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December 13, 2021

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

10 CFR 72.30

**SUSQUEHANNA STEAM ELECTRIC STATION  
INDEPENDENT SPENT FUEL STORAGE  
INSTALLATION (ISFSI) DECOMMISSIONING  
FUNDING PLAN, UPDATED  
PLA-7972**

**Docket No. 50-387, 50-388  
and 72-28**

Susquehanna Nuclear, LLC is submitting the enclosed updated Decommissioning Funding Plan for the Independent Spent Fuel Storage Installation (ISFSI) in accordance with 10 CFR 72.30(b). Enclosure 1 addresses each of the six criteria contained in 10 CFR 72.30(b) and references Enclosure 2, which provides details concerning the ISFSI decommissioning cost estimate that was prepared by TLG Services, Inc. This update is required under 10 CFR 72.30(c) for the ISFSI Decommissioning Cost Estimate.

This letter contains no new regulatory commitments.

Should you have any questions regarding this submittal, please contact Ms. Melisa Krick, Manager – Nuclear Regulatory Affairs at (570) 542-1818.

Sincerely,

A handwritten signature in black ink, appearing to read "K. Cimorelli", written over a horizontal line.

K. Cimorelli

Enclosure 1: Decommissioning Funding Plan  
Enclosure 2: 10 CFR 72.30 ISFSI Decommissioning Cost Estimate

Copy: NRC Region I  
Ms. A Klett, NRC Project Manager  
Mr. C. Highley, NRC Sr. Resident Inspector  
Mr. M. Shields, PA DEP/BRP

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**Enclosure 1 to PLA-7972**  
**Decommissioning Funding Plan**

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## Decommissioning Funding Plan

10 CFR 72.30(b) requires each holder of, or applicant for, a license under Part 72 to submit for NRC review and approval a decommissioning funding plan (DFP). Susquehanna Nuclear, LLC provides the following information required by 10 CFR 72.30(b) to be included in the DFP:

### **Requirement 1:**

*(1) Information on how reasonable assurance will be provided that funds will be available to decommission the ISFSI or MRS.*

#### **Information for Requirement 1:**

Pursuant to 10 CFR 72.30(e)(5), Susquehanna Steam Electric Station is a power reactor licensee under 10 CFR 50, the methods of 10 CFR 50.75(b), (e), and (h) are utilized to provide financial assurance associated with its 90 percent ownership of the Independent Spent Fuel Storage Installation (ISFSI). As shown below, the prepaid funds in the decommissioning trusts for Susquehanna Units 1 and 2 exceed, with credited earnings, the amount required by the NRC for radiological decommissioning of the Units and the ISFSI decommissioning cost estimate (DCE) combined.

### **Requirement 2:**

*(2) A detailed cost estimate for decommissioning, in an amount reflecting:*

*(i) The cost of an independent contractor to perform all decommissioning activities;*

*(ii) An adequate contingency factor; and*

*(iii) The cost of meeting the § 20.1402 of this chapter criteria for unrestricted use, provided that, if the applicant or licensee can demonstrate its ability to meet the provisions of § 20.1403 of this chapter, the cost estimate may be based on meeting the § 20.1403 criteria.*

#### **Information for Requirement 2:**

This information is included in the report in Enclosure 2.

### **Requirement 3:**

*(3) Identification of and justification for using the key assumptions contained in the DCE.*

#### **Information for Requirement 3:**

This information is included in the report in Enclosure 2.

**Requirement 4:**

*(4) A description of the method of assuring funds for decommissioning from paragraph (e) of this section, including means for adjusting cost estimates and associated funding levels periodically over the life of the facility.*

**Information for Requirement 4:**

Susquehanna Nuclear, LLC uses the prepayment method of assuring funds for decommissioning. As reported in the most recent Decommissioning Funding Status Report (PLA-7923 dated March 31, 2021), the market value of the decommissioning trusts as of December 31, 2020, were \$695,622,911 and \$774,735,956 for Susquehanna Units 1 and 2 respectively. When 2 percent real earnings are credited up to the times of permanent termination of operations, along with a pro-rata credit during a dismantlement period, as permitted by 10 CFR § 50.75(e)(1)(i), these amounts have a credited value of \$1,141,243,118 and \$1,315,904,040 respectively. The amount of surplus in these trusts (\$1,207,641,158 combined) is more than sufficient to fund the estimated ISFSI decommissioning cost (\$21.085 million). The decommissioning cost estimate will be adjusted as necessary every three years, as required by 10 CFR 72.30(c). Susquehanna Nuclear, LLC annually adjusts its 90 percent share of the amount of financial assurance required by 10 CFR 50.75(b) in accordance with paragraph (2) of that section, and further adjustment is required by 10 CFR 50.75(f)(3) and (5) at or about five years prior to the projected end of reactor operations.

**Requirement 5:**

*(5) The volume of onsite subsurface material containing residual radioactivity that will require remediation to meet the criteria for license termination.*

**Information for Requirement 5:**

This information is included in the report in Enclosure 2.

**Requirement 6:**

*(6) A certification that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning.*

**Information for Requirement 6:**

Susquehanna Nuclear, LLC, hereby certifies that financial assurance for the estimated cost of decommissioning the Susquehanna ISFSI has been provided as discussed above.

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**Enclosure 2 to PLA-7972**  
**10 CFR 72.30 ISFSI Decommissioning Cost Estimate**

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## **10 CFR 72.30 ISFSI Decommissioning Cost Estimate**

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

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

In accordance with the rule, this letter provides a detailed cost estimate for decommissioning the ISFSI at Susquehanna Steam Electric Station (Susquehanna) in an amount reflecting:

1. The work is 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 the key assumptions contained in the cost estimate; and
2. The volume of onsite subsurface material containing residual radioactivity, if any, that will require remediation to meet the criteria for license termination.

### **2. Spent Fuel Management Strategy**

The operating licenses for the two Susquehanna units are currently set to expire on July 16, 2042 and March 22, 2044, respectively. Approximately 19,136 spent fuel assemblies are currently projected to be generated as a result of plant operations through the license expiration dates. 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 spent fuel transferred to dry storage modules located on the ISFSI, to support continued plant operations. It is likely, based upon the current projection of the DOE's ability to remove spent fuel from the site, that the current ISFSI will be expanded to support continued

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

operations and decommissioning. The ISFSI is operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K<sup>[2]</sup>).

All spent fuel for the entire operating life of the plant is expected to be packaged into Dry Cask Storage (DCS), including spent fuel assemblies in the spent fuel pool at the time of final shutdown. Transferring the spent fuel from the pools to the ISFSI will permit decontamination and dismantling of the spent fuel pool systems and fuel pool areas or result in reduced operating expenses should the station be placed into a SAFSTOR dormancy configuration.

Completion of the ISFSI decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site. However, with no progress by DOE in the removal of spent fuel from commercial generating sites, Susquehanna's current spent fuel management plan, for purposes of this analysis, assumes "just-in-time" acceptance, i.e., the DOE will be able to complete the transfer of spent fuel so as not to impede a deferred decommissioning scenario (SAFSTOR) and the termination of the operating licenses within the required 60 year period (from the cessation of operations). To achieve this objective, based upon the oldest fuel receiving the highest priority,<sup>[3]</sup> and an annual maximum rate of transfer of 3,000 metric tons of uranium/year,<sup>[4]</sup> DOE would commence pickup of spent fuel from Susquehanna by 2075, with the completion of spent fuel receipt by year 2091.

Susquehanna'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 to DOE the ISFSI will be promptly decommissioned (similar to the power reactor DECON alternative). In this estimate the ISFSI decommissioning is considered an independent project, regardless of the decommissioning alternative identified for the nuclear power plant.

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<sup>2</sup> U.S. Code of Federal Regulations, Title 10, Part 72, Subpart K, "General License for Storage of Spent Fuel at Power Reactor Sites."

<sup>3</sup> U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) ... DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance, except as ..."

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

#### **4. ISFSI Description**

The design and capacity of the existing Susquehanna ISFSI is based upon a NUHOMS® dry storage system. The NUHOMS® system is comprised of a dry shielded canister (DSC), utilizing two sizes, either a 52 or 61 spent fuel assembly capacity, and a horizontal storage module (HSM), Models 80, 102 and -H. The DSCs are assumed to be transferred directly to the DOE and not returned to the station. Susquehanna's current spent fuel management plan for the Susquehanna spent fuel would result in approximately 121 HSMs (27 DSCs, each containing 52 assemblies and 94 DSCs, each containing a nominal 61 assemblies) being in position on the storage pad at the site.

A fourth dry storage system will be utilized starting in 2022, the HOLTEC HI-STORM FW Version E Overpack with an 89-assembly capacity Multipurpose Canister (MPC). Susquehanna's current spent fuel management plan for the Susquehanna spent fuel would result in approximately 135 storage systems being in position on the existing storage pad and the proposed expansion storage pad at the site. After all spent fuel has been removed from the spent fuel pools, this represents 100% of the total spent fuel projected to be generated during the currently licensed operating period.

Some of the remaining HSMs and HI-STORMs are assumed to have residual radioactivity due to some minor level of neutron-induced activation of the components as a result of the long-term storage of the spent fuel. The cost to dispose of material with residual radioactivity, and verify that the remaining facility and surrounding environs meet the NRC's radiological limits established for unrestricted use, form the basis of the ISFSI decommissioning estimate.

In addition to the spent fuel HSMs and HI-STORMs located on the ISFSI pad after shutdown there are projected to be additional HI-STORMs that are expected to be used for Greater-than-Class-C (GTCC) storage. The HI-STORMs used for the GTCC canisters (estimated quantity of 4 per unit) are not expected to have any interior contamination or 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 Susquehanna units operating until the end of their current licenses, July 16, 2042 and March 22, 2044, respectively, and the assumptions associated with DOE's spent fuel acceptance, as previously described.

For purposes of this analysis the current pad (221 feet by 224 feet) plus Expansion ISFSI pad (112 feet by 202 feet) will accommodate the 125 HSM modules and 26 HI-STORM modules. This estimate also accounts for the additional proposed expansion pad (340 feet by 135 feet) for the HOLTEC dry fuel storage system (including the 8 for storing GTCC).

The dry storage vendors do not expect the vertical and horizontal storage systems to have any interior or exterior radioactive surface contamination.<sup>[5]</sup> Any neutron activation of the steel and concrete is expected to be extremely small.<sup>[6]</sup> This assumption is adopted for this analysis.

The decommissioning estimate is based on the premise the overpack will contain low levels of neutron-induced residual radioactivity that would necessitate remediation at the time of decommissioning. As an allowance, 18 of the 135 HI-STORMs are assumed to be affected, i.e., contain residual radioactivity. The allowance quantity is based upon the number of HI-STORMs required for the final core off-load (i.e., 764 offloaded assemblies/unit, 89 assemblies per MPC) which results in a total of 9 HI-STORMs/unit or 18 total that contain residual radioactivity. It is assumed that these are the final HI-STORMs offloaded; consequently, they have the least time for radioactive decay of the neutron activation products.

It is not expected that there will be any residual contamination left on the concrete ISFSI pad. Therefore, 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.

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. Susquehanna elected to change Spent Fuel Storage Systems from NUHOMS to HI-STORM FW. Susquehanna will be utilizing the Holtec HI-STORM FW Version E vertical overpack module loaded with the Holtec Multipurpose Canisters containing 89 fuel assemblies (MPC-89). This storage system is expected to be utilized through the end of current plant license.
- (3) Changes in authorized possession limits: There are no changes in authorized possession limits that affect the decommissioning cost estimate.

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<sup>5</sup> Updated Final Safety Analysis Report for the Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel, Transnuclear Inc., NUH-003, Rev. 12, at page 3.5-1

<sup>6</sup> Final Safety Analysis Report on The HOLTEC HI-STORM FW Storage System, Revision 8, at page 2-110

- (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.

There is no known <sup>[7]</sup> subsurface material in the proximity of the ISFSI containing residual radioactivity that will require remediation to meet the criteria for license termination.

Decommissioning is assumed to be performed by an independent contractor. As such, essentially all 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. Those craft labor positions that are expected to be provided locally, are consistent with fully burdened contractor labor rates used in the most recently developed Susquehanna decommissioning cost estimate, escalated to 2021. Susquehanna, as licensee, will oversee the site activities; the estimate includes Susquehanna's labor and overhead costs.

Low-level radioactive waste packaging, transport and disposal costs are based on rates consistent with the most recently developed decommissioning cost estimate (year 2017 dollars), escalated to 2021 dollars.

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

Costs are reported in 2021 dollars and based upon a decommissioning analysis prepared for Susquehanna in 2017. Activity costs originally reported in 2017 dollars have been escalated to 2021 dollars using the Consumer Price Index, Services.<sup>[9]</sup>

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.

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<sup>7</sup> Correspondence dated June 29<sup>th</sup>, 2021 Susquehanna RFI response

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

<sup>9</sup> Bureau of Labor Statistics, Consumer Price Index - All Urban Consumers, Services, Series ID: CUUR0000SAS

## **6. Cost Estimate**

The estimated cost to decommission the ISFSI and release the facility for unrestricted use is provided in Table 2. The cost has been organized into three phases, including:

- An initial planning phase - empty HSMs and HI-STORMs are characterized and the specifications and work procedures for the decontamination developed.
- The remediation phase - material with residual radioactivity is removed, packaged in certified waste containers, transported to the low-level waste site, and disposed of at low-level waste.
- The final phase - license termination surveys, independent surveys are completed, and an application for license termination submitted.

In addition to the direct costs associated with a contractor providing the decommissioning services, the estimate also contains costs for the NRC (and NRC contractor to perform the verification survey), Susquehanna'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 2092, the year following all spent fuel removal.

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

ISFSI Pad

Item	Length (ft)	Width (ft)	Residual Radioactivity
HOLTEC ISFSI Pad	340	135	No
Initial ISFSI Pad	221	224	No
ISFSI Expansion Pad	202	112	No

ISFSI Overpack

Item	Value	Notes (all dimensions are nominal)
HI-STORM FW BWR		
Overall Height (inches)	229.5	
Overall Diameter (inches)	139.0	
Inside Diameter (inches)	81.0	
Inner Liner Thickness (inches)	0.75	
Quantity (total)	264	256 spent fuel + 8 GTCC
Quantity (with residual radioactivity)	18	Equivalent to the number of MPCs used to store last complete core offload
Total Surface Area of overpack interior with Residual Radioactivity (square feet)	5,767	
Low-Level Radioactive Waste (cubic feet)	88,389	
Low-Level Radioactive Waste (packaged density)	56	

Other Potentially Impacted Items

Item	Value	Notes
Number of HI-STORMs used for GTCC storage	8	No residual radioactivity

**Table 2**  
**ISFSI Decommissioning Costs<sup>1</sup> and Waste Volumes**

	(thousands, 2021 dollars)						Waste Volume	Person-Hours		
	Removal	Packaging	Transport	Disposal	Other	Total	(ft3)	Contractor	Licensee	NRC / NRC Contractor
<b>Decommissioning Contractor</b>										
Planning (characterization, specs and procedures)					585	585			1,552	
Remediation (activated metal removal)	400	311	2,994	6,729	-	10,434	88,389	3,971		
License Termination (radiological surveys)					3,484	3,484		25,588		
<b>Subtotal</b>	<b>400</b>	<b>311</b>	<b>2,994</b>	<b>6,729</b>	<b>4,069</b>	<b>14,502</b>	<b>88,389</b>	<b>29,558</b>	<b>1552</b>	<b>-</b>
<b>Supporting Costs</b>										
NRC and NRC Contractor Fees and Costs					561	561				1,153
Insurance					130	130				
Property taxes					334	334				
Corporate Overhead and Shared Services					380	380				
Non-Labor Overhead					102	102				
Security (industrial)					182	182			7,437	
Susquehanna Oversight Staff					678	678			5,642	
<b>Subtotal</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>2,366</b>	<b>2,366</b>	<b>-</b>	<b>-</b>	<b>13,078</b>	<b>1,153</b>
<b>Total (w/o contingency)</b>	<b>400</b>	<b>311</b>	<b>2,994</b>	<b>6,729</b>	<b>6,434</b>	<b>16,868</b>	<b>88,389</b>	<b>29,294</b>	<b>15,783</b>	
<b>Total (w/25% contingency)</b>	<b>500</b>	<b>389</b>	<b>3,742</b>	<b>8,411</b>	<b>8,043</b>	<b>21,085</b>				

Note 1: for funding planning purposes decommissioning costs can be assumed to be incurred in year 2092