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SOUTHERN COMPANY

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U. S. Nuclear Regulatory Commission
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Director, Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
Washington, D. C. 20555-0001

Joseph M. Farley Nuclear Plant- Units 1 and 2
Edwin I. Hatch Nuclear Plant- Units 1 and 2
Vogtle Electric Generating Plant- Units 1 and 2
ISFSI Decommissioning Funding Plan

Ladies and Gentlemen:

On December 17, 2012, Southern Nuclear Operating Company (SNC) requested an exemption from the requirements of 10 CFR 72.30(b), (c), and (d). By letter dated December 31, 2013, the Nuclear Regulatory Commission (NRC) denied SNC's requested exemption and required submittal of the independent spent fuel storage installation (ISFSI) decommissioning cost study within 90 days of the date of the NRC denial letter.

The licensed owners of SNC-operated facilities are electric utilities as defined by 10 CFR 50.2 and as such, recover the cost of electricity through rates established by the entity itself or by a separate regulatory authority. One of the fundamental objectives of cost of service ratemaking is the concept of generational equity which can be summarized as ensuring the customers that receive the benefits from the facility are the same customers that are responsible for the cost of the benefits received, including future liabilities such as spent fuel management and decommissioning the ISFSI. SNC has historically included the cost associated with management of spent fuel required by 10 CFR 50.54(bb) and the cost to decommissioning the ISFSI in the site specific cost studies developed for the purpose of establishing rates. As such, decommissioning funding is provided in excess of the NRC formula amount required by 10 CFR 50.75 and provides adequate assurance that funds required to decommission the ISFSI will be available upon removal of the fuel by the Department of Energy.

Pursuant to 10 CFR 72.30(b), Southern Nuclear Operating Company (SNC) submits the attached decommissioning cost studies and funding plans for the ISFSIs it operates under the general license provisions of 10 CFR 72, Subpart K.

Respectfully submitted,

C. R. Pierce

C. R. Pierce
Regulatory Affairs Director

CRP/emw/cg

Enclosures:
1. Joseph M. Farley Nuclear Plant- Units 1 and 2 ISFSI Decommissioning Cost Estimate
2. Joseph M. Farley Nuclear Plant- Units 1 and 2 ISFSI Decommissioning Financial Assurance
3. Edwin I. Hatch Nuclear Plant- Units 1 and 2 ISFSI Decommissioning Cost Estimate
4. Edwin I. Hatch Nuclear Plant- Units 1 and 2 ISFSI Decommissioning Financial Assurance
5. Vogtle Electric Generating Plant- Units 1 and 2 ISFSI Decommissioning Cost Estimate
6. Vogtle Electric Generating Plant- Units 1 and 2 ISFSI Decommissioning Financial Assurance

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Joseph M. Farley Nuclear Plant- Units 1 and 2
Edwin I. Hatch Nuclear Plant- Units 1 and 2
Vogtle Electric Generating Plant- Units 1 and 2
ISFSI Decommissioning Funding Plan

Enclosure 1

Joseph M. Farley Nuclear Plant- Units 1 and 2
ISFSI Decommissioning Cost Estimate

10 CFR 72.30 ISFSI Decommissioning Cost Estimate For Farley Nuclear Plant

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. Section 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 document provides a detailed cost estimate for decommissioning the ISFSI at Farley Nuclear Plant (FNP) 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 document also provides:

1. Identification of the key assumptions contained in the ISFSI Decommissioning 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 FNP Units 1 & 2 are currently set to expire on June 25, 2037 and March 31, 2041, respectively. Approximately 5,520 spent fuel assemblies are currently projected to be generated as a result of plant operations through the license expiration date. The ISFSI is licensed and operated under 10 CFR Part 72 in accordance with the general license provisions of 10 CFR 72.210.

Assuming that the plant operates to the end of currently licensed life, the spent fuel pools are expected to contain a total of approximately 2,221 spent fuel assemblies after the final core offloads. The spent fuel that cannot be transferred directly from the pool to the DOE for permanent storage is assumed to be packaged in dry storage casks for interim storage

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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

at the ISFSI. Transferring the spent fuel from the pool to the ISFSI will permit decontamination and dismantling of the spent fuel pool systems and allow termination of the Part 50 license using the DECON method described in NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors (GEIS)."

Completion of the ISFSI decommissioning process is dependent upon the DOE's ability to meet its contractual obligation to take delivery of 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.[2] Southern Nuclear's current spent fuel management plan for the FNP spent fuel is based in general upon: 1) a 2032 start date for DOE initiating transfer of commercial spent fuel to a federal facility, and 2) completion of spent fuel receipt by year 2075. The completion date is based upon the DOE's generator allocation/receipt schedules which are based upon the oldest fuel receiving the highest priority. The end date assumes a maximum rate of transfer of 3,000 metric tons of uranium/year.[3]

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) by removing and disposing of residual radioactivity and verifying that remaining materials satisfy NRC release criteria.

For purposes of providing an estimate for a funding plan, financial assurance is expected to be provided on the basis of a ISFSI decommissioning scenario that begins promptly after the conclusion of the transfer process. In this estimate the ISFSI decommissioning is considered an independent project, separate from the decommissioning activities identified for the nuclear power plant.

4. ISFSI Description

The FNP ISFSI uses a Holtec International (Holtec) HI-STORM 100 dry storage system. The HI-STORM 100 is comprised of a multi-purpose canister (MPC) and storage overpack. The multi-purpose canisters are assumed to be transferred directly to the DOE and not returned to the station. The storage overpacks remain onsite after transfer of the spent fuel to the DOE. The majority of the overpacks are assumed to be disposed of as "clean" material. The inner steel liners of the remaining overpacks are assumed to have

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2 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 …"

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

residual radioactivity due to some minor level of neutron-induced activation as a result of the long-term storage of the spent fuel. The cost to dispose of 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.

Southern Nuclear's current management plan for the FNP spent fuel would result in 89 spent fuel storage casks (nominal 32 assemblies per cask) and 56 spent fuel storage casks (nominal 24 assemblies per cask) being located on a storage pad after all spent fuel has been removed from the spent fuel pool. This represents approximately 75% of the total spent fuel projected to be generated during the currently licensed operating period.

In addition to the spent fuel casks located on the ISFSI pad after shutdown, there are projected to be additional casks that are expected to be used for Greater-than-Class-C (GTCC) storage. The storage overpacks used for the GTCC canisters (estimated quantity of 8) 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 unit operating until the end of its current license, (Unit 1 – June 2, 2037; Unit 2 – March 31, 2041), and the assumptions associated with DOE's spent fuel acceptance, as previously described.

The nominal size of the ISFSI pad and adjacent concrete sufficient to store the projected amount of spent fuel is expected to be approximately 40,000 square feet in surface area.

It is not expected that the overpacks will have any interior or exterior radioactive surface contamination. It is 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. Any neutron activation of the steel and concrete is expected to be extremely small. To validate this assumption, the estimate accounts for characterization of 10% of the overpacks; it is likely that some of this characterization will take place well before the last of the fuel is removed from the ISFSI in order to establish a more definitive decommissioning scope.

The decommissioning estimate conservatively assumes that 14 overpacks, excluding those used for GTCC, will contain low levels of neutron-induced residual radioactivity of its inner steel liner that would necessitate remediation at the time of decommissioning. For purposes of this estimate, the overpack inner steel liners are designated for controlled disposal as low-level radioactive waste.

It is not expected that there will be any residual contamination left on the concrete ISFSI pad, or other facilities at the FNP ISFSI. It is 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. Therefore, it is assumed for this analysis that these facilities will not be contaminated. As such, only verification surveys are included for the facilities in the decommissioning estimate.

There is no expected subsurface material in the proximity of the ISFSI containing residual radioactivity that will require remediation to meet the criteria for license termination.

To support an application for License Termination, the estimate assumes that a Final Status Survey will be performed; this will include a 100% survey of the concrete overpack surfaces, and a significant fraction of the ISFSI pad and the immediate area surrounding the pad, and the other ISFSI structures.

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. Southern Nuclear, as the licensee, will oversee the site activities. The estimate includes Southern Nuclear's labor and overhead costs.

Low-level radioactive waste disposal costs are based on Southern Nuclear's current cost of disposal at the Energy*Solutions* Clive, Utah disposal site.

Costs are reported in 2013 dollars.

Contingency has been added at an overall rate of 15.8 %. Contingency has been estimated in accordance with the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates."[4]

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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4 T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.

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 overpacks are characterized and the specifications and work procedures for the decontamination (liner removal) are developed.
- The remediation phase - 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 survey and independent surveys are completed, and an application for license termination is 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), Southern Nuclear's oversight staff, site security (industrial), and other site operating costs.

For estimating purposes it should be conservatively assumed that all expenditures will be incurred in the year 2076, the year following all spent fuel removal.

Table 1
Significant Quantities and Physical Dimensions

ISFSI Pad

Item	Surface Area (ft^2)	Residual Radioactivity
ISFSI Pad	39,936	No

ISFSI Overpack

Item	Value	Notes (all dimensions are nominal)
Overall Height (inches)	218	
Outside Diameter (inches)	132.5	Main cylindrical body of overpack
Inside Diameter (inches)	73.5	
Inner Liner Thickness (inches)	1.25	
Quantity (total)	153	Spent Fuel 145 + GTCC 8
Quantity (with residual radioactivity)	14	Equivalent to the number of overpacks used to store last complete core offloads
Total Surface Area of Overpack Inner Liner with Residual Radioactivity (square feet)	4770	
Low-Level Radioactive Waste (cubic feet)	4134	
Low-Level Radioactive Waste (packaged density- lbs./cu.ft.)	84	

Other Potentially Impacted Items

Item	Quantity	Notes
Number of Overpacks used for GTCC storage	8	No residual radioactivity
Transfer Cask	1	No residual radioactivity

Table 2
ISFSI Decommissioning Costs[1] and Waste Volumes

	(thousands, 2013 dollars)						Waste Volume	Person-Hours		
	Removal	Packaging	Transport	Disposal	Other	Total	(ft^3)	Contractor	Licensee	NRC / NRC Contractor
Decommissioning Contractor										
Planning (characterization, specs and procedures)					332	332		1,288		
Remediation (activated liner removal)	240	16	74	250	54	635	4,134	832		
License Termination (radiological surveys)					1,999	1,999		17,411		
Subtotal	**240**	**16**	**74**	**250**	**2,385**	**2,966**	**4,134**	19,531		
Supporting Costs										
NRC and NRC Contractor Fees and Costs					394	394				776
Insurance					135	135				
Property Tax					2	2				
Site Overheads					62	62				
Corporate Overheads					55	55				
Security (Industrial)					97	97		4,978		
Farley Oversight Staff					284	284			3,771	
Subtotal					**1,029**	**1,029**		**4,978**	**3,771**	**776**
Total (w/o contingency)	**240**	**16**	**74**	**250**	**3,414**	**3,994**	**4,134**	**24,509**	**3,771**	**776**
Total (*with15.8%* contingency)						**4,624**				

Note 1: For funding planning purposes decommissioning costs can be assumed to be incurred in year 2076.

Joseph M. Farley Nuclear Plant- Units 1 and 2
Edwin I. Hatch Nuclear Plant- Units 1 and 2
Vogtle Electric Generating Plant- Units 1 and 2
ISFSI Decommissioning Funding Plan

Enclosure 2

Joseph M. Farley Nuclear Plant- Units 1 and 2
ISFSI Decommissioning Financial Assurance

10 CFR 72.30 ISFSI Decommissioning Financial Assurance For Farley Nuclear Plant

Southern Nuclear (SNC) operates the Farley Nuclear Plant (FNP) independent spent fuel storage installation (ISFSI) in accordance with the general license provisions of the 10 CFR 72, Subpart K. The FNP ISFSI is a shared facility for storage of spent fuel from both FNP Unit 1 and Unit 2. Accordingly, the cost associated with operation and decommissioning the ISFSI is not unit-specific and may be funded from the existing decommissioning trust fund established in accordance with 10 CFR 50.75 for either unit.

The ISFSI decommissioning cost estimate provided in Enclosure 1 is derived from the site-specific decommissioning cost study prepared by TLG Services, Inc. for FNP. The scope of the decommissioning cost study includes decommissioning of the reactor facility to permit license termination, management of the spent fuel in accordance with 10 CFR 50.54(bb), and decommissioning the ISFSI following removal of the spent fuel. The estimated costs are adjusted periodically to reflect the current assumptions such as cost of energy, labor, burial cost, projected capacity, and schedule for removal of fuel from the site. Incorporation of the cost to decommission the ISFSI into the scope of the FNP decommissioning cost study and use for cost-of-service ratemaking, provides assurance that adequate funding will be available as required by 10 CFR 72.30(b), (c), and (d).

Financial assurance that adequate funds are available to decommission the ISFSI is based on the following:

- Site specific cost studies have historically included the cost to decommissioning the ISFSI as part of the scope of activities necessary to decommission the Part 50 facility and terminate the Part 50 specific license in accordance with 10 CFR 50.82, Termination of License.

- SNC previously collected funds to demonstrate compliance with the NRC minimum decommissioning funding requirement based on the NRC formula amount described in 10 CFR 50.75 based on the original operating license period of 40 years. Upon issuance of the renewed operating license, these same funds will accumulate interest over an additional 20 year period. As a result, the decommissioning trust fund balances will exceed the NRC minimum decommissioning funding formula amount described in 10 CFR 50.75 at time of Part 50 license expiration and provide additional assurance that adequate funds will be available to decommission the FNP ISFSI.

- The FNP decommissioning cost study prepared by TLG Services, Inc. dated June 2013 estimated the amount necessary for FNP ISFSI decommissioning to be $4,624,000 (2013$) shared by both operating units. The estimates from the TLG cost study are included in Table 1.

- In accordance with 10 CFR 72.30(b), financial assurance, for decommissioning, has been provided in an amount separate from the requirements of 10 CFR 50.75(b). The amount allocated for ISFSI decommissioning is held in the same financial instrument as the reactor decommissioning funds required by 10 CFR 50.75. As shown in Table 1, these funds are in excess of the amount required for decommissioning the Part 50 facility and provide adequate assurance that funding for decommissioning the ISFSI will be available upon expiration of the Part 50 operating licenses for FNP Units 1 and 2.

Accordingly, the funds set aside to cover the ISFSI decommissioning costs for FNP are not the same funds credited for compliance with the decommissioning funding requirements of 10 CFR 50.75. Table 1 provides a summary of funding available to demonstrate adequate assurance of decommissioning funding in the amounts required by 10 CFR 50.75 and 10 CFR 72.30 will be available when required to decommission the Part 50 reactor plants and the Part 72 ISFSI, respectively.

Table 1

Financial Assurance
Alabama Power Company
100% Ownership

		Unit 1	Unit 2
1	The NRC minimum decommissioning estimate pursuant to 10 CFR 50.75(b) and (c) (Dec 2012$)	$ 488,129,000	$ 488,129,000
2	Total amount accumulated in the trust fund at the end of 2013 (2013$)	$ 363,286,406	$ 349,553,015
3	Assumptions regarding: (a) Rates of escalation in decommissioning costs; (b) Rates of earnings on decommissioning funds; (c) Real rate of return; and	 4.5% 7.0% 2.5%	 4.5% 7.0% 2.5%
4	Projected NRC minimum requirements pursuant to 10 CFR 50.75(b) and (c) (U1-year 2037, U2- year 2041)	$ 1,467,039,716	$ 1,749,472,149
5	Projected Ending Fund Balance (U1-year 2037, U2- year 2041)	$ 1,869,724,603[1]	$ 2,356,562,290[1]
6	Additional Funds available for Spent Fuel Management (10 CFR 50.54 (bb) and 10 CFR 72.30) and Site Restoration (U1-year 2037, U2- year 2041) Row 5 – Row 4	$ 402,684,887	$607,090,141
7	ISFSI decommissioning cost estimate from TLG Services Inc. cost study (2013$)	$ 2,312,000	$ 2,312,000
8	Projected ISFSI decommissioning cost estimate from TLG Services Inc. cost study (U1-year 2037, U2- year 2041)	$ 6,649,344	$ 7,929,466

Note 1: Includes annual contributions to the fund as approved by Alabama Public Service Commission on a schedule previously submitted by letter dated March 29, 2013 (Agencywide Documents Access and Management System Accession No. ML13091A215).

Joseph M. Farley Nuclear Plant- Units 1 and 2
Edwin I. Hatch Nuclear Plant- Units 1 and 2
Vogtle Electric Generating Plant- Units 1 and 2
ISFSI Decommissioning Funding Plan

Enclosure 3

Edwin I. Hatch Nuclear Plant- Units 1 and 2
ISFSI Decommissioning Cost Estimate

10 CFR 72.30 ISFSI Decommissioning Cost Estimate
For Edwin I. Hatch Nuclear Plant

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. Section 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 document provides a detailed cost estimate for decommissioning the ISFSI at Hatch Nuclear Plant (HNP) 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 document also provides:

1. Identification of the key assumptions contained in the ISFSI Decommissioning 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 HNP Units 1 & 2 are currently set to expire on August 6, 2034 and June 13, 2038, respectively. Approximately 14,823 spent fuel assemblies are currently projected to be generated as a result of plant operations through the license expiration date. The ISFSI is licensed and operated under 10 CFR Part 72 in accordance with the general license provisions of 10 CFR 72.210.

Assuming that the plant operates to the end of currently licensed life, the spent fuel pools are expected to contain a total of approximately 3,329 spent fuel assemblies after the final core offloads. The spent fuel that cannot be transferred directly from the pool to the DOE for permanent storage is assumed to be packaged in dry storage casks for interim storage at the ISFSI. Transferring the spent fuel from the pool to the ISFSI will permit decontamination and dismantling of the spent fuel pool systems and allow termination of

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

the Part 50 license using the DECON method described in NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors (GEIS)."

Completion of the ISFSI decommissioning process is dependent upon the DOE's ability to meet its contractual obligation to take delivery of 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.[2] Southern Nuclear's current spent fuel management plan for the HNP spent fuel is based in general upon: 1) a 2025 start date for DOE initiating transfer of commercial spent fuel to a federal facility, and 2) completion of spent fuel receipt in 2067. The completion date is based upon the DOE's generator allocation/receipt schedules which are based upon the oldest fuel receiving the highest priority. The end date assumes a maximum rate of transfer of 3,000 metric tons of uranium/year.[3]

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) by removing and disposing of residual radioactivity and verifying that remaining materials satisfy NRC release criteria.

For purposes of providing an estimate for a funding plan, financial assurance is expected to be provided on the basis of a ISFSI decommissioning scenario that begins promptly after the conclusion of the transfer process. In this estimate the ISFSI decommissioning is considered an independent project, separate from the decommissioning activities identified for the nuclear power plant.

4. ISFSI Description

The HNP ISFSI uses a Holtec International (Holtec) HI-STORM 100 dry storage system. The HI-STORM 100 is comprised of a multi-purpose canister (MPC) and storage overpack. The multi-purpose canisters are assumed to be transferred directly to the DOE and not returned to the station. The storage overpacks remain onsite after transfer of the spent fuel to the DOE. The majority of the overpacks are assumed to be disposed of as "clean" material. The inner steel liners of the remaining 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 spent fuel. The cost to dispose of residual radioactivity, and

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2 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 …"

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

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.

Southern Nuclear's current management plan for the HNP spent fuel would result in 104 spent fuel storage casks (nominal 68 assemblies per cask) and 32 spent fuel storage casks (nominal 52 assemblies per cask) being located on a storage pad after all spent fuel has been removed from the spent fuel pool. This represents approximately 59% of the total spent fuel projected to be generated during the currently licensed operating period.

In addition to the spent fuel casks located on the ISFSI pad after shutdown, there are projected to be additional casks that are expected to 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 the unit operating until the end of its current license, (Unit 1 – August 6, 2034; Unit 2 – June 13, 2038), and the assumptions associated with DOE's spent fuel acceptance, as previously described.

The nominal size of the ISFSI pad and adjacent concrete sufficient to store the projected amount of spent fuel is expected to be approximately 55,000 square feet in surface area.

It is not expected that the overpacks will have any interior or exterior radioactive surface contamination. It is 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. Any neutron activation of the steel and concrete is expected to be extremely small. To validate this assumption, the estimate accounts for characterization of 10% of the overpacks; it is likely that some of this characterization will take place well before the last of the fuel is removed from the ISFSI in order to establish a more definitive decommissioning scope.

The decommissioning estimate conservatively assumes that 22 overpacks, excluding those used for GTCC, will contain low levels of neutron-induced residual radioactivity of its inner steel liner that would necessitate remediation at the time of decommissioning. For purposes of this estimate, the overpack inner steel liners are designated for controlled disposal as low-level radioactive waste.

It is not expected that there will be any residual contamination left on the concrete ISFSI pad, or other facilities at the HNP ISFSI. It is 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. Therefore, it is assumed for this analysis that these facilities will not be contaminated. As such, only verification surveys are included for the facilities in the decommissioning estimate.

There is no expected subsurface material in the proximity of the ISFSI containing residual radioactivity that will require remediation to meet the criteria for license termination.

To support an application for License Termination, the estimate assumes that a Final Status Survey will be performed; this will include a 100% survey of the concrete overpack surfaces, and a significant fraction of the ISFSI pad and the immediate area surrounding the pad, and the other ISFSI structures.

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. Southern Nuclear, as the licensee, will oversee the site activities. The estimate includes Southern Nuclear's labor and overhead costs.

Low-level radioactive waste disposal costs are based on Southern Nuclear Company's current cost of disposal at the Energy*Solutions* Clive, Utah disposal site.

Costs are reported in 2012 dollars.

Contingency has been added at an overall rate of 17.9 %. Contingency has been estimated in accordance with the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates.[4]

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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4 T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.

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 overpacks are characterized and the specifications and work procedures for the decontamination (liner removal) are developed.
- The remediation phase - 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 and independent surveys are completed, and an application for license termination is 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), Southern Nuclear's oversight staff, site security (industrial), and other site operating costs.

For estimating purposes it should be conservatively assumed that all expenditures will be incurred in the year 2068, the year following all spent fuel removal.

Table 1
Significant Quantities and Physical Dimensions

ISFSI Pad

Item	Surface Area (ft^2)	Residual Radioactivity
ISFSI Pad	55,380	No

ISFSI Overpack

Item	Value	Notes (all dimensions are nominal)
Overall Height (inches)	239	
Outside Diameter (inches)	132.5	Main cylindrical body of overpack
Inside Diameter (inches)	73.5	
Inner Liner Thickness (inches)	1.25	
Quantity (total)	146	Spent Fuel 136 + GTCC 10
Quantity (with residual radioactivity)	22	Equivalent to the number of overpacks used to store last complete core offloads
Total Surface Area of Overpack Inner Liner with Residual Radioactivity (square feet)	8736	
Low-Level Radioactive Waste (cubic feet)	5330	
Low-Level Radioactive Waste (packaged density- lbs./cu.ft.)	84	

Other Potentially Impacted Items

Item	Quantity	Notes
Number of Overpacks used for GTCC storage	10	No residual radioactivity
Transfer Cask	1	No residual radioactivity
Cask Transfer Facility	1	No residual radioactivity

Table 2
ISFSI Decommissioning Costs[1] and Waste Volumes

	(thousands, 2012 dollars)						Waste Volume	Person-Hours		
	Removal	Packaging	Transport	Disposal	Other	Total	(ft^3)	Contractor	Licensee	NRC / NRC Contractor
Decommissioning Contractor										
Planning (characterization, specs and procedures)					372	372		1,104		
Remediation (activated liner removal)	83	17	137	1,223	37	1,497	5,330	1,522		
License Termination (radiological surveys)					1,452	1,452		12,264		
Subtotal	**83**	**17**	**137**	**1,223**	**1,861**	**3,321**	**5,330**	14,890		
Supporting Costs										
NRC and NRC Contractor Fees and Costs					191	191				776
Insurance					67	67				
Property Tax					0	0				
Security (Industrial)					114	114		5,013		
Hatch Oversight Staff					291	291			3,803	
Subtotal					**663**	**663**		**5,013**	**3,803**	**776**
Total (w/o contingency)	**83**	**17**	**137**	**1,223**	**2,525**	**3,984**	**5,330**	**19,903**	**3,803**	**776**
Total (*w/17.9%* contingency)						**4,699**				

Note 1: For funding planning purposes decommissioning costs can be assumed to be incurred in year 2068.

Joseph M. Farley Nuclear Plant- Units 1 and 2
Edwin I. Hatch Nuclear Plant- Units 1 and 2
Vogtle Electric Generating Plant- Units 1 and 2
ISFSI Decommissioning Funding Plan

Enclosure 4

Edwin I. Hatch Nuclear Plant- Units 1 and 2
ISFSI Decommissioning Financial Assurance

10 CFR 72.30 ISFSI Decommissioning Financial Assurance For Hatch Nuclear Plant

Southern Nuclear (SNC) operates the Hatch Nuclear Plant (HNP) independent spent fuel storage installation (ISFSI) in accordance with the general license provisions of the 10 CFR 72, Subpart K. The HNP ISFSI is a shared facility for storage of spent fuel from both HNP Unit 1 and Unit 2. Accordingly, the cost associated with operation and decommissioning the ISFSI is not unit-specific and may be funded from the existing decommissioning trust fund established in accordance with 10 CFR 50.75 for either unit.

The ISFSI decommissioning cost estimate provided in Enclosure 3 is derived from the site-specific decommissioning cost study prepared by TLG Services, Inc. for HNP. The scope of the decommissioning cost study includes decommissioning of the reactor facility to permit license termination, management of the spent fuel in accordance with 10 CFR 50.54(bb), and decommissioning the ISFSI following removal of the spent fuel. The estimated costs are adjusted periodically to reflect the current assumptions such as cost of energy, labor, burial cost, projected capacity, and schedule for removal of fuel from the site. Incorporation of the cost to decommission the ISFSI into the scope of the HNP decommissioning cost study and use for cost-of-service ratemaking, provides assurance that adequate funding will be available as required by 10 CFR 72.30(b), (c), and (d).

Financial assurance that adequate funds are available to decommission the ISFSI is based on the following:

- Site specific cost studies have historically included the cost to decommissioning the ISFSI as part of the scope of activities necessary to decommission the Part 50 facility and terminate the Part 50 specific license in accordance with 10 CFR 50.82, Termination of License.

- SNC previously collected funds to demonstrate compliance with the NRC minimum decommissioning funding requirement based on the NRC formula amount described in 10 CFR 50.75 based on the original operating license period of 40 years. Upon issuance of the renewed operating license, these same funds will accumulate interest over an additional 20 year period. As a result, the decommissioning trust fund balances will exceed the NRC minimum decommissioning funding formula amount described in 10 CFR 50.75 at time of Part 50 license expiration and provide additional assurance that adequate funds will be available to decommission the HNP ISFSI.

- The HNP decommissioning cost study prepared by TLG Services, Inc. dated November 2012 estimated the amount necessary for HNP ISFSI decommissioning to be $4,699,000 (2012$) shared by both operating units. The estimates from the TLG cost study are included in the following Tables and divided based on percentage ownership.

- In accordance with 10 CFR 72.30(b), financial assurance, for decommissioning, has been provided in an amount separate from the requirements of 10 CFR 50.75(b). The amount allocated for ISFSI decommissioning is held in the same financial instrument as the reactor decommissioning funds required by 10 CFR 50.75. As shown in the Tables, these funds are in excess of the amount required for decommissioning the Part 50 facility and provide adequate assurance that funding for decommissioning the ISFSI will be available upon expiration of the Part 50 operating licenses for HNP Units 1 and 2.

Accordingly, the funds set aside to cover the ISFSI decommissioning costs for HNP are not the same funds credited for compliance with the decommissioning funding requirements of 10 CFR 50.75. The Tables provide a summary of funding available to demonstrate adequate assurance of decommissioning funding in the amounts required by 10 CFR 50.75 and 10 CFR 72.30 will be available when required to decommission the Part 50 reactor plants and the Part 72 ISFSI, respectively.

Table 1

Edwin I. Hatch Nuclear Plant
Georgia Power Company
Ownership Percentage – 50.1%

		Unit 1	Unit 2
1	NRC Minimum Decommissioning Estimate pursuant to 10 CFR 50.75 (b) and (c) (Dec 2012$)	$ 322,426,000	$ 322,426,000
2	Decommissioning Trust Fund Balance year end (2012$)	$ 225,354,000[1]	$ 210,128,000[1]
3	Assumptions regarding: (a) Rates of escalation in decommissioning costs; (b) Rates of earnings on decommissioning funds; (c) Real rate of return; and	 2.41% 4.41% 2.00%	 2.41% 4.41% 2.00%
4	Projected NRC minimum requirements pursuant to 10 CFR 50.75(b) and (c) (U1-year 2034, U2- year 2038)	$ 544,455,150	$ 598,868,645
5	Projected Year End Fund Balance (U1-year 2034, U2- year 2038)	$ 594,032,000[2]	$ 720,124,000[2]
6	Additional Funds available for Spent Fuel Management (10 CFR 50.54 (bb) and 10 CFR 72.30) and Site Restoration (U1-year 2034, U2- year 2038) Row 5 – Row 4	$ 49,576,850	$121,255,355
7	ISFSI decommissioning cost estimate from TLG Services Inc. cost study (2012$)	$ 1,177,100[3]	$ 1,177,100[3]
8	Projected ISFSI decommissioning cost estimate from TLG Services Inc. cost study (U1-year 2034, U2- year 2038)	$ 1,987,674	$ 2,186,325

NOTES: [1]Funding is to an External Sinking Fund with the sources of funds from Traditional Cost of Service ratemaking as ordered by the Georgia Public Service Commission.

[2]The Balance is shown at first year. Yearend balance is not used due to expenditures starting in 2034 and 2038 for Units 1 and 2, respectively.

[3]TLG Services provided an estimate for site ISFSI decommissioning, for projections the estimate was split 50/50 between units.

Table 2

Edwin I. Hatch Nuclear Plant
Oglethorpe Power Corporation
Ownership Percentage – 30%

		Unit 1	Unit 2
1	NRC Minimum Decommissioning Estimate pursuant to 10 CFR 50.75 (b) and (c) (Dec 2012$)	$ 193,069,500	$ 193,069,500
2	Decommissioning Trust Fund Balance (2013$)	$ 118,944,451	$ 93,511,406
3	Assumptions regarding:		
	(a) Rates of escalation in decommissioning costs;	2.41%	2.41%
	(b) Rates of earnings on decommissioning funds;	6.0%	6.0%
	(c) Real rate of return; and	3.59%	3.59%
4	Projected NRC minimum requirements pursuant to 10 CFR 50.75(b) and (c) (U1-year 2034, U2- year 2038)	$ 326,021,114	$ 358,604,051
5	Projected Ending Fund Balance (U1-year 2034, U2- year 2038)	$ 404,359,226	$ 401,338,865
6	Additional Funds available for Spent Fuel Management (10 CFR 50.54 (bb) and 10 CFR 72.30) and Site Restoration (U1-year 2034, U2- year 2038) Row 5 – Row 4	$ 78,338,112	$42,734,814
7	ISFSI decommissioning cost estimate from TLG Services Inc. cost study (2012$)	$ 704,850[1]	$ 704,850[1]
8	Projected ISFSI decommissioning cost estimate from TLG Services Inc. cost study (U1-year 2034, U2- year 2038)	$ 1,190,224	$ 1,309,177

NOTES: [1]TLG Services provided an estimate for site ISFSI decommissioning, for projections the estimate was split 50/50 between units.

As a rural electric cooperative, OPC rates are established by its Board of Directors. The OPC Board of Directors approves the Long Range Financial Forecast annually. The Long Range Financial Forecast includes a 6% rate of earnings for the Hatch and Vogtle Nuclear Decommissioning Trust Funds, less a 2.41% rate of escalation, for a real rate of return of 3.59%

Table 3

Edwin I. Hatch Nuclear Plant
Municipal Electric Authority of Georgia
Ownership Percentage – 17.7%

		Unit 1	Unit 2
1	The NRC minimum decommissioning estimate pursuant to 10 CFR 50.75(b) and (c) (2012$)	$ 113,911,000	$ 113,911,000
2	Total amount accumulated in the trust fund at the end of 2013 (2013$)	$ 98,193,878	$ 96,255,900
3	Assumptions regarding:		
	(a) Rates of escalation in decommissioning costs;	3.60 %	3.60 %
	(b) Rates of earnings on decommissioning funds;	5.60 %	5.60 %
	(c) Real rate of return; and	2.00 %	2.00 %
4	Projected NRC minimum requirements pursuant to 10 CFR 50.75(b) and (c) (U1-year 2034, U2- year 2038)	$ 248,016,334	$ 285,705,963
5	Projected Ending Fund Balance (U1-year 2034, U2- year 2038)	$ 292,141,557[1]	$ 354,659,536[1]
6	Additional Funds available for Spent Fuel Management (10 CFR 50.54 (bb) and 10 CFR 72.30) and Site Restoration (U1-year 2034, U2- year 2038) Row 5 – Row 4	$ 44,125,223	$ 68,953,573
7	ISFSI decommissioning cost estimate from TLG Services Inc. cost study (2012$)	$ 415,862[2]	$ 415,862[2]
8	Projected ISFSI decommissioning cost estimate from TLG Services Inc. cost study (U1-year 2034, U2- year 2038)	$ 905,448	$ 1,043,043

NOTES: [1]Fund Balance is adjusted to account for fees and earnings.

[2]TLG Services provided an estimate for site ISFSI decommissioning, for projections the estimate was split 50/50 between units.

Table 4

Edwin I. Hatch Nuclear Plant
Dalton Utilities
Ownership Percentage – 2.2%

		Unit 1	Unit 2
1	The NRC minimum decommissioning estimate pursuant to 10 CFR 50.75(b) and (c) (2012$)	$ 14,158,000	$ 14,158,000
2	Total amount accumulated in the fund at the end of 2013 (2013$)	$ 17,442,611	$ 15,974,961
3	Assumptions regarding: (d) Rates of escalation in decommissioning costs; (e) Rates of earnings on decommissioning funds; (f) Real rate of return; and	 2.41% 3.70 % 1.29 %	 2.41% 3.70 % 1.29 %
4	Projected NRC minimum requirements pursuant to 10 CFR 50.75(b) and (c) (U1-year 2034, U2- year 2038)	$ 23,907,489	$ 26,296,832
5	Projected Ending Fund Balance (U1-year 2034, U2- year 2038)	$ 37,408,077	$ 39,619,475
6	Additional Funds available for Spent Fuel Management (10 CFR 50.54 (bb) and 10 CFR 72.30) and Site Restoration (U1-year 2034, U2- year 2038) Row 5 – Row 4	$ 13,500,588	$ 13,322,643
7	ISFSI decommissioning cost estimate from TLG Services Inc. cost study (2012$)	$ 51,689[1]	$ 51,689[1]
8	Projected ISFSI decommissioning cost estimate from TLG Services Inc. cost study (U1-year 2034, U2- year 2038)	$ 87,283	$ 96,006

NOTE: [1]TLG Services provided an estimate for site ISFSI decommissioning, for projections the estimate was split 50/50 between units.

Joseph M. Farley Nuclear Plant- Units 1 and 2
Edwin I. Hatch Nuclear Plant- Units 1 and 2
Vogtle Electric Generating Plant- Units 1 and 2
ISFSI Decommissioning Funding Plan

Enclosure 5

Vogtle Electric Generating Plant- Units 1 and 2
ISFSI Decommissioning Cost Estimate

10 CFR 72.30 ISFSI Decommissioning Cost Estimate For Vogtle Electric Generating Plant

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. Section 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 document provides a detailed cost estimate for decommissioning the ISFSI at Vogtle Electric Generating Plant (VNP) 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 document also provides:

1. Identification of the key assumptions contained in the ISFSI Decommissioning 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 VNP Units 1 & 2 are currently set to expire on January 16, 2047 and February 9, 2049, respectively. Approximately 7,156 spent fuel assemblies are currently projected to be generated as a result of plant operations through the license expiration date. The ISFSI currently has six loaded casks on the pad and is licensed and operated under 10 CFR Part 72 in accordance with the general license provisions of 10 CFR 72.210.

Assuming that the plant operates to the end of currently licensed life, the spent fuel pools are expected to contain a total of approximately 2,113 spent fuel assemblies after the final

[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

core offloads. The spent fuel that cannot be transferred directly from the pool to the DOE for permanent storage is assumed to be packaged in dry storage casks for interim storage at the ISFSI. Transferring the spent fuel from the pool to the ISFSI will permit decontamination and dismantling of the spent fuel pool systems and allow termination of the Part 50 license using the DECON method described in NUREG-0586, "Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors (GEIS)."

Completion of the ISFSI decommissioning process is dependent upon the DOE's ability to meet its contractual obligation 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.[2] Southern Nuclear's current spent fuel management plan for the VNP spent fuel is based in general upon: 1) a 2025 start date for DOE initiating transfer of commercial spent fuel to a federal facility, and 2) completion of spent fuel receipt by year 2071. The completion date is based upon the DOE's generator allocation/receipt schedules which are based upon the oldest fuel receiving the highest priority. The end date assumes a maximum rate of transfer of 3,000 metric tons of uranium/year.[3]

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) by removing and disposing of residual radioactivity and verifying that remaining materials satisfy NRC release criteria.

For purposes of providing an estimate for a funding plan, financial assurance is expected to be provided on the basis of a ISFSI decommissioning scenario that begins promptly after the conclusion of the transfer process. In this estimate the ISFSI decommissioning is considered an independent project, separate from of the decommissioning activities identified for the nuclear power plant.

4. ISFSI Description

The VNP ISFSI uses a Holtec International (Holtec) HI-STORM 100 dry storage system. The HI-STORM 100 is comprised of a multi-purpose canister (MPC) and storage overpack. The multi-purpose canisters are assumed to be transferred directly to the DOE and not returned to the station. The storage overpacks remain onsite after transfer of the

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2 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 …"

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

spent fuel to the DOE. The majority of the overpacks are assumed to be disposed of as "clean" material. The inner steel liners of the remaining 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 spent fuel. The cost to dispose of 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.

Southern Nuclear's current management plan for the VNP spent fuel would result in 66 spent fuel storage casks (nominal 32 assemblies per cask) and 65 spent fuel storage casks (nominal 24 assemblies per cask) being located on a storage pad after all spent fuel has been removed from the spent fuel pool. This represents approximately 51% of the total spent fuel projected to be generated during the currently licensed operating period.

In addition to the spent fuel casks located on the ISFSI pad after shutdown, there are projected to be additional casks that are expected to 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 the unit operating until the end of its current license, (Unit 1 – January 16, 2047; Unit 2 – February 9, 2049), and the assumptions associated with DOE's spent fuel acceptance, as previously described.

The nominal size of the ISFSI pad and adjacent concrete sufficient to store the projected amount of spent fuel is expected to be approximately 54,000 square feet in surface area.

It is not expected that the overpacks will have any interior or exterior radioactive surface contamination. It is 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. Any neutron activation of the steel and concrete is expected to be extremely small. To validate this assumption, the estimate accounts for characterization of 10% of the overpacks; it is likely that some of this characterization will take place well before the last of the fuel is removed from the ISFSI in order to establish a more definitive decommissioning scope.

The decommissioning estimate conservatively assumes that 14 overpacks, excluding those used for GTCC, will contain low levels of neutron-induced residual radioactivity of its inner steel liner that would necessitate remediation at the time of decommissioning.

For purposes of this estimate, the overpack inner steel liners are designated for controlled disposal as low-level radioactive waste.

It is not expected that there will be any residual contamination left on the concrete ISFSI pad, or other facilities at the VNP ISFSI. It is 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. Therefore, it is assumed for this analysis that these facilities will not be contaminated. As such, only verification surveys are included for the facilities in the decommissioning estimate.

There is no expected subsurface material in the proximity of the ISFSI containing residual radioactivity that will require remediation to meet the criteria for license termination.

To support an application for License Termination, the estimate assumes that a Final Status Survey will be performed; this will include a 100% survey of the concrete overpack surfaces, and a significant fraction of the ISFSI pad and the immediate area surrounding the pad, and the other ISFSI structures.

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. Southern Nuclear, as the licensee, will oversee the site activities. The estimate includes Southern Nuclear's labor and overhead costs.

Low-level radioactive waste disposal costs are based on Southern Nuclear's current cost of disposal at the Energy*Solutions* Clive, Utah disposal site.

Costs are reported in 2012 dollars.

Contingency has been added at an overall rate of 17.1 %. Contingency has been estimated in accordance with the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates.[4]

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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4 T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.

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 overpacks are characterized and the specifications and work procedures for the decontamination (liner removal) are developed.
- The remediation phase - 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 and independent surveys are completed, and an application for license termination is 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), Southern Nuclear Company's oversight staff, site security (industrial), and other site operating costs.

For estimating purposes it should be conservatively assumed that all expenditures will be incurred in the year 2072, the year following all spent fuel removal.

Table 1
Significant Quantities and Physical Dimensions

ISFSI Pad

Item	Surface Area (ft^2)	Residual Radioactivity
ISFSI Pad and Adjacent Concrete	53,817	No

ISFSI Overpack

Item	Value	Notes (all dimensions are nominal)
Overall Height (inches)	239	
Outside Diameter (inches)	132.5	Main cylindrical body of overpack
Inside Diameter (inches)	73.5	
Inner Liner Thickness (inches)	1.25	
Quantity (total)	141	Spent Fuel 131 + GTCC 10
Quantity (with residual radioactivity)	14	Equivalent to the number of overpacks used to store last complete core offloads
Total Surface Area of Overpack Inner Liner with Residual Radioactivity (square feet)	5,559	
Low-Level Radioactive Waste (cubic feet)	3,413	
Low-Level Radioactive Waste (packaged density- lbs./cu.ft.)	84	

Other Potentially Impacted Items

Item	Quantity	Notes
Number of Overpacks used for GTCC storage	10	No residual radioactivity
Cask Transfer Facility	1	No residual radioactivity
Transfer Cask	1	No residual radioactivity

Table 2
ISFSI Decommissioning Costs[1] and Waste Volumes

	(thousands, 2012 dollars)						Waste Volume	Person-Hours		
	Removal	Packaging	Transport	Disposal	Other	Total	(ft^3)	Contractor	Licensee	NRC / NRC Contractor
Decommissioning Contractor										
Planning (characterization, specs and procedures)					371	371		1,104		
Remediation (activated liner removal)	60	10	85	780	37	973	3,412	970		
License Termination (radiological surveys)					1,410	1,410		11,980		
Subtotal	**60**	**10**	**85**	**780**	**1,818**	**2,753**	**3,412**	14,054		
Supporting Costs										
NRC and NRC Contractor Fees and Costs					191	191				776
Insurance					67	67				
Property Tax					0	0				
Security (Industrial)					112	112		5,054		
Vogtle Oversight Staff					283	283			3,834	
Subtotal					**653**	**653**		5,054	**3,834**	**776**
Total (w/o contingency)	**60**	**10**	**85**	**780**	**2,471**	**3,406**	**3,412**	**19,108**	**3,834**	**776**
Total (*w/17.1%* contingency)						**3,987**				

Note 1: For funding planning purposes decommissioning costs can be assumed to be incurred in year 2072.

Joseph M. Farley Nuclear Plant- Units 1 and 2
Edwin I. Hatch Nuclear Plant- Units 1 and 2
Vogtle Electric Generating Plant- Units 1 and 2
ISFSI Decommissioning Funding Plan

Enclosure 6

Vogtle Electric Generating Plant- Units 1 and 2
ISFSI Decommissioning Financial Assurance

10 CFR 72.30 ISFSI Decommissioning Financial Assurance For Vogtle Electric Generating Plant

Southern Nuclear (SNC) operates the Vogtle Nuclear Plant (VNP) independent spent fuel storage installation (ISFSI) in accordance with the general license provisions of the 10 CFR 72, Subpart K. The VNP ISFSI is a shared facility for storage of spent fuel from both VNP Unit 1 and Unit 2. Accordingly, the cost associated with operation and decommissioning the ISFSI is not unit-specific and may be funded from the existing decommissioning trust fund established in accordance with 10 CFR 50.75 for either unit.

The ISFSI decommissioning cost estimate provided in Enclosure 5 is derived from the site-specific decommissioning cost study prepared by TLG Services, Inc. for VNP. The scope of the decommissioning cost study includes decommissioning of the reactor facility to permit license termination, management of the spent fuel in accordance with 10 CFR 50.54(bb), and decommissioning the ISFSI following removal of the spent fuel. The estimated costs are adjusted periodically to reflect the current assumptions such as cost of energy, labor, burial cost, projected capacity, and schedule for removal of fuel from the site. Incorporation of the cost to decommission the ISFSI into the scope of the VNP decommissioning cost study and use for cost-of-service ratemaking, provides assurance that adequate funding will be available as required by 10 CFR 72.30(b), (c), and (d).

Financial assurance that adequate funds are available to decommission the ISFSI is based on the following:

- Site specific cost studies have historically included the cost to decommissioning the ISFSI as part of the scope of activities necessary to decommission the Part 50 facility and terminate the Part 50 specific license in accordance with 10 CFR 50.82, Termination of License.

- SNC previously collected funds to demonstrate compliance with the NRC minimum decommissioning funding requirement based on the NRC formula amount described in 10 CFR 50.75 based on the original operating license period of 40 years. Upon issuance of the renewed operating license, these same funds will accumulate interest over an additional 20 year period. As a result, the decommissioning trust fund balances will exceed the NRC minimum decommissioning funding formula amount described in 10 CFR 50.75 at time of Part 50 license expiration and provide additional assurance that adequate funds will be available to decommission the VNP ISFSI.

- The VNP decommissioning cost study prepared by TLG Services, Inc. dated November 2012 estimated the amount necessary for VNP ISFSI decommissioning to be $4,699,000 (2012$) shared by both operating units. The estimates from the TLG cost study are included in the following Tables and divided based on percentage ownership.

- In accordance with 10 CFR 72.30(b), financial assurance, for decommissioning, has been provided in an amount separate from the requirements of 10 CFR 50.75(b). The amount allocated for ISFSI decommissioning is held in the same financial instrument as the reactor decommissioning funds required by 10 CFR 50.75. As shown in the Tables, these funds are in excess of the amount required for decommissioning the Part 50 facility and provide adequate assurance that funding for decommissioning the ISFSI will be available upon expiration of the Part 50 operating licenses for VNP Units 1 and 2.

Accordingly, the funds set aside to cover the ISFSI decommissioning costs for VNP are not the same funds credited for compliance with the decommissioning funding requirements of 10 CFR 50.75. The Tables provide a summary of funding available to demonstrate adequate assurance of decommissioning funding in the amounts required by 10 CFR 50.75 and 10 CFR 72.30 will be available when required to decommission the Part 50 reactor plants and the Part 72 ISFSI, respectively.

Table 1

Vogtle Electric Generating Plant
Georgia Power Company
Ownership Percentage – 45.7%

		Unit 1	Unit 2
1	NRC Minimum Decommissioning Estimate pursuant to 10 CFR 50.75 (b) and (c) (Dec 2012$)	$ 235,595,000	$ 235,595,000
2	Decommissioning Trust Fund Balance year end (2012$)	$ 123,185,000[1]	$ 132,825,000[1]
3	Assumptions regarding: (a) Rates of escalation in decommissioning costs; (b) Rates of earnings on decommissioning funds; (c) Real rate of return; and	 2.41% 4.41% 2.00%	 2.41% 4.41% 2.00%
4	Projected NRC minimum requirements pursuant to 10 CFR 50.75(b) and (c) (U1-year 2047, U2- year 2049)	$ 542,186,730	$ 568,635,038
5	Projected Year End Fund Balance (U1-year 2047, U2- year 2049)	$ 604,300,000[2]	$ 692,837,000[2]
6	Additional Funds available for Spent Fuel Management (10 CFR 50.54 (bb) and 10 CFR 72.30) and Site Restoration (U1-year 2047, U2- year 2049) Row 5 – Row 4	$62,113,270	$ 124,20,,963
7	ISFSI decommissioning cost estimate from TLG Services Inc. cost study (2012$)	$ 911,030[3]	$ 911,030[3]
8	Projected ISFSI decommissioning cost estimate from TLG Services Inc. cost study (U1-year 2047, U2- year 2049)	$ 2,096,598	$ 2,198,872

NOTES: [1]Funding is to an External Sinking Fund with the sources of funds from Traditional Cost of Service ratemaking as ordered by the Georgia Public Service Commission.

[2]The Balance is shown at first year. Yearend balance is not used due to expenditures starting in 2047 and 2049 for Units 1 and 2, respectively.

[3]TLG Services provided an estimate for site ISFSI decommissioning, for projections the estimate was split 50/50 between units.

Table 2

Vogtle Electric Generating Plant
Oglethorpe Power Corporation
Ownership Percentage – 30.0%

		Unit 1	Unit 2
1	NRC Minimum Decommissioning Estimate pursuant to 10 CFR 50.75 (b) and (c) (Dec 2012$)	$ 154,657,800	$ 154,657,800
2	Decommissioning Trust Fund Balance (2013$)	$ 69,391,624	$ 62,857,014
3	Assumptions regarding: (a) Rates of escalation in decommissioning costs; (b) Rates of earnings on decommissioning funds; (c) Real rate of return; and	 2.41% 6.0% 3.59%	 2.41% 6.0% 3.59%
4	Projected NRC minimum requirements pursuant to 10 CFR 50.75(b) and (c) (U1-year 2047, U2- year 2049)	$ 355,921,844	$ 373,284,000
5	Projected Ending Fund Balance (U1-year 2047, U2- year 2049)	$ 503,160,420	$ 512,111,933
6	Additional Funds available for Spent Fuel Management (10 CFR 50.54 (bb) and 10 CFR 72.30) and Site Restoration (U1-year 2047, U2- year 2049) Row 5 – Row 4	$ 147,238,575	$138,827,933
7	ISFSI decommissioning cost estimate from TLG Services Inc. cost study (2012$)	$ 598,050[1]	$ 598,050[1]
8	Projected ISFSI decommissioning cost estimate from TLG Services Inc. cost study (U1-year 2047, U2- year 2049)	$ 1,376,323	$ 1,443,461

NOTE: [1]TLG Services provided an estimate for site ISFSI decommissioning, for projections the estimate was split 50/50 between units.

As a rural electric cooperative, OPC rates are established by its Board of Directors. The OPC Board of Directors approves the Long Range Financial Forecast annually. The Long Range Financial Forecast includes a 6% rate of earnings for the Hatch and Vogtle Nuclear Decommissioning Trust Funds, less a 2.41% rate of escalation, for a real rate of return of 3.59%

Table 3

Vogtle Electric Generating Plant
Municipal Electric Authority of Georgia
Ownership Percentage – 22.7%

		Unit 1	Unit 2
1	The NRC minimum decommissioning estimate pursuant to 10 CFR 50.75(b) and (c) (2012$)	$ 117,024,000	$ 117,024,000
2	Total amount accumulated in the trust fund (2013$)	$ 99,690,771	$ 93,486,759
3	Assumptions regarding: (a) Rates of escalation in decommissioning costs; (b) Rates of earnings on decommissioning funds; (c) Real rate of return; and	 3.60 % 5.60 % 2.00 %	 3.60 % 5.60 % 2.00 %
4	Projected NRC minimum requirements pursuant to 10 CFR 50.75(b) and (c) (U1-year 2047, U2- year 2049)	$ 403,521,220	$ 433,097,711
5	Projected Ending Fund Balance (U1-year 2047, U2- year 2049)	$ 582,061,420[1]	$ 606,851,015[1]
6	Additional Funds available for Spent Fuel Management (10 CFR 50.54 (bb) and 10 CFR 72.30) and Site Restoration (U1-year 2047, U2- year 2049) Row 5 – Row 4	$ 178,540,200	$ 173,753,304
7	ISFSI decommissioning cost estimate from TLG Services Inc. cost study (2012$)	$ 452,525[2]	$ 452,525[2]
8	Projected ISFSI decommissioning cost estimate from TLG Services Inc. cost study (U1-year 2047, U2- year 2049)	$ 1,560,391	$ 1,674,762

NOTE: [1]Fund Balance is adjusted to account for fees and earnings.

[2]TLG Services provided an estimate for site ISFSI decommissioning, for projections the estimate was split 50/50 between units.

Table 4

Vogtle Electric Generating Plant
Dalton Utilities
Ownership Percentage – 1.6%

		Unit 1	Unit 2
1	The NRC minimum decommissioning estimate pursuant to 10 CFR 50.75(b) and (c) (2012$)	$ 8,248,000	$ 8,248,000
2	Total amount accumulated in the fund at the end of 2013 (2013$)	$ 7,737,593	$ 8,050,446
3	Assumptions regarding: (d) Rates of escalation in decommissioning costs; (e) Rates of earnings on decommissioning funds; (f) Real rate of return; and	 2.41% 3.70 % 1.29 %	 2.41% 3.70 % 1.29 %
4	Projected NRC minimum requirements pursuant to 10 CFR 50.75(b) and (c) (U1-year 2047, U2- year 2049)	$ 18,981,541	$ 19,907,476
5	Projected Ending Fund Balance (U1-year 2047, U2- year 2049)	$ 26,612,373	$ 29,775,233
6	Additional Funds available for Spent Fuel Management (10 CFR 50.54 (bb) and 10 CFR 72.30) and Site Restoration (U1-year 2047, U2- year 2049) Row 5 – Row 4	$ 7,630,832	$ 9,867,757
7	ISFSI decommissioning cost estimate from TLG Services Inc. cost study (2012$)	$ 31,896[1]	$ 31,896[1]
8	Projected ISFSI decommissioning cost estimate from TLG Services Inc. cost study (U1-year 2047, U2- year 2049)	$ 73,404	$ 76,985

NOTE: [1]TLG Services provided an estimate for site ISFSI decommissioning, for projections the estimate was split 50/50 between units.