



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-16-153

September 28, 2016

10 CFR 72.30
10 CFR 72.4

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

Watts Bar Nuclear Plant, Units 1 and 2
Facility Operating License Nos. NPF-90 and NPF-96
NRC Docket Nos. 50-390, 50-391 and 72-1048

Subject: **Initial Decommissioning Funding Plan for Watts Bar Nuclear Plant
Independent Spent Fuel Storage Installation (ISFSI)**

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 72.30, Tennessee Valley Authority (TVA) hereby submits for Nuclear Regulatory Commission (NRC) review and approval TVA's initial decommissioning funding plan for the Independent Spent Fuel Storage Installation (ISFSI) at the Watts Bar Nuclear Plant (Watts Bar).

The decommissioning funding plan for the Watts Bar ISFSI is provided in the Enclosure.

There are no new regulatory commitments contained in this submittal. If you have any questions regarding this matter, please contact Edward D. Schrull at 423-751-3850.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosure: Watts Bar Nuclear Plant Independent Spent Fuel Storage Installation
Decommissioning Funding Plan

cc: NRC Project Manager – Watts Bar Nuclear Plant
NRC Senior Resident Inspector – Watts Bar Nuclear Plant

Enclosure

Watts Bar Nuclear Plant
Independent Spent Fuel Storage Installation
Decommissioning Funding Plan

**WATTS BAR NUCLEAR PLANT
Independent Spent Fuel Storage Installation
Decommissioning Funding Plan**

1. Background and Introduction

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 72.30, this enclosure provides a detailed cost estimate for decommissioning the Independent Spent Fuel Storage Installation (ISFSI) at Watts Bar Nuclear Plant (Watts Bar) 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 20.1402.

This enclosure 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, including means for adjusting the cost estimate and associated funding levels periodically over the life of the facility; and
3. The volume of onsite subsurface material containing residual radioactivity, if any, that will require remediation to meet the criteria for license termination.

The material in Sections 1 through 6, and Tables 1 and 2, herein, were prepared based on evaluations conducted by TLG Services, Inc. Apparent inconsistencies within Tables 1 and Table 2 are due to rounding. Section 7, containing the financial assurance information, was prepared by Tennessee Valley Authority (TVA).

2. Spent Fuel Management Strategy

The operating licenses for Watts Bar Units 1 and 2 are currently set to expire on November 9, 2035, and October 21, 2055, respectively. Approximately 5,269 spent fuel assemblies are projected to be generated over the life of the two units. In the absence of a firm plan by the Department of Energy (DOE) for removing spent fuel from the site, an ISFSI has been constructed 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, future construction of a second pad to support both operations and decommissioning of Watts Bar Units 1 and 2. The ISFSI is operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K).

Because the DOE has not yet begun removing spent fuel from the site, it is envisioned that the spent fuel pool will contain a significant number of spent fuel assemblies at the time of expiration of the current operating licenses in 2035 for Unit 1 and 2055 for Unit 2, assuming the units operate to those dates, and including assemblies off-loaded from the reactor vessels. To facilitate immediate dismantling operations or safe-storage operations, the fuel 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 as described in 10 CFR 961.11. The current TVA spent fuel management plan for Watts Bar spent fuel assumes that the last of the spent fuel will be removed from the site within approximately fifty years of the shutdown of Unit 1. This ensures that spent fuel is off site prior to commencing decommissioning operations in the SAFSTOR alternative.

TVA'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 submittal 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 pad 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(s).

4. ISFSI Description

The ISFSI at Watts Bar is currently comprised of numerous contiguous pads that, for the purpose of the ISFSI decommissioning estimate, are considered a single pad. It is assumed that this ISFSI area will be expanded with an additional pad added to provide sufficient storage capacity. The design and capacity of the dry storage modules on the pads is based upon the Holtec HI-STORM FW dry cask storage system. The system consists of multi-purpose canisters (MPCs), with nominal capacities of 37 fuel assemblies. The MPCs are contained within steel-lined concrete storage overpacks.

The MPCs are assumed to be transferred directly to the DOE and not returned to the station. Some of the overpacks are assumed to have residual radioactivity due to some minor level of neutron-induced activation as a result of the long-term storage of the fuel. The cost to dispose of residual radioactivity, and to verify that the remaining facility and surrounding environs meet the NRC's radiological limits established for unrestricted use, forms the basis of the ISFSI decommissioning estimate.

TVA's current spent fuel management plan for Watts Bar spent fuel would result in 143 MPCs and overpacks being placed on the storage pad at the site. This represents 100% of the total spent fuel projected to be generated during the currently licensed operating period. 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 143 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 10) 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 Watts Bar operating until the end of its current licenses (2035 and 2055) 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.^[4] This assumption is adopted for this analysis.

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, 11 of the 143 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 offloaded assemblies per reactor, 37 assemblies per cask, 2 reactors) which results in 11 overpacks. It is assumed that the casks containing low levels of neutron-induced residual radioactivity are the final casks offloaded; consequently they have the least time for radioactive decay of the neutron activation products. The overpacks will be segmented and packaged for disposal as low-level radioactive waste.

Holtec does not expect any residual contamination to be left on the concrete ISFSI pad.^[5] 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.

⁴ HI-STORM FW FSAR, Holtec International, Report HI-2114830, Rev.0, at page 2-83 (Accession Number ML11270A045)

⁵ HI-STORM FW FSAR, Holtec International, Report HI-2114830, Rev.0, at page 2-84 (Accession Number ML11270A045)

The MPC transfer casks, crawler, and ISFSI equipment storage building are also assumed to not contain any residual contamination, and to require only verification surveys to “free release” these items.

The estimate is limited to costs necessary to terminate the ISFSI’s NRC license and meet the 10 CFR 20.1402 criteria for unrestricted use. Disposition of released material and structures is outside the scope of the estimate.

Based on TVA’s review of the records maintained in accordance with §50.75(g)(1), there is no known subsurface material containing residual radioactivity in the proximity of the ISFSI that would require remediation. As such, there is no allowance for soil remediation in the estimate to decommission the ISFSI.

Low-level radioactive waste disposal costs are based on TVA’s negotiated rates with EnergySolutions. The estimate assumes that the waste from the affected overpack concrete and steel is disposed of at the bulk rate.

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. TVA, 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.^[6]

Costs are reported in 2016 dollars and based upon an ongoing decommissioning analysis being prepared for Watts Bar.

⁶ “Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness,” U.S. Nuclear Regulatory Commission’s Office of Federal and State Materials and Environmental Management Programs, NUREG-1757, Volume 3, Revision 1, February 2012

6. Cost Considerations

The estimated cost to decommission the ISFSI and release the facility for unrestricted use is provided in Table 2. The cost includes an initial planning phase. During this phase the empty overpacks, ISFSI pads, transfer casks and crawler, Crawler Building, and surrounding environs are characterized, and the activity specifications and work procedures for the decontamination (shield overpack disposition) are 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, and 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), TVA'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 2086 (i.e., the year following fuel removal).

7. Financial Assurance

TVA has provided a statement of intent indicating that funds for decommissioning will be obtained when necessary. This method for assuring ISFSI decommissioning funding is provided for in §72.30(e)(4) in the case of Federal, State, or local government licensees. Under the provisions of the Tennessee Valley Authority Act of 1933, as amended, 16 U.S.C. §§ 831-831ee (2012), TVA is a corporate agency and instrumentality of the United States Government.

As shown in Table 2, the cost to decommission the ISFSI at Watts Bar Nuclear Plant is estimated to be \$11,461,000. A statement of intent for this amount is provided in Attachment A. Additionally, as required by §72.30(b)(6), a certification of financial assurance is provided in Attachment B.

TVA will adjust the cost estimate every three years to account for changes in the costs and the extent of contamination. Following changes to the cost estimate, funding levels will be evaluated to determine if additional funding or use of a different funding mechanism is warranted.

Enclosure

**Table 1
Significant Quantities and Physical Dimensions**

ISFSI Pad

Item	Length (ft)	Width (ft)	Residual Radioactivity
ISFSI Pad (assumed size at shutdown)	295	181	No

ISFSI Storage Overpack

Item	HOLTEC FW	Notes
Overall Height (inches)	209.0	Dimensions are nominal
Outside Diameter (inches)	139.0	Dimensions are nominal
Inside Diameter (inches)	77.0	Dimensions are nominal
Inner Liner Thickness (inches)	1.0	Dimensions are nominal
Quantity (total)	143	
Quantity (Holtec FW) (total)	153	143 spent fuel + 10 GTCC
Quantity (with residual radioactivity)	11	Equivalent to the number of overpacks used to store last complete core offload
Packaged Waste Quantities		
Inner Activated Liner Removal (cubic feet)	2,306	
Outer Activated Liner Removal (cubic feet)	4,745	
Activated Concrete (cubic feet)	29,752	
Activated overpack miscellaneous steel (cubic feet)	5,815	
Filters and DAW Waste (cubic feet)	122	
Total Low-Level Radioactive Waste (cubic feet)	42,742	
Low-Level Radioactive Waste (packaged density)	80	Average weight density

Other Potentially Impacted Items

Item	Quantity	Notes
Transfer Cask	2	No residual radioactivity
Cask Crawler	1	No residual radioactivity
Crawler Building	1	No residual radioactivity
Approach Slab & Fabrication Pad	1	No residual radioactivity

Enclosure

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

	Costs (thousands, 2016 dollars)						Waste Volume (ft3)	Person-Hours		
	Removal	Packaging	Transport	Disposal	Other	Total		Contractor	Licensee	NRC / NRC Contractor
Decommissioning Contractor										
Planning (characterization, specs and procedures)	-	-	-	-	458	458	-	-	1,288	-
Decontamination (activated disposition)	323	182	1,044	3,787	94	5,429	42,742	4,617	-	-
License Termination (radiological surveys)	-	-	-	-	2,119	2,119	-	17,400	-	-
Subtotal	323	182	1,044	3,787	2,671	8,005	42,742	22,017	1,288	-
Supporting Costs										
NRC and NRC Contractor Fees and Costs	-	-	-	-	281	281	-	-	-	776
Insurance	-	-	-	-	145	145	-	-	-	-
Property taxes	-	-	-	-	-	-	-	-	-	-
Plant utilities budget	-	-	-	-	138	138	-	-	-	-
Corporate A&G	-	-	-	-	37	37	-	-	-	-
Security Staff Cost	-	-	-	-	231	231	-	6,032	-	-
Oversight Staff Cost	-	-	-	-	331	331	-	-	4,576	-
Subtotal	-	-	-	-	1,163	1,163	-	6,032	4,576	776
Total (w/o contingency)	323	182	1,044	3,787	3,834	9,169	42,742	28,049	5,864	776
Total (w/25% contingency)						11,461				

ATTACHMENT A

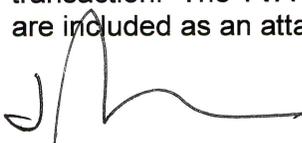
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902
(865) 632-2101

Watts Bar Nuclear Plant, Units 1 and 2
Facility Operating License Nos. NPF-90 and NPF-96
NRC Docket Nos. 50-390, 50-391 and 72-1048

STATEMENT OF INTENT

The Tennessee Valley Authority (TVA) is a corporate agency and instrumentality of the United States Government created pursuant to the Tennessee Valley Authority Act of 1933, as amended, 16 U.S.C. §§ 831-831ee (2012). Pursuant to 10 CFR § 72.30(e)(4), TVA states that it will obtain the funds for decommissioning the Watts Bar Nuclear Plant ISFSI, estimated to be \$11,461,000 as described in the Decommissioning Plan, when necessary. These funds will be obtained and made available sufficiently in advance of decommissioning to prevent the delay of required activities.

A copy of the Delegation of Authority from the Chief Executive Officer to the Chief Nuclear Officer is provided in Exhibit A as evidence that I am authorized to represent TVA in this transaction. The TVA Board Practice Amendments referenced in the Delegation of Authority are included as an attachment to Exhibit A.



Joe P. Grimes
Chief Nuclear Officer
Tennessee Valley Authority
September 27, 2016

Exhibit A: Memo Delegating Authority from the Chief Executive Officer to the Chief Nuclear Officer

ATTACHMENT B

Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902
(865) 632-2101

Watts Bar Nuclear Plant, Units 1 and 2
Facility Operating License Nos. NPF-90 and NPF-96
NRC Docket Nos. 50-390, 50-391 and 72-1048

CERTIFICATION OF FINANCIAL ASSURANCE

In accordance with 10 CFR 72.30(b)(6), I certify that financial assurance in the amount of \$11,461,000 will be made available when necessary to decommission the Watts Bar Nuclear Plant Independent Spent Fuel Storage Installation using the financial assurance method set forth in 10 CFR 72.30(e)(4).

Should additional information be needed regarding this certification of financial assurance by the Tennessee Valley Authority, contact Joseph W. Shea, Vice President, Nuclear Licensing, at (423) 751-6887.



Joe P. Grimes
Chief Nuclear Officer
Tennessee Valley Authority
September 27, 2016

Exhibit A

TENNESSEE VALLEY AUTHORITY

Memo Delegating Authority
from the Chief Executive Officer
to the Chief Nuclear Officer

September 27, 2016

William D. Johnson, WT 7B-K

FUNDING OF ESTIMATED COSTS FOR DECOMMISSIONING TENNESSEE VALLEY
AUTHORITY INDEPENDENT SPENT FUEL STORAGE INSTALLATIONS AT BROWNS FERRY,
SEQUOYAH AND WATTS BAR NUCLEAR PLANTS

Tennessee Valley Authority is required to submit decommissioning funding plans to the Nuclear Regulatory Commission every three years. The purpose of the funding plans is to provide reasonable assurance that funds will be available to decommission the Independent Spent Fuel Storage Installations (ISFSIs) at the Browns Ferry Nuclear Plant, Sequoyah Nuclear Plant, and Watts Bar Nuclear Plant after the plants cease operation. The funding plans will contain a cost estimate for decommissioning each ISFSI, as well as a statement of intent indicating that sufficient funds for decommissioning will be obtained when necessary.

Authority to approve decommissioning projects is within your authority under the Tennessee Valley Authority Board Practice entitled, "Capital Projects Approvals" (originally approved by the Board on January 28, 2007 and amended on November 17, 2011). The Board Practice provides that the Chief Executive Officer has the authority to approve any capital project that does not exceed \$50 million. Additionally, with regard to the authority to contract for the ISFSIs, the TVA Board Practice on Procurement Contract Approvals (originally approved by the Board on November 30, 2006 and amended on November 17, 2011) authorizes the Chief Executive Officer to approve any procurement contract that does not exceed \$100 million if its term does not exceed 5 years, and any contract that does not exceed \$25 million if its term exceeds 5 years. The appropriate TVA Board Practice documents are attached for ease of reference.

Based upon the ISFSI decommissioning cost estimates, approval of the decommissioning activities for each project fall within the Chief Executive Officer's authority under the applicable TVA Board Practices. Accordingly, I request that you delegate to the Chief Nuclear Officer the authority to submit appropriate certification statements and statements of intent for the Browns Ferry Nuclear Plant, Sequoyah Nuclear Plant and Watts Bar Nuclear Plant Independent Spent Fuel Storage Installations in amounts not to exceed \$50 million in total.

Your signature below indicates your approval.



Joseph P. Grimes
Executive Vice President and
Chief Nuclear Officer

Approved:  For WDJ 9.27.16
William D. Johnson, President and Chief Executive Officer Date

Attachments
cc: See Page 2

PROPOSED BOARD RESOLUTION
(TVA Board Practice Amendments)

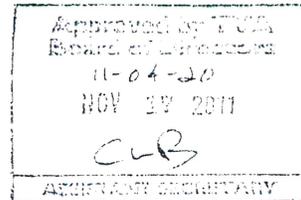
WHEREAS the Board has from time to time adopted certain practices to address various Board and Board Committee processes and activities or to provide guidance in interpreting provisions of the Bylaws of the Tennessee Valley Authority; and

WHEREAS the Board has reviewed the existing practices and desires to make amendments to reflect the functions of the various Board Committees rather than the formal Committee names; and

WHEREAS the Board believes it would be useful and appropriate to adopt a practice allowing the grouping of non-controversial, ministerial items together for Board consideration at a public board meeting when considered appropriate by the Chairman of the Board and the Chief Executive Officer;

BE IT RESOLVED, That the Board hereby amends the TVA Board Practices to make such administrative changes as reflected in the document attached hereto and filed with the records of the Board as Exhibit 11-17-11 R; and

BE IT RESOLVED, FURTHER, That the Board hereby adopts the TVA Board Practice entitled Consent Agenda as reflected in the same Exhibit.



TVA Board Practice

Capital Projects Approvals

Background

Section 3.2(i) of the *Bylaws of The Tennessee Valley Authority* provides, among other things, that TVA's Chief Executive Officer (CEO) has all authorities and duties "necessary or appropriate to carry out projects and activities approved by the Board of Directors or to maintain continuity and/or reliability of ongoing operations."

The Board acknowledges that a routine part of maintaining continuity and/or reliability of ongoing operations involves undertaking capital projects. By adopting this *TVA Board Practice*, the Board is providing more definitive guidance to the CEO as to what capital projects the Board generally considers to be within the CEO's approval authority under Section 3.2(i) of the *Bylaws*. It is intended by the Board to enable the CEO to assume authority to approve capital projects up to a specified dollar amount.

Guidance

- The CEO may approve a capital project that has been specified by line-item in a Board-approved budget, provided that capital projects in amounts greater than \$100 million will be presented for review to the committee with oversight responsibility for the budget ~~Operations, Environment, and Safety Committee~~ (in coordination with other Board Committees, as appropriate)
- The CEO may assume the authority to approve any capital project not specified by line-item in a Board-approved budget provided the project amount does not exceed \$50 million.

Notwithstanding the foregoing, the CEO may determine that a capital project should be submitted to the Board for its consideration and approval on the grounds that new, special, or novel considerations are involved.

Approved by the Board of Directors of the Tennessee Valley Authority
January 25, 2007

PROPOSED BOARD RESOLUTION
(TVA Board Practice Amendments)

WHEREAS the Board has from time to time adopted certain practices to address various Board and Board Committee processes and activities or to provide guidance in interpreting provisions of the Bylaws of the Tennessee Valley Authority; and

WHEREAS the Board has reviewed the existing practices and desires to make amendments to reflect the functions of the various Board Committees rather than the formal Committee names; and

WHEREAS the Board believes it would be useful and appropriate to adopt a practice allowing the grouping of non-controversial, ministerial items together for Board consideration at a public board meeting when considered appropriate by the Chairman of the Board and the Chief Executive Officer;

BE IT RESOLVED, That the Board hereby amends the TVA Board Practices to make such administrative changes as reflected in the document attached hereto and filed with the records of the Board as Exhibit 11-17-11 R; and

BE IT RESOLVED, FURTHER, That the Board hereby adopts the TVA Board Practice entitled Consent Agenda as reflected in the same Exhibit

