Value	Notes
HI-STORM 100S-185 Overall Height (inches)	185	Dimensions are nominal
HI-STORM 100S-218 Overall Height (inches)	218	Dimensions are nominal
Outside Diameter (inches)	132.0	Dimensions are nominal
Inside Diameter (inches)	73.5	Dimensions are nominal
Quantity (total)	74	62 IP-2 + 5 IP-1 spent fuel + 7 GTCC
Quantity (with residual radioactivity)	7	Equivalent to the number of overpacks used to store last complete core offload
Low-Level Radioactive Waste (total packaged volume)	20,064	Cubic feet
Low-Level Radioactive Waste (packaged density)	94	Average weight density

Other Potentially Impacted Items

Item	Value	Notes
Transport Cask	1	
Number of Overpacks used for GTCC storage	7 (IP-1 and 2)	No residual radioactivity

Table 2
ISFSI Decommissioning Costs and Waste Volumes
(50% of total cost)

	Costs (thousands, 2018 dollars)						Waste Volume	Person-Hours	
	Removal	Packaging	Transport	Disposal	Other	Total	Class A (cubic feet)	Craft	Oversight and Contractor
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	199	199	-	-	608
Decontamination/Demolition (activated cask disposition)	213	138	1,108	4,027	13	5,499	20,064	2,064	-
License Termination (radiological surveys)	-	-	-	-	1,089	1,089	-	8,337	-
Subtotal	**213**	**138**	**1,108**	**4,027**	**1,300**	**6,787**	**20,064**	**10,401**	**608**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	246	246	-	-	577
Insurance	-	-	-	-	73	73	-	-	-
Property Taxes	-	-	-	-	701	701	-	-	-
Plant Energy Budget	-	-	-	-	-	-	-	-	-
Non-Labor Overhead	-	-	-	-	7	7	-	-	-
Corporate A&G	-	-	-	-	41	41	-	-	-
Security	-	-	-	-	79	79	-	-	1,991
Entergy Oversight Staff	-	-	-	-	366	366	-	-	1,949
Subtotal	**-**	**-**	**-**	**-**	**1,331**	**1,331**	**-**	**-**	**4,516**
Total (w/o contingency)	**213**	**138**	**1,108**	**4,027**	**2,631**	**8,117**	**20,064**	**10,401**	**5,124**
Total (w/25% contingency)	**266**	**172**	**1,386**	**5,034**	**3,289**	**10,147**	-	-	-

Table 3
IP-2 Financial Assurance

Plant name: Indian Point Energy Center, Unit 2

	Month	Day	Year
Year of Biennial:	9	30	2018
Termination of Operation:	4	30	2024

	MWth	1986$	ECI	Base Lx		Lx	Px	Fx		Ex		Bx
PWR	3216	$103,300,800	135.9	2.16	0.65	2.94	2.247	3.071	0.13	2.59	0.22	12.471

NRC Minimum: **$515,340,509** **Site Specific:**

Licensee:	% Owned:	Amount of NRC Minimum/Site Specific:	Amount in Trust Fund:
Entergy	100.00%	$515,340,509	$643,422,033

Step 1:
Earnings Credit:

Trust Fund Balance:	Real Rate of Return per year	Years Left in License	Total Real Rate of	Total Earnings:	
$643,422,033	2%	5.58	1.11691	**$718,643,587**	**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 year	Years of Annuity:	Total Annuity:
$0	2%	0	$0

Step 3:
Decom Period:

Total Earnings:	Real Rate of Return per year	Decom Period:	Total Real Rate of	Total Earnings for Decom:	
$718,643,587	2%	7	0.14869	$53,426,001	**Total Earnings for Decom = (1/2) x Total Earnings x [(1+RRR)^Decom period - 1]**

Total of Steps 1 - 3:	
$772,069,588	**Total = Total Earnings + Total Earnings for Decom**

Excess (Shortfall)	**$**	**256,729,078**	**to NRC minimum**
	$	**(10,147,000)**	**Less ISFSI**
	$	**-**	**Parent Co Guaranty**
	$	**246,582,078**	**Total Excess Financial Assurance**

ENCLOSURE 3B

CNRO 2018-00050

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Indian Point Nuclear Generating Station, Units 3

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Indian Point Nuclear Power Plant, Unit 3
ISFSI Docket 72-051

1. Background and Introduction

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,[1] 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 2015.[2]

In accordance with the rule, this letter provides a detailed cost estimate for decommissioning the ISFSI constructed at Indian Point Energy Center (Indian Point), 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.

---

1 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.

2 "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, James A. FitzPatrick and Vermont Yankee Nuclear Power Station," ENOC-12-00039, dated December 17, 2015 (NRC Accession No. ML15351A524).

2. Spent Fuel Management Strategy

There are three nuclear units on the Indian Point site, two operating (IP-2 and IP-3) and one permanently shutdown (IP-1). This funding plan addresses the disposition of IP-3 spent fuel, as it relates to dry storage (the IP-1 and IP-2 spent fuel is addressed in a separate plan).

Approximately 1,856 spent fuel assemblies are currently projected to be generated over the operating life. Because of the breach by the Department of Energy (DOE) of its contract to remove fuel from the site, an ISFSI has been constructed and fuel casks have been emplaced thereon to support continued plant operations of IP-3 as well as IP-2. Based upon the current projection of the DOE's ability to remove spent fuel from the site, a second pad will need to be constructed to support decommissioning. Since the projected spent fuel storage requirements for both IP-3 and IP-2 are similar, and the casks will be comingled on the two pads, the funding requirements are assumed to be allocated equally between the two nuclear units (the IP-1 casks are included with the IP-2 inventory). The ISFSI is assumed to be operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[3]).

Because of the DOE's breach, it is envisioned that the IP-3 spent fuel pool will contain a significant number of spent fuel assemblies at the time operations cease, including assemblies off-loaded from the reactor vessel. To facilitate immediate dismantling operations or safe-storage operations, the IP-3 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 Indian Point 3, LLC's (Entergy) current spent fuel management plan for the IP-3 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 IP-3 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,[4] the spent fuel is projected to be fully removed from the Indian Point site in 2061.

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

---

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

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

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..."[5]

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: …[A]dvances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities."

Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE's 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report. Because of this continued delay, this estimate revises the assumed start date for DOE fuel acceptance from 2025 to 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

---

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

The design and capacity of the current Indian Point ISFSI is based upon the Holtec HI-STORM 100S dry cask storage system. The system consists of a multi-purpose canister, with a nominal capacity of 32 fuel assemblies, and a steel-lined concrete storage overpack.

Entergy's current spent fuel management plan for the IP-3 spent fuel would result in 58 spent fuel storage casks 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 2033 (based on IP-1's allotment) DOE start date for Indian Point spent fuel, a 3,000 MTU / year pickup rate, and a 75 cask capacity for the current ISFSI pad. This scenario would allow the spent fuel storage pool to be emptied within the ten years following the permanent cessation of operations (ten years is based upon the need to use the IP-2 pool for packaging IP-3 spent fuel for dry storage).

The 58 IP-3 casks projected to be on the ISFSI pad 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 6) 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 cessation of operation of IP-3.

The existing ISFSI pad is approximately 96 feet by 208 feet, and has a maximum capacity of 75 casks. The supplemental pad (future) is assumed to have a capacity of 65 casks.

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.[6] 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, 7 of the 58 IP-3 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., 193 assemblies, 32 assemblies per cask) which results in approximately 7 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.

---

6 HI-STORM FSAR, Holtec International, Report HI-2002444, Rev. 13, at page 2-204 (Accession Number ML16138A100).

The dry storage vendor, Holtec International, does not expect any residual contamination to be left on the concrete ISFSI pad.[7] 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 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.

The latest decommissioning cost study for IP-3 (issued in 2013) included the cost for the remediation of contaminated (radiological) soil, based upon a detailed characterization of the site and affected areas. The ISFSI was constructed at the north end of the site which was previously undeveloped and outside the existing Protected Area.[8] Therefore, there is no allowance for the remediation any additional contaminated soil in the estimate to decommissioning the ISFSI.

Low-level radioactive waste disposal costs are based on Entergy's negotiated rates with Energy*Solutions*.

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.

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.[9]
Costs are reported in 2018 dollars and based upon internal decommissioning analyses issued in 2013. Activity costs were updated to 2018 dollars.

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 ISFSI.

(2) Facility modifications: There have been no facility modifications in the past three years that affect the decommissioning cost estimate. However, for purposes of

---

7 Ibid. page 2.205.

8 Indian Point Energy Center, Applicant's Environmental Report, Operating License Renewal Stage, p. 3-6 (Accession Number ML071210530).

9 "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.

bounding the decommissioning cost estimate, future expansion of the ISFSI is assumed in the current estimate based upon continuing delays by the DOE in removing the spent fuel from the site.

(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 IP-3 casks and the IP-3 allocated cost to decommissioning the ISFSI pads (the remaining portion will be funded by IP-2) 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 2062, the year following all spent fuel removal.

7. Financial Assurance

ISFSI operations at Indian 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 a judgment entered against the DOE under federal law and the Standard Contract.[10] 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 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:

---

[10] Entergy Nuclear FitzPatrick, LLC, Entergy Nuclear Indian Point 3, and Entergy Nuclear Operations, Inc. v. United States, Court of Federal Claims, No. 03-2627-C (2009)

- 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 IP-3 is $515.341 million, based upon the NRC's latest financial assurance funding determination.[11]
- Based upon IP-3's decommissioning trust fund balance as of September 30, 2018 and considering the allowed real rate of return on the fund between October 1, 2018 and the assumed end of IP-3 decommissioning, the trust fund will contain a $506.842 million surplus (refer to Table 3) beyond the NRC minimum funding formula provided in 10CFR50.75(e). This surplus 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.

11 "Report on Waste Burial Charges," U.S. Nuclear Regulatory Commission's Office of Nuclear Reactor Regulation, NUREG-1307, Rev. 16, November 2016

Table 1
Significant Quantities and Physical Dimensions

ISFSI Pad

Item	Length (ft)	Width (ft)	Residual Radioactivity
ISFSI Pad (dimensions are for current pad)	208	96	No
New ISFSI Pad (conceptual design)	148	132	No

ISFSI Storage Overpack

Item	Value	Notes
HI-STORM 100S-218 Overall Height (inches)	218	Dimensions are nominal
Outside Diameter (inches)	132.0	Dimensions are nominal
Inside Diameter (inches)	73.5	Dimensions are nominal
Quantity (total)	64	58 spent fuel + 6 GTCC
Quantity (with residual radioactivity)	7	Equivalent to the number of overpacks used to store last complete core offload
Low-Level Radioactive Waste (total packaged volume)	20,064	Cubic feet
Low-Level Radioactive Waste (packaged density)	94	Average weight density

Other Potentially Impacted Items

Item	Value	Notes
Transport Cask	1	
Number of Overpacks used for GTCC storage	6	No residual radioactivity

Table 2
ISFSI Decommissioning Costs and Waste Volumes
(50% of total cost)

	Costs (thousands, 2018 dollars)						Waste Volume	Person-Hours	
	Removal	Packaging	Transport	Disposal	Other	Total	Class A (cubic feet)	Craft	Oversight and Contractor
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	199	199	-	-	608
Decontamination/Demolition (activated cask disposition)	213	138	1,108	4,027	13	5,499	20,064	2,064	-
License Termination (radiological surveys)	-	-	-	-	1,089	1,089	-	8,337	-
Subtotal	**213**	**138**	**1,108**	**4,027**	**1,300**	**6,787**	**20,064**	**10,401**	**608**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	246	246	-	-	577
Insurance	-	-	-	-	73	73	-	-	-
Property Taxes	-	-	-	-	701	701	-	-	-
Plant Energy Budget	-	-	-	-	-	-	-	-	-
Non-Labor Overhead	-	-	-	-	7	7	-	-	-
Corporate A&G	-	-	-	-	41	41	-	-	-
Security (industrial)	-	-	-	-	79	79	-	-	1,991
Entergy Oversight Staff	-	-	-	-	366	366	-	-	1,949
Subtotal	**-**	**-**	**-**	**-**	**1,331**	**1,331**	**-**	**-**	**4,516**
Total (w/o contingency)	**213**	**138**	**1,108**	**4,027**	**2,631**	**8,117**	**20,064**	**10,401**	**5,124**
Total (w/25% contingency)	**266**	**172**	**1,386**	**5,034**	**3,289**	**10,147**			

Table 3
IP-3 Financial Assurance

Plant name: Indian Point Energy Center, Unit 3

	Month	Day	Year
Year of Biennial:	9	30	2018
Termination of Operation:	4	30	2025

	MWth	1986$	ECI	Base Lx		Lx	Px	Fx		Ex		Bx
PWR	3216	$103,300,800	135.9	2.16	0.65	2.94	2.247	3.071	0.13	2.59	0.22	12.471

NRC Minimum: **$515,340,509** **Site Specific:**

Licensee:	% Owned:	Amount of NRC Minimum/Site Specific:	Amount in Trust Fund:
Entergy	100.00%	$515,340,509	$835,156,457

Step 1:
Earnings Credit:

Trust Fund Balance:	Real Rate of Return per	Years Left in License	Total Real Rate of	Total Earnings:	
$835,156,457	2%	6.58	1.13925	**$951,449,277**	**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:	
$951,449,277	2%	7	0.14869	$70,733,436	**Total Earnings for Decom = (1/2) x Total Earnings x [(1+RRR)^Decom period - 1]**

Total of Steps 1 - 3:	
$1,022,182,713	**Total = Total Earnings + Total Earnings for Decom**

Excess (Shortfall)	**$**	**506,842,204**	**to NRC minimum**
	$	**(10,147,000)**	**Less ISFSI**
	$	**-**	**Parent Co Guaranty**
	$	**496,695,204**	**Total Excess Financial Assurance**

ENCLOSURE 4

CNRO 2018-00050

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Pilgrim Nuclear Power Station

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Pilgrim Nuclear Power Station
ISFSI Docket 72-1044

1. Background and Introduction

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,[1] 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 2015.[2]

In accordance with the rule, this letter provides a detailed cost estimate for decommissioning the ISFSI at Pilgrim Nuclear Power Station (Pilgrim), 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.

---

1 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

2 "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, James A. FitzPatrick and Vermont Yankee Nuclear Power Station," ENOC-12-00039, dated December 17, 2015 (NRC Accession No. ML15351A524)

2. Spent Fuel Management Strategy

Entergy Corporation announced that it will close Pilgrim no later than June 1, 2019. Assuming the plant operates until that date, approximately 4,118 spent fuel assemblies are currently projected to be generated. Because of the breach by the Department of Energy (DOE) of its contract to remove fuel from the site, an ISFSI is needed to support continued plant operations. Based upon the current projection of the DOE's ability to remove spent fuel from the site, this estimate includes, for financial planning purposes, the construction of a second ISFSI after shutdown to support decommissioning. The ISFSI(s) is assumed to be operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[3]).

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 operations cease, 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 Generation Company's (Entergy) current spent fuel management plan for the Pilgrim spent fuel is based in general upon: 1) a 2025 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 Pilgrim 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,[4] the spent fuel is projected to be fully removed the Pilgrim site in 2062.

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..."[5]

---

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

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

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

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: …[A]dvances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities."

Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE's 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report. Because of this continued delay, this estimate revises the assumed start date for DOE fuel acceptance from 2025 to 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 ISFSIs 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

The design and capacity of the Pilgrim ISFSI(s) is based upon the Holtec HI-STORM 100S dry cask storage system. The system consists of a multi-purpose canister, with a nominal capacity of 68 fuel assemblies, and a steel-lined concrete storage overpack.

Entergy current spent fuel management plan for the Pilgrim spent fuel would result in 61 spent fuel storage casks being placed on storage pads. The current pad at Pilgrim is designed for 40 storage casks. Pilgrim has announced plans to construct a new pad sized to accommodate all 61 casks. This projected configuration is based upon the 2030 DOE spent fuel program start with a 2030 DOE start date for Pilgrim spent fuel, a

3,000 MTU / year pickup rate, and a future second ISFSI pad to be built to accommodate all spent fuel. Once the existing pad is no longer needed, it will be decommissioned along with the balance of the plant structures. Therefore, the cost to decommission the current pad is not included.

The 61 casks projected to be on the ISFSI pad 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 3) 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(s) expected after all spent fuel and GTCC material has been removed from the site. The configuration of the ISFSI(s) is based on the station operating until mid-2019 and the DOE's spent fuel acceptance assumptions, as previously described. The current Pilgrim ISFSI pad is approximately 52 feet by 239 feet, the future expansion pad will accommodate all spent fuel (operational overpacks and casks stored on the current ISFSI pad).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.[6] 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, 9 of the 61 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., 580 offloaded assemblies, 68 assemblies per cask) which results in 9 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 dry storage vendor, Holtec International, does not expect any residual contamination to be left on the concrete ISFSI pad.[7] 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 are included for the pad in the decommissioning estimate. An allowance is also included for surveying any transfer equipment.

---

6 HI-STORM FSAR, Holtec International, Report HI-2002444, Rev. 13, at page 2.204 (Accession Number ML16138A100).

7 Ibid. page 2.205.

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.

During the construction of the ISFSI, the top six inches of soil at the excavation was sampled and analyzed. [8] There was no plant-related radioactive material in the samples, only naturally-occurring isotopes and background levels of ^{137}Cs in the soil. Therefore, there is no allowance for the remediation of any contaminated soil in the estimate to decommission the ISFSI. It is reasonable to assume that the second ISFSI site would also be free of plant-related radionuclides or remediated prior to construction. Therefore, there is no allowance for the remediation of any additional contaminated soil in the estimate to decommission the second pad.

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

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.

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.[9]

Costs are reported in 2018 dollars and based upon an internal decommissioning analysis prepared for Pilgrim in 2018. Activity costs were updated to 2018 dollars.

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 ISFSI.

(2) Facility modifications: There have been no facility modifications in the past three years that affect the decommissioning cost estimate. However, for purposes of bounding the decommissioning cost estimate, future expansion of the ISFSI is assumed in the current estimate based upon continuing delays by the DOE in removing the spent fuel from the site.

(3) Changes in authorized possession limits: There are no changes in authorized possession limits that affect the decommissioning cost estimate.

---

8 Addendum to Radiological Engineering Evaluation 12-017, ISFSI On-Site Soil Sample Results, June 2012

9 "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.

(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(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 2063, the year following all spent fuel removal.

7. Financial Assurance

ISFSI operations at Pilgrim 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 a judgment entered against the DOE under federal law and the Standard Contract.[10] 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 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 10 CFR Part 50 radiological decommissioning, these funds would be available to address costs incurred by Entergy, including ISFSI decommissioning costs.

---

10 For Pilgrim, *sub nom. Boston Edison Co. v. United States*, 64 Fed. Cl. 167 (2005).

- The projected amount necessary for decommissioning Pilgrim is $628.185 million, based upon the NRC's latest financial assurance funding determination.[11]
- Based upon Pilgrim's decommissioning trust fund balance as of September 30, 2018 and considering the allowed real rate of return on the fund between October 1, 2018 and the assumed end of Pilgrim station decommissioning, the trust fund will contain a $549.142 million surplus (refer to Table 3) beyond the NRC minimum funding formula provided in 10CFR50.75(e). This surplus 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.

11 "Report on Waste Burial Charges," U.S. Nuclear Regulatory Commission's Office of Nuclear Reactor Regulation, NUREG-1307, Rev. 16, November 2016

Table 1
Significant Quantities and Physical Dimensions

ISFSI Pad

Item	Length (ft)	Width (ft)	Residual Radioactivity
ISFSI Pad (current pad)	238.5	52	No
ISFSI Pad (conceptual pad)	154	120	No

ISFSI Storage Overpack

Item	Value	Notes
Overall Height (inches)	218	Dimensions are nominal
Outside Diameter (inches)	132	Dimensions are nominal
Inside Diameter (inches)	73.50	Dimensions are nominal
Quantity (total)	64	61 spent fuel + 3 GTCC
Quantity (with residual radioactivity)	9	Equivalent to the number of overpacks used to store last complete core offload
Low-Level Radioactive Waste (total packaged volume)	45,639	Cubic feet
Low-Level Radioactive Waste (packaged density)	53	Average weight density

Other Potentially Impacted Items

Item	Value	Notes
Transporter cask	1	
Number of Overpacks used for GTCC storage	3	No residual radioactivity

Table 2
ISFSI Decommissioning Costs and Waste Volumes

	Costs (thousands, 2018 dollars)						Waste Volume	Person-Hours	
	Removal	Packaging	Transport	Disposal	Other	Total	Class A (cubic feet)	Craft	Oversight and Contractor
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	262	262	-		1,048
Decontamination/Demolition (activated cask disposition)	263	186	1,568	2,664	25	4,707	45,639	2,669	-
License Termination (radiological surveys)	-	-	-	-	1,186	1,186	-	9,050	-
Subtotal	**263**	**186**	**1,568**	**2,664**	**1,473**	**6,155**	**45,639**	**11,719**	**1,048**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	481	481	-	-	1,153
Insurance	-	-	-	-	80	80	-	-	-
Property Taxes	-	-	-	-	96	96	-	-	-
Plant Energy Budget	-	-	-	-	-	-	-	-	-
Non-Labor Overhead	-	-	-	-	222	222	-	-	-
Security	-	-	-	-	231	231		-	4,958
Entergy Oversight Staff	-	-	-	-	271	271	-	-	3,761
Subtotal	**-**	**-**	**-**	**-**	**1,382**	**1,382**	**-**	**-**	**9,872**
Total (w/o contingency)	**263**	**186**	**1,568**	**2,664**	**2,855**	**7,537**	**45,639**	**11,719**	**10,920**
Total (w/25% contingency)	**329**	**233**	**1,960**	**3,331**	**3,569**	**9,421**			

Table 3
Financial Assurance

Plant name: Pilgrim Nuclear Generating Station

	Month	Day	Year
Year of Biennial:	9	30	2018
Termination of Operation:	5	31	2019

	MWth	1986$	ECI	Base Lx		Lx	Px	Fx		Ex		Bx
BWR	2028	$122,252,000	135.9	2.16	0.65	2.94	2.247	3.071	0.13	2.63	0.22	13.132

NRC Minimum: **$628,184,641** **Site Specific:**

Licensee:	% Owned:	Amount of NRC Minimum/Site Specific:	Amount in Trust Fund:
Entergy	100.00%	$628,184,641	$1,081,426,497

Step 1:
Earnings Credit:

Trust Fund Balance:	Real Rate of Return per	Years Left in License	Total Real Rate of	Total Earnings:	
$1,081,426,497	2%	0.67	1.01334	**$1,095,857,329**	**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:	
$1,095,857,329	2%	7	0.14869	$81,469,139	**Total Earnings for Decom = (1/2) x Total Earnings x [(1+RRR)^Decom period - 1]**

Total of Steps 1 - 3:	
$1,177,326,468	**Total = Total Earnings + Total Earnings for Decom**

Excess (Shortfall)	**$**	**549,141,827**	**to NRC minimum**
	$	**(9,421,000)**	**Less ISFSI**
	$	-	Parent Co Guaranty
	$	539,720,827	Total Excess Financial Assurance

ENCLOSURE 5

CNRO 2018-00050

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Vermont Yankee Nuclear Power Station

10 CFR 72.30 ISFSI Decommissioning Funding Plan
Vermont Yankee Nuclear Power Station
ISFSI Docket 72-059

1. Background and Introduction

The Nuclear Regulatory Commission (NRC) issued its final rule on Decommissioning Planning on June 17, 2011,[1] 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 2015.[2]

In accordance with the rule, this letter provides a detailed cost estimate for decommissioning the ISFSI at the Vermont Yankee Nuclear Power Station (Vermont Yankee), 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.

---

1 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.

2 "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, James A. FitzPatrick and Vermont Yankee Nuclear Power Station," ENOC-12-00039, dated December 17, 2015 (NRC Accession No. ML15351A524).

2. Spent Fuel Management Strategy

Vermont Yankee permanently ceased reactor operations on December 29, 2014.[3] Approximately 3,880 spent fuel assemblies (3,879 assemblies and 1 fuel debris canister) 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 had been constructed and fuel casks have been emplaced thereon to support plant operations. Based upon the current projection of the DOE's ability to remove spent fuel from the site, a second pad was constructed to support decommissioning. The ISFSI is operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[4]).

Because of the DOE's breach, the spent fuel is packaged in dry storage casks for interim storage at the ISFSI.

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 Vermont Yankee's (Entergy) current spent fuel management plan for the Vermont 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 Vermont 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,[5] the spent fuel is projected to be fully removed from the Vermont Yankee site in 2057.

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..."[6]

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: …[A]dvances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities."

---

3 BVY 15-001, "Certifications of Permanent Cessation of Power Operations and Permanent Removal of Fuel from the Reactor Vessel," January 12, 2015 (Accession Number ML15013A426).

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

5 "Acceptance Priority Ranking & Annual Capacity Report," DOE/RW-0567, July 2004.

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

Although the DOE proposed it would start fuel acceptance in 2025, no progress has been made in the repository program since DOE's 2013 strategy was issued except for the completion of the Yucca Mountain safety evaluation report. Because of this continued delay, this estimate revises the assumed start date for DOE fuel acceptance from 2025 to 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 position.

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

The design and capacity of the Vermont Yankee ISFSI(s) is based upon the Holtec HI-STORM 100S dry cask storage system. The system consists of a multi-purpose canister, with a nominal capacity of 68 fuel assemblies, and a steel-lined concrete storage overpack.

Entergy's spent fuel management plan for the Vermont Yankee spent fuel resulted in 58 spent fuel storage casks being placed on the storage pads at the site (including the casks generated during plant operations).

The 58 casks exclude 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 1) 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 current spent fuel inventory at the site (3,880 assemblies) and the DOE's spent fuel acceptance assumptions, as previously described. For purposes of this analysis, the second pad was needed to accommodate all the casks used to store spent fuel at the site, including those casks placed on the initial ISFSI pad during plant operations. The second ISFSI pad is 93 feet by 106 feet, and have a maximum capacity of 25 casks.

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.[7] The decommissioning estimate is based on the premise that some of the 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 58 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., 368 offloaded assemblies, 68 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 dry storage vendor, Holtec International, does not expect any residual contamination to be left on the concrete ISFSI pads.[8] 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 pads will not be contaminated. As such, only verification surveys are included for the pads 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.

The decommissioning cost study[9] developed for Vermont Yankee and filed with the NRC, included the cost for the remediation of contaminated (radiological) soil, based upon a review of the site's radiological records and associated affected areas. During the construction of the existing ISFSI, the soil excavated was replaced with engineered fill. This material is not expected to become contaminated from the operation of the ISFSI. The second pad is located adjacent to the first.

---

7 HI-STORM FSAR, Holtec International, Report HI-2002444, Rev. 14.

8 Ibid. page 2.4-2.

9 Site Specific Decommissioning Cost Estimate for the Vermont Yankee Nuclear Power Station, dated December 2014 (Accession Number ML14357A110).

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

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 RS 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.

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.[10]

Costs are reported in 2018 dollars and based upon the estimate included with the Post Shutdown Decommissioning Activities Report[11] in 2014. Activity costs with the exception of those associated with low-level radioactive waste disposal, have been escalated to 2018 dollars using the Consumer Price Index, Services.

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 ISFSI.

(2) Facility modifications: The ISFSI pad was expanded to accommodate the storage requirements of all the stations fuel. The stations fuel protected area was revised to reduce the size of the protected area to that large enough to support ISFSI operations.

(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 pads 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 pads, and surrounding environs are characterized and the activity specifications and work procedures for the decontamination (overpack disposition) developed.

---

10 "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.

11 Entergy Nuclear Operations, Inc., to USNRC, "Post Shutdown Decommissioning Activities Report," December 19, 2014 (Accession Number ML 14357A110)

The next phase includes the cost for craft labor to demolish the activated overpacks, package in certified waste containers, transportation to the Andrews, TX 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), 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 2058, the year following all spent fuel removal.

7. Financial Assurance

ISFSI operations at Vermont Yankee 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 a judgment entered against the DOE under federal law and the Standard Contract.[12] 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 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:

- The decommissioning trust fund is for radiological decommissioning costs and spent fuel management costs.[13] The ISFSI decommissioning is a radiological cost. To the extent that the trust fund balance exceeds costs required for Part 50 radiological decommissioning and spent fuel management, these funds would be available to address costs incurred by Entergy, including ISFSI decommissioning costs.
- The projected amount necessary for decommissioning Vermont Yankee is $934.341 million, including spent fuel management costs, based upon the March 2018 10 CFR 50.75(f) filing for Vermont Yankee, Table 13-1.[14]
- The current decommissioning trust fund balance is $520.649 million (as of September 30, 2018), which is in excess of the projected fund balance shown in Table 3 below for both 2018 and 2019, therefore Table 3 presents a conservative projection. Based on the assumed initial decommissioning trust fund balance in

---

12 Vermont Yankee Nuclear Power Corporation and Entergy Nuclear Vermont Yankee, LLC v. United States, Court of Federal Claims, Nos. 02-898C and 03-2663C (2006).

13 Entergy Nuclear Operations, Inc. obtained an exemption that allows the use of Vermont Yankee trust funds for spent fuel management activities. See NRC Approval of Exemption Request for Spent Fuel Management, 80 Fed. Reg. 35992 (June 23, 2015).

14 Decommissioning Funding Status Report per 10 CFR §50.75(f)(1) and 10 CFR 50.82(a)(8)(v) – Entergy Nuclear Operations, Inc., March 29, 2018, (Accession Number ML18088B369)

Table 3 below, projected fund earnings during the SAFSTOR period (assuming an annual 2% growth rate), and expected expenditures, the trust fund is expected to have an excess of $348 million over the estimated license termination and spent fuel management costs.

- This surplus 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.

Table 1
Significant Quantities and Physical Dimensions

ISFSI Pad

Item	Length (ft)	Width (ft)	Residual Radioactivity
ISFSI Pad (1)	132	106	No
ISFSI Pad (2)	93	106	No

ISFSI Storage Overpack

Item	Value	Notes
Overall Height (inches)	218	Dimensions are nominal
Outside Diameter (inches)	132.0	Dimensions are nominal
Inside Diameter (inches)	73.5	Dimensions are nominal
Quantity (total)	59	58 spent fuel + 1 GTCC
Quantity (with residual radioactivity)	6	Equivalent to the number of overpacks used to store last complete core offload
Low-Level Radioactive Waste (total packaged volume)	17,232	Cubic feet
Low-Level Radioactive Waste (packaged density)	94	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, 2018 dollars)						Waste Volume	Person-Hours	
	Removal	Packaging	Transport	Disposal	Other	Total	Class A (cubic feet)	Craft	Oversight and Contractor
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	262	262	-	-	1,048
Decontamination/Demolition (activated cask disposition)	171	160	902	1,278	25	2,536	17,232	1,772	-
License Termination (radiological surveys)	-	-	-	-	1,042	1,042	-	7,403	-
Subtotal	**171**	**160**	**902**	**1,278**	**1,329**	**3,840**	**17,232**	**9,175**	**1,048**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	481	481	-	-	1,153
Insurance	-	-	-	-	54	54	-	-	-
Property Taxes	-	-	-	-	3	3	-	-	-
Plant Energy Budget	-	-	-	-	60	60	-	-	-
Non-Labor Overhead	-	-	-	-	307	307	-	-	-
Corporate A&G	-	-	-	-	56	56	-	-	-
Security (industrial)	-	-	-	-	245	245	-	-	4,996
Entergy Oversight Staff	-	-	-	-	203	203	-	-	2,067
Subtotal	**-**	**-**	**-**	**-**	**1,408**	**1,408**	**-**	**-**	**8,216**
Total (w/o contingency)	**171**	**160**	**902**	**1,278**	**2,736**	**5,247**	**17,232**	**9,175**	**9,264**
Total (w/25% contingency)	**214**	**199**	**1,127**	**1,598**	**3,421**	**6,559**			

Table 3
Financial Assurance

Vermont Yankee Nuclear Power Station - SAFSTOR Methodology									
Annual Cash Flow Analysis - Total License Termination, Spent Fuel Management less Dry Fuel Costs									
(In Thousands in 2017 Dollars) (see column definitions below)									
Year	**Column 1** 50.75 License Termination Cost ($000's)	**Column 2** 50.54 (bb) Spent Fuel Management Cost ($000's)	**Column 3** Exclude Dry Fuel Spent Fuel Management Cost ($000's)	**Column 4** License Termination Cost plus Spent Fuel Management Cost less Dry Fuel Cost ($000's)	**Column 5** Beginning of Year Trust Fund Balance ($000's)	**Column 6** Withdraw ($000's)	**Column 7** Contribute ($000's)	**Column 8** Trust Fund Earnings ($000's)	**Column 9** Year Ending Trust Fund Balance ($000's)
2018	63,992	76,992	59,715	81,269	581,539	81,269	0	10,005	510,275
2019	5,560	4,232		9,791	510,275	9,791	0	10,010	510,493
2020	5,506	4,232		9,737	510,493	9,737	0	10,015	510,771
2021	5,506	4,232		9,737	510,771	9,737	0	10,021	511,054
2022	3,842	4,232		8,074	511,054	8,074	0	10,060	513,040
2023	3,842	4,232		8,074	513,040	8,074	0	10,099	515,066
2024	3,842	4,243		8,085	515,066	8,085	0	10,140	517,121
2025	3,779	4,232		8,010	517,121	8,010	0	10,182	519,293
2026	3,932	4,232		8,163	519,293	8,163	0	10,223	521,352
2027	3,986	4,232		8,217	521,352	8,217	0	10,263	523,397
2028	3,941	4,243		8,184	523,397	8,184	0	10,304	525,517
2029	3,932	4,232		8,163	525,517	8,163	0	10,347	527,701
2030	3,986	4,232		8,217	527,701	8,217	0	10,390	529,873
2031	3,932	4,232		8,163	529,873	8,163	0	10,434	532,144
2032	3,941	4,243		8,184	532,144	8,184	0	10,479	534,438
2033	3,986	4,232		8,217	534,438	8,217	0	10,524	536,745
2034	3,932	4,232		8,163	536,745	8,163	0	10,572	539,154

Vermont Yankee Nuclear Power Station - SAFSTOR Methodology									
Annual Cash Flow Analysis - Total License Termination, Spent Fuel Management less Dry Fuel Costs									
(In Thousands in 2017 Dollars) (see column definitions below)									
Year	**Column 1** 50.75 License Termination Cost ($000's)	**Column 2** 50.54 (bb) Spent Fuel Management Cost ($000's)	**Column 3** Exclude Dry Fuel Spent Fuel Management Cost ($000's)	**Column 4** License Termination Cost plus Spent Fuel Management Cost less Dry Fuel Cost ($000's)	**Column 5** Beginning of Year Trust Fund Balance ($000's)	**Column 6** Withdraw ($000's)	**Column 7** Contribute ($000's)	**Column 8** Trust Fund Earnings ($000's)	**Column 9** Year Ending Trust Fund Balance ($000's)
2035	3,932	4,232		8,163	539,154	8,163	0	10,620	541,610
2036	3,995	4,243		8,238	541,610	8,238	0	10,667	544,039
2037	3,932	4,232		8,163	544,039	8,163	0	10,718	546,593
2038	3,932	4,232		8,163	546,593	8,163	0	10,769	549,198
2039	3,986	4,232		8,217	549,198	8,217	0	10,820	551,800
2040	3,941	4,243		8,184	551,800	8,184	0	10,872	554,488
2041	3,932	4,232		8,163	554,488	8,163	0	10,926	557,251
2042	3,986	4,232		8,217	557,251	8,217	0	10,981	560,015
2043	3,932	4,232		8,163	560,015	8,163	0	11,037	562,888
2044	3,941	4,243		8,184	562,888	8,184	0	11,094	565,798
2045	3,986	4,232		8,217	565,798	8,217	0	11,152	568,732
2046	3,932	4,232		8,163	568,732	8,163	0	11,211	571,780
2047	3,932	4,232		8,163	571,780	8,163	0	11,272	574,889
2048	3,995	4,243		8,238	574,889	8,238	0	11,333	577,984
2049	3,932	4,232		8,163	577,984	8,163	0	11,396	581,216
2050	3,932	4,232		8,163	581,216	8,163	0	11,461	584,514
2051	3,986	4,232		8,217	584,514	8,217	0	11,526	587,823
2052	3,941	4,243		8,184	587,823	8,184	0	11,593	591,231
2053	3,770	0		3,770	591,231	3,770	0	11,749	599,210

Vermont Yankee Nuclear Power Station - SAFSTOR Methodology									
Annual Cash Flow Analysis - Total License Termination, Spent Fuel Management less Dry Fuel Costs									
(In Thousands in 2017 Dollars) (see column definitions below)									
Year	**Column 1** 50.75 License Termination Cost ($000's)	**Column 2** 50.54 (bb) Spent Fuel Management Cost ($000's)	**Column 3** Exclude Dry Fuel Spent Fuel Management Cost ($000's)	**Column 4** License Termination Cost plus Spent Fuel Management Cost less Dry Fuel Cost ($000's)	**Column 5** Beginning of Year Trust Fund Balance ($000's)	**Column 6** Withdraw ($000's)	**Column 7** Contribute ($000's)	**Column 8** Trust Fund Earnings ($000's)	**Column 9** Year Ending Trust Fund Balance ($000's)
2054	3,824	0		3,824	599,210	3,824	0	11,908	607,293
2055	3,770	0		3,770	607,293	3,770	0	12,070	615,593
2056	3,780	0		3,780	615,593	3,780	0	12,236	624,050
2057	3,824	0		3,824	624,050	3,824	0	12,405	632,630
2058	3,770	0		3,770	632,630	3,770	0	12,577	641,437
2059	3,770	0		3,770	641,437	3,770	0	12,753	650,420
2060	3,834	0		3,834	650,420	3,834	0	12,932	659,518
2061	3,770	0		3,770	659,518	3,770	0	13,115	668,863
2062	3,770	0		3,770	668,863	3,770	0	13,302	678,394
2063	3,824	0		3,824	678,394	3,824	0	13,491	688,061
2064	3,780	0		3,780	688,061	3,780	0	13,686	697,967
2065	3,770	0		3,770	697,967	3,770	0	13,884	708,081
2066	3,824	0		3,824	708,081	3,824	0	14,085	718,342
2067	3,770	0		3,770	718,342	3,770	0	14,291	728,863
2068	34,428	0		34,428	728,863	34,428	0	13,889	708,324
2069	76,618	0		76,618	708,324	76,618	0	12,634	644,340
2070	109,833	0		109,833	644,340	109,833	0	10,690	545,197
2071	89,271	0		89,271	545,197	89,271	0	9,119	465,045
2072	89,728	0		89,728	465,045	89,728	0	7,506	382,823

Vermont Yankee Nuclear Power Station - SAFSTOR Methodology									
Annual Cash Flow Analysis - Total License Termination, Spent Fuel Management less Dry Fuel Costs									
(In Thousands in 2017 Dollars) (see column definitions below)									
Year	**Column 1** 50.75 License Termination Cost ($000's)	**Column 2** 50.54 (bb) Spent Fuel Management Cost ($000's)	**Column 3** Exclude Dry Fuel Spent Fuel Management Cost ($000's)	**Column 4** License Termination Cost plus Spent Fuel Management Cost less Dry Fuel Cost ($000's)	**Column 5** Beginning of Year Trust Fund Balance ($000's)	**Column 6** Withdraw ($000's)	**Column 7** Contribute ($000's)	**Column 8** Trust Fund Earnings ($000's)	**Column 9** Year Ending Trust Fund Balance ($000's)
2073	53,202	0		53,202	382,823	53,202	0	6,592	336,213
2074	551	0		551	336,213	551	0	6,713	342,375
2075	318	0		318	342,375	318	0	6,841	348,898
	713,385	220,956	59,715	874,625	581,539	874,625	0	641,985	348,898