

**DECOMMISSIONING COST STUDY**  
**for the**  
**VOGTLE ELECTRIC GENERATING PLANT**



*prepared for*

**SOUTHERN NUCLEAR OPERATING COMPANY**

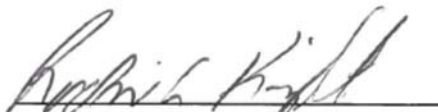
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**October 2018**

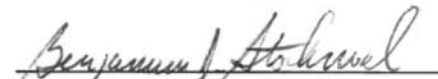
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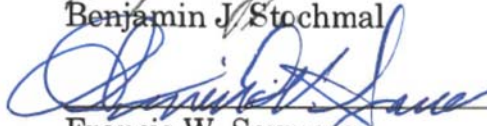
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**REVISION LOG**

<b>Rev. No.</b>	<b>Date</b>	<b>Item Revised</b>	<b>Reason for Revision</b>
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## **EXECUTIVE SUMMARY**

This report presents estimates of the costs to promptly decommission (decontaminate and dismantle) the Vogtle Electric Generating Plant (Vogtle) following a scheduled cessation of plant operations. The estimates are designed to provide Georgia Power Company (GPC) and Southern Nuclear Operating Company (SNC) with sufficient information to assess their financial obligations as they pertain to the eventual decommissioning of the nuclear station.

The analysis relies upon the site-specific, technical information developed for an evaluation prepared in 2015,<sup>[1]</sup> updated to reflect current assumptions pertaining to the disposition of the nuclear plant, and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

The estimates are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The estimates incorporate a cooling period of approximately five years for the spent fuel that resides in the plant's storage pools when operations cease. Any residual fuel remaining in the pools after the five-year period will be relocated to an on-site, interim storage facility to await the transfer to a Department of Energy (DOE) facility. The estimates also include the dismantling of non-essential structures and limited restoration of the site.

The analysis is not an engineering evaluation, but estimates prepared in advance of the detailed planning required to carry out the decommissioning of the nuclear units. It may also not reflect the actual plan to decommission Vogtle; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

The 2015 plant inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, was reviewed for this analysis. Only minor changes to the plant or site over the past three years, that would impact decommissioning, were identified.

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<sup>1</sup> "Decommissioning Cost Estimate for the Vogtle Electric Generating Plant," Document S18-1715-002, Rev. 0, TLG Services, Inc., December 2015

The costs to decommission Vogtle is tabulated at the end of this section. Costs are reported in 2018 dollars and include monies anticipated to be spent for radiological remediation and operating license termination, spent fuel management, and site restoration activities.

A complete discussion of the assumptions relied upon in this analysis is provided in Section 3, along with schedules of annual expenditures for each scenario. A sequence of significant project activities is provided in Section 4 with a timeline for each scenario. Detailed cost reports used to generate the summary tables contained within this document are provided in Appendices C and E.

Consistent with the 2015 analysis, the current cost estimates assume that the shutdown of the nuclear units is a scheduled and pre-planned event (e.g., there is no delay in transitioning the plant and workforce from operations or in obtaining regulatory relief from operating requirements).

The analysis recognizes that spent fuel will be stored at the site in the wet storage pools and/or in an independent spent fuel storage installation (ISFSI) until such time that it can be transferred to the U.S. Department of Energy (DOE). Consequently, the estimates also include those costs to manage and subsequently decommission these interim storage facilities.

The primary goal of the decommissioning is the removal and disposal of the contaminated systems and structures so that the operating licenses for the nuclear units can be terminated. The estimates also include the dismantling of site structures and non-essential facilities and the limited restoration of the site.

### Alternatives and Regulations

The Nuclear Regulatory Commission (NRC) provided general decommissioning requirements in the rule adopted on June 27, 1988.<sup>[2]</sup> In this rule the NRC set forth financial criteria for decommissioning licensed nuclear facilities. The regulations addressed planning needs, timing, funding methods, and environmental review requirements for decommissioning. The rule also defined three decommissioning alternatives as being acceptable to the NRC - DECON, SAFSTOR, and ENTOMB.

DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are

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<sup>2</sup> U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72 "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, Federal Register Volume 53, Number 123 (p 24018 et seq.), June 27, 1988.



removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."<sup>[3]</sup>

SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."<sup>[4]</sup> Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.

ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."<sup>[5]</sup> As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.

The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the NRC directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations; however, rulemaking has been deferred pending the completion of additional research studies, for example, on engineered barriers. In a draft regulatory basis document published in March 2017 in support of rulemaking that would amend NRC regulations concerning nuclear plant decommissioning, the NRC staff proposes removing any discussion of the ENTOMB option from existing guidance documents since the method is not deemed practically feasible.

In 1996, the NRC published revisions to the general requirements for decommissioning nuclear power plants to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process.<sup>[6]</sup> The amendments allowed for greater public participation and better define the transition

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<sup>3</sup> Ibid. FR24022, Column 3.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid. FR24023, Column 2.

<sup>6</sup> U.S. Code of Federal Regulations, Title 10, Parts 2, 50, and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, Federal Register Volume 61, (p 39278 et seq.), July 29, 1996

process from operations to decommissioning. Regulatory Guide 1.184, issued in July 2000, further described the methods and procedures acceptable to the NRC staff for implementing the requirements of the 1996 revised rule that relate to initial activities and major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and process described in the amended regulations. The format and content of the estimate is also consistent with the recommendations of Regulatory Guide 1.202, issued in February 2005.<sup>[7]</sup>

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.<sup>[8]</sup> The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial reporting and assurances. These additional details are included in this analysis, including the ISFSI decommissioning estimate (Appendix E).

### Decommissioning Scenario

The DECON scenario assumes that decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling processes. Spent fuel that cannot be directly transferred to the DOE from the storage pools is relocated to the ISFSI so as to facilitate decontamination and dismantling activities within the fuel handling buildings. Spent fuel storage operations continue at the site until the transfer of the fuel to the DOE is complete, assumed to be in the year 2078.

### Methodology

The methodology used to develop the estimates described within this document follows the basic approach originally presented in the cost estimating guidelines<sup>[9]</sup> developed by

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<sup>7</sup> "Standard Format and Content of Decommissioning Cost Estimates of Decommissioning Cost Estimates for Nuclear Power Reactors," Regulatory Guide 1.202, U.S. Nuclear Regulatory Commission, February 2005

<sup>8</sup> U.S. Code of Federal Regulations, Title 10, Parts 20, 30, 40, 50, 70, and 72, "Decommissioning Planning," Nuclear Regulatory Commission, Federal Register Volume 76, (p 35512 et seq.), June 17, 2011

<sup>9</sup> T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant

the Atomic Industrial Forum (now Nuclear Energy Institute). This reference described a unit factor method for determining decommissioning activity costs. The unit factors used in this analysis incorporate site-specific costs and the latest available information on worker productivity in decommissioning.

An activity duration critical path is used to determine the total decommissioning program schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field engineering, equipment rental, and support services such as quality control and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting cost estimate.

The estimates also reflect lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, and the decommissioning of the Cintichem reactor, hot cells and associated facilities, completed in 1997. In addition, the planning and engineering for the Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, Crystal River, San Onofre and Vermont Yankee nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

### Contingency

Consistent with cost estimating practice, contingencies are applied to the decontamination and dismantling costs developed as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."<sup>[10]</sup> The cost elements in the estimates are based on ideal conditions; therefore, the types of unforeseeable events that are almost certain to occur in decommissioning, based on industry experience, are addressed through a percentage contingency applied on a line-item basis. This contingency factor is a nearly universal element in all large-scale construction and demolition projects. It should be noted that contingency, as used in these estimates, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

The use and role of contingency within decommissioning estimates is not a safety factor issue. Safety factors provide additional security and address situations that may never

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<sup>10</sup> Decommissioning Cost Estimates," AIF/NESP-036, May 1986.  
Project and Cost Engineers' Handbook, Second Edition, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, p. 239.

occur. Contingency funds, by contrast, are expected to be fully expended throughout the program. Inclusion of contingency is necessary to provide assurance that sufficient funding will be available to accomplish the intended tasks.

### Low-Level Radioactive Waste Disposal

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is generally classified as low-level radioactive waste, although not all of the material is suitable for “shallow-land” disposal. With the passage of the “Low-Level Radioactive Waste Disposal Act” in 1980,<sup>[11]</sup> and its Amendments of 1985,<sup>[12]</sup> the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

With the exception of Texas, no new compact facilities have been successfully sited, licensed, and constructed. The Texas Compact disposal facility is now operational and waste is being accepted from generators within the Compact by the operator, Waste Control Specialists (WCS). The facility is also able to accept limited quantities of non-Compact waste.

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to SNC. The majority of the low-level radioactive waste designated for direct disposal (Class A<sup>[13]</sup>) can be sent to EnergySolutions’ facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon SNC’s experience with EnergySolutions. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

The WCS facility is able to receive the Class B and C waste. As such, for this analysis, Class B and C waste was assumed to be shipped to the WCS facility and disposal costs for the waste using this facility were based upon SNC experience.

The dismantling of the components residing closest to the reactor core generates radioactive waste that may be considered unsuitable for shallow-land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear

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<sup>11</sup> “Low-Level Radioactive Waste Policy Act of 1980,” Public Law 96-573, 1980

<sup>12</sup> “Low-Level Radioactive Waste Policy Amendments Act of 1985,” Public Law 99-240, 1986

<sup>13</sup> Waste is classified in accordance with U.S. Code of Federal Regulations, Title 10, Part 61.55

all reasonable costs of disposing of such waste. However, to date, the federal government has not identified a cost for disposing of GTCC or a schedule for acceptance.

For purposes of this analysis only, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as high-level waste and at a cost equivalent to that envisioned for the spent fuel. The GTCC is packaged in the same canisters used for spent fuel and either stored on site or shipped directly to a DOE facility as it is generated (depending upon the timing of the decommissioning and whether the spent fuel has been removed from the site prior to the start of decommissioning).

A significant portion of the metallic waste generated during decommissioning may potentially be contaminated by radioactive materials. Rather than designating this large volume for controlled disposal, this analysis assumes that the material is sent to a licensed facility for characterization and processing. Processing is routinely used to reduce the volume, for example, by component disassembly, sorting, and compaction. The estimates reflect the savings from waste recovery/volume reduction.

#### High-Level Radioactive Waste Management

Congress passed the “Nuclear Waste Policy Act”<sup>[14]</sup> (NWP) in 1982, assigning the federal government’s long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. The NWP provided that DOE would enter into contracts with utilities in which DOE would promise to take the utilities’ spent fuel and high-level radioactive waste and utilities would pay the cost of the disposition services for that material. NWP, along with the individual contracts with the utilities, specified that the DOE was to begin accepting spent fuel by January 31, 1998.

Since the original legislation, the DOE has announced several delays in the program schedule. By January 1998, the DOE had failed to accept any spent fuel or high level waste, as required by the NWP and utility contracts. Delays continue and, as a result, generators have initiated legal action against the DOE in an attempt to obtain compensation for DOE’s partial breach of contract. To date no spent fuel has been accepted from commercial generating sites for disposal.

In 2010 the Obama Administration appointed a Blue Ribbon Commission on America’s Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission’s charter

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<sup>14</sup> “Nuclear Waste Policy Act of 1982 and Amendments,” DOE’s Office of Civilian Radioactive Management, 1982

includes a requirement that it consider “[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed.”<sup>[15]</sup>

On January 26, 2012, the Blue Ribbon Commission issued its “Report to the Secretary of Energy” containing a number of recommendations on nuclear waste disposal. Two of the recommendations that may impact decommissioning planning are:

- “[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities”<sup>[16]</sup>
- “[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste.”<sup>[17]</sup>

In January 2013, the DOE issued the “Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,” in response to the recommendations made by the Blue Ribbon Commission and as “a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel...”<sup>[18]</sup>

“With the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that:

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and

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<sup>15</sup> Charter of the Blue Ribbon Commission on America’s Nuclear Future, “Objectives and Scope of Activities,” 2010

<sup>16</sup> “Blue Ribbon Commission on America’s Nuclear Future, Report to the Secretary of Energy,” [http://www.brc.gov/sites/default/files/documents/brc\\_finalreport\\_jan2012.pdf](http://www.brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf), p. 32, January 2012

<sup>17</sup> *Ibid.*, p.27

<sup>18</sup> “Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,” U.S. DOE, January 11, 2013

- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048.”<sup>[19]</sup>

The NRC’s review of DOE’s license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration significantly reduced the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit issued a writ of mandamus (in August 2013)<sup>[20]</sup> ordering NRC to comply with federal law and resume its review of DOE’s Yucca Mountain repository license application to the extent allowed by previously appropriated funding for the review. That review is now complete with the publication of the five-volume safety evaluation report. A supplement to DOE’s environmental impact statement and an adjudicatory hearing on the contentions filed by interested parties must be completed before a licensing decision can be made.

Completion of the decommissioning process is dependent upon the DOE’s ability to remove spent fuel from the site in a timely manner. DOE’s repository program had assumed that spent fuel allocations would 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.<sup>[21]</sup> SNC’s current spent fuel management plan for the Vogtle spent fuel is based in general upon: 1) a 2032 start date for DOE initiating transfer of commercial spent fuel to a federal facility (not necessarily a final repository), and 2) expectations for spent fuel receipt by the DOE for the Vogtle fuel. The DOE’s generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. Assuming a maximum rate of transfer of 3,000 metric

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<sup>19</sup> *Ibid.*, p.2

<sup>20</sup> U.S. Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, et al, Aug. 2013, [http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/\\$file/11-1271-1451347.pdf](http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/$file/11-1271-1451347.pdf)

<sup>21</sup> In 2008, the DOE issued a report to Congress in which it concluded that it did not have authority, under present law, to accept spent nuclear fuel for interim storage from decommissioned commercial nuclear power reactor sites. However, the Blue Ribbon Commission, in its final report, noted that: “[A]ccepting spent fuel according to the OFF [Oldest Fuel First] priority ranking instead of giving priority to shutdown reactor sites could greatly reduce the cost savings that could be achieved through consolidated storage if priority could be given to accepting spent fuel from shutdown reactor sites before accepting fuel from still-operating plants. .... The magnitude of the cost savings that could be achieved by giving priority to shutdown sites appears to be large enough (i.e., in the billions of dollars) to warrant DOE exercising its right under the Standard Contract to move this fuel first.” For planning purposes only, this estimate does not assume that Vogtle, as a permanently shutdown plant, will receive priority; the fuel removal schedule assumed in this estimate is based upon DOE acceptance of fuel according to the “Oldest Fuel First” priority ranking.

tons of uranium (MTU)/year, the spent fuel is completely removed from the site by the end of 2078 for a 2049 station shutdown.

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the DOE.<sup>[22]</sup> Interim storage of the fuel, until the DOE has completed the transfer, will be in the fuel handling building's storage pool as well as at an on-site ISFSI. For purposes of this analysis, it is assumed that DOE will accept already-canistered fuel.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K<sup>[23]</sup>), has been constructed to support continued plant operations. The facility is assumed to be available to support future decommissioning operations. In the six years following the decision to permanently cease operations, the fuel is packaged for interim storage at the ISFSI. Once the fuel storage pools are emptied, the reactor buildings can be prepared for removal.

For cost estimating purposes, the spent fuel scenario developed for Vogtle assumed that the DOE would initiate spent fuel receipt in the year 2032. DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. The information available on the projected rate of transfer and the backlogged national queue indicates that Vogtle fuel would not be eligible for pickup until 2040. Supplemental dry cask spent nuclear fuel storage in the form of an ISFSI is assumed to be expanded following cessation of plant operations to accommodate the assemblies in the plant's wet storage pools. By relocating the fuel to the ISFSI, the wet storage pools may be secured and decommissioning of the nuclear units may proceed. Costs are included within the estimates to expand the ISFSI to accommodate the residual spent fuel inventories after pool operations cease and for the long-term caretaking of spent fuel at the site through the year 2078.

### Site Restoration

The efficient removal of the contaminated materials at the site may result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities can substantially damage power block structures, potentially weakening the footings and structural supports. It is unreasonable to anticipate that these structures would be repaired and preserved after the

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<sup>22</sup> U.S. Code of Federal Regulations, Title 10, Part 50 – Domestic Licensing of Production and Utilization Facilities, Subpart 54 (bb), "Conditions of Licenses"

<sup>23</sup> U.S. Code of Federal Regulations, Title 10, Part 72, Subpart K, "General License for Storage of Spent Fuel at Power Reactor Sites."



radiological contamination is removed. The cost to dismantle site structures with a work force already mobilized is more efficient and less costly than if the process is deferred.

This estimate assumes that some site features will remain following the decommissioning project. These include the existing electrical switchyard, which is assumed to remain functional in support of the regional electrical distribution system.

Consequently, this study assumes that site structures will be removed to a nominal depth of three feet below the local grade level wherever possible. The site will then be graded and stabilized.

### Summary

The estimates to decommission Vogtle assume the removal of all contaminated and activated plant components and structural materials such that the owner may then have unrestricted use of the site with no further requirements for an operating license. Low-level radioactive waste, other than GTCC waste, is sent to a commercial processor for treatment/conditioning or to a controlled disposal facility.

Decommissioning is accomplished within the 60-year period required by current NRC regulations. In the interim, the spent fuel remains in storage at the site until such time that the transfer to a DOE facility is complete.

The alternative evaluated in this analysis is described in Section 2. The assumptions are presented in Section 3, along with schedules of annual expenditures. The major cost contributors are identified in Section 6, with detailed activity costs, waste volumes, and associated manpower requirements delineated in Appendix C. The major cost components are also identified in the cost summary provided at the end of this section.

The cost elements in the estimates are assigned to one of three subcategories: NRC License Termination (radiological remediation), Spent Fuel Management, and Site Restoration. The subcategory “NRC License Termination” is used to accumulate costs that are consistent with “decommissioning” as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). The cost reported for this subcategory is generally sufficient to terminate the reactors’ operating licenses, recognizing that there may be some additional cost impact from spent fuel management. The License Termination cost subcategory also includes costs to decommission the ISFSI (as required by 10 CFR §72.30). Section 3.4.1 provides the basis for the ISFSI decommissioning cost, delineated in Appendix E.

The “Spent Fuel Management” subcategory contains costs associated with the containerization and transfer of spent fuel from the wet storage pools to the DOE and/or ISFSI for interim storage, as well as the transfer of the spent fuel in storage at the ISFSI to the DOE. Costs are included for the operation of the storage pools and the management of the ISFSI until such time that the transfer is complete. It does not include any spent fuel management expenses incurred prior to the cessation of plant operations, nor does it include any cost related to the final disposal of the spent fuel.

“Site Restoration” is used to capture costs associated with the dismantling and demolition of buildings and facilities demonstrated to be free from contamination. This includes structures never exposed to radioactive materials, as well as those facilities that have been decontaminated to appropriate levels. Consequently, this study assumes that the site structures addressed by this analysis are removed to a depth of three feet and backfilled to conform to local grade.

It should be noted that the costs assigned to these subcategories are allocations. Delegation of cost elements is for the purposes of comparison (e.g., with NRC financial guidelines) or to permit specific financial treatment (e.g., Asset Retirement Obligation determinations). In reality, there can be considerable interaction between the activities in the three subcategories. For example, an owner may decide to remove non-contaminated structures early in the project to improve access to highly contaminated facilities or plant components. In these instances, the non-contaminated removal costs could be reassigned from Site Restoration to an NRC License Termination support activity. However, in general, the allocations represent a reasonable accounting of those costs that can be expected to be incurred for the specific subcomponents of the total estimated program cost, if executed as described.

As noted within this document, the estimates were developed and costs are presented in 2018 dollars. As such, the estimates do not reflect the escalation of costs (due to inflationary and market forces) over the remaining operating life of the plant or during the decommissioning period.

**COST SUMMARY**  
(Thousands of 2018 Dollars)

<b>Work Activity</b>	<b>Unit 1</b>	<b>Unit 2 <sup>[1]</sup></b>	<b>Station</b>
Decontamination	16,138	17,455	33,593
Removal	139,801	168,715	308,516
Packaging	24,315	24,800	49,115
Transportation	15,162	16,438	31,601
Waste Disposal	76,815	80,647	157,461
Off-site Waste Processing	43,982	57,226	101,209
Program Management	280,173	304,771	584,944
Site Security	104,533	111,322	215,855
Spent Fuel Pool Isolation	13,800	9,200	23,000
Spent Fuel Management	107,295	98,020	205,315
Insurance and Regulatory Fees	20,701	17,430	38,131
Energy	4,003	4,057	8,060
Characterization and Licensing Surveys	28,888	25,870	54,758
Property Taxes	0	0	0
Miscellaneous	13,889	17,532	31,421
<b>Total <sup>[2]</sup></b>	<b>889,495</b>	<b>953,482</b>	<b>1,842,977</b>
NRC License Termination	627,574	686,908	1,314,482
Spent Fuel Management	183,845	170,847	354,691
Site Restoration	78,076	95,727	173,804

<sup>[1]</sup> Decommissioning costs associated with “Common” facilities are included with Unit 2

<sup>[2]</sup> Columns may not add due to rounding

## **1. INTRODUCTION**

This report presents estimates of the costs to promptly decommission (decontaminate and dismantle) the Vogtle Electric Generating Plant (Vogtle) following a scheduled cessation of plant operations. The estimates are designed to provide Southern Nuclear Company (SNC) with the information to assess its current decommissioning liability, as it relates to Vogtle.

The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2015<sup>[1]</sup>\* updated to reflect current assumptions pertaining to the disposition of the nuclear plant and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

The analysis is not an engineering evaluation, but estimates prepared in advance of the detailed planning required to carry out the decommissioning of the nuclear units. It may also not reflect the actual plan to decommission Vogtle; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

The 2015 plant inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, were reviewed for this analysis. Changes to the plant or site over the past three years, that would impact decommissioning, were incorporated into the estimate.

### **1.1 OBJECTIVES OF STUDY**

The objectives of this study are to prepare comprehensive estimates of the costs to decommission Vogtle for the scenario outlined in Section 2, to define a sequence of events, and to develop waste stream projections from the decontamination and dismantling activities.

The two units at the Vogtle site were designed and constructed concurrently. Unit 1 obtained its operating license on March 16, 1987, with Unit 2 following on March 31, 1989. For the purposes of this study, the shutdown dates were taken as 60 years after the operating license issue dates (the end of the current

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\* References provided in Section 7 of the document

authorized licenses), or January 16, 2047 for Unit 1 and February 9, 2049 for Unit 2. This time frame was used as input for scheduling the decommissioning.

## **1.2 SITE DESCRIPTION**

The Vogtle site is located in Burke County, Georgia, on the west side of the Savannah River about 26 miles southeast of Augusta and 15 miles east-northeast of Waynesboro. The station is comprised of two essentially identical pressurized water reactors.

The Nuclear Steam Supply System (NSSS) consists of a pressurized water reactor and four-loop Reactor Coolant System, supplied by the Westinghouse Electric Corporation. The license rating of each of the two units is 3625 megawatts (thermal) with a corresponding generating capacity of 1150 and 1152 megawatts (electric), respectively. The reactor coolant system is comprised of the reactor vessel and four heat transfer loops, each containing a vertical U-tube type steam generator and a single stage centrifugal reactor coolant pump. In addition, the system includes a pressurizer, a pressurizer relief tank and interconnected piping. The system is housed within a containment structure, a seismic Category I reinforced-concrete structure. It consists of a steel-lined, prestressed, post-tensioned concrete cylinder with a hemispherical dome.

Heat produced in the reactor is converted to electrical energy by the steam and power conversion system. A turbine-generator system converts the thermal energy of steam produced in the steam generators into mechanical shaft power and then into electrical energy. The plant's turbine-generators are each a General Electric 1800-rpm, tandem compound, six-flow, reheat unit with 38-inch last stage buckets. The high-pressure turbine element includes one double-flow high-pressure turbine. The low-pressure turbine elements include three double-flow low pressure turbines and four external moisture separator-reheaters with one stage reheating elements driving a direct-coupled generator at 1800 rpm. The turbines are operated in a closed feedwater cycle, which condenses the steam; the heated feedwater is returned to the steam generators. The Circulating Water System removes heat rejected in the main condensers. Water is withdrawn from the Savannah River by the circulating water pumps located at the intake structure, which is connected to a cooling tower by a canal. The two pump discharge lines connect to a common header, which connects to a three-section, six-flow-path condenser.

### **1.3 REGULATORY GUIDANCE**

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule "General Requirements for Decommissioning Nuclear Facilities," issued in June 1988.<sup>[2]</sup> This rule set forth financial criteria for decommissioning licensed nuclear power facilities. The regulation addressed decommissioning planning needs, timing, funding methods, and environmental review requirements. The intent of the rule was to ensure that decommissioning would be accomplished in a safe and timely manner and that adequate funds would be available for this purpose. Subsequent to the rule, the NRC issued Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors,"<sup>[3]</sup> which provided additional guidance to the licensees of nuclear facilities on the financial methods acceptable to the NRC staff for complying with the requirements of the rule. The regulatory guide addressed the funding requirements and provided guidance on the content and form of the financial assurance mechanisms indicated in the rule.

The rule defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB. The DECON alternative assumes that any contaminated or activated portion of the plant's systems, structures and facilities are removed or decontaminated to levels that permit the site to be released for unrestricted use shortly after the cessation of plant operations, while the SAFSTOR and ENTOMB alternatives defer the process.

The rule also placed limits on the time allowed to complete the decommissioning process. For all alternatives, the process is restricted in overall duration to 60 years, unless it can be shown that a longer duration is necessary to protect public health and safety. At the conclusion of a 60-year dormancy period (or longer if the NRC approves such a case), the site would still require significant remediation to meet the unrestricted release limits for license termination.

The ENTOMB alternative has not been viewed as a viable option for power reactors due to the significant time required to isolate the long-lived radionuclides for decay to permissible levels. However, with rulemaking permitting the controlled release of a site,<sup>[4]</sup> the NRC did re-evaluated the alternative. The resulting feasibility study, based upon an assessment by Pacific Northwest National Laboratory, concluded that the method did have conditional merit for some, if not most reactors. The staff also found that additional rulemaking would be needed before this option could be treated as a generic alternative.

The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.<sup>[5]</sup> However, the NRC's staff has subsequently recommended that rulemaking be deferred, based upon several factors (e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities), at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation.

In 1996, the NRC published revisions to the general requirements for decommissioning nuclear power plants.<sup>[6]</sup> When the decommissioning regulations were adopted in 1988, it was assumed that the majority of licensees would decommission at the end of the facility's operating licensed life. Since that time, several licensees permanently and prematurely ceased operations. Exemptions from certain operating requirements were required once the reactor was defueled to facilitate the decommissioning. Each case was handled individually, without clearly defined generic requirements. The NRC amended the decommissioning regulations in 1996 to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process. The amendments allow for greater public participation and better define the transition process from operations to decommissioning.

Under the revised regulations, licensees will submit written certification to the NRC within 30 days after the decision to cease operations. Certification will also be required once the fuel is permanently removed from the reactor vessel. Submittal of these notices, along with related changes to Technical Specifications, entitle the licensee to a fee reduction and eliminate the obligation to follow certain requirements needed only during operation of the reactor. Within two years of submitting notice of permanent cessation of operations, the licensee is required to submit a Post-Shutdown Decommissioning Activities Report (PSDAR) to the NRC. The PSDAR describes the planned decommissioning activities, the associated sequence and schedule, and an estimate of expected costs. Prior to completing decommissioning, the licensee is required to submit an application to the NRC to terminate the license, which will include a license termination plan (LTP).

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.<sup>[7]</sup> The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity

into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial reporting and assurances. The additional details, including a decommissioning estimate for the Independent Spent Fuel Storage Installation (ISFSI), are included in this study.

### 1.3.1 Nuclear Waste Policy Act

Congress passed the "Nuclear Waste Policy Act"<sup>[8]</sup> (NWPA) in 1982, assigning the federal government's long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. The NWPA provided that DOE would enter into contracts with utilities in which DOE would promise to take the utilities' spent fuel and high-level radioactive waste and utilities would pay the cost of the disposition services for that material. NWPA, along with the individual contracts with the utilities, specified that the DOE was to begin accepting spent fuel by January 31, 1998.

Since the original legislation, the DOE has announced several delays in the program schedule. By January 1998, the DOE had failed to accept any spent fuel or high level waste, as required by the NWPA and utility contracts. Delays continue and, as a result, generators have initiated legal action against the DOE in an attempt to obtain compensation for DOE's partial breach of contract [9]. To date no spent fuel has been accepted from commercial generating sites for disposal.

In 2010, the Obama Administration appointed a Blue Ribbon Commission on America's Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission's charter includes a requirement that it consider "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed."<sup>[10]</sup>

On January 26, 2012, the Blue Ribbon Commission issued its "Report to the Secretary of Energy" containing a number of recommendations on nuclear waste disposal. Two of the recommendations that may impact decommissioning planning are:



- “[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities”
- “[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste.”<sup>[12]</sup>

In January 2013, the DOE issued the “Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste,” in response to the recommendations made by the Blue Ribbon Commission and as “a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel...”<sup>[13]</sup> This document states:

“With the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that:

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048.”

The NRC’s review of DOE’s license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration significantly reduced the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit issued a writ of mandamus (in August 2013)<sup>[14]</sup> ordering NRC to comply with federal law and resume its review of DOE’s Yucca Mountain repository license application to the extent allowed by previously appropriated funding for the review. That review is now complete with

the publication of the five-volume safety evaluation report. A supplement to DOE's environmental impact statement and an adjudicatory hearing on the contentions filed by interested parties must be completed before a licensing decision can be made.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. 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.<sup>[15]</sup> SNC's current spent fuel management plan for the Vogtle spent fuel is based in general upon: 1) a 2032 start date for DOE initiating transfer of commercial spent fuel to a federal facility (not necessarily a final repository), and 2) expectations for spent fuel receipt by the DOE for the Vogtle fuel. The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. The information available on the projected rate of transfer and the backlogged national queue indicates that the oldest Vogtle fuel would not be eligible for pickup until 2040. Assuming a maximum rate of transfer of 3,000 metric tons of uranium (MTU)/year, the spent fuel is completely removed from the site by year end 2078 for a 2049 station shutdown.

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the DOE.<sup>[16]</sup> Interim storage of the fuel, until the DOE has completed the transfer, will be in the fuel handling building's storage pool as well as at an on-site ISFSI. For purposes of this analysis, it is assumed that DOE will accept already-canistered fuel.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K <sup>[15]</sup>), has been constructed to support continued plant operations. The ISFSI is assumed to be expanded following cessation of plant operations to accommodate the assemblies in the plant's wet storage pools. By relocating the fuel to the ISFSI, the wet storage pools may be secured and decommissioning of the nuclear units may proceed. Costs are included within the estimates to expand the ISFSI to accommodate the residual spent fuel inventories after pool operations cease and for the long-term caretaking of spent fuel at the site through the year 2078.

The SNC position is that the DOE has a contractual obligation to accept Vogtle's fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, including the cost of storing spent fuel in this study is appropriate to ensure the availability of sufficient decommissioning funds at the end of the station's life if the DOE has not met its obligation. The cost for the interim storage of spent fuel has been calculated and is separately presented as "Spent Fuel Management" expenditures in this report.

### 1.3.2 Low-Level Radioactive Waste Regulations

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for "shallow-land" disposal. With the passage of the "Low-Level Radioactive Waste Policy Act" in 1980,<sup>[17]</sup> and its Amendments of 1985,<sup>[18]</sup> the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

With the exception of Texas, no new compact facilities have been successfully sited, licensed, and constructed. The Texas Compact disposal facility is now operational and waste is being accepted from generators within the Compact by the operator, Waste Control Specialists (WCS). The facility is also able to accept limited quantities of non-Compact waste.

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to SNC. The majority of the low-level radioactive waste designated for direct disposal (Class A<sup>[19]</sup>) can be sent to EnergySolutions' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon SNC's current experience-based costs associated with the EnergySolutions facility. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

The WCS facility is able to receive the Class B and C waste. As such, for this analysis, Class B and C waste was assumed to be shipped to the WCS facility. Disposal costs for this waste were also based upon SNC's current experience-based costs associated with the WCS facility.

The dismantling of the components residing closest to the reactor core generates radioactive waste that may be considered unsuitable for shallow-land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste. However, to date, the federal government has not identified a cost for disposing of GTCC or a schedule for acceptance.

For purposes of this analysis only, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as high-level waste and at a cost equivalent to that envisioned for the spent fuel. The GTCC is packaged in the same canisters used for spent fuel and either stored on site or shipped directly to a DOE facility as it is generated (depending upon the timing of the decommissioning and whether the spent fuel has been removed from the site prior to the start of decommissioning).

A significant portion of the metallic waste generated during decommissioning may potentially be contaminated by radioactive materials. Rather than designating this large volume for controlled disposal, this analysis assumes that the material is sent to a licensed facility for characterization and processing. Processing is routinely used to reduce the volume, for example, by component disassembly, sorting, and compaction. The estimates reflect the savings from waste recovery/volume reduction.

### 1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, “Radiological Criteria for License Termination,”<sup>[20]</sup> amending 10 CFR Part 20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates assume that the Vogtle site will be remediated to a residual level consistent with the NRC-

prescribed level. It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).<sup>[21]</sup> An additional and separate limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.<sup>[22]</sup>

On October 9, 2002, the NRC signed an agreement with the EPA on the radiological decommissioning and decontamination of NRC-licensed sites. The Memorandum of Understanding (MOU)<sup>[23]</sup> provides that EPA will defer exercise of authority under CERCLA for the majority of facilities decommissioned under NRC authority. The MOU also includes provisions for NRC and EPA consultation for certain sites when, at the time of license termination, (1) groundwater contamination exceeds EPA-permitted levels; (2) NRC contemplates restricted release of the site; and/or (3) residual radioactive soil concentrations exceed levels defined in the MOU.

The MOU does not impose any new requirements on NRC licensees and should reduce the involvement of the EPA with NRC licensees who are decommissioning. Most sites are expected to meet the NRC criteria for unrestricted use, and the NRC believes that only a few sites will have groundwater or soil contamination in excess of the levels specified in the MOU that trigger consultation with the EPA. However, if there are other hazardous materials on the site, the EPA may be involved in the cleanup. As such, the possibility of dual regulation remains for certain licensees. The present study does not include any costs for this occurrence.

## **2. DECOMMISSIONING ALTERNATIVE**

Detailed cost estimates were developed to decommission Vogtle based upon the approved DECON decommissioning alternative. The DECON alternative, as defined by the NRC, is "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations." This study does not address the cost to dispose of the spent fuel residing at the site; such costs are funded through a surcharge on electrical generation. However, the study does estimate the costs incurred with the interim on-site storage of the fuel pending shipment by the DOE to an off-site disposal facility.

The operating licenses for Units 1 and 2 currently expire in January 2047 and February 2049, respectively. The DECON scenario assumes that decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling processes. Spent fuel that cannot be directly transferred to the DOE from the storage pools is relocated to the ISFSI so as to facilitate decontamination and dismantling activities within the fuel handling buildings. Spent fuel storage operations continue at the site until the transfer of the fuel to the DOE is complete, assumed to be in the year 2078.

The following section describes the basic activities associated with the DECON decommissioning alternative. Although detailed procedures for each activity identified are not provided, and the actual sequence of work may vary, the activity descriptions provide a basis not only for estimating, but also for the expected scope of work, i.e., engineering and planning at the time of decommissioning.

The conceptual approach that the NRC has described in its regulations divides decommissioning into three phases. The initial phase commences with the effective date of permanent cessation of operations and involves the transition of both plant and licensee from reactor operations (i.e., power production) to facility de-activation and closure. During the first phase, notification is provided to the NRC certifying the permanent cessation of operations and the removal of fuel from the reactor vessel. The licensee is then prohibited from reactor operation.

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimates developed for Vogtle are also divided into phases or periods; however, demarcation of the phases is based upon major milestones within the project or significant changes in the projected expenditures.

## **2.1 PERIOD 1 – PREPARATIONS**

In anticipation of the cessation of plant operations, detailed preparations are undertaken to provide a smooth transition from plant operations to site decommissioning. Through implementation of a staffing transition plan, the organization required to manage the intended decommissioning activities is assembled from available plant staff and outside resources. Preparations include the planning for permanent defueling of the reactor, revision of technical specifications applicable to the operating conditions and requirements, a characterization of the facility and major components, and the development of the PSDAR.

### **2.1.1 Engineering and Planning**

The PSDAR, required within two years of the notice to cease operations, provides a description of the licensee's planned decommissioning activities, a timetable, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local hearing to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59, i.e., without specific NRC approval. Major activities are defined as any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components (for shipment) containing greater than Class C waste (GTCC), as defined by 10 CFR §61. Major components are further defined as comprising the reactor vessel and internals, large bore recirculation system piping, and other large components that are radioactive. The NRC includes the following additional criteria for use of the §50.59 process in decommissioning. The proposed activity must not:

- foreclose release of the site for possible unrestricted use,
- significantly increase decommissioning costs,
- cause any significant environmental impact, or
- violate the terms of the licensee's existing license.

Existing operational technical specifications are reviewed and modified to reflect plant conditions and the safety concerns associated with permanent cessation of operations. The environmental impact associated

with the planned decommissioning activities is also considered. Typically, a licensee is not allowed to proceed if the consequences of a particular decommissioning activity are greater than that bounded by previously evaluated environmental assessments or impact statements. In this instance, the licensee must submit a license amendment for the specific activity and update the environmental report.

The decommissioning program outlined in the PSDAR will be designed to accomplish the required tasks within the ALARA guidelines (as defined in 10 CFR §20) for protection of personnel from exposure to radiation hazards. It will also address the continued protection of the health and safety of the public and the environment during the dismantling activity. Consequently, with the development of the PSDAR, activity specifications, cost-benefit and safety analyses, and work packages and procedures, would be assembled to support the proposed decontamination and dismantling activities.

#### **2.1.2 Site Preparations**

Following final plant shutdown, and in preparation for actual decommissioning activities, the following activities are initiated:

- Characterization of the site and surrounding environs. This includes (1) performing detailed radiation surveys of work areas and major components (including the reactor vessel and its internals), and (2) performing contamination surveys of internal piping components levels and primary shield cores.
- Isolation of the spent fuel storage pool and fuel handling systems. This allows decommissioning operations to be performed in plant areas to the greatest extent, with minimum impact to the project schedule. The fuel will be transferred from the spent fuel pool once it decays to the point that it meets the heat load criteria of the spent fuel casks. It is therefore assumed that the fuel pool will remain operational for a minimum of five and one-half years following the cessation of plant operations.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-



metallic components generated in decommissioning), site security and emergency programs, and industrial safety.

- Construction of an ISFSI-to-DOE transfer facility. This facility will allow the efficient transfer of spent fuel canisters from the ISFSI pad to the DOE transportation overpacks and transportation vehicle.

## **2.2 PERIOD 2 – DECOMMISSIONING OPERATIONS**

This period includes physical decommissioning activities associated with the removal and disposal of systems and structures containing contamination and radioactivity including the successful termination of the Part 50 operating licenses, exclusive of the ISFSI. Significant decommissioning activities in this phase include:

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. This may include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.
- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This may include the upgrading of roads (on and off site) to facilitate hauling and transport. Building modifications may be required to facilitate access of large/heavy equipment. Modifications may also be required to support the segmentation of the reactor vessel internals and component extraction.
- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.
- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages.
- Decontamination of components and piping systems as required to control (minimize) worker exposure.
- Removal of piping and components no longer essential to support decommissioning operations.
- Removal of control rod drive housings and the head service structure from the reactor vessel head. Segmentation of the vessel closure head.
- Removal and segmentation of the upper internals assemblies. Segmentation will maximize the loading of the shielded transport casks,

- i.e., by weight and activity. The operations are conducted under water using remotely operated tooling and contamination controls.
- Disassembly and segmentation of the remaining reactor internals, including core former and lower core support assembly.
  - Segmentation of the reactor vessel. This requires installation of a shielded work platform. Cutting operations are performed in-air using remotely operated equipment within a contamination control envelope, with the water level maintained just below the cut to minimize the working area dose rates. Segments are transferred in-air to containers that are stored under water.
  - Removal of the activated portions of the concrete biological shield and accessible contaminated concrete surfaces. If dictated by the steam generator and pressurizer removal scenarios, those portions of the associated cubicles necessary for access and component extraction are removed.
  - Removal of the steam generators and pressurizer for controlled disposal. Decontaminate exterior surfaces, as required, and seal-weld openings (nozzles, inspection hatches, and other penetrations). These components can serve as their own burial containers provided that all penetrations are properly sealed and the internal contaminants are stabilized. Steel shielding will be added as necessary to meet transportation limits and regulations.
  - Expansion of the ISFSI and transfer of the spent fuel from the storage pools to the DOE and ISFSI pad for interim storage. Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer to the DOE is expected to begin in 2040 and to be completed by the end of the year 2078.

At least two years prior to the anticipated date of license termination, an LTP will be required. Submitted as a supplement to the Final Safety Analysis Report (FSAR), or equivalent, the plan must include: a site characterization, description of the remaining dismantling activities, plans for site remediation, procedures for the final radiation survey, designation of the end use of the site, an updated cost estimate to complete the decommissioning, and any associated environmental concerns. The NRC will notice the receipt of the plan, make the plan available for public comment, and schedule a local hearing. LTP approval will be subject to any conditions and limitations as deemed appropriate by the NRC. The licensee may then commence with the final remediation of site facilities and services, including:

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).
- Removal of the steel liners from refueling canal, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/contaminated concrete.
- Surveys of the decontaminated areas of the containment structure.
- Remediation and removal of the contaminated equipment and material from the auxiliary building and any other contaminated facility. Radiation and contamination controls will be utilized until radiation and contamination levels are reduced such that the structures and equipment can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity facilitates surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.
- Removal of the remaining components, equipment, and plant services in support of the area release survey(s).
- Routing of material removed in the decontamination and dismantling to a central processing area. Material certified to be free of contamination is released for unrestricted disposition, e.g., as scrap, recycle, or general disposal. Contaminated material is characterized and segregated for additional off-site processing (disassembly, chemical cleaning, volume reduction, and waste treatment), and/or packaged for controlled disposal at a low-level radioactive waste disposal facility.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the “Multi-Agency Radiation Survey and Site Investigation Manual” (MARSSIM).<sup>[24]</sup> This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies state-of-the-art, commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the surveys are complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an

independent confirmation of radiological site conditions, and makes a determination on final termination of the license.

The NRC will amend the operating licenses to reduce the licensed area to the ISFSI area if it determines that site remediation has been performed in accordance with the LTP, and that the terminal radiation survey and associated documentation demonstrate that the property (exclusive of the ISFSI) is suitable for release.

## **2.3 PERIOD 3 - SITE RESTORATION, ISFSI OPERATIONS AND DEMOLITION**

### **2.3.1 Site Restoration**

Following completion of decommissioning operations, site restoration activities may begin. Efficient removal of the contaminated materials and verification that residual radionuclide concentrations are below the NRC limits may result in substantial damage to many of the structures. Although performed in a controlled and safe manner, blasting, coring, drilling, scarification (surface removal), and the other decontamination activities will substantially degrade power block structures, including the reactor and auxiliary buildings. Verifying that subsurface radionuclide concentrations meet NRC site release requirements may require removal of grade slabs and lower floors, potentially weakening footings and structural supports. This removal activity will be necessary for those facilities and plant areas where historical records, when available, indicate the potential for radionuclides having been present in the soil, where system failures have been recorded, or where it is required to confirm that subsurface process and drain lines were not breached over the operating life of the station.

Prompt dismantling of site structures is clearly the most appropriate and cost-effective option. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The cost to dismantle site structures with a work force already mobilized on site is more efficient than if the process were deferred. Site facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public and future workers. Abandonment creates a breeding ground for vermin infestation and other biological hazards.

This cost study presumes that non-essential structures and site facilities are dismantled as a continuation of the decommissioning activity. Foundations and exterior walls are removed to a nominal depth of three feet below grade. The three-foot depth allows for the placement of gravel for drainage, and topsoil so that vegetation can be established for erosion control. Site areas affected by the dismantling activities are restored and the plant area graded as required to prevent ponding and inhibit the refloating of subsurface materials.

Non-contaminated concrete rubble produced by demolition activities is processed to remove rebar and miscellaneous embedments. The processed material is then used on site to backfill voids. Excess non-contaminated materials are trucked to an off-site area for disposal as construction debris. Removable concrete vehicle barriers are removed intact and transported off site (cost of handling and transport is included in the estimate). Disposal of the barriers is based on no cost or credit to the decommissioning project.

### **2.3.2 ISFSI Operations & Demolition**

The ISFSI will continue to operate under a general license (10 CFR Part 50) following the amendment of the operating licenses to release the adjacent (power block) property. Assuming the DOE starts accepting spent fuel in 2032, transfer of spent fuel from Vogtle continues through the year 2078. Any delay in the transfer process, for example, due to a delay in the scheduled opening of the geologic repository, a slower acceptance rate, or a combination of a delayed start date and lower transfer rate, results in a longer on-site residence time for the spent fuel and therefore additional caretaking expenses.

At the conclusion of the spent fuel transfer process, the ISFSI is decommissioned. The NRC terminates the Part 50 license if it determines that the remediation of the ISFSI has been performed in accordance with an ISFSI license termination plan and that the final radiation survey and associated documentation demonstrate that the facility is suitable for release.

The existing ISFSI design is based upon the use of a multi-purpose canister (MPC), each with a concrete overpack. The spent fuel is placed inside the MPC, which is placed inside the concrete overpack (cylindrical concrete shielding container), and stored vertically on a storage pad. For purposes of this cost analysis, it is assumed that once the MPCs

containing the spent fuel assemblies have been removed, and any residual radioactivity removed from the concrete overpack, the license for the ISFSI will be terminated. Following license termination the concrete overpacks will be dismantled using conventional reinforced concrete demolition techniques. The concrete storage pad will then be removed, and the area graded and landscaped to conform to the surrounding environment.

### **3. COST ESTIMATE**

The cost estimates prepared for decommissioning Vogtle consider the unique features of the site, including the nuclear steam supply system, power generation systems, support services, site buildings, and ancillary facilities. The bases of the estimates, including the sources of information relied upon, the estimating methodology employed, site-specific considerations and other pertinent assumptions are described in this section.

#### **3.1 BASIS OF ESTIMATE**

The current estimates are developed using the basic design information originally generated for the decommissioning analysis prepared in 1994 and subsequently updated on a periodic basis with the most recent analysis completed in 2015. The information was reviewed for the current estimates and updated, as deemed appropriate. The site-specific considerations and assumptions used in the previous estimates were also revisited. Modifications were incorporated where new information was available or where experience from ongoing decommissioning programs provided viable alternatives or improved processes.

#### **3.2 METHODOLOGY**

The methodology used to develop these cost estimates follow the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"<sup>[25]</sup> and the DOE "Decommissioning Handbook."<sup>[26]</sup> These documents present a unit factor method for estimating decommissioning activity costs, which simplifies the estimating calculations. Unit factors for concrete removal (\$/cubic yard), steel removal (\$/ton), and cutting costs (\$/inch) were developed using local labor rates provided by SNC. The activity-dependent costs are estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures rely upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means.<sup>[27]</sup>

The unit factor method provides a demonstrable basis for establishing reliable cost estimates. The detail provided in the unit factors, including activity duration, labor costs (by craft), and equipment and consumable costs, provides a high level of confidence that essential elements have not been omitted. Appendix

A presents the detailed development of a typical unit factor. Appendix B provides the values contained within one set of factors developed for this analysis.

Regulatory Guide 1.184 <sup>[27]</sup> describes the methods and procedures that are acceptable to the NRC staff for implementing the requirements that relate to the initial activities and the major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and sequence in the regulations. The format and content of the estimates is also consistent with the recommendations of Regulatory Guide 1.202. <sup>[28]</sup>

This estimates reflect lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells, and associated facilities, completed in 1997. In addition, the planning and engineering for the Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, Crystal River, San Onofre and Vermont Yankee nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

#### Work Difficulty Factors

TLG has historically applied work difficulty adjustment factors (WDFs) to account for the inefficiencies in working in radiologically controlled areas and in a power plant environment. WDFs are assigned to each unique set of unit factors, commensurate with the inefficiencies associated with working in confined, hazardous environments. The ranges used for the WDFs are as follows:

- |                                 |            |
|---------------------------------|------------|
| • Access Factor                 | 10% to 20% |
| • Respiratory Protection Factor | 10% to 50% |
| • Radiation/ALARA Factor        | 10% to 37% |
| • Protective Clothing Factor    | 10% to 30% |
| • Work Break Factor             | 8.33%      |

The factors and their associated range of values were developed in conjunction with the AIF/NESP-036 study. The application of the factors is discussed in more detail in that publication.

#### Scheduling Program Durations

The unit factors, adjusted by the WDFs as described above, are applied against the inventory of materials to be removed in the radiological controlled areas.



The resulting man-hours, or crew-hours, are used in the development of the decommissioning program schedule, using resource loading and event sequencing considerations. The scheduling of conventional removal and dismantling activities is based upon productivity information available from the "Building Construction Cost Data" publication. Dismantling of the fuel pool systems and decontamination of the spent fuel pools is also dependent upon the timetable for the transfer of the spent fuel assemblies from the pools to the DOE and/or ISFSI.

An activity duration critical path is used to determine the total decommissioning program schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field engineering, equipment rental, and support services such as quality control and security. This systematic approach for assembling decommissioning estimates provides a high degree of confidence in the reliability of the resulting cost estimate.

### **3.3 FINANCIAL COMPONENTS OF THE COST MODEL**

TLG's proprietary decommissioning cost model, DECCER, produces a number of distinct cost elements. These direct expenditures, however, do not comprise the total cost to accomplish the project goal, i.e., license termination, spent fuel management, and site restoration.

Inherent in any cost estimate that does not rely on historical data is the inability to specify the precise source of costs imposed by factors such as tool breakage, accidents, illnesses, weather delays, and labor stoppages. In TLG's DECCER cost model, contingency fulfills this role. Contingency is added to each line item to account for costs that are difficult or impossible to develop analytically. Such costs are historically inevitable over the duration of a job of this magnitude; therefore, this cost analysis includes funds to cover these types of expenses.

#### **3.3.1 Contingency**

The activity- and period-dependent costs are combined to develop the total decommissioning cost. A contingency is then applied on a line-item basis, using one or more of the contingency types listed in the AIF/NESP-036 study. "Contingencies" are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook"<sup>[28]</sup> as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will

increase costs are likely to occur." The cost elements in this estimate are based upon ideal conditions and maximum efficiency; therefore, consistent with industry practice, a contingency factor has been applied. In the AIF/NESP-036 study, the types of unforeseeable events that are likely to occur in decommissioning are discussed and guidelines are provided for percentage contingency in each category. It should be noted that contingency, as used in this estimate, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

The use and role of contingency within decommissioning estimates is not a "safety factor issue." Safety factors provide additional security and address situations that may never occur. Contingency funds are expected to be fully expended throughout the program. They also provide assurance that sufficient funding is available to accomplish the intended tasks. An estimate without contingency, or from which contingency has been removed, could disrupt the orderly progression of events and jeopardize a successful conclusion to the decommissioning process.

For example, the most technologically challenging task in decommissioning a commercial nuclear station is the disposition of the reactor vessel and internal components, which have become highly radioactive after a lifetime of exposure to radiation produced in the core. The disposition of these highly radioactive components forms the basis for the critical path (schedule) for decommissioning operations. Cost and schedule are inter-dependent and any deviation in schedule has a significant impact on cost for performing a specific activity.

Disposition of the reactor vessel internals involves the underwater cutting of complex components that are highly radioactive. Costs are based upon optimum segmentation, handling, and packaging scenarios. The schedule is primarily dependent upon the turnaround time for the heavily shielded shipping casks, including preparation, loading, and decontamination of the containers for transport. The number of casks required is a function of the pieces generated in the segmentation activity, a value calculated on optimum performance of the tooling employed in cutting the various subassemblies. The risks and uncertainties associated with this task are that the expected optimization may not be achieved, resulting in delays and additional program costs. For this reason, contingency must be included to mitigate the consequences of the expected inefficiencies inherent in this complex

activity, along with related concerns associated with the operation of highly specialized tooling, field conditions, and water clarity.

Contingency funds are an integral part of the total cost to complete the decommissioning process. Exclusion of this component puts at risk a successful completion of the intended tasks and, potentially, subsequent related activities. For this study, TLG examined the major activity-related problems (decontamination, segmentation, equipment handling, packaging, transport, and waste disposal) that necessitate a contingency. Individual activity contingencies range from 10% to 75%, depending on the degree of difficulty judged to be appropriate from TLG's actual decommissioning experience. The contingency values used in this study are as follows:

• Decontamination	50%
• Contaminated Component Removal	25%
• Contaminated Component Packaging	10%
• Contaminated Component Transport	15%
• Low-Level Radioactive Waste Disposal	25%
• Low-Level Radioactive Waste Processing	15%
• Reactor Segmentation	75%
• NSSS Component Removal	25%
• Reactor Waste Packaging	25%
• Reactor Waste Transport	25%
• Reactor Vessel Component Disposal	50%
• GTCC Disposal	15%
• Non-Radioactive Component Removal	15%
• Heavy Equipment and Tooling	15%
• Supplies	25%
• Engineering	15%
• Energy	15%
• Characterization and Termination Surveys	30%
• Construction	15%
• Insurance and Taxes	10%
• Staffing	15%
• NRC and Emergency Planning Fees	10%
• Spent Fuel Storage (Dry) Systems	15%
• Spent Fuel Transfer Costs	15%

- Operations and Maintenance Expenses 15%
- ISFSI Decommissioning 25%

The contingency values are applied to the appropriate components of the estimates on a line item basis. A composite value is then reported at the end of each detailed estimate (as provided in Appendix C). The overall contingency, when applied this basis, results in an average value of 18.7% for Unit 1 and 18.6% for Unit 2. Appendix E, the ISFSI decommissioning calculation, uses a flat 25% contingency added at the end of the calculation.

### 3.3.2 Financial Risk

In addition to the routine technology-related uncertainties addressed by contingency, there is a broader level of project uncertainty that is sometimes necessary to consider when bounding decommissioning costs. Examples can include changes in work scope, pricing, job performance, and other variations that could conceivably, but not necessarily, occur. Consideration is sometimes necessary to generate a level of confidence in the estimate, within a range of probabilities. TLG considers these types of costs under the broad term “financial risk.” Included within the category of financial risk are:

- Transition activities and costs: ancillary expenses associated with eliminating 50% to 80% of the site labor force shortly after the cessation of plant operations, added cost for worker separation packages throughout the decommissioning program, national or company-mandated retraining, and retention incentives for key personnel.
- Delays in approval of the decommissioning plan due to intervention, public participation in local community meetings, legal challenges, and national and local hearings.
- Changes in the project work scope from the baseline estimate, involving the discovery of unexpected levels of contaminants, contamination in places not previously expected, contaminated soil previously undiscovered (either radioactive or hazardous material contamination), variations in plant inventory or configuration not indicated by the as-built drawings.
- Regulatory changes, e.g., affecting worker health and safety, site release criteria, waste transportation, and disposal.

- Policy decisions altering national commitments, e.g., in the ability to accommodate certain waste forms for disposition, or in the timetable for such.
- Changes in the DOE's spent fuel transfer schedule and acceptance rate. Changes in these parameters affect the ISFSI size and duration of spent fuel storage and transfer.
- Pricing changes for basic inputs, such as labor, energy, materials, and waste disposal.

This cost study does not add any additional costs to the estimate for financial risk, since there is insufficient historical data from which to project future liabilities. Consequently, the areas of uncertainty or risk are revisited periodically and addressed through repeated revisions or updates of the base estimates.

### **3.4 SITE-SPECIFIC CONSIDERATIONS**

There are a number of site-specific considerations that affect the method for dismantling and removal of equipment from the site and the degree of restoration required. The cost impact of the considerations identified below is included in this cost study.

#### **3.4.1 Spent Fuel**

The cost to dispose the spent fuel generated from plant operations is not reflected within the estimates to decommission Vogtle. Ultimate disposition of the spent fuel is within the province of the DOE's Waste Management System, as defined by the Nuclear Waste Policy Act. As such, the disposal cost is financed by a surcharge paid into the DOE's waste fund during operations. On November 19, 2013, the U.S. Court of Appeals for the D.C. Circuit ordered the Secretary of the Department of Energy to suspend collecting annual fees for nuclear waste disposal from nuclear power plant operators until the DOE has conducted a legally adequate fee assessment.

The NRC does, however, requires licensees to establish a program to manage and provide funding for the management of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy. This requirement is prepared for through inclusion of certain high-level waste cost elements within the estimates, as described below.

The DOE's repository program assumes that spent fuel will be accepted for disposal from the nation's commercial nuclear plants in the order (the "queue") in which it was removed from service ("oldest fuel first").<sup>[30]</sup> Repository operations were based upon annual industry-wide receipt of 400 Metric Tons Heavy Metal (MTHM) in the first year of operation, a total of 3,800 MTHM in years 2 through 4 and 3,000 MTHM for year 5 and beyond.<sup>[31]</sup> The DOE contracts provide mechanisms for altering the oldest fuel first allocation scheme, including emergency deliveries, exchanges of allocations amongst utilities and the option of providing priority acceptance from permanently shut down nuclear reactors. Because it is unclear how these mechanisms may operate once DOE begins accepting spent fuel from commercial reactors, this study assumes that DOE will accept spent fuel in an oldest fuel first order.

With the storage pools emptied, decommissioning operations can be concluded and the operating licenses terminated.

### ISFSI

An ISFSI, which is operated under the plant's general license, has been constructed to support management of the spent fuel during operations. Costs are not included to re-license the ISFSI, but are included to expand the capacity of the ISFSI following final plant shutdown. The facility is assumed to be available to support spent fuel management once the units cease operation, until the DOE is able to removal all spent fuel from the site.

The ISFSI will continue to operate throughout decommissioning, and beyond the termination of the operating license in the DECON decommissioning alternative, until such time that the transfer of spent fuel to the DOE can be completed. Assuming, that DOE begins to remove spent fuel from the site in 2040, the process is expected to be completed by the year 2078.

Post-shutdown and maintenance costs for the spent fuel pools and the ISFSI are also included and address the cost for staffing the facility, as well as security, insurance, and licensing fees. Costs are provided for the final disposition of the facilities once the transfer is complete. These costs are allocated on a 50:50 basis between Units 1 and 2.

### Canister and Overpack

A Holtec HI-STORM 100S Version B system is assumed for future ISFSI capacity expansions. For fuel assemblies transferred from the pools to the ISFSI after shut down, 24 assemblies are loaded into a canister. The cost of the concrete overpack is included in the decommissioning estimate. The cost of the MPC's is assumed to be funded from sources outside the decommissioning fund.

### Canister Loading and Transfer

The estimates include the cost for the labor and equipment to transfer and load each spent fuel canister into the DOE transport cask or to the ISFSI from the wet storage pools. Since the DOE has not published details about its cask system, an SNC-provided allowance is used to estimate the cost to transfer the fuel from the ISFSI into the DOE transport cask. However, use of this allowance should not be used to infer that SNC has any detailed information on the cask system DOE will ultimately provide.

### Operations and Maintenance

The estimates include the cost of operating and maintaining the spent fuel pools and the ISFSI, respectively. Pool operations are expected to continue approximately five and one half years after the cessation of operations. ISFSI operating costs are based upon a 30 year period of operations following the shutdown of Unit 2.

### ISFSI Decommissioning

In accordance with 10 CFR §72.30, licensees must have a proposed decommissioning plan for the ISFSI site and facilities that includes a cost estimate for the plan. The plan should contain sufficient information on the proposed practices and procedures for the decontamination of the ISFSI and for the disposal of residual radioactive materials after all spent fuel, high-level radioactive waste, and reactor-related GTCC waste have been removed.

A multi-purpose (storage and transport) canister (MPC) with a concrete overpack is used as a basis for the cost analyses. The majority of the overpacks are assumed to be disposed of as "clean" material. As an allowance, the inner steel liners of the remaining overpacks (total of 18)

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, i.e., contain residual radioactivity. The allowance is based upon the number of modules required for the final core off-load (i.e., 193 offloaded assemblies, 24 assemblies per canister) which results in 9 overpack liners per unit. It is assumed that these are the final modules offloaded; consequently they have the least time for radioactive decay of the neutron activation products.

No contamination or activation of the ISFSI pad is assumed. 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. As such, only verification surveys are included for the pads in the decommissioning estimate. The estimate is limited to costs necessary to terminate the ISFSI's NRC license and meet the §20.1402 criteria for unrestricted use.

In accordance with the specific requirements of 10 CFR §72.30 for the ISFSI work scope, the cost estimate for decommissioning the ISFSI reflects: 1) the cost of an independent contractor performing the decommissioning activities; 2) an adequate contingency factor; and 3) the cost of meeting the criteria for unrestricted use. The decommissioning cost for the ISFSI is identified as a separate line item in the Unit 1 and 2 cost tables in Appendix C, and as stand-alone table in Appendix E.

### GTCC

The dismantling of the reactor internals is expected to generate radioactive waste considered unsuitable for shallow land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste.<sup>[32]</sup>

Although the material is not classified as high-level waste, federal regulations under the Act designate that disposal of this material is a federal responsibility under Section 3(b)(1)(D). However, the DOE has not been forthcoming with an acceptance criteria or disposition schedule



for this material, and numerous questions remain as to the ultimate disposal cost and waste form requirements.

As such, for purposes of this study, the GTCC has been packaged and disposed of in the same manner as high-level waste, at a cost equivalent to that envisioned for the spent fuel. The number of canisters required and the packaged volume for GTCC was based upon experience at Maine Yankee (e.g., the constraints on loading as identified in the canister's certificate of compliance), but adjusted for the increased spent fuel capacity of the current MPCs.

It is assumed that the DOE would not accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage at the Hatch site. GTCC costs have been segregated and included within the "License Termination" expenditures.

#### 3.4.2 Reactor Vessel and Internal Components

The reactor pressure vessel and internal components are segmented in order to meet transportation and disposal requirements. Segmentation is performed in the refueling canal, where a turntable and remote cutter are installed. The vessel is segmented in place, using a mast-mounted cutter supported off the lower head and directed from a shielded work platform installed overhead in the reactor well. Transportation cask specifications and transportation regulations will dictate segmentation and packaging methodology. Material is loaded into single use cask liners that are loaded into shielded and reusable transportation casks.

Intact disposal of the reactor vessel and internal components could provide savings in cost and worker exposure by eliminating the complex segmentation requirements, isolation of the GTCC material, and transport/storage of the resulting waste packages. Portland General Electric (PGE) was able to dispose of the Trojan reactor as an intact package. However, its location on the Columbia River simplified the transportation analysis since:

- The reactor package could be secured to the transport vehicle for the entire journey, i.e., the package was not lifted during transport.

- There were no man-made or natural terrain features between the plant site and the disposal location that could produce a large drop, and
- Transport speeds were very low, limited by the overland transport vehicle and the river barge.
- As a member of the Northwest Compact, PGE had a site available for disposal of the package-the US Ecology facility in Washington State. The characteristics of this arid site proved favorable in demonstrating compliance with land disposal regulations.

It is not known whether this option will be available when Vogtle ceases operation. Future viability of this option will depend upon the ultimate location of the disposal site, and the disposal site licensee's ability to accept highly radioactive packages and effectively isolate them from the environment. Consequently, as a bounding condition, the study assumes the reactor vessel requires segmentation.

### 3.4.3 Primary System Components

The reactor coolant system is assumed to be decontaminated using chemical agents prior to the start of dismantling operations. This type of decontamination can be expected to have a significant ALARA impact, since in this scenario the removal work is done within the first few years of shutdown. A decontamination factor (average reduction) of 10 is assumed for the process. Disposal of the decontamination solution effluent is included within the estimate as a "process chemical waste" charge.

The following discussion deals with the removal and disposition of the steam generators, but the techniques involved are also applicable to other large components, such as heat exchangers, component coolers, and the pressurizer. The steam generators' size, weight, and location within the containment will ultimately determine the removal strategy.

A potential method for removal (and the one used as the basis in this estimate) is the extraction of the generators through the existing equipment hatch. Sections of the steam generator cubicle walls, adjoining floor slabs, may require removal to allow for the generators to be maneuvered to the hatch.

Grating within the work area is decontaminated and removed. Next, a trolley crane is set up for removal of the generators. By setting the trolley crane first, it can be used to move portions of the steam generator cubicle walls and floor slabs from the containment to a location where they are decontaminated and transported to the material handling area.

The generators are rigged for removal, disconnected from the surrounding piping and supports, and maneuvered into the open area where they will be lowered onto a dolly. Once each steam generator has been placed in the horizontal position, nozzles and other openings are sealed. When this stage has been completed, each generator is moved out of containment and lowered onto a multi-wheeled transporter. The generators are relocated to an on-site storage area. The generator secondary side dome and internals are removed in order to reduce the component dimensions to permit rail transport to the disposal facility. The secondary side (dome and internals) is reduced in volume, repackaged, and sent to the recycling facility. If required, the lower shell will have carbon steel plate welded to its outside surface for shielding during transport. The interior volume is filled with low-density cellular concrete for stabilization of the internal contamination and to satisfy burial ground packaging requirements. The pressurizer is removed using the same technique. Each component is then loaded onto a heavy-duty flatcar for rail transport to the disposal facility.

Reactor coolant piping is cut from the reactor vessel once the water level in the vessel (used for personnel shielding during dismantling and cutting operations in and around the vessel) drops below the nozzle zone. The piping is boxed and transported by shielded van. The reactor coolant pumps and motors are lifted out intact, packaged, and transported by rail for disposal.

#### 3.4.4 Main Turbine and Condenser

The main turbine is dismantled using conventional maintenance procedures. The turbine rotors and shafts are removed to a laydown area. The lower turbine casings are removed from their anchors by controlled demolition. The main condenser is disassembled and moved to a laydown area. Material is surveyed and if free of radioactive contamination, released as scrap.

### 3.4.5 Transportation Methods

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components qualifies as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49 of the Code of Federal Regulations.<sup>[29]</sup> The contaminated material is packaged in Industrial Packages (IP I, II, or III) for transport unless demonstrated to qualify as their own shipping containers. The reactor vessel and internal components are expected to be transported in accordance with Part 71,<sup>[30]</sup> as Type B. It is conceivable that the reactor, due to its limited specific activity, could qualify as LSA II or III. However, the high radiation levels on the outer surface require that additional shielding be incorporated within the packaging so as to attenuate the dose to levels acceptable for transport.

Any fuel cladding failure that occurred during the lifetime of the plant is assumed to have released fission products at sufficiently low levels that the buildup of quantities of long-lived isotopes (e.g., <sup>137</sup>Cs, <sup>90</sup>Sr, or transuranics) has been prevented from reaching levels exceeding those that permit the major reactor components to be shipped under current transportation regulations and disposal requirements.

Transport of the highly activated metal, produced in the segmentation of the reactor vessel and internal components, is by shielded truck cask. Cask shipments may exceed 95,000 pounds, including vessel segment(s), supplementary shielding, cask tie-downs, and tractor-trailer. The maximum level of activity per shipment assumed permissible is based upon the license limits of the available shielded transport casks. The segmentation scheme for the vessel and internal segments are designed to meet these limits.

The transport of large intact components, e.g., large heat exchangers and other oversized components, is by a combination of truck, rail, and/or multi-wheeled transporter.

Transportation costs for Class A radioactive material requiring controlled disposal are based upon the mileage to the EnergySolutions' facility in Clive, Utah. Transportation costs for the higher activity Class B and C radioactive material are based upon the mileage to the WCS facility in Andrews County, Texas. The transportation cost for the GTCC material is assumed to be contained within the disposal cost. Transportation costs for off-site waste processing are based upon the

mileage to Oak Ridge, Tennessee. Truck transport costs are developed from published tariffs from Tri-State Motor Transit.<sup>[31]</sup>

#### **3.4.6 Low-Level Radioactive Waste Disposal**

To the greatest extent practical, metallic material generated in the decontamination and dismantling processes is treated to reduce the total volume requiring controlled disposal. The treated material, meeting the regulatory and/or site release criterion, is released as scrap, requiring no further cost consideration. Conditioning and recovery of the waste stream is performed off site at a licensed processing center. Any material leaving the site is subject to a survey and release charge, at a minimum.

The mass of radioactive waste generated during the various decommissioning activities at the site is shown on a line-item basis in the detailed Appendix C, and summarized in Section 5. The quantified waste summaries shown in these tables are consistent with 10 CFR Part 61 classifications. Commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations. The volumes are calculated based on the exterior package dimensions for containerized material or a specific calculation for components serving as their own waste containers.

The more highly-activated reactor components will be shipped in reusable, shielded truck casks with disposable liners. In calculating disposal costs, the burial fees are applied against the liner volume, as well as the special handling requirements of the payload. Packaging efficiencies are lower for the highly-activated materials (greater than Class A waste), where high concentrations of gamma-emitting radionuclides limit the capacity of the shipping canisters.

The estimates include an allowance for the removal and disposal of contaminated soil (see Appendix D, page 2) and disposal of contaminated tools and equipment used to support operations. Continued plant operations and/or future regulatory actions, such as the development of site-specific release criteria, may increase this volume.

The cost to dispose of the lowest level waste and the majority of the material generated from the decontamination and dismantling activities is based upon the current cost for disposal at EnergySolutions

facility in Clive, Utah. Disposal costs for the higher activity waste (Class B and C) were based upon SNC's current experiences with WCS for the Andrews County facility.

#### 3.4.7 Site Conditions Following Decommissioning

The NRC terminates the site licenses (Part 50) if it determines that site remediation has been performed in accordance with the license termination plan, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release. The NRC's involvement in the decommissioning process, of the Part 50 facility, ends at this point. Building codes, environmental regulations and future plans for the site dictate the next step in the decommissioning process. As an example, the estimates assume that the electrical switchyard will remain operational in support of the electrical transmission and distribution system.

The large underground cooling water piping is isolated, sealed, and abandoned in place. Site utility and service piping is abandoned in place. Electrical manholes are backfilled with suitable earthen material and abandoned. Asphalt surfaces in the immediate vicinity of site buildings are broken up and the material used for backfill on site, if needed. The site access road remains. The ISFSI remains and is subsequently decommissioned as explained in Section 3.4.1.

The estimate includes an allowance for the removal and disposal of contaminated soil and contaminated concrete in the wastewater retention basin. Continued plant operations and/or future regulatory actions, such as the development of site-specific release criteria, may increase this volume.

Structures are removed to a nominal depth of three feet below grade. Concrete rubble generated from demolition activities is processed and used as clean fill. Excess concrete waste is trucked and disposed of at a commercial landfill. The site is graded following the removal of non-essential structures to conform to the adjacent landscape, and vegetation is established to inhibit erosion.

A significant amount of the below grade piping is located around the perimeter of the power block. The estimate includes a cost to excavate this area to an average depth of six feet so as to expose the piping, duct bank,

conduit, and any near-surface grounding grid. The overburden is surveyed and stockpiled on site for future use in backfilling the below grade voids.

### **3.5 ASSUMPTIONS**

The following are the major assumptions made in the development of the estimates for decommissioning the site.

#### **3.5.1 Estimating Basis**

Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in 2018 dollars. Costs are not inflated, escalated, or discounted over the periods of performance.

The 2015 plant inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, were reviewed for this analysis. There were no changes to plant systems / structures that would impact.

The study follows the principles of ALARA through the use of work duration adjustment factors. These factors address the impact of activities such as radiological protection instruction, mock-up training, and the use of respiratory protection and protective clothing. The factors lengthen a task's duration, increasing costs and lengthening the overall schedule. ALARA planning is considered in the costs for engineering and planning, and in the development of activity specifications and detailed procedures. Changes to worker exposure limits may impact the decommissioning cost and project schedule.

#### **3.5.2 Labor Costs**

SNC will hire a Decommissioning Operations Contractor (DOC) to manage the decommissioning. The licensee will provide site security, radiological health and safety, quality assurance and overall site administration during the decommissioning and demolition phases. Contract personnel will provide engineering services, e.g., for preparing the activity specifications, work procedures, activation, and structural analyses, under the direction of the owner.

Personnel costs are based upon average salary information provided by SNC. Overhead costs are included for site and corporate support, reduced commensurate with the staffing of the project.

The costs associated for the transition of the operating organization to decommissioning, e.g., separation packages, retraining, severance, and incentives are not included in the estimates and were considered to be ongoing operating expenses.

The craft labor required to decontaminate and dismantle the nuclear units is acquired through standard site contracting practices. The current cost of labor at the site is used as an estimating basis. Costs for site administration, operations, construction, and maintenance personnel are based upon average salary information provided by SNC.

Security, while reduced from operating levels, is maintained throughout the decommissioning for access control, material control, and to safeguard the spent fuel (in accordance with the requirements of 10 CFR Part 37, Part 72, and Part 73). Security costs include provisions for recurring expenses. Once the fuel has been transferred to the DOE in 2078, the security organization will be reduced to Part 37 requirements.

The estimates incorporate economies of scale. Examples include the reduction in the man-hours and dollars for the preparation of common engineering work packages for the two units. Staff levels are reduced for supervision and management of parallel activities. Cost sharing is also reflected within the estimates for selective and joint decommissioning activities and in the purchase of specialty decommissioning equipment.

### **3.5.3 Design Conditions**

Any fuel cladding failure that occurred during the lifetime of the plant was assumed to have released fission products at sufficiently low levels so that the buildup of quantities of long-lived isotopes (e.g., cesium-137, strontium-90, or transuranics) have been prevented from reaching levels exceeding those that permit the major NSSS components to be shipped under current transportation regulations and disposal requirements.

The curie contents of the vessel and internals at final shutdown were derived from those listed in NUREG/CR-3474.<sup>[32]</sup> Actual estimates were derived from the curie/gram values contained therein and adjusted for the different mass of Vogtle components, projected operating life, and different periods of decay. Additional short-lived isotopes are derived from NUREG/CR-0130<sup>[33]</sup> and NUREG/CR-0672,<sup>[34]</sup> and benchmarked to the long-lived values from NUREG/CR-3474.



The control elements are disposed of along with the spent fuel, i.e., there is no additional cost provided for their disposal.

Activation of the containment structure was confined to the sacrificial shield in the estimates. More extensive activation (at very low levels) of the interior structures within containment have been detected at several reactors and the owners have elected to dispose of the affected material at a controlled facility rather than reuse the material as fill on site or send it to a landfill. The ultimate disposition of the material removed depends upon the site release criteria selected and the designated end use for the site.

#### Contaminated Soil

The estimates include an allowance for the remediation of potentially contaminated soil at several site areas that have been identified by SNC that may contain concentrations of radionuclides in excess of NRC release limits. The areas include the refueling water storage tank missile shield and the soil around the waste oil separator. The requirements assumed for soil remediation may be affected by continued plant operations and/or future regulatory actions, such as the development of site-specific release criteria.

### 3.5.4 General

#### Transition Activities

Existing warehouses will be cleared of non-essential material and remain for use by SNC and its subcontractors. The warehouses may be dismantled as they become surplus to the decommissioning program. The station's operating staff will perform the following activities at no additional cost or credit to the project during the transition period:

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.
- Drain and collect acids, caustics, and other chemical stores for recycle and/or sale. It is assumed that these chemicals will have some value; therefore, the cost for their removal will be compensated through their subsequent sale.
- Process operating waste inventories. Disposal of operating wastes (e.g., filtration media, resins) during this initial period is not

considered a decommissioning expense. The estimates do not address the disposition of any legacy components, with the exception of the contaminated operations / maintenance tools and equipment.

#### Scrap and Salvage

The existing plant equipment was considered obsolete and only suitable for scrap as deadweight quantities. Economically reasonable efforts will be made to salvage equipment following final plant shutdown. However, dismantling techniques assumed by TLG for equipment in these estimates are not consistent with removal techniques required for salvage (resale) of equipment. Experience indicates that some buyers wanted equipment stripped down to very specific requirements before they would consider purchase. This required expensive rework after the equipment has been removed from its installed location. Since placing salvage value on this machinery and equipment would be speculative, and the value would be small in comparison to the overall decommissioning expenses, these estimates did not attempt to quantify the value that may be realized based upon those efforts.

It is assumed, for purposes of this estimate, that any value received from the sale of scrap generated in the dismantling process would be more than offset by the on-site processing costs. The dismantling techniques assumed in the decommissioning estimates did not include the additional cost for size reduction and preparation to meet “furnace ready” conditions. For example, the recovery of copper from electrical cabling from a facility currently being decommissioned has required the removal and disposition of the PCB-contaminated insulation, an added expense. With a volatile market, the potential profit margin in scrap recovery is highly speculative, regardless of the ability to free release this material. This assumption was an implicit recognition of scrap value in the disposal of clean metallic waste at no additional cost to the project.

Furniture, tools, mobile equipment such as forklifts, trucks, bulldozers, and other such items of property owned by the utility will be removed at no cost or credit to the decommissioning project. Disposition may include relocation to other generating facilities. Spare parts will also be made available for alternative use.

The concrete debris resulting from building demolition activities is crushed on site to reduce the size of the debris. The resulting crushed

concrete is used to backfill below grade voids. The rebar removed from the concrete crushing process is disposed of as scrap steel in a similar fashion as other scrap metal as discussed previously.

### Energy

For estimating purposes, the plant is assumed to be de-energized, with the exception of those facilities associated with spent fuel storage. Replacement power costs are used to calculate the cost of energy consumed during decommissioning for tooling, lighting, ventilation, and essential services.

### Emergency Planning

FEMA fees associated with emergency planning are assumed to continue for approximately 18 months following the cessation of operations. At this time, the fees are discontinued, based upon the anticipated condition of the spent fuel (i.e., the hottest spent fuel assemblies are assumed to be cool enough that no substantial Zircaloy oxidation and off-site event would occur with the loss of spent fuel pool water). State and local fees remain at operating levels until all fuel has been transferred from the pools to the ISFSI. After all spent fuel is in dry storage the state and local fees are reduced. These fees are eliminated after all spent fuel is off site.

### Insurance

Costs for continuing coverage (nuclear liability and property insurance) following cessation of plant operations and during decommissioning are included and based upon current operating premiums. Reductions in premiums, throughout the decommissioning process, are based upon the guidance provided in SECY-00-0145, "Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning."<sup>[35]</sup> The NRC's financial protection requirements are based on various reactor (and spent fuel) configurations.

### Property Taxes

The property tax during the decommissioning period is considered negligible and is not considered in these estimates.

### Site Modifications

The perimeter fence and in-plant security barriers are moved, as appropriate, to conform to the site security plan in force during the various stages of the project.

### Hazardous and Mixed Waste

No significant quantities of asbestos, industrial solvents, chromated water, lead, mercury or mixed waste are expected to be present on site at the time of decommissioning. Therefore, remediation costs were not included in the study.

### Overhead Costs

Based upon current corporate and overhead costs provided by SNC, an allowance is included as an overhead rate on utility salaries. These costs include: site overhead costs required to support the site decommissioning staff, and an allowance for corporate costs required to continue at reduced levels during the decommissioning period.

## **3.6 IMPACT OF DECOMMISSIONING MULTIPLE REACTOR UNITS**

In estimating the near simultaneous decommissioning of two co-located reactor units there can be opportunities to achieve economies of scale, by sharing costs between units, and coordinating the sequence of work activities. There will also be schedule constraints, particularly where there are requirements for specialty equipment and staff, or practical limitations on when final status surveys can take place. For purposes of the estimate, Units 1 and 2 are assumed to be essentially identical. Common facilities have been assigned to Unit 2. A summary of the principal impacts are listed below.

- The sequence of work generally follows the principal that the work is done at Unit 1 first, followed by similar work at Unit 2. This permits the experience gained at Unit 1 to be applied by the workforce at the second unit. It should be noted however, that the estimates do not consider productivity improvements at the second unit, since there is little documented experience with decommissioning two units simultaneously. The work associated with developing activity specifications and procedures can be considered essentially identical between the two units, therefore the second unit costs are assumed to be a fraction of the first unit (~ 43%).

- Segmenting the reactor vessel and internals will require the use of special equipment. The decommissioning project will be scheduled such that Unit 2's reactor internals and vessel are segmented after the activities at Unit 1 have been completed.
- Some program management and support costs, particularly costs associated with the more senior positions, can be avoided with two reactors undergoing decommissioning simultaneously. As a result, the estimate is based on a "lead" unit that includes these senior positions, and a "second" unit that excludes these positions.
- Unit 1, as the first unit to enter decommissioning, incurs the majority of site characterization costs.
- Unit 1, as the first unit to enter decommissioning, incurs a greater fraction of the NRC hourly charges.
- The final radiological survey schedule is affected by a two-unit decommissioning schedule. It would be considered impractical to try to complete the final status survey of Unit 1, while Unit 2 still has ongoing radiological remediation work and waste handling in process. As such, the final status surveys of Units 1 and 2 are conducted concurrently.
- The final demolition of buildings at Units 1 and 2 are considered to take place concurrently.
- Costs for operating and maintaining the ISFSI after the operating licenses are terminated are allocated equally between Units 1 and 2.
- Shared systems and common structures are generally assigned to Unit 2.
- Station costs such as emergency response fees, corporate overhead, and insurance are generally allocated on an equal basis between the two units.

### **3.7 COST ESTIMATE SUMMARY**

Summary level costs, license termination, spent fuel and site restoration costs projected for the decommissioning of each of the two units are provided in Tables 3.1 and 3.2 (sub-parts a, b, c, and d). The tables delineate the cost contributors by year of expenditures as well as cost contributor (e.g., labor, materials, and waste disposal).

The tables in Appendix C provide additional detail. The cost elements in these tables are assigned to one of three subcategories: "License Termination," "Spent Fuel Management," and "Site Restoration." The subcategory "License Termination" is used to accumulate costs that are consistent with

“decommissioning” as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). The cost reported for this subcategory is generally sufficient to terminate the plant’s operating license, recognizing that there may be some additional cost impact from spent fuel management. The License Termination cost subcategory also includes costs to decommission the ISFSI (as required by 10 CFR §72.30). The basis for the ISFSI decommissioning cost that is included in Appendix C is provided in Appendix E.

The “Spent Fuel Management” subcategory contains costs associated with the containerization and transfer of spent fuel from the wet storage pools to the DOE and/or ISFSI for interim storage, as well as the transfer of the spent fuel in storage at the ISFSI to the DOE. Costs are included for the operation of the storage pools and the management of the ISFSI until such time that the transfer is complete. It does not include any spent fuel management expenses incurred prior to the cessation of plant operations, nor does it include any cost related to the final disposal of the spent fuel.

“Site Restoration” is used to capture costs associated with the dismantling and demolition of buildings and facilities demonstrated to be free from contamination. This includes structures never exposed to radioactive materials, as well as those facilities that have been decontaminated to appropriate levels. Structures are removed to a depth of three feet and backfilled to conform to local grade.

As discussed in Section 3.4.1, it is assumed that the DOE will not accept the GTCC waste prior to completing the transfer of spent fuel. Therefore, the cost of GTCC disposal is shown in the final year of ISFSI operation. While designated for disposal at the federal facility along with the spent fuel, GTCC waste is still classified as low-level radioactive waste and, as such, included as a “License Termination” expense.

Decommissioning costs are reported in 2018 dollars. Costs are not inflated, escalated, or discounted over the period of expenditure (or projected lifetime of the plant). The schedules are based upon the detailed activity costs reported in Appendix C, along with the timelines presented in Section 4.

The “Burial” column (Table 3.1 and 3.2) contains costs for the processing of low-level radioactive waste, as well as for the controlled disposal of material that cannot be recovered (released for unrestricted use). Since the following tables are often used in escalation analyses, costs associated with the disposition of GTCC have been reassigned to the “Other” column, commensurate with contractual payments for a one-time disposal service,

although the cost is still reported in the “LLRW Disposal Costs” column in Appendix C and as a “Waste Disposal” cost in the summary tables (i.e., on the table on page xix, and Table 6-1 and 6-2). “Off-site Waste Processing,” separately reported in the summary tables, has been included in the “Burial” column as well.

**TABLE 3.1a**  
**SUMMARY SCHEDULE OF ANNUAL EXPENDITURES**  
**UNIT 1**  
(Thousands, 2018 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	66,129	12,035	645	66	27,369	106,245
2048	72,686	31,462	994	18,014	8,531	131,687
2049	68,651	34,038	639	30,820	9,228	143,376
2050	57,365	21,698	550	22,277	7,093	108,983
2051	51,558	15,348	504	17,882	5,995	91,287
2052	40,699	13,016	383	15,151	11,636	80,885
2053	4,180	311	0	11	1,122	5,624
2054	4,180	311	0	11	1,122	5,624
2055	27,711	2,046	103	41	1,407	31,308
2056	15,482	10,701	67	0	1,014	27,264
2057	15,440	10,672	67	0	1,011	27,190
2058	11,065	7,090	44	0	924	19,123
2059	2,964	460	0	0	762	4,186
2060	2,972	461	0	0	764	4,197
2061	2,964	460	0	0	762	4,186
2062	2,964	460	0	0	762	4,186
2063	2,964	460	0	0	762	4,186
2064	2,972	461	0	0	764	4,197
2065	2,964	460	0	0	762	4,186
2066	2,964	460	0	0	762	4,186
2067	2,964	460	0	0	762	4,186
2068	2,972	461	0	0	764	4,197
2069	2,964	460	0	0	762	4,186
2070	2,964	460	0	0	762	4,186
2071	2,964	460	0	0	762	4,186
2072	2,972	461	0	0	764	4,197
2073	2,964	460	0	0	762	4,186
2074	2,964	460	0	0	762	4,186
2075	2,964	460	0	0	762	4,186
2076	2,972	461	0	0	764	4,197



**TABLE 3.1a (continued)**  
**SUMMARY SCHEDULE OF ANNUAL EXPENDITURES**  
**UNIT 1**  
(Thousands, 2018 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2077	2,964	460	0	0	762	4,186
2078	2,974	1,370	0	0	14,435	18,780
2079	4,181	1,275	6	2,848	4,222	12,531
Total	498,659	170,112	4,003	107,122	109,600	889,495

**TABLE 3.1b**  
**SCHEDULE OF ANNUAL EXPENDITURES – LICENSE TERMINATION**  
**UNIT 1**  
(Thousands, 2018 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	63,160	4,928	645	66	16,967	85,766
2048	66,411	17,372	994	18,014	6,547	109,338
2049	63,332	22,523	639	30,820	7,790	125,104
2050	53,142	14,595	550	22,277	5,655	96,219
2051	47,899	10,516	504	17,882	4,557	81,358
2052	37,040	9,496	383	15,151	10,732	72,802
2053	1,971	234	0	11	838	3,055
2054	1,971	234	0	11	838	3,055
2055	24,575	1,479	101	41	1,110	27,306
2056	81	0	0	0	295	375
2057	81	0	0	0	294	374
2058	52	0	0	0	191	243
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	0	0	0	0	0
2062	0	0	0	0	0	0
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0
2076	0	0	0	0	0	0

**TABLE 3.1b** (continued)  
**SCHEDULE OF ANNUAL EXPENDITURES – LICENSE TERMINATION**  
**UNIT 1**  
(Thousands, 2018 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2077	0	0	0	0	0	0
2078	108	880	0	0	13,687	14,674
2079	1,099	236	0	2,848	3,722	7,904
Total	360,921	82,492	3,817	107,122	73,222	627,574

**TABLE 3.1c  
SCHEDULE OF ANNUAL EXPENDITURES – SPENT FUEL  
UNIT 1  
(Thousands, 2018 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	2,369	7,106	0	0	10,403	19,878
2048	4,685	14,056	0	0	1,984	20,726
2049	3,814	11,442	0	0	1,438	16,694
2050	2,189	6,568	0	0	1,438	10,196
2051	1,354	4,061	0	0	1,438	6,852
2052	2,223	3,096	0	0	904	6,223
2053	2,209	77	0	0	284	2,569
2054	2,209	77	0	0	284	2,569
2055	2,760	253	2	0	288	3,303
2056	2,906	259	67	0	410	3,642
2057	2,898	258	67	0	409	3,632
2058	2,921	329	44	0	533	3,826
2059	2,964	460	0	0	762	4,186
2060	2,972	461	0	0	764	4,197
2061	2,964	460	0	0	762	4,186
2062	2,964	460	0	0	762	4,186
2063	2,964	460	0	0	762	4,186
2064	2,972	461	0	0	764	4,197
2065	2,964	460	0	0	762	4,186
2066	2,964	460	0	0	762	4,186
2067	2,964	460	0	0	762	4,186
2068	2,972	461	0	0	764	4,197
2069	2,964	460	0	0	762	4,186
2070	2,964	460	0	0	762	4,186
2071	2,964	460	0	0	762	4,186
2072	2,972	461	0	0	764	4,197
2073	2,964	460	0	0	762	4,186
2074	2,964	460	0	0	762	4,186
2075	2,964	460	0	0	762	4,186
2076	2,972	461	0	0	764	4,197

**TABLE 3.1c (continued)**  
**SCHEDULE OF ANNUAL EXPENDITURES – SPENT FUEL**  
**UNIT 1**  
(Thousands, 2018 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2077	2,964	460	0	0	762	4,186
2078	2,867	491	0	0	749	4,106
2079	0	0	0	0	42	42
Total	91,761	56,811	180	0	35,092	183,845

**TABLE 3.1d  
SCHEDULE OF ANNUAL EXPENDITURES – SITE RESTORATION  
UNIT 1  
(Thousands, 2018 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	600	0	0	0	0	600
2048	1,589	34	0	0	0	1,623
2049	1,506	73	0	0	0	1,579
2050	2,034	535	0	0	0	2,568
2051	2,306	772	0	0	0	3,077
2052	1,436	424	0	0	0	1,860
2053	0	0	0	0	0	0
2054	0	0	0	0	0	0
2055	376	314	0	0	9	699
2056	12,495	10,442	0	0	309	23,247
2057	12,461	10,414	0	0	309	23,184
2058	8,091	6,762	0	0	200	15,053
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	0	0	0	0	0
2062	0	0	0	0	0	0
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0
2076	0	0	0	0	0	0

TABLE 3.1d (continued)  
**SCHEDULE OF ANNUAL EXPENDITURES – SITE RESTORATION  
UNIT 1**  
(Thousands, 2018 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2077	0	0	0	0	0	0
2078	0	0	0	0	0	0
2079	3,082	1,039	6	0	459	4,585
Total	45,976	30,808	6	0	1,286	78,076

**TABLE 3.2a  
SUMMARY SCHEDULE OF ANNUAL EXPENDITURES  
UNIT 2  
(Thousands, 2018 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2049	53,710	9,772	601	62	12,922	77,066
2050	67,630	25,659	995	16,580	8,086	118,949
2051	68,523	31,635	639	32,526	9,062	142,386
2052	71,079	24,602	561	27,195	7,370	130,807
2053	72,543	19,548	504	23,324	6,147	122,067
2054	62,548	18,449	411	18,956	9,742	110,106
2055	38,335	5,822	162	2,707	4,287	51,312
2056	17,245	15,153	67	0	1,015	33,481
2057	17,198	15,112	67	0	1,012	33,390
2058	12,207	9,974	44	0	924	23,148
2059	2,964	460	0	0	762	4,186
2060	2,972	461	0	0	764	4,197
2061	2,964	460	0	0	762	4,186
2062	2,964	460	0	0	762	4,186
2063	2,964	460	0	0	762	4,186
2064	2,972	461	0	0	764	4,197
2065	2,964	460	0	0	762	4,186
2066	2,964	460	0	0	762	4,186
2067	2,964	460	0	0	762	4,186
2068	2,972	461	0	0	764	4,197
2069	2,964	460	0	0	762	4,186
2070	2,964	460	0	0	762	4,186
2071	2,964	460	0	0	762	4,186
2072	2,972	461	0	0	764	4,197
2073	2,964	460	0	0	762	4,186
2074	2,964	460	0	0	762	4,186
2075	2,964	460	0	0	762	4,186
2076	2,972	461	0	0	764	4,197
2077	2,964	460	0	0	762	4,186
2078	2,974	1,370	0	0	14,435	18,780
2079	4,181	1,143	6	2,848	4,225	12,402
Total	544,531	186,980	4,057	124,197	93,717	953,482



**TABLE 3.2b**  
**SCHEDULE OF ANNUAL EXPENDITURES – LICENSE TERMINATION**  
**UNIT 2**  
(Thousands, 2018 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2049	51,198	2,953	601	62	11,359	66,171
2050	63,273	16,028	995	16,580	6,458	103,334
2051	63,638	22,666	639	32,526	7,625	127,094
2052	66,248	16,430	561	27,195	5,928	116,363
2053	67,773	11,973	504	23,324	4,709	108,285
2054	57,233	11,732	411	18,956	8,762	97,095
2055	34,293	3,966	160	2,707	3,990	45,115
2056	35	0	0	0	295	329
2057	34	0	0	0	294	328
2058	22	0	0	0	191	213
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	0	0	0	0	0
2062	0	0	0	0	0	0
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0
2076	0	0	0	0	0	0
2077	0	0	0	0	0	0
2078	108	880	0	0	13,687	14,674
2079	1,099	236	0	2,848	3,725	7,907
Total	404,955	86,863	3,871	124,197	67,022	686,908

**TABLE 3.2c  
SCHEDULE OF ANNUAL EXPENDITURES – SPENT FUEL  
UNIT 2  
(Thousands, 2018 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2049	2,273	6,819	0	0	1,563	10,656
2050	3,199	9,596	0	0	1,627	14,422
2051	2,960	8,880	0	0	1,438	13,278
2052	2,558	7,675	0	0	1,442	11,675
2053	2,264	6,793	0	0	1,438	10,495
2054	3,272	6,226	0	0	979	10,477
2055	3,321	1,398	2	0	288	5,008
2056	2,906	259	67	0	410	3,642
2057	2,898	258	67	0	409	3,632
2058	2,921	329	44	0	533	3,826
2059	2,964	460	0	0	762	4,186
2060	2,972	461	0	0	764	4,197
2061	2,964	460	0	0	762	4,186
2062	2,964	460	0	0	762	4,186
2063	2,964	460	0	0	762	4,186
2064	2,972	461	0	0	764	4,197
2065	2,964	460	0	0	762	4,186
2066	2,964	460	0	0	762	4,186
2067	2,964	460	0	0	762	4,186
2068	2,972	461	0	0	764	4,197
2069	2,964	460	0	0	762	4,186
2070	2,964	460	0	0	762	4,186
2071	2,964	460	0	0	762	4,186
2072	2,972	461	0	0	764	4,197
2073	2,964	460	0	0	762	4,186
2074	2,964	460	0	0	762	4,186
2075	2,964	460	0	0	762	4,186
2076	2,972	461	0	0	764	4,197
2077	2,964	460	0	0	762	4,186
2078	2,867	491	0	0	749	4,106
2079	0	0	0	0	42	42
Total	87,797	57,463	180	0	25,407	170,847

**TABLE 3.2d**  
**SCHEDULE OF ANNUAL EXPENDITURES – SITE RESTORATION**  
**UNIT 2**  
(Thousands, 2018 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2049	239	0	0	0	0	239
2050	1,159	35	0	0	0	1,194
2051	1,925	89	0	0	0	2,014
2052	2,272	497	0	0	0	2,769
2053	2,505	781	0	0	0	3,287
2054	2,043	491	0	0	0	2,535
2055	721	459	0	0	9	1,189
2056	14,305	14,895	0	0	310	29,510
2057	14,266	14,854	0	0	309	29,429
2058	9,263	9,645	0	0	201	19,109
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	0	0	0	0	0
2062	0	0	0	0	0	0
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0
2076	0	0	0	0	0	0
2077	0	0	0	0	0	0
2078	0	0	0	0	0	0
2079	3,082	907	6	0	459	4,453
Total	51,779	42,654	6	0	1,289	95,728

## **4. SCHEDULE ESTIMATE**

The schedule for the decommissioning scenario considered in this study followed the sequence presented in the AIF/NESP-036 study, with minor changes to reflect recent experience and site-specific constraints. In addition, the scheduling was revised to reflect the required cooling period for the spent fuel.

A schedule or sequence of activities is presented in Figure 4.1. The schedule reflects the prompt decommissioning alternative and the start date consistent with a scheduled shutdown in 2047 for Unit 1 and 2049 for Unit 2. The sequence assumed that fuel would be removed from each units spent fuel pool within the first five years after shutdown. The key activities listed in the schedule do not reflect a one-to-one correspondence with those activities in the Appendix C cost table, but reflect dividing some activities for clarity and combining others for convenience. The schedule was prepared using the “Microsoft Office Project Professional” computer software.<sup>[36]</sup>

### **4.1 SCHEDULE ESTIMATE ASSUMPTIONS**

The schedule was generated using a precedence network and associated software. Activity durations were based upon the actual man-hour estimates calculated for each area. The schedule was assembled by sequencing the work areas, considering work crew availability and material access/egress. The following assumptions were made in the development of the decommissioning schedule:

- The spent fuel storage area of the fuel handling buildings are isolated until such time that all spent fuel has been discharged from the storage pools to the DOE or to the ISFSI. Decontamination and dismantling of the storage pools are initiated once the transfer of spent fuel is complete. The fuel handling buildings will continue to serve as the spent fuel storage/transfer facility until such time that all spent fuel has been removed from the spent fuel pools. The fuel handling buildings are expected to operate for approximately five and one-half years after the cessation of operations.
- All work (except vessel and internals removal activities) will be performed during an 8-hour workday, 5 days per week, with no overtime. There are eleven paid holidays per year.
- Reactor and internals removal activities will be performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.

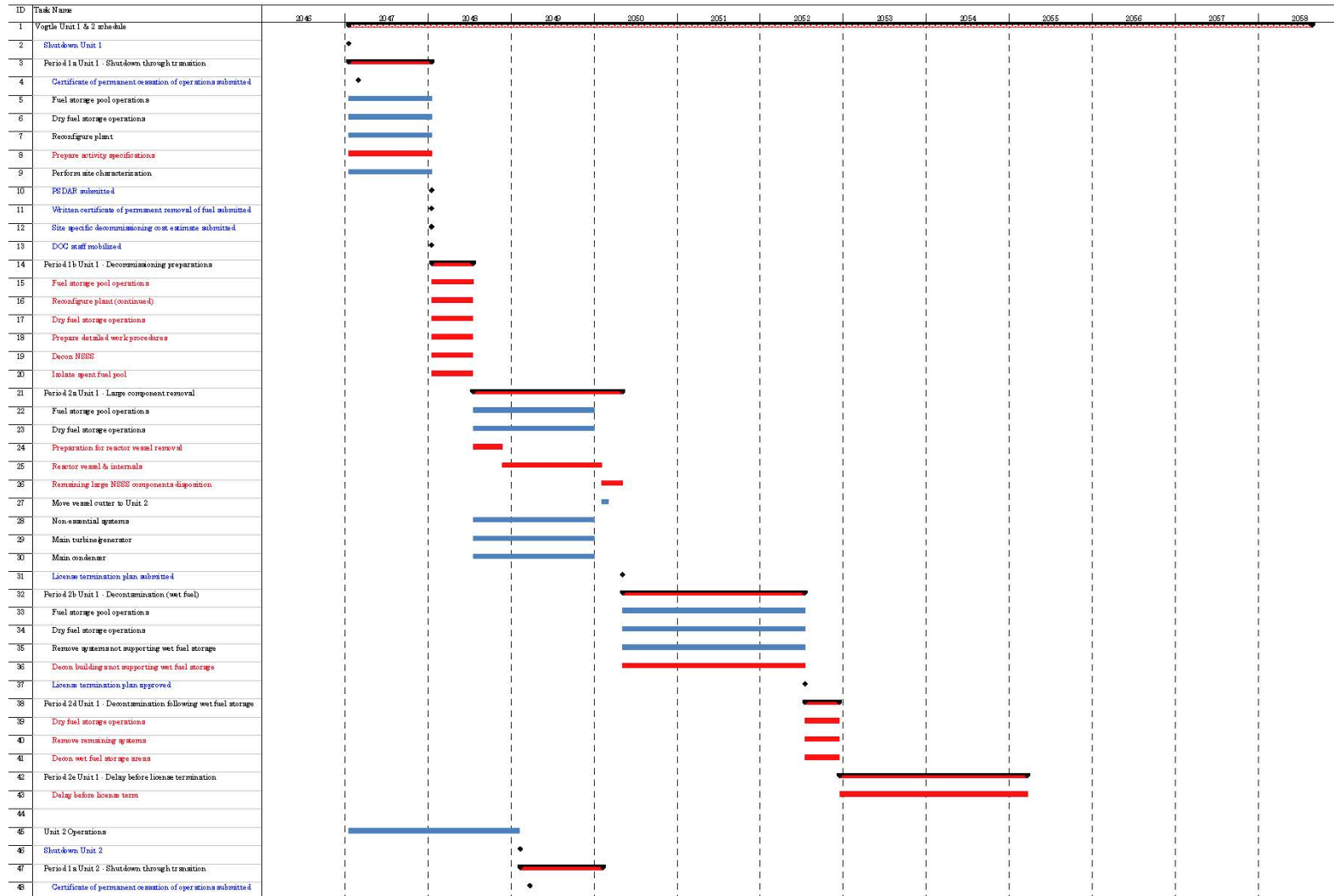
- Multiple crews will work parallel activities to the maximum extent possible, consistent with: optimum efficiency; adequate access for cutting, removal and laydown space; and the stringent safety measures necessary during demolition of heavy components and structures.
- For plant systems removal, the systems with the longest removal durations in areas on the critical path were considered to determine the duration of the activity.

## **4.2 PROJECT SCHEDULE**

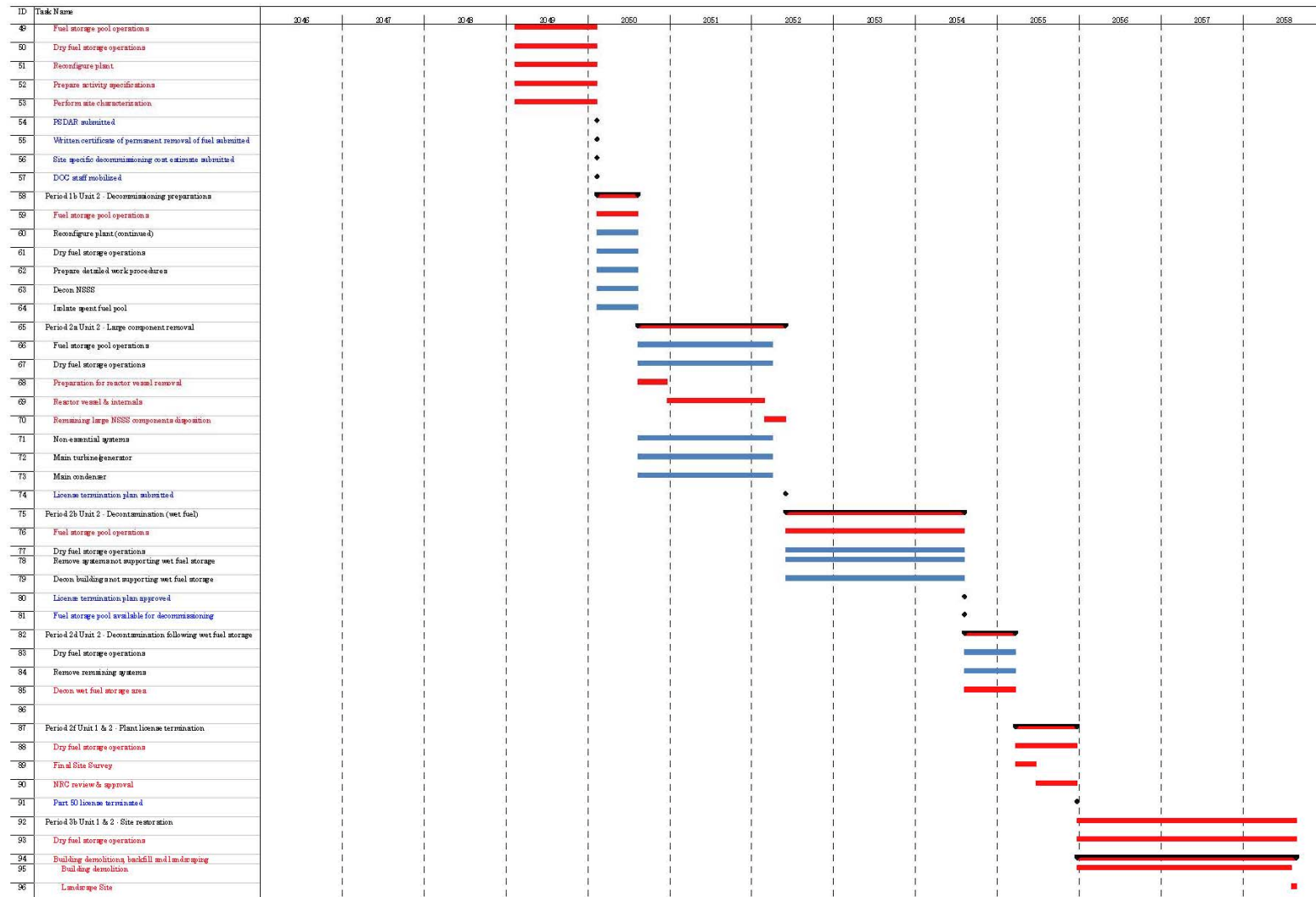
The period-dependent costs presented in Appendix C were based upon the durations developed in the schedule for the decommissioning of Vogtle. Durations were established between several milestones in each project period; these durations were used to establish a critical path for the entire project. In turn, the critical path duration for each period was used as the basis for determining the period-dependent costs. A second critical path is also shown for the spent fuel cooling period, which determines the release of the reactor buildings for final decontamination.

Project timelines are shown in this section as Figure 4.2. Milestone dates were based on a 60-year plant operating life from the operating license issue date, a five-year wet storage period for the last core discharge, and continued operation of the ISFSI until the DOE can complete the transfer of spent fuel and GTCC waste from the site.

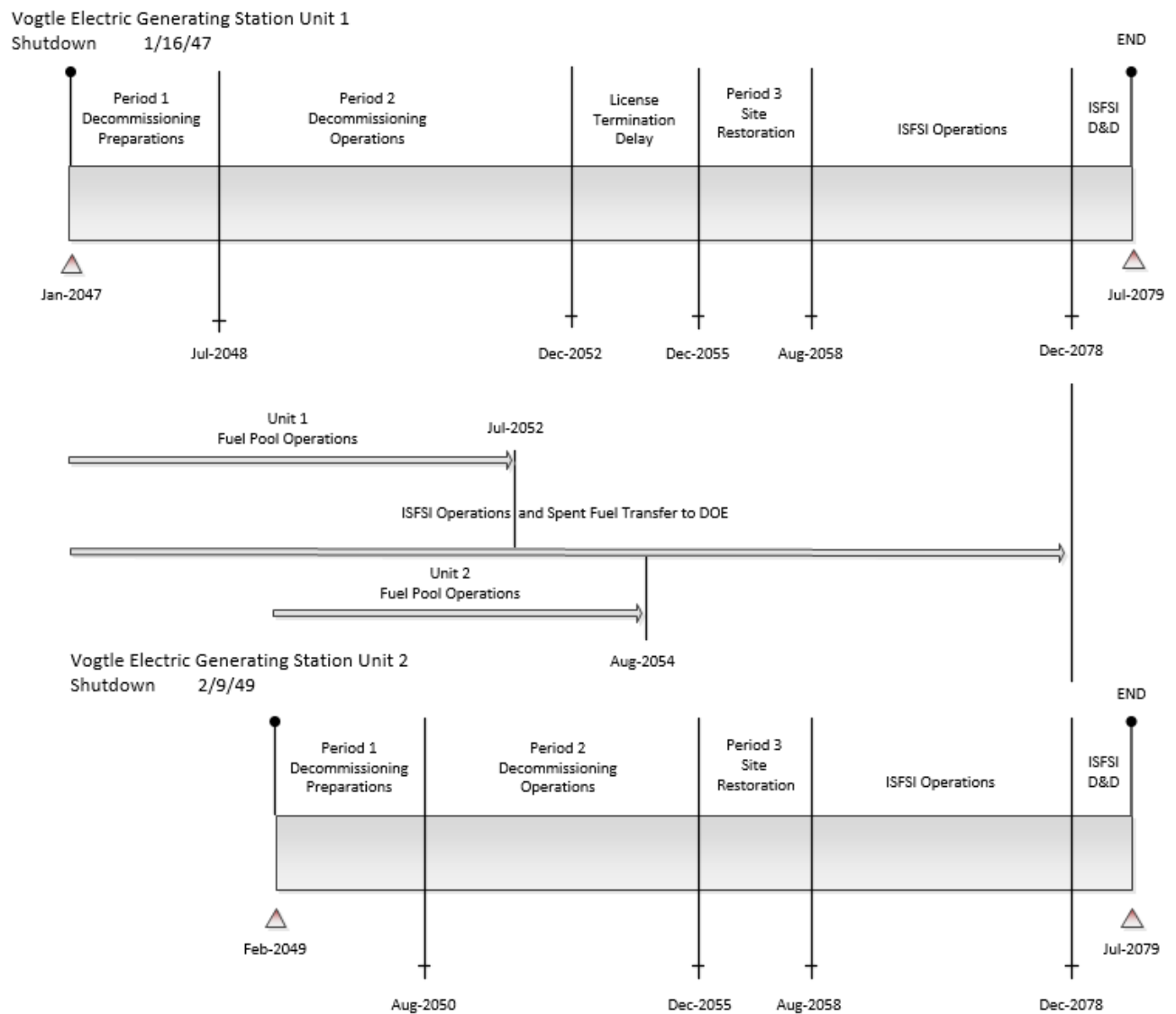
**FIGURE 4.1  
DECOMMISSIONING ACTIVITY SCHEDULE**



**FIGURE 4.1 (continued)**  
**DECOMMISSIONING ACTIVITY SCHEDULE**



**FIGURE 4.2  
DECOMMISSIONING TIMELINE  
(not to scale)**





## **5. RADIOACTIVE WASTES**

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license(s). This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act,<sup>[37]</sup> the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations (CFR) delineates the production, utilization, and disposal of radioactive materials and processes. In particular, 10 CFR Part 71 defines the requirements for packaging and transportation of radioactive material and 10 CFR Part 61 defines the criteria and procedures by which the NRC issues licenses for the disposal of radioactive waste. 10 CFR 61.55(a)(2)(iv) states that GTCC waste requires disposal in a geologic repository unless otherwise approved by the NRC.

Most of the materials being transported for controlled burial are categorized as low specific activity (LSA) or surface contaminated object (SCO) materials containing Type A quantities, as defined in 49 CFR Part 173.<sup>[38]</sup> Shipping containers are required to be Industrial Packages (IP-1, IP-2 or IP-3). For this study, commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations.

The destinations for the various waste streams from decommissioning are identified in Figures 5.1 and 5.2. The volumes of radioactive waste generated during the various decommissioning activities at the site are shown on a line-item basis in Appendix C and summarized in Tables 5.1 and 5.2. The quantified waste volume summaries shown in these tables are consistent with Part 61 classifications. The volumes were calculated based on the exterior dimensions for containerized material. The volumes were calculated on the displaced volume of components serving as their own waste containers.

The reactor vessel and internals are categorized as large quantity shipments and, accordingly, will be shipped in reusable, shielded truck casks with disposable liners. In calculating disposal costs, the burial fees were applied against the liner volume and the special handling requirements of the payload. Packaging efficiencies are lower for the highly activated materials (greater than Class A waste), where high concentrations of gamma-emitting radionuclides limit the capacity of the shipping canisters.

No process system containing/handling radioactive substances at shutdown is presumed to meet material release criteria by decay alone, i.e., systems radioactive at shutdown will still be radioactive over the time period during which the

decommissioning is accomplished, due to the presence of long-lived radionuclides. While the dose rates decrease with time, radionuclides such as  $^{137}\text{Cs}$  will still control the disposition requirements.

The waste material generated in the decontamination and dismantling of Vogtle will primarily be generated during Period 2. A significant portion of the metallic waste will be designated for additional processing and treatment at an off-site facility. Processing reduces the volume of material requiring controlled disposal through such techniques and processes as survey and sorting, decontamination and volume reduction. The material that cannot be unconditionally released will be packaged for controlled disposal at a licensed facility. Material considered potentially contaminated when removed from the radiologically controlled area will be sent to processing facilities for conditioning and disposal at an all-inclusive unit cost of \$3.32 per pound. Other contaminated components and activated materials will be routed for controlled disposal. The disposal volumes reported in the tables reflect the reductions resulting from reprocessing.

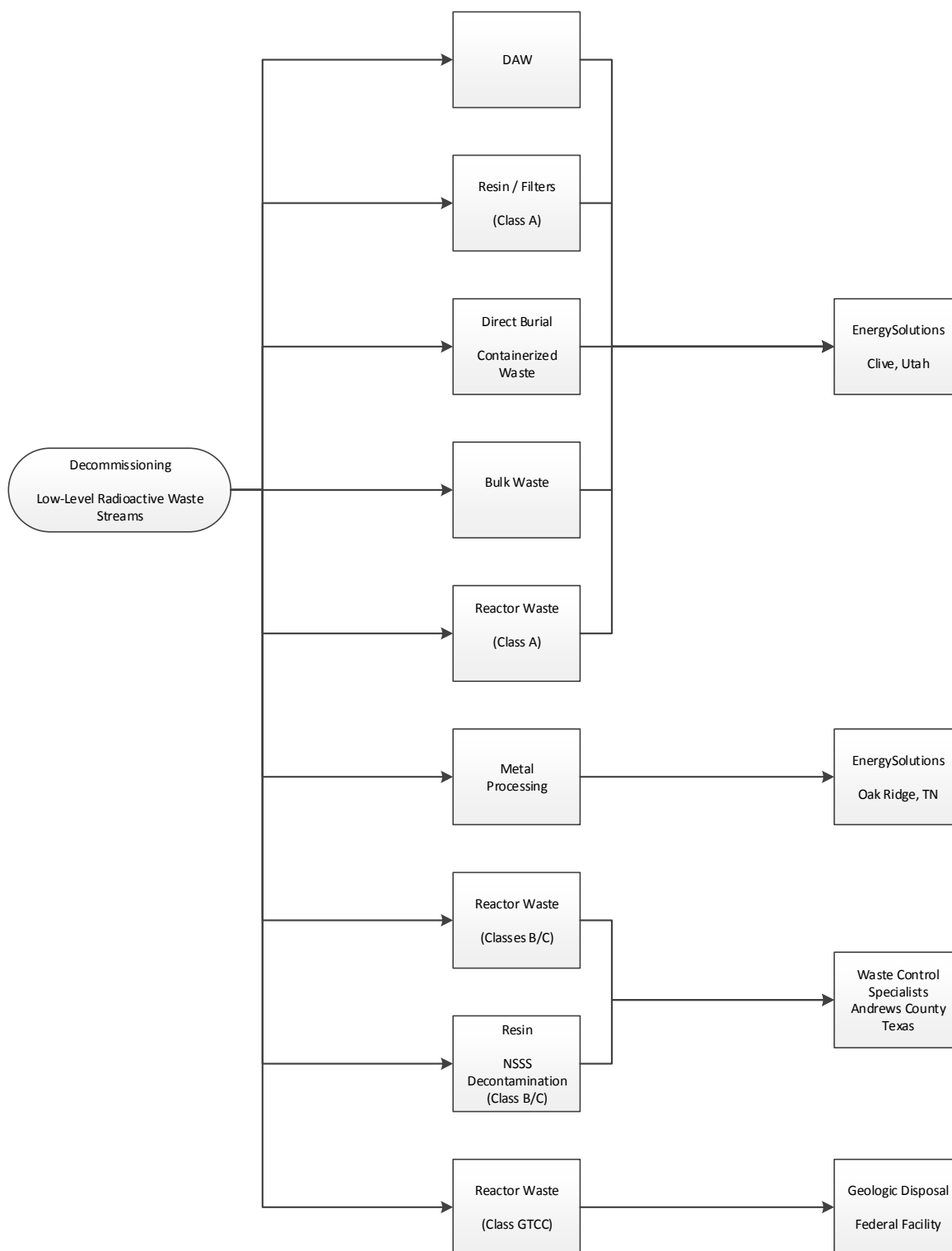
For purposes of constructing the estimate, all Class B and C wastes were assumed to be disposed of at the WCS facility in Andrews, Texas. This schedule was used to estimate the disposal fees for highly activated components, such as the reactor vessel internals (not qualifying as GTCC radioactive material), and concentrated radioactive material resulting from decontamination and water processing operations. Based on current SNC experience, an average disposal rate of \$10,296 per cubic foot was used for irradiated hardware (metallic waste). This rate includes a 32% fee applied to the base WCS rate of \$7,800 per cubic foot. Similarly, an average disposal rate of \$3,260 per cubic foot was used for Class B wastes originating from chemical decontamination. This rate also includes a 32% fee applied to the WCS base rate of \$2,470 per cubic foot.

Class A resins shipped in a cask are disposed of at a cost of \$50,276 per cask (includes state taxes). The remaining Class A radioactive waste, including contaminated metallic and concrete debris, will be disposed of at the EnergySolutions facility. This includes lower activity material such as miscellaneous steel, metal siding, scaffolding, structural steel, and large components (including heat exchangers and sections of the reactor vessel). The disposal costs for this material are as follows (includes state taxes):

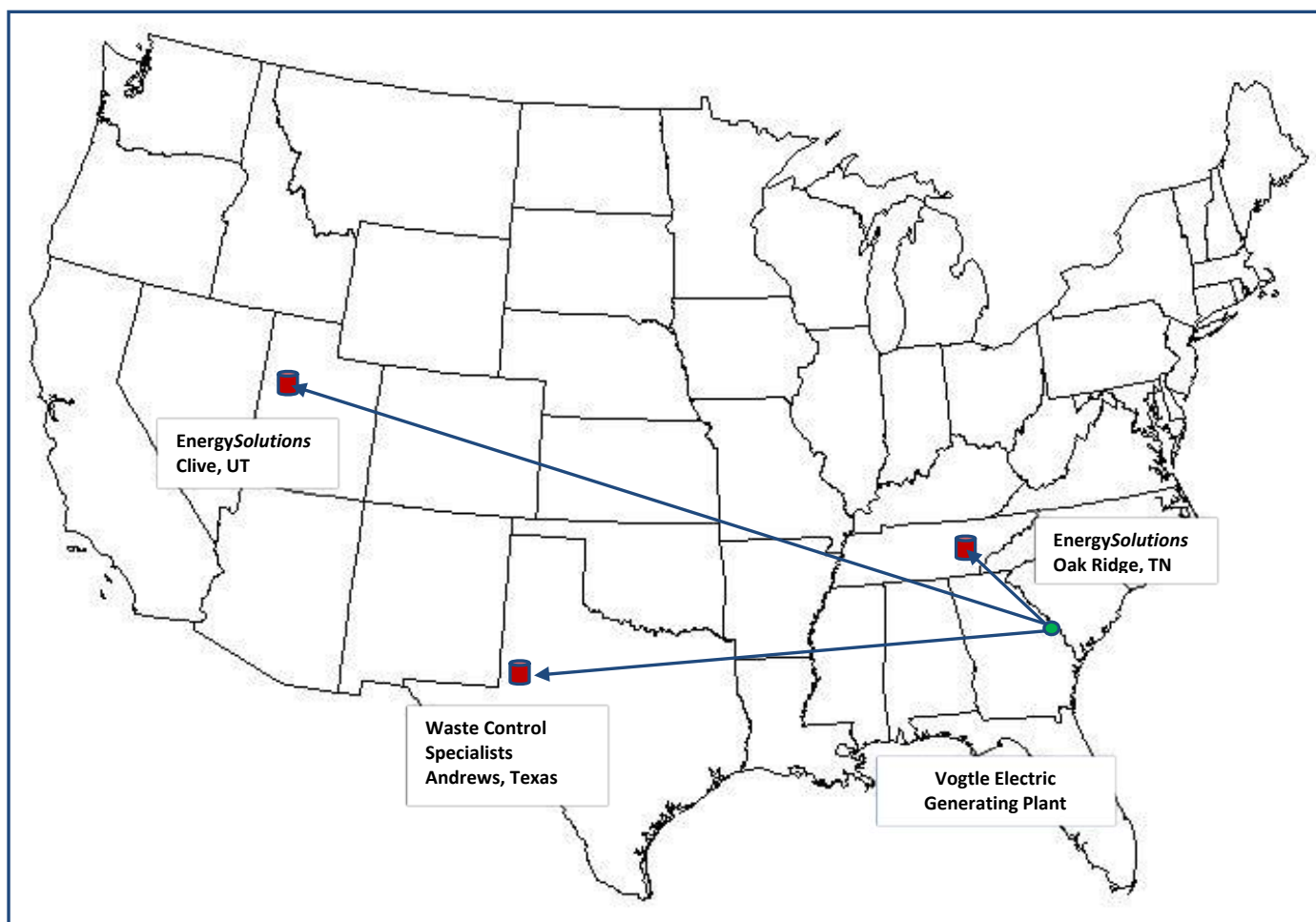
- \$316 per cubic foot for large components that are to be disposed of in their entirety
- \$250 per cubic foot for materials that meets EnergySolutions' "containerized waste" criteria

- \$63 per cubic foot for disposal of material that meets EnergySolutions' "debris" criteria, and
- \$4.54 per pound (\$91 per cubic foot) for disposal of Dry Active Waste (DAW)

**FIGURE 5.1**  
**RADIOACTIVE WASTE DISPOSITION**



**FIGURE 5.2  
DECOMMISSIONING WASTE DESTINATIONS  
RADIOLOGICAL**



The figure indicates the destinations for the low-level radioactive waste designated for direct disposal (Clive, Utah and Andrews County, Texas) and processing/recovery (Oak Ridge, Tennessee).

Disposal of GTCC is expected to be disposed of in the same location as spent fuel.

**TABLE 5.1  
DECOMMISSIONING WASTE SUMMARY  
UNIT 1**

	<b>Waste Class<sup>[1]</sup></b>	<b>Volume (cubic feet)</b>	<b>Weight (pounds)</b>
Low-Level Radioactive Waste			
EnergySolutions, Utah, Class A			
Contaminated/activated metallic waste	A	88,357	6,432,617
Dry active waste (DAW)	A	15,844	316,877
Concrete, bulk metallic waste	A	67,298	3,568,734
Soil	A	-	-
Resins, Filters	A	4,155	300,271
Waste Control Specialists Facility, Class B and C			
Resins, Filters	B	848	90,351
Irradiated Hardware	B	963	107,552
Irradiated Hardware	C	393	47,411
Geologic Repository (Greater-than Class C)			
Irradiated Hardware	>C	2,061	410,142
Total <sup>[2]</sup>		179,919	11,273,955
Processed Metallic Waste			11,401,520
Scrap Metal			129,500,000

<sup>[1]</sup> Waste is classified according to the requirements as delineated in Part 61.55

<sup>[2]</sup> Columns may not add due to rounding

**TABLE 5.2  
DECOMMISSIONING WASTE SUMMARY  
UNIT 2**

	<b>Waste Class<sup>[1]</sup></b>	<b>Volume (cubic feet)</b>	<b>Weight (pounds)</b>
Low-Level Radioactive Waste			
EnergySolutions, Utah, Class A			
Contaminated/activated metallic waste	A	96,452	6,954,539
Dry active waste (DAW)	A	17,773	355,465
Concrete, bulk metallic waste	A	68,087	3,609,718
Soil	A	8,304	647,704
Resins, Filters	A	4,607	347,817
Waste Control Specialists Facility, Class B and C			
Resins, Filters	B	848	90,351
Irradiated Hardware	B	963	107,552
Irradiated Hardware	C	393	47,411
Geologic Repository (Greater-than Class C)			
Irradiated Hardware	>C	2,061	410,142
Total <sup>[2]</sup>		199,487	12,570,698
Processed Metallic Waste			14,849,570
Scrap Metal			160,732,000

<sup>[1]</sup> Waste is classified according to the requirements as delineated in Part 61.55

<sup>[2]</sup> Columns may not add due to rounding

## **6. RESULTS**

Costs were developed to decommission Vogtle following a scheduled cessation of plant operations. The analyses relied upon the site-specific, technical information developed from a previous analyses, the most recent previous analysis performed in 2015 supplemented with updated information supplied by SNC, to reflect current plant design conditions and operating assumptions. While not an engineering study, the estimates do provide sufficient information to assess the financial obligations as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report were based on numerous fundamental assumptions, including a 60-year operating life, regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenario assumed continued operation of the plant's spent fuel pools for approximately five and one half years following the cessation of operations for continued cooling of the assemblies. The ISFSI will be expanded to allow transfer of all fuel from the spent fuel pools and the orderly progression of decommissioning activities. The ISFSI will be decontaminated and demolished once the DOE completes the transfer of the assemblies and the GTCC material to its repository.

The costs projected to promptly decommission Vogtle are estimated to be \$889.5 million for Unit 1 and \$953.5 million for Unit 2. The majority of the \$1,843.0 million cost (approximately 71.3%) is associated with the physical decontamination and dismantling of the nuclear units, so that the operating licenses can be terminated. Caretaking and handling of the spent fuel and termination of the ISFSI license, constitutes an additional 19.2% of the cost. The remaining 9.4% is for the demolition of the remaining structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 and 6.2, are either labor-related, ISFSI related, or associated with the management and disposition of the radioactive waste. Program management is the largest single contributor to the overall cost. The magnitude of the expense is a function of both the size of the organization required to manage the decommissioning and the duration of the program. It was assumed, for purposes of this analysis, that the utility would oversee the decommissioning program, managing the decommissioning labor force and the associated subcontractors. The size and composition of the management organization will vary with the decommissioning phase and associated site activities. However, once the operating licenses have been terminated, the staff will reduce substantially for the conventional demolition and restoration of the site, and for the long-term care of the spent fuel.



As described in this report, the spent fuel pools will remain operational for approximately five and one half years following the cessation of plant operations. The pools will be isolated and independent spent fuel islands created. This will allow decommissioning operations to proceed in and around the reactor buildings. Over the five and one half-year period, the spent fuel will be packaged into transportable steel canisters for loading into a DOE-provided transport cask. The canisters will be transferred directly to the DOE or stored in concrete overpacks at the ISFSI until the DOE is able to receive them.

A significant portion of the metallic waste is designated for additional processing and treatment at an off-site facility. Processing reduces the volume of material requiring controlled disposal through such techniques and processes as survey and sorting, decontamination, and volume reduction. The material that cannot be unconditionally released is packaged for controlled disposal at one of the currently operating facilities. The cost identified in the summary tables for processing is all-inclusive, incorporating the ultimate disposition of the material.

The cost for waste disposal includes only those costs associated with the controlled disposition of the low-level radioactive waste generated from decontamination and dismantling activities, including plant equipment and components, structural material, filters, resins and dry-active waste. As described in Section 5, disposal of the lower level radioactive material will be at the EnergySolutions facility. Selective reactor vessel components and processed liquid waste (Class B) will be sent to the WCS facility in Andrews County, Texas. Highly radioactive reactor vessel internal components (GTCC waste), requiring additional isolation from the environment, will be packaged for geologic disposal. The cost of geologic disposal was based upon a weight-cost equivalent for spent fuel.

Removal costs reflect the labor-intensive nature of the decommissioning process and the management controls required to ensure a safe and successful program. Decontamination and packaging costs also have a large labor component that is based upon prevailing union wages. Non-radiological demolition is a natural extension of the decommissioning process. The methods employed in decontamination and dismantling are generally destructive and indiscriminate in inflicting collateral damage. With a work force mobilized to support decommissioning operations, non-radiological demolition can be an integrated activity and a logical expansion of the work being performed in the process of terminating the operating license. Prompt demolition reduces future liabilities and could be more cost-effective than deferral, due to the ultimate deterioration of facilities (and therefore the working conditions).

The reported cost for transport includes the tariffs and surcharges associated with moving large components and/or overweight shielded casks overland, and the general

expense, e.g., labor and fuel, of transporting material to the destinations identified in this report. For purposes of this estimate, material will be primarily shipped to the waste disposal facilities by truck.

Decontamination will be used to reduce the plants radiation fields and minimize worker exposure. Slightly contaminated material or material located within a contaminated area will be sent to an off-site processing center, i.e., this estimate did not assume that contaminated plant components and equipment could be economically decontaminated for uncontrolled release in-situ. Centralized processing centers have proven to be a more efficient means of handling the large volumes of material produced in the dismantling of a nuclear unit.

License termination survey costs were associated with the labor intensive and complex activity of verifying that contamination has been removed from the site to the levels specified by the regulating agency. This process involves a systematic survey of all remaining plant surface areas and surrounding environs, sampling, isotopic analysis, and documentation of the findings. The status of any plant components and materials not removed in the decommissioning process will also require confirmation and will add to the expense of surveying the facilities alone.

The remaining costs include allocations for heavy equipment and temporary services, and other expenses such as regulatory fees and the premiums for nuclear insurance. While site operating costs are greatly reduced following the final cessation of plant operations, certain administrative functions do need to be maintained at a basic functional and regulatory level.

A description of events that resulted in the release of radioactive material that needed to be recorded to assist in future decommissioning activities is provided in Appendix D.

**TABLE 6.1  
SUMMARY OF DECOMMISSIONING COST ELEMENTS  
UNIT 1**

<b>Work Category</b>	<b>Cost 2018 \$s (thousands)</b>	<b>Percent of Total Costs</b>
Decontamination	16,138	1.8%
Removal	139,801	15.7%
Packaging	24,315	2.7%
Transportation	15,162	1.7%
Waste Disposal	76,815	8.6%
Off-site Waste Processing	43,982	4.9%
Program Management	280,173	31.5%
Site Security	104,533	11.8%
Spent Fuel Pool Isolation	13,800	1.6%
Spent Fuel Management	107,295	12.1%
Insurance and Regulatory Fees	20,701	2.3%
Energy	4,003	0.5%
Characterization and Licensing Surveys	28,888	3.2%
Property Taxes	-	-
Miscellaneous	13,889	1.6%
Total	889,495	100.0%

**NOTE:** Columns may not add due to rounding

**TABLE 6.2  
SUMMARY OF DECOMMISSIONING COST ELEMENTS  
UNIT 2**

<b>Work Category</b>	<b>Cost 2018 \$s (thousands)</b>	<b>Percent of Total Costs</b>
Decontamination	17,455	1.8
Removal	168,715	17.7
Packaging	24,800	2.6
Transportation	16,438	1.7
Waste Disposal	80,647	8.5
Off-site Waste Processing	57,226	6.0
Program Management	304,771	32.0
Site Security	111,322	11.7
Spent Fuel Pool Isolation	9,200	1.0
Spent Fuel Management	98,020	10.3
Insurance and Regulatory Fees	17,430	1.8
Energy	4,057	0.4
Characterization and Licensing Surveys	25,870	2.7
Property Taxes	-	-
Miscellaneous	17,532	1.8
Total	953,482	100.0

**NOTE:** Columns may not add due to rounding

## **7. REFERENCES**

1. “Decommissioning Cost Study for the Vogtle Electric Generating Plant,” Document S18-1715-002, Rev. 0, TLG Services, Inc., December 2015
2. U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, 53 Fed. Reg. 24018, June 27, 1988 [\[Open\]](#)
3. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," Rev. 2, October 2011 [\[Open\]](#)
4. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, “Radiological Criteria for License Termination” [\[Open\]](#)
5. U.S. Code of Federal Regulations, Title 10, Parts 20 and 50, “Entombment Options for Power Reactors,” Advanced Notice of Proposed Rulemaking, Federal Register Volume 66, Number 200, October 16, 2001 [\[Open\]](#)
6. U.S. Code of Federal Regulations, Title 10, Parts 2, 50 and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, 61 Fed. Reg. 39278, July 29, 1996 [\[Open\]](#)
7. 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, (p 35512 et seq.), June 17, 2011 [\[Open\]](#)
8. U.S. Code of Federal Regulations, Title 10, Part 72, “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste,” Federal Register Volume 53, Number 31658, August 19, 1988 [\[Open\]](#)
9. U.S. Code of Federal Regulations, Title 10, Part 72, Subpart K, “General License for Storage of Spent Fuel at Power Reactor Sites” [\[Open\]](#)
10. “Nuclear Waste Policy Act of 1982,” 42 U.S. Code 10101, et seq. [\[Open\]](#)

## **7. REFERENCES**

(continued)

11. Charter of the Blue Ribbon Commission on America's Nuclear Future, "Objectives and Scope of Activities" [\[Open\]](#)
12. "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," p. 27, 32, January 2012 [\[Open\]](#)
13. "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013 [\[Open\]](#)
14. U.S. Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, et al, Aug. 2013 [\[Open\]](#)
15. In 2008, the DOE issued a report to Congress in which it concluded that it did not have authority, under present law, to accept spent nuclear fuel for interim storage from decommissioned commercial nuclear power reactor sites. However, the Blue Ribbon Commission, in its final report, noted that: "[A]ccepting spent fuel according to the OFF [Oldest Fuel First] priority ranking instead of giving priority to shutdown reactor sites could greatly reduce the cost savings that could be achieved through consolidated storage if priority could be given to accepting spent fuel from shutdown reactor sites before accepting fuel from still-operating plants. .... The magnitude of the cost savings that could be achieved by giving priority to shutdown sites appears to be large enough (i.e., in the billions of dollars) to warrant DOE exercising its right under the Standard Contract to move this fuel first." For planning purposes only, this estimate does not assume that Vogtle, as a permanently shutdown plant, will receive priority; the fuel removal schedule assumed in this estimate is based upon DOE acceptance of fuel according to the "Oldest Fuel First" priority ranking. The plant owner will seek the most expeditious means of removing fuel from the site when DOE commences performance.

## **7. REFERENCES**

(continued)

16. U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses" [\[Open\]](#)
17. "Low-Level Radioactive Waste Policy Act of 1980," Public Law 96-573, 1980 [\[Open\]](#)
18. "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, January 15, 1986 [\[Open\]](#)
19. Waste is classified in accordance with U.S. Code of Federal Regulations, Title 10, Part 61.55 [\[Open\]](#)
20. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Final Rule, Radiological Criteria for License Termination," 62 Fed. Reg. 39058, July 21, 1997 [\[Open\]](#)
21. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," EPA Memorandum OSWER No. 9200.4-18, August 22, 1997 [\[Open\]](#)
22. U.S. Code of Federal Regulations, Title 40, Part 141.66, "Maximum contaminant levels for radionuclides" [\[Open\]](#)
23. "Memorandum of Understanding Between the Environmental Protection Agency and the Nuclear Regulatory Commission: Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites," OSWER 9295.8-06a, October 9, 2002 [\[Open\]](#)
24. "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," NUREG-1575, Rev. 1, EPA 402-R-97-016, Rev. 1, August 2000 [\[Open\]](#)
25. T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986 [\[Open\]](#)
26. W.J. Manion and T.S. LaGuardia, "Decommissioning Handbook," U.S. Department of Energy, DOE/EV/10128-1, November 1980 [\[Open\]](#)

## **7. REFERENCES**

(continued)

27. “Building Construction Cost Data 2018,” Robert Snow Means Company, Inc., Kingston, Massachusetts [\[Open\]](#)
28. Project and Cost Engineers’ Handbook, Second Edition, p. 239, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, 1984
29. U.S. Department of Transportation, Section 49 of the Code of Federal Regulations, “Transportation,” Parts 173 through 178 [\[Open\]](#)
30. U.S. Code of Federal Regulations, Title 10, Part 71, “Packaging and Transportation of Radioactive Material” [\[Open\]](#)
31. Tri-State Motor Transit Company, published tariffs, as amended
32. J.C. Evans et al., "Long-Lived Activation Products in Reactor Materials" NUREG/CR-3474, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, August 1984 [\[Open\]](#)
33. R.I. Smith, G.J. Konzek, W.E. Kennedy, Jr., "Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," NUREG/CR-0130 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, June 1978 [\[Open Main Report\]](#) [\[Open Appendices\]](#)
34. H.D. Oak, et al., "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station," NUREG/CR-0672 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission, June 1980 [\[Open Main Report\]](#) [\[Open Appendices\]](#)
35. SECY-00-0145, “Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning,” June 2000 [\[Open\]](#)
36. “Microsoft Office Project Professional 2013,” Microsoft Corporation
37. “Atomic Energy Act of 1954,” (68 Stat. 919) [\[Open\]](#)



**APPENDIX A**  
**UNIT COST FACTOR DEVELOPMENT**

## APPENDIX A UNIT COST FACTOR DEVELOPMENT

Example: Unit Factor for Removal of Contaminated Heat Exchanger < 3,000 lbs.

### 1. SCOPE

Heat exchangers weighing < 3,000 lbs. will be removed in one piece using a crane or small hoist. They will be disconnected from the inlet and outlet piping. The heat exchanger will be sent to the waste processing area.

### 2. CALCULATIONS

Act ID	Activity Description	Activity Duration	Critical Duration*
a	Remove insulation	60	(b)
b	Mount pipe cutters	60	60
c	Install contamination controls	20	(b)
d	Disconnect inlet and outlet lines	60	60
e	Cap openings	20	(d)
f	Rig for removal	30	30
g	Unbolt from mounts	30	30
h	Remove contamination controls	15	15
i	Remove, wrap in plastic, send to the waste processing area	<u>60</u>	<u>60</u>
	Totals (Activity/Critical)	355	255

Duration adjustment(s):

+ Respiratory protection adjustment (50% of critical duration)	128
+ Radiation/ALARA adjustment (37.1% of critical duration)	<u>95</u>

Adjusted work duration	478
+ Protective clothing adjustment (30% of adjusted duration)	<u>143</u>

Productive work duration	621
+ Work break adjustment (8.33 % of productive duration)	<u>52</u>

Total work duration min	673 min
-------------------------	---------

**\*\*\* Total duration = 11.217 hr \*\*\***

\* *Note: (alpha designation) indicates activities that can be performed in parallel with corresponding Act ID (within critical duration)*

**APPENDIX A  
(continued)**

**3. LABOR REQUIRED**

Crew	Number	Duration (hr)	Rate (\$/hr)	Cost
<hr/>				
Laborers	3.00	11.217	23.85	802.58
Craftsmen	2.00	11.217	50.32	1,128.88
Foreman	1.00	11.217	54.52	611.55
General Foreman	0.25	11.217	56.83	159.37
Fire Watch	0.05	11.217	23.85	13.38
Health Physics Technician	1.00	11.217	57.04	639.82
Total labor cost				\$3,355.58

**4. EQUIPMENT & CONSUMABLES COSTS**

Equipment Costs	none
Consumables/Materials Costs	
-Gas torch consumables 1 @ \$20.08/hr x 1 hr {1}	\$20.08
-Blotting paper 50 @ \$0.60/sq ft {2}	\$30.00
-Tarpaulin 50 @ \$0.47/sq ft {3}	\$23.50
Subtotal cost of equipment and materials	\$73.58
Overhead & sales tax on equipment and materials @ 17.00 %	\$12.51
Total costs, equipment & material	\$86.09
<b>TOTAL COST:</b>	
<b>Removal of contaminated heat exchanger &lt;3000 pounds:</b>	<b>\$ 3,441.67</b>
Total labor cost:	\$3,355.58
Total equipment/material costs:	\$86.09
Total craft labor man-hours required per unit:	81.884

## **5. NOTES AND REFERENCES**

- Work difficulty factors were developed in conjunction with the Atomic Industrial Forum (AIF) (now Nuclear Energy Institute) program to standardize nuclear decommissioning cost estimates and are delineated in Volume 1, Chapter 5 of the "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.
- References for equipment & consumables costs:
  1. R.S. Means (2018) Line Number 01 54 33 40-6360, page 734
  2. [www.mcmaster.com](http://www.mcmaster.com) online catalog, McMaster Carr Spill Control (7193T88)
  3. R.S. Means (2018) Division 01 56, Section 13.60-0600, page 23
- Material and consumable costs were adjusted using the regional indices for Augusta, Georgia.

## **APPENDIX B**

### **UNIT COST FACTOR LISTING (DECON: Power Block Structures Only)**

## **APPENDIX B**

### **UNIT COST FACTOR LISTING (Power Block Structures Only)**

<b>Unit Cost Factor</b>	<b>Cost/Unit (\$)</b>
Removal of clean instrument and sampling tubing, \$/linear foot	0.31
Removal of clean pipe 0.25 to 2 inches diameter, \$/linear foot	3.16
Removal of clean pipe >2 to 4 inches diameter, \$/linear foot	4.84
Removal of clean pipe >4 to 8 inches diameter, \$/linear foot	10.40
Removal of clean pipe >8 to 14 inches diameter, \$/linear foot	19.08
Removal of clean pipe >14 to 20 inches diameter, \$/linear foot	24.99
Removal of clean pipe >20 to 36 inches diameter, \$/linear foot	36.72
Removal of clean pipe >36 inches diameter, \$/linear foot	43.56
Removal of clean valve >2 to 4 inches	67.87
Removal of clean valve >4 to 8 inches	104.04
Removal of clean valve >8 to 14 inches	190.85
Removal of clean valve >14 to 20 inches	249.88
Removal of clean valve >20 to 36 inches	367.23
Removal of clean valve >36 inches	435.56
Removal of clean pipe hanger for small bore piping	24.16
Removal of clean pipe hanger for large bore piping	76.70
Removal of clean pump, <300 pound	179.04
Removal of clean pump, 300-1000 pound	515.32
Removal of clean pump, 1000-10,000 pound	1,979.05
Removal of clean pump, >10,000 pound	3,839.58
Removal of clean pump motor, 300-1000 pound	213.22
Removal of clean pump motor, 1000-10,000 pound	819.23
Removal of clean pump motor, >10,000 pound	1,843.26
Removal of clean heat exchanger <3000 pound	1,072.56
Removal of clean heat exchanger >3000 pound	2,716.75
Removal of clean feedwater heater/deaerator	7,588.90
Removal of clean moisture separator/reheater	15,509.47
Removal of clean tank, <300 gallons	229.88

**APPENDIX B  
(continued)**

<b>Unit Cost Factor</b>	<b>Cost/Unit (\$)</b>
Removal of clean tank, 300-3000 gallon	718.08
Removal of clean tank, >3000 gallons, \$/square foot surface area	6.37
Removal of clean electrical equipment, <300 pound	94.92
Removal of clean electrical equipment, 300-1000 pound	347.14
Removal of clean electrical equipment, 1000-10,000 pound	694.27
Removal of clean electrical equipment, >10,000 pound	1,693.13
Removal of clean electrical transformer < 30 tons	1,175.85
Removal of clean electrical transformer > 30 tons	3,386.25
Removal of clean standby diesel generator, <100 kW	1,201.03
Removal of clean standby diesel generator, 100 kW to 1 MW	2,680.78
Removal of clean standby diesel generator, >1 MW	5,549.76
Removal of clean electrical cable tray, \$/linear foot	9.07
Removal of clean electrical conduit, \$/linear foot	3.98
Removal of clean mechanical equipment, <300 pound	94.92
Removal of clean mechanical equipment, 300-1000 pound	347.14
Removal of clean mechanical equipment, 1000-10,000 pound	694.27
Removal of clean mechanical equipment, >10,000 pound	1,693.13
Removal of clean HVAC equipment, <300 pound	114.78
Removal of clean HVAC equipment, 300-1000 pound	417.11
Removal of clean HVAC equipment, 1000-10,000 pound	831.30
Removal of clean HVAC equipment, >10,000 pound	1,693.13
Removal of clean HVAC ductwork, \$/pound	0.33
Removal of contaminated instrument and sampling tubing, \$/linear foot	1.19
Removal of contaminated pipe 0.25 to 2 inches diameter, \$/linear foot	17.69
Removal of contaminated pipe >2 to 4 inches diameter, \$/linear foot	29.10
Removal of contaminated pipe >4 to 8 inches diameter, \$/linear foot	49.40
Removal of contaminated pipe >8 to 14 inches diameter, \$/linear foot	91.36

**APPENDIX B  
(continued)**

<b>Unit Cost Factor</b>	<b>Cost/Unit (\$)</b>
Removal of contaminated pipe >14 to 20 inches diameter, \$/linear foot	108.91
Removal of contaminated pipe >20 to 36 inches diameter, \$/linear foot	148.78
Removal of contaminated pipe >36 inches diameter, \$/linear foot	174.86
Removal of contaminated valve >2 to 4 inches	364.33
Removal of contaminated valve >4 to 8 inches	436.41
Removal of contaminated valve >8 to 14 inches	850.99
Removal of contaminated valve >14 to 20 inches	1,076.45
Removal of contaminated valve >20 to 36 inches	1,425.19
Removal of contaminated valve >36 inches	1,685.99
Removal of contaminated pipe hanger for small bore piping	118.46
Removal of contaminated pipe hanger for large bore piping	364.72
Removal of contaminated pump, <300 pound	783.95
Removal of contaminated pump, 300-1000 pound	1,831.51
Removal of contaminated pump, 1000-10,000 pound	5,586.82
Removal of contaminated pump, >10,000 pound	13,605.02
Removal of contaminated pump motor, 300-1000 pound	804.37
Removal of contaminated pump motor, 1000-10,000 pound	2,302.13
Removal of contaminated pump motor, >10,000 pound	5,168.84
Removal of contaminated heat exchanger <3000 pound	3,441.67
Removal of contaminated heat exchanger >3000 pound	10,062.37
Removal of contaminated tank, <300 gallons	1,309.24
Removal of contaminated tank, >300 gallons, \$/square foot	25.25
Removal of contaminated electrical equipment, <300 pound	594.72
Removal of contaminated electrical equipment, 300-1000 pound	1,477.39
Removal of contaminated electrical equipment, 1000-10,000 pound	2,847.14
Removal of contaminated electrical equipment, >10,000 pound	5,665.83
Removal of contaminated electrical cable tray, \$/linear foot	28.77
Removal of contaminated electrical conduit, \$/linear foot	15.01



**APPENDIX B  
(continued)**

<b>Unit Cost Factor</b>	<b>Cost/Unit (\$)</b>
Removal of contaminated mechanical equipment, <300 pound	661.01
Removal of contaminated mechanical equipment, 300-1000 pound	1,629.39
Removal of contaminated mechanical equipment, 1000-10,000 pound	3,134.82
Removal of contaminated mechanical equipment, >10,000 pound	5,665.83
Removal of contaminated HVAC equipment, <300 pound	661.01
Removal of contaminated HVAC equipment, 300-1000 pound	1,629.39
Removal of contaminated HVAC equipment, 1000-10,000 pound	3,134.82
Removal of contaminated HVAC equipment, >10,000 pound	5,665.83
Removal of contaminated HVAC ductwork, \$/pound	1.80
Removal/plasma arc cut of contaminated thin metal components, \$/linear in.	3.13
Additional decontamination of surface by washing, \$/square foot	6.12
Additional decontamination of surfaces by hydrolasing, \$/square foot	31.87
Decontamination rig hook up and flush, \$/ 250 foot length	5,527.96
Chemical flush of components/systems, \$/gallon	20.46
Removal of clean standard reinforced concrete, \$/cubic yard	65.56
Removal of grade slab concrete, \$/cubic yard	74.53
Removal of clean concrete floors, \$/cubic yard	329.27
Removal of sections of clean concrete floors, \$/cubic yard	965.75
Removal of clean heavily rein concrete w/#9 rebar, \$/cubic yard	94.48
Removal of contaminated heavily rein concrete w/#9 rebar, \$/cubic yard	1,825.43
Removal of clean heavily rein concrete w/#18 rebar, \$/cubic yard	128.03
Removal of contaminated heavily rein concrete w/#18 rebar, \$/cubic yard	2,411.75
Removal heavily rein concrete w/#18 rebar & steel embedments, \$/cubic yard	388.26
Removal of below-grade suspended floors, \$/cubic yard	179.41
Removal of clean monolithic concrete structures, \$/cubic yard	759.49
Removal of contaminated monolithic concrete structures, \$/cubic yard	1,807.84
Removal of clean foundation concrete, \$/cubic yard	600.24

## APPENDIX B (continued)

Unit Cost Factor	Cost/Unit (\$)
Removal of contaminated foundation concrete, \$/cubic yard	1,685.04
Explosive demolition of bulk concrete, \$/cubic yard	43.82
Removal of clean hollow masonry block wall, \$/cubic yard	23.24
Removal of contaminated hollow masonry block wall, \$/cubic yard	61.49
Removal of clean solid masonry block wall, \$/cubic yard	23.24
Removal of contaminated solid masonry block wall, \$/cubic yard	61.49
Backfill of below-grade voids, \$/cubic yard	29.81
Removal of subterranean tunnels/voids, \$/linear foot	87.46
Placement of concrete for below-grade voids, \$/cubic yard	143.73
Excavation of clean material, \$/cubic yard	2.77
Excavation of contaminated material, \$/cubic yard	38.70
Removal of clean concrete rubble (tipping fee included), \$/cubic yard	23.48
Removal of contaminated concrete rubble, \$/cubic yard	23.36
Removal of building by volume, \$/cubic foot	0.26
Removal of clean building metal siding, \$/square foot	0.97
Removal of contaminated building metal siding, \$/square foot	3.75
Removal of standard asphalt roofing, \$/square foot	1.48
Removal of transite panels, \$/square foot	1.66
Scarifying contaminated concrete surfaces (drill & spall), \$/square foot	11.06
Scabbling contaminated concrete floors, \$/square foot	6.19
Scabbling contaminated concrete walls, \$/square foot	16.01
Scabbling contaminated ceilings, \$/square foot	54.62
Scabbling structural steel, \$/square foot	5.36
Removal of clean overhead crane/monorail < 10 ton capacity	516.28
Removal of contaminated overhead crane/monorail < 10 ton capacity	1,576.03
Removal of clean overhead crane/monorail >10-50 ton capacity	1,239.06
Removal of contaminated overhead crane/monorail >10-50 ton capacity	3,781.81
Removal of polar crane > 50 ton capacity	5,274.83

**APPENDIX B  
(continued)**

<b>Unit Cost Factor</b>	<b>Cost/Unit (\$)</b>
Removal of gantry crane > 50 ton capacity	21,164.08
Removal of structural steel, \$/pound	0.16
Removal of clean steel floor grating, \$/square foot	4.23
Removal of contaminated steel floor grating, \$/square foot	12.69
Removal of clean free standing steel liner, \$/square foot	9.55
Removal of contaminated free standing steel liner, \$/square foot	29.42
Removal of clean concrete-anchored steel liner, \$/square foot	4.78
Removal of contaminated concrete-anchored steel liner, \$/square foot	34.32
Placement of scaffolding in clean areas, \$/square foot	15.06
Placement of scaffolding in contaminated areas, \$/square foot	23.10
Landscaping with topsoil, \$/acre	22,930.58
Cost of CPC B-88 LSA box & preparation for use	1,987.96
Cost of CPC B-25 LSA box & preparation for use	1,859.33
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,579.05
Cost of CPC B-144 LSA box & preparation for use	10,430.92
Cost of LSA drum & preparation for use	191.81
Cost of cask liner for CNSI 8 120A cask (resins)	11,608.84
Cost of cask liner for CNSI 8 120A cask (filters)	8,243.22
Decontamination of surfaces with vacuuming, \$/square foot	0.64

**APPENDIX C**  
**DETAILED COST ANALYSES**

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Vogtle Electric Generating Plant, Unit 1 .....	C-2
Vogtle Electric Generating Plant, Unit 2 .....	C-11

Table C-1  
Vogtle Electric Generating Plant Unit 1  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	241	36	277	277	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	554	83	637	637	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	120	18	139	139	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	120	18	139	139	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	904	136	1,039	1,039	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	374	56	430	430	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	904	136	1,039	1,039	-	-	-	-	-	-	-	-	-	7,500
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	602	90	693	693	-	-	-	-	-	-	-	-	-	5,000
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	120	18	139	139	-	-	-	-	-	-	-	-	-	1,000
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	593	89	682	614	-	68	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	502	75	577	520	-	58	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	60	9	69	69	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	855	128	984	984	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	783	117	901	901	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Biological shield	-	-	-	-	-	-	60	9	69	69	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Steam generators	-	-	-	-	-	-	376	56	432	432	-	-	-	-	-	-	-	-	-	3,120
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	193	29	222	111	-	111	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	48	7	55	-	-	55	-	-	-	-	-	-	-	400
1a.1.17.10	Main Condensers	-	-	-	-	-	-	48	7	55	-	-	55	-	-	-	-	-	-	-	400
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	376	56	432	216	-	216	-	-	-	-	-	-	-	3,120
1a.1.17.12	Waste management	-	-	-	-	-	-	554	83	637	637	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	108	16	125	62	-	62	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	4,558	684	5,241	4,615	-	626	-	-	-	-	-	-	-	37,827
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	289	43	333	333	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,300	495	3,795	3,795	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	148	22	170	170	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	15,017	2,253	17,270	16,644	-	626	-	-	-	-	-	-	-	78,157
Period 1a Additional Costs																					
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	12,000	1,800	13,800	13,800	-	-	-	-	-	-	-	-	-	-
1a.2.2	ISFSI to DOE Transfer Facility	-	-	-	-	-	-	7,911	1,187	9,098	-	9,098	-	-	-	-	-	-	-	-	-
1a.2.3	Site Characterization	-	-	-	-	-	-	6,103	1,831	7,934	7,934	-	-	-	-	-	-	-	-	30,500	10,852
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	26,015	4,818	30,832	21,734	9,098	-	-	-	-	-	-	-	30,500	10,852
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,592	1,289	9,881	-	9,881	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	8,592	1,289	9,881	-	9,881	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	2,395	240	2,635	2,635	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	521	-	-	-	-	-	130	651	651	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	546	-	-	-	-	-	82	628	628	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	3	-	55	-	16	87	87	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	585	88	673	673	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,141	114	1,255	1,255	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	690	69	758	-	758	-	-	-	-	-	-	-	-	-
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	810	121	931	-	931	-	-	-	-	-	-	-	-	-
1a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	53	8	61	-	61	-	-	-	-	-	-	-	-	-
1a.4.11	Security Staff Cost	-	-	-	-	-	-	7,777	1,167	8,944	8,944	-	-	-	-	-	-	-	-	-	164,320
1a.4.12	Utility Staff Cost	-	-	-	-	-	-	31,471	4,721	36,192	36,192	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,067	13	3	-	55	44,922	6,755	52,815	51,064	1,750	-	-	610	-	-	-	12,190	20	586,560
1a.0	TOTAL PERIOD 1a COST	-	1,067	13	3	-	55	94,546	15,114	110,798	89,442	20,730	626	-	610	-	-	-	12,190	30,520	675,569

Table C-1  
Vogtle Electric Generating Plant Unit 1  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	570	86	656	590	-	66	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	120	18	139	139	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	301	45	346	346	-	-	-	-	-	-	-	-	-	2,500
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	163	24	187	47	-	140	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	120	18	139	139	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	120	18	139	139	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	120	18	139	139	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	437	66	503	503	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	145	22	166	83	-	83	-	-	-	-	-	-	-	1,200
1b.1.1.10	Missile shields	-	-	-	-	-	-	54	8	62	62	-	-	-	-	-	-	-	-	-	450
1b.1.1.11	Biological shield	-	-	-	-	-	-	145	22	166	166	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.12	Steam generators	-	-	-	-	-	-	554	83	637	637	-	-	-	-	-	-	-	-	-	4,600
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	120	18	139	69	-	69	-	-	-	-	-	-	-	1,000
1b.1.1.14	Main Turbine	-	-	-	-	-	-	188	28	216	-	-	216	-	-	-	-	-	-	-	1,560
1b.1.1.15	Main Condensers	-	-	-	-	-	-	188	28	216	-	-	216	-	-	-	-	-	-	-	1,560
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	329	49	378	340	-	38	-	-	-	-	-	-	-	2,730
1b.1.1.17	Reactor building	-	-	-	-	-	-	329	49	378	340	-	38	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,005	601	4,606	3,740	-	866	-	-	-	-	-	-	-	33,243
1b.1.2	Decon primary loop	737	-	-	-	-	-	-	369	1,106	1,106	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	737	-	-	-	-	-	4,005	970	5,712	4,846	-	866	-	-	-	-	-	-	1,067	33,243
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	999	-	-	-	-	-	-	150	1,148	1,148	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,339	201	1,540	1,540	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	76	-	45	134	-	195	-	111	561	561	-	-	-	467	-	-	-	27,990	91	-
1b.3.4	Process decommissioning chemical flush waste	2	-	79	333	-	2,765	-	750	3,929	3,929	-	-	-	-	848	-	-	90,351	159	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,989	-	-	-	-	-	-	298	2,287	2,287	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,801	1,470	11,272	-	11,272	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,066	1,202	124	466	-	2,960	11,141	3,161	22,120	10,848	11,272	-	-	467	848	-	-	118,341	250	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	36	-	-	-	-	-	-	9	45	45	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,194	119	1,314	1,314	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	292	-	-	-	-	-	73	365	365	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	272	-	-	-	-	-	41	313	313	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	2	-	32	-	9	51	51	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	583	87	671	671	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	328	33	361	361	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	344	34	378	-	378	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	404	61	464	-	464	-	-	-	-	-	-	-	-	-
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	26	4	30	-	30	-	-	-	-	-	-	-	-	-
1b.4.12	Security Staff Cost	-	-	-	-	-	-	3,760	564	4,324	4,324	-	-	-	-	-	-	-	-	-	78,823
1b.4.13	DOC Staff Cost	-	-	-	-	-	-	5,606	841	6,447	6,447	-	-	-	-	-	-	-	-	-	63,266
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	15,786	2,368	18,154	18,154	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	36	564	7	2	-	32	28,032	4,243	32,916	32,043	873	-	-	356	-	-	-	7,122	12	353,668
1b.0	TOTAL PERIOD 1b COST	3,839	1,766	131	468	-	2,993	43,178	8,374	60,748	47,738	12,144	866	-	823	848	-	-	125,463	1,328	386,911
PERIOD 1 TOTALS		3,839	2,832	144	471	-	3,048	137,725	23,488	171,546	137,180	32,874	1,492	-	1,432	848	-	-	137,654	31,848	1,062,480
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	129	99	36	88	-	493	-	229	1,073	1,073	-	-	-	1,839	-	-	-	128,296	4,820	-
2a.1.1.2	Pressurizer Relief Tank	24	19	9	23	-	128	-	53	256	256	-	-	-	479	-	-	-	33,443	893	-
2a.1.1.3	Reactor Coolant Pumps & Motors	82	80	164	225	-	1,621	-	517	2,689	2,689	-	-	-	5,128	-	-	-	805,200	4,124	100
2a.1.1.4	Pressurizer	37	50	415	105	-	910	-	316	1,834	1,834	-	-	-	2,879	-	-	-	251,899	2,373	938
2a.1.1.5	Steam Generators	344	3,232	2,584	3,503	4,085	7,065	-	4,143	24,957	24,957	-	-	39,095	22,354	-	-	-	3,275,398	29,799	2,875
2a.1.1.6	CRDMs/ICIs/Service Structure Removal	146	251	242	108	-	587	-	323	1,657	1,657	-	-	-	3,965	-	-	-	152,894	8,248	-
2a.1.1.7	Reactor Vessel Internals	127	5,414	10,761	1,645	-	14,708	405	14,640	47,701	47,701	-	-	-	1,878	963	393	-	329,968	34,590	1,542
2a.1.1.8	Reactor Vessel	106	6,860	2,939	1,605	-	4,550	405	8,670	25,135	25,135	-	-	-	13,584	-	-	-	973,399	34,590	1,542
2a.1.1	Totals	996	16,005	17,151	7,302	4,085	30,062	809	28,891	105,301	105,301	-	-	39,095	52,107	963	393	-	5,950,497	119,437	6,997

Table C-1  
Vogtle Electric Generating Plant Unit 1  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
Removal of Major Equipment																						
2a.1.2	Main Turbine/Generator	-	133	-	-	-	-	-	20	152	-	-	152	-	-	-	-	-	-	3,130	-	
2a.1.3	Main Condensers	-	502	-	-	-	-	-	75	577	-	-	577	-	-	-	-	-	-	11,923	-	
Cascading Costs from Clean Building Demolition																						
2a.1.4.1	*Reactor	-	415	-	-	-	-	-	62	477	477	-	-	-	-	-	-	-	-	4,916	-	
2a.1.4.2	Auxiliary Building	-	311	-	-	-	-	-	47	358	358	-	-	-	-	-	-	-	-	2,323	-	
2a.1.4.3	Fuel Handling Building	-	43	-	-	-	-	-	6	50	50	-	-	-	-	-	-	-	-	413	-	
2a.1.4	Totals	-	769	-	-	-	-	-	115	885	885	-	-	-	-	-	-	-	-	7,653	-	
Disposal of Plant Systems																						
2a.1.5.1	Auxiliary Feedwater	-	58	-	-	-	-	-	9	66	-	-	66	-	-	-	-	-	-	1,671	-	
2a.1.5.2	Auxiliary Gas	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	356	-	
2a.1.5.3	Auxiliary Gas - RCA	-	10	0	0	10	-	-	4	24	24	-	-	72	-	-	-	-	-	2,923	175	
2a.1.5.4	Auxiliary Steam	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	-	689	-
2a.1.5.5	Auxiliary Steam - RCA	-	22	0	1	31	-	-	10	65	65	-	-	228	-	-	-	-	-	9,264	427	
2a.1.5.6	Circulating Water	-	224	-	-	-	-	-	34	258	-	-	258	-	-	-	-	-	-	-	6,512	-
2a.1.5.7	Circulating Water Chemical Injection	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	-	251	-
2a.1.5.8	Condensate & Feedwater	-	343	-	-	-	-	-	51	394	-	-	394	-	-	-	-	-	-	-	9,524	-
2a.1.5.9	Condensate & Feedwater - RCA	-	291	17	44	1,356	-	-	284	1,993	1,993	-	-	9,999	-	-	-	-	-	406,077	6,405	
2a.1.5.10	Condensate Chemical Injection	-	34	-	-	-	-	-	5	39	-	-	39	-	-	-	-	-	-	-	1,081	-
2a.1.5.11	Condensate Filter Demineralizer	-	53	-	-	-	-	-	8	61	-	-	61	-	-	-	-	-	-	-	1,470	-
2a.1.5.12	Condenser Air Ejection	-	36	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	-	1,026	-
2a.1.5.13	Condenser Tube Cleaning	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	-	320	-
2a.1.5.14	Containment Spray - RCA	-	185	6	15	464	-	-	119	789	789	-	-	3,420	-	-	-	-	-	138,886	3,867	
2a.1.5.15	Electrohydraulic Control	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	-	87	-
2a.1.5.16	Eng Safety Feature Room Coolers - RCA	-	46	1	2	69	-	-	22	140	140	-	-	505	-	-	-	-	-	20,521	1,056	
2a.1.5.17	Extraction Steam	-	89	-	-	-	-	-	13	102	-	-	102	-	-	-	-	-	-	-	2,629	-
2a.1.5.18	Feedwater Heater Drain	-	165	-	-	-	-	-	25	190	-	-	190	-	-	-	-	-	-	-	4,759	-
2a.1.5.19	Feedwater Heater Vent	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	-	2,027	-
2a.1.5.20	Heater Ventilation	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	-	297	-
2a.1.5.21	Main Steam	-	234	-	-	-	-	-	35	269	-	-	269	-	-	-	-	-	-	-	6,650	-
2a.1.5.22	Main Steam - RCA	-	535	39	104	3,163	-	-	628	4,469	4,469	-	-	23,319	-	-	-	-	-	946,992	11,824	
2a.1.5.23	Miscellaneous Leak Detection	-	20	2	2	11	17	-	11	64	64	-	-	78	68	-	-	-	-	7,553	425	
2a.1.5.24	Miscellaneous Piping	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	-	105	-
2a.1.5.25	NSCW Chemical Injection	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	-	177	-
2a.1.5.26	Plant Make-Up Water Treatment	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	-	179	-
2a.1.5.27	Post Accident Sampling - RCA	-	21	0	1	35	-	-	11	68	68	-	-	260	-	-	-	-	-	10,575	398	
2a.1.5.28	River Intake Chlorination	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	-	583	-
2a.1.5.29	Safety Injection - RCA	-	263	8	22	678	-	-	172	1,143	1,143	-	-	5,000	-	-	-	-	-	203,054	5,329	
2a.1.5.30	Steam Generator Blowdown	-	301	22	30	180	211	-	162	905	905	-	-	1,328	856	-	-	-	-	108,793	6,767	
2a.1.5.31	Turbine Drive Steam	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	-	1,211	-
2a.1.5.32	Turbine Generator Gas	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	-	205	-
2a.1.5.33	Turbine Generator Hydrogen Seal Oil	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	-	212	-
2a.1.5.34	Turbine Generator Stator Cooling	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	-	325	-
2a.1.5.35	Turbine Lube Oil Storage & Filtration	-	56	-	-	-	-	-	8	65	-	-	65	-	-	-	-	-	-	-	1,637	-
2a.1.5.36	Turbine Plant Closed Cooling Water	-	32	-	-	-	-	-	5	37	-	-	37	-	-	-	-	-	-	-	925	-
2a.1.5.37	Turbine Plant Cooling Water	-	209	-	-	-	-	-	31	241	-	-	241	-	-	-	-	-	-	-	6,020	-
2a.1.5.38	Turbine Plant Sampling	-	42	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	-	1,250	-
2a.1.5.39	Waste Water - RCA	-	6	0	1	20	-	-	5	31	31	-	-	149	-	-	-	-	-	6,033	122	
2a.1.5	Totals	-	3,518	96	223	6,017	228	-	1,700	11,781	9,691	-	2,090	44,358	924	-	-	-	-	1,860,671	88,975	-
2a.1.6	Scaffolding in support of decommissioning	-	3,671	29	9	192	27	-	958	4,886	4,886	-	-	1,276	113	-	-	-	-	64,568	38,848	-
2a.1	Subtotal Period 2a Activity Costs	996	24,597	17,276	7,534	10,294	30,317	809	31,759	123,583	120,763	-	2,820	84,729	53,143	963	393	-	7,875,735	269,966	6,997	
Period 2a Additional Costs																						
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,933	580	2,512	2,512	-	-	-	-	-	-	-	-	33,885	-	
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	1,933	580	2,512	2,512	-	-	-	-	-	-	-	-	33,885	-	
Period 2a Collateral Costs																						
2a.3.1	Process decommissioning water waste	133	-	81	240	-	351	-	198	1,003	1,003	-	-	-	838	-	-	-	-	50,256	163	-
2a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.3	Small tool allowance	-	232	-	-	-	-	-	35	267	241	-	27	-	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	23,915	3,587	27,502	-	27,502	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	133	232	81	240	-	351	23,915	3,821	28,773	1,244	27,502	27	-	838	-	-	-	-	50,256	163	-
Period 2a Period-Dependent Costs																						
2a.4.1	Decon supplies	129	-	-	-	-	-	-	32	161	161	-	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	963	96	1,059	1,059	-	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,426	-	-	-	-	-	607	3,033	3,033	-	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,839	-	-	-	-	-	576	4,415	4,415	-	-	-	-	-	-	-	-	-	-	-

Table C-1  
Vogtle Electric Generating Plant Unit 1  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
2a.4.6	Disposal of DAW generated	-	-	104	24	-	459	-	129	716	716	-	-	-	5,039	-	-	-	100,786	164	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	1,002	150	1,152	1,152	-	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs (continued)																					
2a.4.8	NRC Fees	-	-	-	-	-	-	1,072	107	1,179	1,179	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	731	73	804	-	804	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,459	219	1,678	-	1,678	-	-	-	-	-	-	-	-	-
2a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	96	14	110	-	110	-	-	-	-	-	-	-	-	-
2a.4.12	Security Staff Cost	-	-	-	-	-	-	11,921	1,788	13,710	13,710	-	-	-	-	-	-	-	-	-	275,222
2a.4.13	DOC Staff Cost	-	-	-	-	-	-	24,699	3,705	28,404	28,404	-	-	-	-	-	-	-	-	-	284,977
2a.4.14	Utility Staff Cost	-	-	-	-	-	-	41,028	6,154	47,183	47,183	-	-	-	-	-	-	-	-	-	528,161
2a.4	Subtotal Period 2a Period-Dependent Costs	129	6,265	104	24	-	459	82,970	13,651	103,602	101,010	2,592	-	-	5,039	-	-	-	100,786	164	1,088,359
2a.0	TOTAL PERIOD 2a COST	1,258	31,095	17,461	7,799	10,294	31,127	109,627	49,810	258,470	225,530	30,094	2,847	84,729	59,020	963	393	-	8,026,777	304,179	1,095,356
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Additional Systems - RCA	-	232	8	20	611	-	-	154	1,025	1,025	-	-	4,508	-	-	-	-	183,071	4,785	-
2b.1.1.2	Aux Component Cooling Water - RCA	-	319	17	45	1,371	-	-	294	2,045	2,045	-	-	10,109	-	-	-	-	410,550	6,608	-
2b.1.1.3	Auxiliary Bldg & Misc Drains	-	586	42	57	170	450	-	297	1,602	1,602	-	-	1,252	1,835	-	-	-	167,974	13,026	-
2b.1.1.4	Auxiliary Bldg HVAC	-	754	24	56	1,350	99	-	427	2,710	2,710	-	-	9,956	405	-	-	-	430,125	15,242	-
2b.1.1.5	Backflushable Filter - RCA	-	32	1	2	46	-	-	15	95	95	-	-	339	-	-	-	-	13,747	616	-
2b.1.1.6	Boron Recycle	170	152	15	22	193	137	-	191	881	881	-	-	1,421	558	-	-	-	93,476	6,737	-
2b.1.1.7	Chemical & Volume Control	553	629	73	87	295	682	-	669	2,988	2,988	-	-	2,178	2,756	-	-	-	265,954	23,677	-
2b.1.1.8	Chilled Water	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	2,693	-
2b.1.1.9	Chilled Water - RCA	-	110	2	5	166	-	-	53	337	337	-	-	1,223	-	-	-	-	49,671	2,137	-
2b.1.1.10	Component Cooling Water - RCA	-	309	37	97	2,955	-	-	539	3,936	3,936	-	-	21,783	-	-	-	-	884,608	6,961	-
2b.1.1.11	Containment & Aux Bldg Drains	-	205	17	23	25	197	-	109	577	577	-	-	183	804	-	-	-	58,687	4,579	-
2b.1.1.12	Containment Air Purification & Cleanup	-	68	17	23	286	120	-	95	609	609	-	-	2,108	484	-	-	-	116,952	1,605	-
2b.1.1.13	Containment Cooling	-	771	24	55	1,327	101	-	428	2,706	2,706	-	-	9,784	415	-	-	-	423,729	15,547	-
2b.1.1.14	Containment Heat Removal	-	896	50	96	1,563	394	-	576	3,576	3,576	-	-	11,526	1,615	-	-	-	570,693	18,345	-
2b.1.1.15	Control Building Drains	-	72	-	-	-	-	-	11	82	-	-	82	-	-	-	-	-	-	1,996	-
2b.1.1.16	Control Building HVAC	-	102	-	-	-	-	-	15	117	-	-	117	-	-	-	-	-	-	3,272	-
2b.1.1.17	Diesel Generator	-	34	-	-	-	-	-	5	39	-	-	39	-	-	-	-	-	-	904	-
2b.1.1.18	Diesel Generator Bldg HVAC	-	27	-	-	-	-	-	4	32	-	-	32	-	-	-	-	-	-	898	-
2b.1.1.19	Electric Chase Tunnel Drains	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	444	-
2b.1.1.20	Electric Tunnel Ventilation	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	44	-
2b.1.1.21	Electrical - Clean	-	2,746	-	-	-	-	-	412	3,158	-	-	3,158	-	-	-	-	-	-	71,727	-
2b.1.1.22	Electrical - Contaminated	-	940	17	39	972	66	-	405	2,439	2,439	-	-	7,168	270	-	-	-	308,256	19,558	-
2b.1.1.23	Electrical - RCA	-	5,403	100	264	8,054	-	-	2,608	16,428	16,428	-	-	59,377	-	-	-	-	2,411,337	104,474	-
2b.1.1.24	Fire Protection - RCA	-	512	13	34	1,039	-	-	290	1,888	1,888	-	-	7,657	-	-	-	-	310,967	10,413	-
2b.1.1.25	Instrument Air	-	42	-	-	-	-	-	6	48	-	-	48	-	-	-	-	-	-	1,319	-
2b.1.1.26	Instrument Air - RCA	-	174	2	6	185	-	-	72	440	440	-	-	1,363	-	-	-	-	55,343	3,231	-
2b.1.1.27	Miscellaneous HVAC	-	62	-	-	-	-	-	9	71	-	-	71	-	-	-	-	-	-	2,042	-
2b.1.1.28	Miscellaneous Reactor Coolant	73	95	10	11	14	90	-	87	380	380	-	-	102	363	-	-	-	27,624	3,552	-
2b.1.1.29	Nuclear Sampling - Gaseous	-	11	1	1	4	7	-	5	29	29	-	-	32	27	-	-	-	3,040	229	-
2b.1.1.30	Nuclear Sampling - Liquid	-	27	2	2	10	18	-	13	74	74	-	-	73	72	-	-	-	7,708	611	-
2b.1.1.31	Nuclear Service Cooling Water	-	118	-	-	-	-	-	18	135	-	-	135	-	-	-	-	-	-	3,292	-
2b.1.1.32	Nuclear Service Cooling Water - RCA	-	860	29	76	2,323	-	-	578	3,865	3,865	-	-	17,124	-	-	-	-	695,434	17,571	-
2b.1.1.33	Plant Demineralized Water	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	425	-
2b.1.1.34	Plant Demineralized Water - RCA	-	19	0	1	20	-	-	8	48	48	-	-	147	-	-	-	-	5,964	347	-
2b.1.1.35	Potable Water	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	98	-
2b.1.1.36	Potable Water - RCA	-	4	0	0	7	-	-	2	13	13	-	-	51	-	-	-	-	2,065	76	-
2b.1.1.37	Radwaste Solidification & Vol Reduction	-	22	3	2	3	19	-	11	61	61	-	-	21	77	-	-	-	5,875	467	-
2b.1.1.38	Reactor M/U Wtr Storage Tank & Degas	-	119	10	12	51	87	-	62	339	339	-	-	373	352	-	-	-	37,822	2,587	-
2b.1.1.39	Residual Heat Removal	220	177	27	38	157	291	-	259	1,170	1,170	-	-	1,155	1,187	-	-	-	122,713	5,084	-
2b.1.1.40	Service Air	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	1,179	-
2b.1.1.41	Service Air - RCA	-	136	2	5	160	-	-	59	362	362	-	-	1,178	-	-	-	-	47,856	2,625	-
2b.1.1.42	Solidification Building Drains	16	18	2	2	3	20	-	18	79	79	-	-	21	83	-	-	-	6,136	674	-
2b.1.1.43	Turbine Bldg HVAC	-	423	-	-	-	-	-	64	487	-	-	487	-	-	-	-	-	-	13,857	-
2b.1.1.44	Turbine Building Drain	-	144	-	-	-	-	-	22	165	-	-	165	-	-	-	-	-	-	4,169	-
2b.1.1.45	Utility Water - RCA	-	29	0	1	30	-	-	12	73	73	-	-	223	-	-	-	-	9,066	535	-
2b.1.1.46	Waste Evaporator Steam Supply - RCA	-	9	0	1	17	-	-	5	31	31	-	-	122	-	-	-	-	4,946	182	-
2b.1.1.47	Waste Processing - Gas	-	173	17	23	294	114	-	121	742	742	-	-	2,165	456	-	-	-	117,671	3,765	-
2b.1.1.48	Waste Processing - Liquid	411	421	46	60	345	430	-	484	2,199	2,199	-	-	2,546	1,743	-	-	-	215,472	16,727	-
2b.1.1	Totals	1,444	18,146	608	1,167	24,044	3,324	-	9,538	58,271	53,746	-	4,525	177,267	13,501	-	-	-	8,064,533	420,933	-
2b.1.2	Scaffolding in support of decommissioning	-	4,589	36	12	240	34	-	1,197	6,108	6,108	-	-	1,595	141	-	-	-	80,710	48,560	-



Table C-1  
Vogtle Electric Generating Plant Unit 1  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Decontamination of Site Buildings																					
2b.1.3.1	Reactor	1,108	1,009	59	399	926	1,646	-	1,422	6,569	6,569	-	-	6,829	17,499	-	-	-	1,037,885	45,279	-
2b.1.3.2	Auxiliary Building	897	482	35	299	269	406	-	759	3,146	3,146	-	-	1,984	11,469	-	-	-	623,109	30,690	-
2b.1.3	Totals	2,005	1,491	94	698	1,195	2,051	-	2,181	9,715	9,715	-	-	8,813	28,968	-	-	-	1,660,994	75,969	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	494	74	568	568	-	-	-	-	-	-	-	-	-	4,096
2b.1.5	Receive NRC approval of termination plan									a											
2b.1	Subtotal Period 2b Activity Costs	3,448	24,226	738	1,876	25,480	5,409	494	12,991	74,661	70,136	-	4,525	187,676	42,609	-	-	-	9,806,237	545,462	4,096
Period 2b Additional Costs																					
2b.2.1	Remedial Action Surveys	-	-	-	-	-	-	2,810	843	3,653	3,653	-	-	-	-	-	-	-	-	49,261	-
2b.2.2	Excavation of Underground Services	-	1,629	-	-	-	-	316	292	2,237	-	-	2,237	-	-	-	-	-	-	9,000	-
2b.2.3	Operational Tools & Equipment	-	-	9	22	-	589	-	151	772	772	-	-	-	5,880	-	-	-	176,400	16	-
2b.2	Subtotal Period 2b Additional Costs	-	1,629	9	22	-	589	3,126	1,286	6,661	4,424	-	2,237	-	5,880	-	-	-	176,400	58,277	-
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	188	-	117	347	-	508	-	285	1,445	1,445	-	-	-	1,213	-	-	-	72,756	236	-
2b.3.2	Process decommissioning chemical flush waste	3	-	102	430	-	814	-	280	1,628	1,628	-	-	-	1,094	-	-	-	116,621	205	-
2b.3.3	Small tool allowance	-	368	-	-	-	-	-	55	423	423	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,345	1,552	11,897	-	11,897	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	192	368	219	777	-	1,322	10,345	2,172	15,394	3,497	11,897	-	-	2,307	-	-	-	189,377	441	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,604	-	-	-	-	-	-	401	2,005	2,005	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,174	117	1,291	1,291	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	3,971	-	-	-	-	-	993	4,964	4,964	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,823	-	-	-	-	-	723	5,546	5,546	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	152	36	-	671	-	188	1,047	1,047	-	-	-	7,374	-	-	-	147,487	241	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,306	131	1,437	1,437	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	891	89	980	-	980	-	-	-	-	-	-	-	-	-
2b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,779	267	2,046	-	2,046	-	-	-	-	-	-	-	-	-
2b.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	448	67	515	515	-	-	-	-	-	-	-	-	-	-
2b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	116	17	134	-	134	-	-	-	-	-	-	-	-	-
2b.4.13	Security Staff Cost	-	-	-	-	-	-	17,041	2,556	19,598	19,598	-	-	-	-	-	-	-	-	-	329,062
2b.4.14	DOC Staff Cost	-	-	-	-	-	-	20,460	3,069	23,529	23,529	-	-	-	-	-	-	-	-	-	246,796
2b.4.15	Utility Staff Cost	-	-	-	-	-	-	34,492	5,174	39,665	39,665	-	-	-	-	-	-	-	-	-	459,315
2b.4	Subtotal Period 2b Period-Dependent Costs	1,604	8,794	152	36	-	671	78,671	13,938	103,865	100,706	3,159	-	-	7,374	-	-	-	147,487	241	1,035,173
2b.0	TOTAL PERIOD 2b COST	5,244	35,017	1,118	2,711	25,480	7,992	92,635	30,386	200,582	178,764	15,056	6,762	187,676	58,171	-	-	-	10,319,500	604,420	1,039,269
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	441	46	194	126	-	1,107	-	547	2,460	2,460	-	-	-	4,536	-	-	-	288,188	1,249	-
Disposal of Plant Systems																					
2d.1.2.1	Aux Bldg Flood Alarms & Drains	-	123	9	12	33	95	-	62	333	333	-	-	245	386	-	-	-	34,613	2,739	-
2d.1.2.2	Electrical Fuel Bldg.	-	601	11	30	922	-	-	294	1,859	1,859	-	-	6,799	-	-	-	-	276,099	11,617	-
2d.1.2.3	Fire Protection	-	146	-	-	-	-	-	22	168	-	-	168	-	-	-	-	-	-	4,115	-
2d.1.2.4	Sewage Treatment	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	16	-
2d.1.2.5	Spent Fuel Cooling & Purification	-	253	32	45	190	338	-	186	1,044	1,044	-	-	1,400	1,380	-	-	-	144,935	5,736	-
2d.1.2.6	Utility Water	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	872	-
2d.1.2.7	Waste Water	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	186	-
2d.1.2	Totals	-	1,157	52	87	1,145	433	-	569	3,444	3,236	-	207	8,444	1,766	-	-	-	455,647	25,281	-
Decontamination of Site Buildings																					
2d.1.3.1	Fuel Handling Building	705	722	13	59	377	88	-	622	2,586	2,586	-	-	2,782	1,899	-	-	-	204,527	30,405	-
2d.1.3	Totals	705	722	13	59	377	88	-	622	2,586	2,586	-	-	2,782	1,899	-	-	-	204,527	30,405	-
2d.1.4	Scaffolding in support of decommissioning	-	918	7	2	48	7	-	239	1,222	1,222	-	-	319	28	-	-	-	16,142	9,712	-
2d.1	Subtotal Period 2d Activity Costs	1,146	2,843	265	275	1,571	1,634	-	1,978	9,711	9,503	-	207	11,545	8,230	-	-	-	964,504	66,647	-
Period 2d Additional Costs																					
2d.2.1	Remedial Action Surveys	-	-	-	-	-	-	494	148	642	642	-	-	-	-	-	-	-	-	8,656	-
2d.2.2	SFP non-fuel cleanout	-	-	-	-	-	-	4,900	1,470	6,370	6,370	-	-	-	-	-	-	-	-	-	-
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	5,394	1,618	7,012	7,012	-	-	-	-	-	-	-	-	8,656	-

Table C-1  
Vogtle Electric Generating Plant Unit 1  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	84	-	53	156	-	228	-	128	648	648	-	-	-	544	-	-	-	32,648	106	-
2d.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.3.3	Small tool allowance	-	54	-	-	-	-	-	8	62	62	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	135	49	902	129	-	188	1,404	1,404	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,057	159	1,216	-	1,216	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	84	54	188	205	902	357	1,057	483	3,330	2,114	1,216	-	6,000	1,073	-	-	-	336,256	253	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	215	-	-	-	-	-	-	54	269	269	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	222	22	245	245	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	545	-	-	-	-	-	136	681	681	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	914	-	-	-	-	-	137	1,051	1,051	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	39	9	-	173	-	49	270	270	-	-	-	1,902	-	-	-	38,040	62	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	97	15	112	112	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	209	21	230	230	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	84	8	93	-	93	-	-	-	-	-	-	-	-	-
2d.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	170	25	195	195	-	-	-	-	-	-	-	-	-	-
2d.4.11	ISFSI Operating Costs	-	-	-	-	-	-	22	3	25	-	25	-	-	-	-	-	-	-	-	-
2d.4.12	Security Staff Cost	-	-	-	-	-	-	865	130	995	121	874	-	-	-	-	-	-	-	-	16,891
2d.4.13	DOC Staff Cost	-	-	-	-	-	-	2,611	392	3,003	3,003	-	-	-	-	-	-	-	-	-	31,616
2d.4.14	Utility Staff Cost	-	-	-	-	-	-	3,796	569	4,366	4,156	210	-	-	-	-	-	-	-	-	52,405
2d.4	Subtotal Period 2d Period-Dependent Costs	215	1,459	39	9	-	173	8,078	1,562	11,536	10,334	1,202	-	-	1,902	-	-	-	38,040	62	100,911
2d.0	TOTAL PERIOD 2d COST	1,445	4,356	493	489	2,472	2,164	14,529	5,640	31,588	28,963	2,417	207	17,545	11,205	-	-	-	1,338,800	75,619	100,911
PERIOD 2e - Delay before License Termination																					
Period 2e Direct Decommissioning Activities																					
Period 2e Additional Costs																					
2e.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,162	349	1,511	1,511	-	-	-	-	-	-	-	-	-	6,240
2e.2	Subtotal Period 2e Additional Costs	-	-	-	-	-	-	1,162	349	1,511	1,511	-	-	-	-	-	-	-	-	-	6,240
Period 2e Collateral Costs																					
2e.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	201	30	232	-	232	-	-	-	-	-	-	-	-	-
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	201	30	232	-	232	-	-	-	-	-	-	-	-	-
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance	-	-	-	-	-	-	1,210	121	1,331	1,331	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	213	-	-	-	-	-	53	266	266	-	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	5	1	-	21	-	6	32	32	-	-	-	226	-	-	-	4,517	7	-
2e.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	515	51	566	566	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	459	46	505	-	505	-	-	-	-	-	-	-	-	-
2e.4.8	ISFSI Operating Costs	-	-	-	-	-	-	120	18	138	-	138	-	-	-	-	-	-	-	-	-
2e.4.9	Security Staff Cost	-	-	-	-	-	-	4,708	706	5,414	661	4,754	-	-	-	-	-	-	-	-	91,899
2e.4.10	Utility Staff Cost	-	-	-	-	-	-	2,389	358	2,747	2,555	192	-	-	-	-	-	-	-	-	32,989
2e.4	Subtotal Period 2e Period-Dependent Costs	-	213	5	1	-	21	9,401	1,360	11,000	5,411	5,589	-	-	226	-	-	-	4,517	7	124,888
2e.0	TOTAL PERIOD 2e COST	-	213	5	1	-	21	10,765	1,739	12,742	6,922	5,821	-	-	226	-	-	-	4,517	7	131,128
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	165	50	215	215	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	165	50	215	215	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	9,554	2,866	12,421	12,421	-	-	-	-	-	-	-	-	199,494	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	9,554	2,866	12,421	12,421	-	-	-	-	-	-	-	-	199,494	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,339	201	1,540	1,540	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	265	40	305	-	305	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,604	241	1,845	1,540	305	-	-	-	-	-	-	-	-	-

Table C-1  
Vogtle Electric Generating Plant Unit 1  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	402	40	443	443	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	895	-	-	-	-	-	224	1,119	1,119	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	2	-	31	-	9	48	48	-	-	-	337	-	-	-	6,734	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	432	43	475	475	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	153	15	168	-	168	-	-	-	-	-	-	-	-	-
2f.4.8	ISFSI Operating Costs	-	-	-	-	-	-	40	6	46	-	46	-	-	-	-	-	-	-	-	-
2f.4.9	Security Staff Cost	-	-	-	-	-	-	1,566	235	1,800	220	1,581	-	-	-	-	-	-	-	-	30,559
2f.4.10	DOC Staff Cost	-	-	-	-	-	-	4,071	611	4,682	4,682	-	-	-	-	-	-	-	-	-	46,622
2f.4.11	Utility Staff Cost	-	-	-	-	-	-	5,138	771	5,909	5,371	538	-	-	-	-	-	-	-	-	59,942
2f.4	Subtotal Period 2f Period-Dependent Costs	-	895	7	2	-	31	11,890	1,966	14,790	12,458	2,332	-	-	337	-	-	-	6,734	11	137,123
2f.0	TOTAL PERIOD 2f COST	-	895	7	2	-	31	23,214	5,123	29,271	26,634	2,637	-	-	337	-	-	-	6,734	199,505	140,243
PERIOD 2 TOTALS		7,948	71,576	19,083	11,000	38,245	41,334	250,770	92,698	532,654	466,812	56,026	9,816	289,949	128,958	963	393	-	19,696,330	1,183,729	2,506,909
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor	-	2,379	-	-	-	-	-	357	2,736	-	-	2,736	-	-	-	-	-	-	28,377	-
3b.1.1.2	Auxiliary Building	-	4,871	-	-	-	-	-	731	5,602	-	-	5,602	-	-	-	-	-	-	25,553	-
3b.1.1.3	Circulating Water Intake Canal	-	508	-	-	-	-	-	76	584	-	-	584	-	-	-	-	-	-	7,985	-
3b.1.1.4	Control Building	-	2,481	-	-	-	-	-	372	2,853	-	-	2,853	-	-	-	-	-	-	16,818	-
3b.1.1.5	Cooling Tower Foundation	-	2,524	-	-	-	-	-	379	2,903	-	-	2,903	-	-	-	-	-	-	40,191	-
3b.1.1.6	Diesel Generator Building	-	376	-	-	-	-	-	56	432	-	-	432	-	-	-	-	-	-	2,431	-
3b.1.1.7	Misc. Buildings and Tanks	-	532	-	-	-	-	-	80	612	-	-	612	-	-	-	-	-	-	4,685	-
3b.1.1.8	Nuclear Service Cooling Tower Facilities	-	714	-	-	-	-	-	107	821	-	-	821	-	-	-	-	-	-	4,620	-
3b.1.1.9	Station Tunnels	-	264	-	-	-	-	-	40	304	-	-	304	-	-	-	-	-	-	2,572	-
3b.1.1.10	Turbine Building	-	1,412	-	-	-	-	-	212	1,624	-	-	1,624	-	-	-	-	-	-	22,988	-
3b.1.1.11	Turbine Pedestal	-	435	-	-	-	-	-	65	500	-	-	500	-	-	-	-	-	-	2,695	-
3b.1.1.12	Fuel Handling Building	-	1,070	-	-	-	-	-	160	1,230	-	-	1,230	-	-	-	-	-	-	5,242	-
3b.1.1	Totals	-	17,565	-	-	-	-	-	2,635	20,200	-	-	20,200	-	-	-	-	-	-	164,157	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	1,559	-	-	-	-	-	234	1,793	-	-	1,793	-	-	-	-	-	-	3,577	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	188	28	216	216	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	19,124	-	-	-	-	188	2,897	22,209	216	-	21,993	-	-	-	-	-	-	167,734	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	969	-	-	-	-	5	146	1,119	-	-	1,119	-	-	-	-	-	-	5,132	-
3b.2.2	Hyperbolic Cooling Tower Demolition	-	4,470	-	-	-	-	-	671	5,141	-	-	5,141	-	-	-	-	-	-	21,229	-
3b.2.3	Construction Debris	-	-	-	-	-	-	715	107	822	-	-	822	-	-	-	-	-	-	-	-
3b.2	Subtotal Period 3b Additional Costs	-	5,439	-	-	-	-	720	924	7,082	-	-	7,082	-	-	-	-	-	-	26,361	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	148	-	-	-	-	-	22	170	-	-	170	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	802	120	922	-	922	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	148	-	-	-	-	802	143	1,093	-	922	170	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	716	72	788	788	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	8,020	-	-	-	-	-	1,203	9,223	-	-	9,223	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	157	24	180	-	180	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	305	30	335	-	335	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	544	54	598	-	598	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	142	21	163	-	163	-	-	-	-	-	-	-	-	-
3b.4.8	Security Staff Cost	-	-	-	-	-	-	5,574	836	6,410	(0)	5,628	782	-	-	-	-	-	-	-	108,790
3b.4.9	DOC Staff Cost	-	-	-	-	-	-	13,363	2,005	15,368	-	-	15,368	-	-	-	-	-	-	-	147,842
3b.4.10	Utility Staff Cost	-	-	-	-	-	-	8,243	1,236	9,479	0	1,915	7,565	-	-	-	-	-	-	-	94,145
3b.4	Subtotal Period 3b Period-Dependent Costs	-	8,020	-	-	-	-	29,044	5,481	42,545	788	8,820	32,937	-	-	-	-	-	-	-	350,777
3b.0	TOTAL PERIOD 3b COST	-	32,731	-	-	-	-	30,753	9,444	72,929	1,004	9,742	62,183	-	-	-	-	-	-	194,095	352,337

Table C-1  
Vogtle Electric Generating Plant Unit 1  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,832	1,625	12,457	-	12,457	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	10,832	1,625	12,457	-	12,457	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	5,429	543	5,972	-	5,972	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	3,407	341	3,748	-	3,748	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	4,120	412	4,532	-	4,532	-	-	-	-	-	-	-	-	-
3c.4.6	ISFSI Operating Costs	-	-	-	-	-	-	1,077	162	1,238	-	1,238	-	-	-	-	-	-	-	-	-
3c.4.7	Security Staff Cost	-	-	-	-	-	-	37,079	5,562	42,641	-	42,641	-	-	-	-	-	-	-	-	697,589
3c.4.8	Utility Staff Cost	-	-	-	-	-	-	12,602	1,890	14,493	-	14,493	-	-	-	-	-	-	-	-	142,689
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	63,714	8,909	72,623	-	72,623	-	-	-	-	-	-	-	-	840,278
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	74,546	10,534	85,081	-	85,081	-	-	-	-	-	-	-	-	840,278
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	704	-	-	11,892	-	1,960	14,555	14,555	-	-	-	-	-	2,061	410,142	-	-	-
3d.1.1	Totals	-	-	704	-	-	11,892	-	1,960	14,555	14,555	-	-	-	-	-	2,061	410,142	-	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	704	-	-	11,892	-	1,960	14,555	14,555	-	-	-	-	-	2,061	410,142	-	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	57	9	65	-	65	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	57	9	65	-	65	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	10	1	11	11	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	4	0	5	-	5	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-
3d.4.6	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.7	Security Staff Cost	-	-	-	-	-	-	70	10	80	80	-	-	-	-	-	-	-	-	-	1,316
3d.4.8	Utility Staff Cost	-	-	-	-	-	-	24	4	27	27	-	-	-	-	-	-	-	-	-	269
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	118	17	135	119	16	-	-	-	-	-	-	-	-	1,586
3d.0	TOTAL PERIOD 3d COST	-	-	704	-	-	11,892	175	1,985	14,755	14,674	81	-	-	-	-	2,061	410,142	-	-	1,586
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	244	185	1,316	-	2,278	1,574	1,399	6,997	6,997	-	-	-	45,264	-	-	-	2,431,346	11,456	1,233
3e.2	Subtotal Period 3e Additional Costs	-	244	185	1,316	-	2,278	1,574	1,399	6,997	6,997	-	-	-	45,264	-	-	-	2,431,346	11,456	1,233
Period 3e Collateral Costs																					
3e.3	Subtotal Period 3e Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	87	22	109	109	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	NRC ISFSI Fees	-	-	-	-	-	-	38	4	42	-	42	-	-	-	-	-	-	-	-	-
3e.4.5	Security Staff Cost	-	-	-	-	-	-	469	117	586	586	-	-	-	-	-	-	-	-	-	9,733
3e.4.6	Utility Staff Cost	-	-	-	-	-	-	170	42	212	212	-	-	-	-	-	-	-	-	-	1,912
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	764	185	949	907	42	-	-	-	-	-	-	-	-	11,645
3e.0	TOTAL PERIOD 3e COST	-	244	185	1,316	-	2,278	2,338	1,585	7,945	7,904	42	-	-	45,264	-	-	-	2,431,346	11,456	12,878

Table C-1  
Vogtle Electric Generating Plant Unit 1  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Site Restoration ISFSI	-	3,321	-	-	-	-	399	558	4,278	-	-	4,278	-	-	-	-	-	-	37,112	80
3f.2	Subtotal Period 3f Additional Costs	-	3,321	-	-	-	-	399	558	4,278	-	-	4,278	-	-	-	-	-	-	37,112	80
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	49	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	49	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	115	-	-	-	-	-	17	132	-	-	132	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	5	1	6	-	-	6	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	26	4	30	-	-	30	-	-	-	-	-	-	-	855
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	73	11	84	-	-	84	-	-	-	-	-	-	-	769
3f.4	Subtotal Period 3f Period-Dependent Costs	-	115	-	-	-	-	103	33	251	-	-	251	-	-	-	-	-	-	-	1,624
3f.0	TOTAL PERIOD 3f COST	-	3,485	-	-	-	-	502	598	4,585	-	-	4,585	-	-	-	-	-	-	37,112	1,704
PERIOD 3 TOTALS		-	36,460	889	1,316	-	14,170	108,315	24,146	185,295	23,582	94,945	66,768	-	45,264	-	-	2,061	2,841,488	242,664	1,208,783
TOTAL COST TO DECOMMISSION		11,787	110,868	20,115	12,788	38,245	58,552	496,809	140,332	889,495	627,574	183,845	78,076	289,949	175,654	1,810	393	2,061	22,675,470	1,458,241	4,778,171

TOTAL COST TO DECOMMISSION WITH 18.73% CONTINGENCY:	\$889,495	thousands of 2018 dollars
TOTAL NRC LICENSE TERMINATION COST IS 70.55% OR:	\$627,574	thousands of 2018 dollars
SPENT FUEL MANAGEMENT COST IS 20.67% OR:	\$183,845	thousands of 2018 dollars
NON-NUCLEAR DEMOLITION COST IS 8.78% OR:	\$78,076	thousands of 2018 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	177,857	cubic feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	2,061	Cubic Feet
TOTAL SCRAP METAL REMOVED:	64,750	Tons
TOTAL CRAFT LABOR REQUIREMENTS:	1,458,241	Man-hours

End Notes:  
n/a - indicates that this activity not charged as decommissioning expense  
a - indicates that this activity performed by decommissioning staff  
0 - indicates that this value is less than 0.5 but is non-zero  
A cell containing " - " indicates a zero value

Table C-2  
Vogtle Electric Generating Plant Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	556
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	103	15	119	119	-	-	-	-	-	-	-	-	-	856
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	237	36	273	273	-	-	-	-	-	-	-	-	-	1,969
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	52	8	59	59	-	-	-	-	-	-	-	-	-	428
1a.1.10	End product description	-	-	-	-	-	-	52	8	59	59	-	-	-	-	-	-	-	-	-	428
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	556
1a.1.12	Define major work sequence	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,210
1a.1.13	Perform SER and EA	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	1,327
1a.1.14	Prepare/submit Defueled Technical Specifications	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,210
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	258	39	297	297	-	-	-	-	-	-	-	-	-	2,140
1a.1.16	Prepare/submit Irradiated Fuel Management Plan	-	-	-	-	-	-	52	8	59	59	-	-	-	-	-	-	-	-	-	428
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	254	38	292	263	-	29	-	-	-	-	-	-	-	2,106
1a.1.17.2	Plant systems	-	-	-	-	-	-	215	32	247	222	-	25	-	-	-	-	-	-	-	1,783
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	26	4	30	30	-	-	-	-	-	-	-	-	-	214
1a.1.17.4	Reactor internals	-	-	-	-	-	-	366	55	421	421	-	-	-	-	-	-	-	-	-	3,039
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	335	50	385	385	-	-	-	-	-	-	-	-	-	2,782
1a.1.17.6	Biological shield	-	-	-	-	-	-	26	4	30	30	-	-	-	-	-	-	-	-	-	214
1a.1.17.7	Steam generators	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	1,335
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	83	12	95	47	-	47	-	-	-	-	-	-	-	685
1a.1.17.9	Main Turbine	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	171
1a.1.17.10	Main Condensers	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	171
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	161	24	185	93	-	93	-	-	-	-	-	-	-	1,335
1a.1.17.12	Waste management	-	-	-	-	-	-	237	36	273	273	-	-	-	-	-	-	-	-	-	1,969
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	46	7	53	27	-	27	-	-	-	-	-	-	-	385
1a.1.17	Total	-	-	-	-	-	-	1,951	293	2,243	1,975	-	268	-	-	-	-	-	-	-	16,190
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,027
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,300	495	3,795	3,795	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	72	11	83	83	-	-	-	-	-	-	-	-	-	599
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	63	10	73	73	-	-	-	-	-	-	-	-	-	526
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	9,631	1,445	11,075	10,807	-	268	-	-	-	-	-	-	-	33,451
Period 1a Additional Costs																					
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	8,000	1,200	9,200	9,200	-	-	-	-	-	-	-	-	-	-
1a.2.2	Site Characterization	-	-	-	-	-	-	2,610	783	3,393	3,393	-	-	-	-	-	-	-	-	13,042	4,640
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	10,610	1,983	12,593	12,593	-	-	-	-	-	-	-	-	13,042	4,640
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,852	1,328	10,180	-	10,180	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	8,852	1,328	10,180	-	10,180	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	2,395	240	2,635	2,635	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	521	-	-	-	-	-	130	651	651	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	546	-	-	-	-	-	82	628	628	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	3	-	55	-	16	87	87	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	585	88	673	673	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	799	80	879	879	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	690	69	758	-	758	-	-	-	-	-	-	-	-	-
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	810	121	931	-	931	-	-	-	-	-	-	-	-	-
1a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	53	8	61	-	61	-	-	-	-	-	-	-	-	-
1a.4.11	Security Staff Cost	-	-	-	-	-	-	7,777	1,167	8,944	8,944	-	-	-	-	-	-	-	-	-	164,320
1a.4.12	Utility Staff Cost	-	-	-	-	-	-	31,471	4,721	36,192	36,192	-	-	-	-	-	-	-	-	-	422,240
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,067	13	3	-	55	44,580	6,720	52,438	50,688	1,750	-	-	610	-	-	-	12,190	20	586,560
1a.0	TOTAL PERIOD 1a COST	-	1,067	13	3	-	55	73,672	11,476	86,286	74,088	11,930	268	-	610	-	-	-	12,190	13,061	624,651

Table C-2  
Vogtle Electric Generating Plant Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	244	37	281	253	-	28	-	-	-	-	-	-	-	2,026
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	52	8	59	59	-	-	-	-	-	-	-	-	-	428
1b.1.1.3	Reactor internals	-	-	-	-	-	-	129	19	148	148	-	-	-	-	-	-	-	-	-	1,070
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	70	10	80	20	-	60	-	-	-	-	-	-	-	578
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	52	8	59	59	-	-	-	-	-	-	-	-	-	428
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	52	8	59	59	-	-	-	-	-	-	-	-	-	428
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	52	8	59	59	-	-	-	-	-	-	-	-	-	428
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	187	28	215	215	-	-	-	-	-	-	-	-	-	1,554
1b.1.1.9	Facility closeout	-	-	-	-	-	-	62	9	71	36	-	36	-	-	-	-	-	-	-	514
1b.1.1.10	Missile shields	-	-	-	-	-	-	23	3	27	27	-	-	-	-	-	-	-	-	-	193
1b.1.1.11	Biological shield	-	-	-	-	-	-	62	9	71	71	-	-	-	-	-	-	-	-	-	514
1b.1.1.12	Steam generators	-	-	-	-	-	-	237	36	273	273	-	-	-	-	-	-	-	-	-	1,969
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	52	8	59	30	-	30	-	-	-	-	-	-	-	428
1b.1.1.14	Main Turbine	-	-	-	-	-	-	80	12	93	-	-	93	-	-	-	-	-	-	-	668
1b.1.1.15	Main Condensers	-	-	-	-	-	-	80	12	93	-	-	93	-	-	-	-	-	-	-	668
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	141	21	162	146	-	16	-	-	-	-	-	-	-	1,168
1b.1.1.17	Reactor building	-	-	-	-	-	-	141	21	162	146	-	16	-	-	-	-	-	-	-	1,168
1b.1.1	Total	-	-	-	-	-	-	1,714	257	1,971	1,601	-	371	-	-	-	-	-	-	-	14,228
1b.1.2	Decon primary loop	737	-	-	-	-	-	-	369	1,106	1,106	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	737	-	-	-	-	-	1,714	626	3,078	2,707	-	371	-	-	-	-	-	-	1,067	14,228
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	999	-	-	-	-	-	-	150	1,148	1,148	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,339	201	1,540	1,540	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	76	-	45	134	-	195	-	111	561	561	-	-	-	467	-	-	-	27,990	91	-
1b.3.4	Process decommissioning chemical flush waste	2	-	79	333	-	2,765	-	750	3,929	3,929	-	-	-	-	848	-	-	90,351	159	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,200	-	-	-	-	-	180	1,380	1,380	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,989	-	-	-	-	-	-	298	2,287	2,287	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,118	918	7,036	-	7,036	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	3,066	1,202	124	466	-	2,960	7,457	2,608	17,884	10,848	7,036	-	-	467	848	-	-	118,341	250	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	36	-	-	-	-	-	-	9	45	45	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	1,194	119	1,314	1,314	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	292	-	-	-	-	-	73	365	365	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	272	-	-	-	-	-	41	313	313	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	2	-	32	-	9	51	51	-	-	-	356	-	-	-	7,122	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	583	87	671	671	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	218	22	239	239	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	344	34	378	-	378	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	404	61	464	-	464	-	-	-	-	-	-	-	-	-
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	26	4	30	-	30	-	-	-	-	-	-	-	-	-
1b.4.12	Security Staff Cost	-	-	-	-	-	-	3,586	538	4,123	4,123	-	-	-	-	-	-	-	-	-	74,675
1b.4.13	DOC Staff Cost	-	-	-	-	-	-	5,606	841	6,447	6,447	-	-	-	-	-	-	-	-	-	63,266
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	15,786	2,368	18,154	18,154	-	-	-	-	-	-	-	-	-	211,579
1b.4	Subtotal Period 1b Period-Dependent Costs	36	564	7	2	-	32	27,747	4,206	32,594	31,722	873	-	-	356	-	-	-	7,122	12	349,520
1b.0	TOTAL PERIOD 1b COST	3,839	1,766	131	468	-	2,993	36,919	7,440	53,556	45,277	7,909	371	-	823	848	-	-	125,463	1,328	363,748
PERIOD 1 TOTALS		3,839	2,832	144	471	-	3,048	110,591	18,916	139,842	119,364	19,839	639	-	1,432	848	-	-	137,654	14,389	988,399
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	129	99	36	88	-	493	-	229	1,073	1,073	-	-	-	1,839	-	-	-	128,296	4,820	-
2a.1.1.2	Pressurizer Relief Tank	24	19	9	23	-	128	-	53	256	256	-	-	-	479	-	-	-	33,443	893	-
2a.1.1.3	Reactor Coolant Pumps & Motors	82	80	164	225	-	1,621	-	517	2,689	2,689	-	-	-	5,128	-	-	-	805,200	4,124	100
2a.1.1.4	Pressurizer	37	50	415	105	-	910	-	316	1,834	1,834	-	-	-	2,879	-	-	-	251,899	2,373	938
2a.1.1.5	Steam Generators	344	3,232	2,584	3,503	4,085	7,065	-	4,143	24,957	24,957	-	-	39,095	22,354	-	-	-	3,275,398	29,799	2,875
2a.1.1.6	CRDMs/ICIs/Service Structure Removal	146	251	242	108	-	587	-	323	1,657	1,657	-	-	-	3,965	-	-	-	152,894	8,248	-
2a.1.1.7	Reactor Vessel Internals	127	5,414	10,761	1,645	-	14,708	405	14,640	47,701	47,701	-	-	-	1,878	963	393	-	329,968	34,590	1,542
2a.1.1.8	Reactor Vessel	106	6,860	2,939	1,605	-	4,550	405	8,670	25,135	25,135	-	-	-	13,584	-	-	-	973,399	34,590	1,542
2a.1.1	Totals	996	16,005	17,151	7,302	4,085	30,062	809	28,891	105,301	105,301	-	-	39,095	52,107	963	393	-	5,950,497	119,437	6,997

Table C-2  
Vogtle Electric Generating Plant Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	133	-	-	-	-	-	20	152	-	-	152	-	-	-	-	-	-	3,130	-
2a.1.3	Main Condensers	-	502	-	-	-	-	-	75	577	-	-	577	-	-	-	-	-	-	11,923	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor	-	415	-	-	-	-	-	62	477	477	-	-	-	-	-	-	-	-	4,916	-
2a.1.4.2	Auxiliary Building	-	311	-	-	-	-	-	47	358	358	-	-	-	-	-	-	-	-	2,323	-
2a.1.4.3	Fuel Handling Building	-	43	-	-	-	-	-	6	50	50	-	-	-	-	-	-	-	-	413	-
2a.1.4	Totals	-	769	-	-	-	-	-	115	885	885	-	-	-	-	-	-	-	-	7,653	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Feedwater	-	66	-	-	-	-	-	10	76	-	-	76	-	-	-	-	-	-	1,910	-
2a.1.5.2	Auxiliary Gas	-	43	-	-	-	-	-	6	50	-	-	50	-	-	-	-	-	-	1,383	-
2a.1.5.3	Auxiliary Gas - RCA	-	37	0	1	39	-	-	15	93	93	-	-	286	-	-	-	-	11,631	684	-
2a.1.5.4	Auxiliary Steam	-	46	-	-	-	-	-	7	52	-	-	52	-	-	-	-	-	-	1,354	-
2a.1.5.5	Auxiliary Steam - RCA	-	37	1	2	63	-	-	19	123	123	-	-	467	-	-	-	-	18,976	739	-
2a.1.5.6	Circulating Water	-	211	-	-	-	-	-	32	242	-	-	242	-	-	-	-	-	-	6,082	-
2a.1.5.7	Circulating Water Chemical Injection	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	506	-
2a.1.5.8	Condensate & Feedwater	-	365	-	-	-	-	-	55	419	-	-	419	-	-	-	-	-	-	10,136	-
2a.1.5.9	Condensate & Feedwater - RCA	-	315	20	53	1,611	-	-	330	2,329	2,329	-	-	11,879	-	-	-	-	482,405	7,039	-
2a.1.5.10	Condensate Chemical Injection	-	41	-	-	-	-	-	6	47	-	-	47	-	-	-	-	-	-	1,242	-
2a.1.5.11	Condensate Filter Demineralizer	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	2,342	-
2a.1.5.12	Condenser Air Ejection	-	41	-	-	-	-	-	6	47	-	-	47	-	-	-	-	-	-	1,166	-
2a.1.5.13	Condenser Tube Cleaning	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	348	-
2a.1.5.14	Construction Water	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	93	-
2a.1.5.15	Containment Spray - RCA	-	188	6	15	462	-	-	119	790	790	-	-	3,409	-	-	-	-	138,422	3,905	-
2a.1.5.16	Electrohydraulic Control	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	97	-
2a.1.5.17	Eng Safety Feature Room Coolers - RCA	-	42	1	2	62	-	-	20	127	127	-	-	460	-	-	-	-	18,695	961	-
2a.1.5.18	Extraction Steam	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	2,717	-
2a.1.5.19	Feedwater Heater Drain	-	167	-	-	-	-	-	25	192	-	-	192	-	-	-	-	-	-	4,821	-
2a.1.5.20	Feedwater Heater Vent	-	61	-	-	-	-	-	9	70	-	-	70	-	-	-	-	-	-	1,787	-
2a.1.5.21	Heater Ventilation	-	23	-	-	-	-	-	3	26	-	-	26	-	-	-	-	-	-	658	-
2a.1.5.22	Main Steam	-	236	-	-	-	-	-	35	271	-	-	271	-	-	-	-	-	-	6,683	-
2a.1.5.23	Main Steam - RCA	-	536	40	105	3,205	-	-	634	4,520	4,520	-	-	23,626	-	-	-	-	959,449	11,946	-
2a.1.5.24	Miscellaneous Leak Detection	-	23	2	3	14	19	-	13	75	75	-	-	100	78	-	-	-	9,141	484	-
2a.1.5.25	Miscellaneous Piping	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	783	-
2a.1.5.26	NSCW Chemical Injection	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	192	-
2a.1.5.27	Plant Make-Up Water Treatment	-	319	-	-	-	-	-	48	367	-	-	367	-	-	-	-	-	-	8,520	-
2a.1.5.28	Post Accident Sampling - RCA	-	21	0	1	24	-	-	9	55	55	-	-	176	-	-	-	-	7,158	392	-
2a.1.5.29	River Intake Chlorination	-	205	-	-	-	-	-	31	236	-	-	236	-	-	-	-	-	-	5,837	-
2a.1.5.30	Safety Injection - RCA	-	349	12	32	962	-	-	238	1,592	1,592	-	-	7,094	-	-	-	-	288,093	7,215	-
2a.1.5.31	Steam Generator Blowdown	-	309	22	29	185	205	-	163	915	915	-	-	1,366	831	-	-	-	108,913	6,940	-
2a.1.5.32	Turbine Drive Steam	-	45	-	-	-	-	-	7	52	-	-	52	-	-	-	-	-	-	1,239	-
2a.1.5.33	Turbine Generator Gas	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	241	-
2a.1.5.34	Turbine Generator Hydrogen Seal Oil	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	217	-
2a.1.5.35	Turbine Generator Stator Cooling	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	325	-
2a.1.5.36	Turbine Lube Oil Storage & Filtration	-	71	-	-	-	-	-	11	82	-	-	82	-	-	-	-	-	-	1,941	-
2a.1.5.37	Turbine Plant Closed Cooling Water	-	31	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	867	-
2a.1.5.38	Turbine Plant Cooling Water	-	209	-	-	-	-	-	31	241	-	-	241	-	-	-	-	-	-	6,016	-
2a.1.5.39	Turbine Plant Sampling	-	50	-	-	-	-	-	7	57	-	-	57	-	-	-	-	-	-	1,433	-
2a.1.5.40	Waste Water - RCA	-	404	27	72	2,199	-	-	444	3,147	3,147	-	-	16,213	-	-	-	-	658,421	8,935	-
2a.1.5	Totals	-	4,767	132	315	8,827	225	-	2,382	16,647	13,765	-	2,882	65,077	910	-	-	-	2,701,303	120,177	-
2a.1.6	Scaffolding in support of decommissioning	-	3,671	29	9	192	27	-	958	4,886	4,886	-	-	1,276	113	-	-	-	64,568	38,848	-
2a.1	Subtotal Period 2a Activity Costs	996	25,847	17,311	7,626	13,104	30,314	809	32,441	128,449	124,837	-	3,612	105,447	53,129	963	393	-	8,716,368	301,168	6,997
Period 2a Additional Costs																					
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,933	580	2,512	2,512	-	-	-	-	-	-	-	-	33,885	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	1,933	580	2,512	2,512	-	-	-	-	-	-	-	-	33,885	-
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	135	-	82	242	-	355	-	201	1,015	1,015	-	-	-	847	-	-	-	50,808	165	-
2a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.3	Small tool allowance	-	252	-	-	-	-	-	38	290	261	-	29	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	18,617	2,793	21,410	-	21,410	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	135	252	82	242	-	355	18,617	3,031	22,714	1,276	21,410	29	-	847	-	-	-	50,808	165	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	129	-	-	-	-	-	-	32	162	162	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	966	97	1,063	1,063	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,581	-	-	-	-	-	645	3,226	3,226	-	-	-	-	-	-	-	-	-	-



Table C-2  
Vogtle Electric Generating Plant Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
2a.4.5	Heavy equipment rental	-	3,851	-	-	-	-	-	578	4,428	4,428	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	108	25	-	475	-	133	741	741	-	-	-	5,217	-	-	-	104,344	170	-
Period 2a	Period-Dependent Costs (continued)																				
2a.4.7	Plant energy budget	-	-	-	-	-	-	1,005	151	1,155	1,155	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	735	74	809	809	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	733	73	806	-	806	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,464	220	1,683	-	1,683	-	-	-	-	-	-	-	-	-
2a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	96	14	110	-	110	-	-	-	-	-	-	-	-	-
2a.4.12	Security Staff Cost	-	-	-	-	-	-	11,722	1,758	13,480	13,480	-	-	-	-	-	-	-	-	-	270,799
2a.4.13	DOC Staff Cost	-	-	-	-	-	-	24,774	3,716	28,490	28,490	-	-	-	-	-	-	-	-	-	285,843
2a.4.14	Utility Staff Cost	-	-	-	-	-	-	41,422	6,213	47,635	47,635	-	-	-	-	-	-	-	-	-	532,195
2a.4	Subtotal Period 2a Period-Dependent Costs	129	6,431	108	25	-	475	82,916	13,704	103,789	101,189	2,600	-	-	5,217	-	-	-	104,344	170	1,088,837
2a.0	TOTAL PERIOD 2a COST	1,260	32,531	17,501	7,894	13,104	31,144	104,275	49,756	257,464	229,814	24,010	3,641	105,447	59,193	963	393	-	8,871,521	335,388	1,095,834
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Additional Systems - RCA	-	232	8	20	611	-	-	154	1,025	1,025	-	-	4,508	-	-	-	-	183,071	4,785	-
2b.1.1.2	Aux Bldg & Misc Drains	-	748	54	72	260	555	-	381	2,070	2,070	-	-	1,918	2,261	-	-	-	222,495	16,613	-
2b.1.1.3	Aux Component Cooling Water - RCA	-	369	20	52	1,581	-	-	339	2,360	2,360	-	-	11,654	-	-	-	-	473,273	7,685	-
2b.1.1.4	Auxiliary Bldg HVAC	-	818	28	62	1,435	135	-	466	2,945	2,945	-	-	10,582	552	-	-	-	464,844	16,747	-
2b.1.1.5	Backflushable Filter - RCA	-	41	1	2	56	-	-	19	118	118	-	-	410	-	-	-	-	16,664	785	-
2b.1.1.6	Boron Recycle	296	322	33	42	239	300	-	349	1,583	1,583	-	-	1,765	1,214	-	-	-	149,870	12,893	-
2b.1.1.7	Chemical & Volume Control	549	666	76	90	313	699	-	684	3,078	3,078	-	-	2,309	2,823	-	-	-	275,843	24,568	-
2b.1.1.8	Chilled Water	-	156	-	-	-	-	-	23	180	-	-	180	-	-	-	-	-	-	4,545	-
2b.1.1.9	Chilled Water - RCA	-	174	4	10	304	-	-	91	583	583	-	-	2,239	-	-	-	-	90,929	3,461	-
2b.1.1.10	Component Cooling Water - RCA	-	333	37	99	3,026	-	-	556	4,051	4,051	-	-	22,306	-	-	-	-	905,870	7,486	-
2b.1.1.11	Containment & Aux Bldg Drains	-	262	22	30	32	251	-	140	736	736	-	-	236	1,022	-	-	-	74,864	5,806	-
2b.1.1.12	Containment Air Purification & Cleanup	-	76	10	16	203	84	-	74	462	462	-	-	1,494	343	-	-	-	82,554	1,799	-
2b.1.1.13	Containment Cooling	-	769	24	55	1,324	101	-	427	2,700	2,700	-	-	9,762	414	-	-	-	422,814	15,504	-
2b.1.1.14	Containment Heat Removal	-	896	50	96	1,563	394	-	577	3,577	3,577	-	-	11,526	1,616	-	-	-	570,710	18,350	-
2b.1.1.15	Control Building Drains	-	74	-	-	-	-	-	11	85	-	-	85	-	-	-	-	-	-	2,051	-
2b.1.1.16	Control Building HVAC	-	161	-	-	-	-	-	24	185	-	-	185	-	-	-	-	-	-	5,035	-
2b.1.1.17	Diesel Generator	-	56	-	-	-	-	-	8	65	-	-	65	-	-	-	-	-	-	1,490	-
2b.1.1.18	Diesel Generator Bldg HVAC	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	886	-
2b.1.1.19	Electric Chase Tunnel Drains	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	456	-
2b.1.1.20	Electric Tunnel Ventilation	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	32	-
2b.1.1.21	Electrical - Clean	-	2,770	-	-	-	-	-	416	3,186	-	-	3,186	-	-	-	-	-	-	72,409	-
2b.1.1.22	Electrical - Contaminated	-	958	17	39	952	65	-	406	2,436	2,436	-	-	7,020	265	-	-	-	301,891	19,990	-
2b.1.1.23	Electrical - RCA	-	5,512	100	265	8,100	-	-	2,643	16,620	16,620	-	-	59,716	-	-	-	-	2,425,099	106,964	-
2b.1.1.24	Fire Protection - RCA	-	1,731	56	149	4,556	-	-	1,144	7,637	7,637	-	-	33,592	-	-	-	-	1,364,187	36,537	-
2b.1.1.25	HP Bldg HVAC	-	11	0	1	16	2	-	6	36	36	-	-	115	9	-	-	-	5,248	233	-
2b.1.1.26	Instrument Air	-	72	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	2,298	-
2b.1.1.27	Instrument Air - RCA	-	303	4	11	332	-	-	128	778	778	-	-	2,448	-	-	-	-	99,412	5,582	-
2b.1.1.28	Miscellaneous HVAC	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	2,679	-
2b.1.1.29	Miscellaneous Reactor Coolant	54	74	8	8	12	70	-	67	293	293	-	-	90	281	-	-	-	21,839	2,704	-
2b.1.1.30	Nuclear Sampling - Gaseous	-	34	3	3	12	24	-	17	94	94	-	-	90	96	-	-	-	9,917	709	-
2b.1.1.31	Nuclear Sampling - Liquid	-	42	4	4	12	30	-	21	114	114	-	-	92	121	-	-	-	11,664	910	-
2b.1.1.32	Nuclear Service Cooling Water	-	130	-	-	-	-	-	20	150	-	-	150	-	-	-	-	-	-	3,633	-
2b.1.1.33	Nuclear Service Cooling Water - RCA	-	998	35	94	2,861	-	-	696	4,684	4,684	-	-	21,090	-	-	-	-	856,487	20,482	-
2b.1.1.34	Piping Penetration Filtration & Exhaust	-	12	2	2	40	9	-	12	77	77	-	-	297	37	-	-	-	14,467	278	-
2b.1.1.35	Plant Demineralized Water	-	64	-	-	-	-	-	10	74	-	-	74	-	-	-	-	-	-	1,897	-
2b.1.1.36	Plant Demineralized Water - RCA	-	83	1	4	120	-	-	40	249	249	-	-	886	-	-	-	-	35,990	1,594	-
2b.1.1.37	Potable Water	-	89	-	-	-	-	-	13	102	-	-	102	-	-	-	-	-	-	2,488	-
2b.1.1.38	Potable Water - RCA	-	191	4	10	309	-	-	96	611	611	-	-	2,280	-	-	-	-	92,588	3,682	-
2b.1.1.39	Radwaste Pump Seal Water - RCA	-	9	0	1	20	-	-	5	35	35	-	-	151	-	-	-	-	6,117	167	-
2b.1.1.40	Radwaste Solid Bldg Cooling Wtr - RCA	-	45	1	2	54	-	-	20	122	122	-	-	402	-	-	-	-	16,313	900	-
2b.1.1.41	Radwaste Solidification & Vol Reduction	-	481	57	64	195	505	-	291	1,594	1,594	-	-	1,441	2,032	-	-	-	190,055	10,225	-
2b.1.1.42	Radwaste Solidification Bldg HVAC	-	687	26	52	1,105	142	-	383	2,395	2,395	-	-	8,147	578	-	-	-	367,780	14,031	-
2b.1.1.43	Radwaste Transfer Bldg HVAC	-	131	4	9	222	17	-	72	455	455	-	-	1,634	70	-	-	-	70,794	2,678	-
2b.1.1.44	Reactor M/U Wtr Storage Tank & Degas	-	158	13	15	58	111	-	79	434	434	-	-	424	448	-	-	-	46,249	3,427	-
2b.1.1.45	Residual Heat Removal	232	211	41	51	213	389	-	310	1,449	1,449	-	-	1,572	1,576	-	-	-	165,224	6,052	-
2b.1.1.46	Service Air	-	64	-	-	-	-	-	10	74	-	-	74	-	-	-	-	-	-	1,954	-
2b.1.1.47	Service Air - RCA	-	225	3	8	247	-	-	95	578	578	-	-	1,822	-	-	-	-	74,000	4,237	-
2b.1.1.48	Solidification Building Drains	246	290	24	34	64	276	-	281	1,215	1,215	-	-	471							

Table C-2  
Vogtle Electric Generating Plant Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (Continued)																					
2b.1.1.52	Waste Evaporator Steam Supply - RCA	-	123	3	7	224	-	-	66	423	423	-	-	1,652	-	-	-	-	67,106	2,422	-
2b.1.1.53	Waste Processing - Gas	-	242	19	25	303	131	-	144	864	864	-	-	2,231	522	-	-	-	124,701	5,196	-
2b.1.1.54	Waste Processing - Liquid	812	889	99	117	423	905	-	945	4,188	4,188	-	-	3,117	3,654	-	-	-	362,226	34,810	-
2b.1.1	Totals	2,190	23,580	894	1,625	31,524	5,196	-	12,919	77,928	72,962	-	4,967	232,413	21,058	-	-	-	10,791,580	552,682	-
2b.1.2	Scaffolding in support of decommissioning	-	4,589	36	12	240	34	-	1,197	6,108	6,108	-	-	1,595	141	-	-	-	80,710	48,560	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor	1,108	1,032	62	405	926	1,655	-	1,432	6,621	6,621	-	-	6,829	17,690	-	-	-	1,050,608	45,686	-
2b.1.3.2	Auxiliary Building	897	482	35	299	269	406	-	759	3,146	3,146	-	-	1,984	11,469	-	-	-	623,109	30,690	-
2b.1.3.3	Radwaste Processing Facility	32	26	2	11	31	15	-	33	151	151	-	-	231	403	-	-	-	28,434	1,266	-
2b.1.3.4	Radwaste Solidification Building	13	75	3	10	172	17	-	57	348	348	-	-	1,267	214	-	-	-	62,299	1,664	-
2b.1.3.5	Radwaste Transfer & Alternate Buildings	17	1	0	1	-	1	-	9	31	31	-	-	-	41	-	-	-	1,950	447	-
2b.1.3	Totals	2,067	1,617	103	726	1,399	2,094	-	2,290	10,296	10,296	-	-	10,311	29,817	-	-	-	1,766,400	79,753	-
2b.1.4	Prepare/submit License Termination Plan	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	1,753
2b.1.5	Receive NRC approval of termination plan								a												
2b.1	Subtotal Period 2b Activity Costs	4,257	29,785	1,033	2,363	33,163	7,325	211	16,438	94,576	89,609	-	4,967	244,319	51,016	-	-	-	12,638,690	680,995	1,753
Period 2b Additional Costs																					
2b.2.1	Remedial Action Surveys	-	-	-	-	-	-	2,810	843	3,653	3,653	-	-	-	-	-	-	-	-	49,261	-
2b.2.2	Excavation of Underground Services	-	1,629	-	-	-	-	316	292	2,237	-	-	2,237	-	-	-	-	-	-	9,000	-
2b.2.3	Operational Tools & Equipment	-	-	9	22	-	589	-	151	772	772	-	-	-	5,880	-	-	-	176,400	16	-
2b.2	Subtotal Period 2b Additional Costs	-	1,629	9	22	-	589	3,126	1,286	6,661	4,424	-	2,237	-	5,880	-	-	-	176,400	58,277	-
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	189	-	118	349	-	510	-	286	1,453	1,453	-	-	-	1,219	-	-	-	73,136	238	-
2b.3.2	Process decommissioning chemical flush waste	4	-	142	602	-	1,141	-	392	2,282	2,282	-	-	-	1,534	-	-	-	163,436	287	-
2b.3.3	Small tool allowance	-	457	-	-	-	-	-	69	526	526	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	17,263	2,589	19,852	-	19,852	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	194	457	260	951	-	1,651	17,263	3,336	24,113	4,261	19,852	-	-	2,753	-	-	-	236,572	525	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,669	-	-	-	-	-	-	417	2,086	2,086	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,171	117	1,288	1,288	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	4,721	-	-	-	-	-	1,180	5,901	5,901	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,811	-	-	-	-	-	722	5,532	5,532	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	187	44	-	822	-	231	1,284	1,284	-	-	-	9,038	-	-	-	180,750	295	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	961	144	1,106	1,106	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	891	89	980	980	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	888	89	977	-	977	-	-	-	-	-	-	-	-	-
2b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,774	266	2,041	-	2,041	-	-	-	-	-	-	-	-	-
2b.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	447	67	514	514	-	-	-	-	-	-	-	-	-	-
2b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	116	17	134	-	134	-	-	-	-	-	-	-	-	-
2b.4.13	Security Staff Cost	-	-	-	-	-	-	27,618	4,143	31,760	31,760	-	-	-	-	-	-	-	-	-	537,147
2b.4.14	DOC Staff Cost	-	-	-	-	-	-	28,893	4,334	33,227	33,227	-	-	-	-	-	-	-	-	-	332,800
2b.4.15	Utility Staff Cost	-	-	-	-	-	-	48,142	7,221	55,364	55,364	-	-	-	-	-	-	-	-	-	617,732
2b.4	Subtotal Period 2b Period-Dependent Costs	1,669	9,532	187	44	-	822	110,903	19,038	142,194	139,043	3,151	-	-	9,038	-	-	-	180,750	295	1,487,679
2b.0	TOTAL PERIOD 2b COST	6,120	41,403	1,489	3,380	33,163	10,388	131,502	40,098	267,544	237,337	23,004	7,203	244,319	68,686	-	-	-	13,232,410	740,091	1,489,432
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	441	46	194	126	-	1,107	-	547	2,460	2,460	-	-	-	4,536	-	-	-	288,188	1,249	-
Disposal of Plant Systems																					
2d.1.2.1	Aux Bldg Flood Alarms & Drains	-	150	11	14	43	112	-	75	404	404	-	-	316	455	-	-	-	41,947	3,352	-
2d.1.2.2	Electrical Fuel Bldg.	-	611	11	29	895	-	-	293	1,840	1,840	-	-	6,600	-	-	-	-	268,042	11,861	-
2d.1.2.3	Fire Protection	-	447	-	-	-	-	-	67	514	-	-	514	-	-	-	-	-	-	12,783	-
2d.1.2.4	Fuel Handling Bldg HVAC	-	604	20	44	1,052	82	-	338	2,140	2,140	-	-	7,757	336	-	-	-	336,426	12,220	-
2d.1.2.5	Sewage Treatment	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	88	-
2d.1.2.6	Spent Fuel Cooling & Purification	-	251	35	46	169	359	-	188	1,049	1,049	-	-	1,244	1,462	-	-	-	144,084	5,713	-
2d.1.2.7	Utility Water	-	107	-	-	-	-	-	16	123	-	-	123	-	-	-	-	-	-	3,321	-
2d.1.2.8	Waste Water	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	5,385	-
2d.1.2	Totals	-	2,361	76	134	2,159	553	-	1,006	6,289	5,433	-	856	15,917	2,253	-	-	-	790,499	54,722	-
Decontamination of Site Buildings																					
2d.1.3.1	Fuel Handling Building	705	726	13	60	387	88	-	624	2,603	2,603	-	-	2,852	1,904	-	-	-	207,551	30,486	-
2d.1.3	Totals	705	726	13	60	387	88	-	624	2,603	2,603	-	-	2,852	1,904	-	-	-	207,551	30,486	-

Table C-2  
Vogtle Electric Generating Plant Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
2d.1.4	Scaffolding in support of decommissioning	-	918	7	2	48	7	-	239	1,222	1,222	-	-	319	28	-	-	-	16,142	9,712	-
2d.1	Subtotal Period 2d Activity Costs	1,146	4,050	290	322	2,594	1,755	-	2,416	12,574	11,718	-	856	19,088	8,721	-	-	-	1,302,380	96,170	-
Period 2d Additional Costs																					
2d.2.1	Remedial Action Surveys	-	-	-	-	-	-	728	218	946	946	-	-	-	-	-	-	-	-	12,757	-
2d.2.2	Soil Remediation	-	40	3	298	-	524	-	186	1,051	1,051	-	-	-	8,304	-	-	-	647,704	683	-
2d.2.3	License Termination Survey Planning	-	-	-	-	-	-	1,162	349	1,511	1,511	-	-	-	-	-	-	-	-	-	6,240
Period 2d Additional Costs (continued)																					
2d.2.4	Solid Waste Landfill #2 Closure/Post-closure	-	-	-	-	-	-	3,086	463	3,549	3,549	-	-	-	-	-	-	-	-	-	-
2d.2.5	SFP non-fuel cleanout	-	-	-	-	-	-	4,900	1,470	6,370	6,370	-	-	-	-	-	-	-	-	-	-
2d.2	Subtotal Period 2d Additional Costs	-	40	3	298	-	524	9,876	2,686	13,427	13,427	-	-	-	8,304	-	-	-	647,704	13,440	6,240
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	83	-	52	155	-	226	-	127	644	644	-	-	-	541	-	-	-	32,446	105	-
2d.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.3.3	Small tool allowance	-	73	-	-	-	-	-	11	84	84	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	135	49	902	129	-	188	1,404	1,404	-	-	6,000	529	-	-	-	303,608	147	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,817	573	4,390	-	4,390	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	83	73	188	204	902	356	3,817	899	6,521	2,131	4,390	-	6,000	1,070	-	-	-	336,054	252	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	229	-	-	-	-	-	-	57	287	287	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	328	33	361	361	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	820	-	-	-	-	-	205	1,025	1,025	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,347	-	-	-	-	-	202	1,549	1,549	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	46	11	-	202	-	57	315	315	-	-	-	2,216	-	-	-	44,324	72	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	144	22	165	165	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	207	21	228	228	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	124	12	137	-	137	-	-	-	-	-	-	-	-	-
2d.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	250	38	288	288	-	-	-	-	-	-	-	-	-	-
2d.4.11	ISFSI Operating Costs	-	-	-	-	-	-	33	5	37	-	37	-	-	-	-	-	-	-	-	-
2d.4.12	Security Staff Cost	-	-	-	-	-	-	1,275	191	1,467	179	1,288	-	-	-	-	-	-	-	-	24,892
2d.4.13	DOC Staff Cost	-	-	-	-	-	-	5,548	832	6,380	6,380	-	-	-	-	-	-	-	-	-	63,825
2d.4.14	Utility Staff Cost	-	-	-	-	-	-	10,153	1,523	11,676	11,115	560	-	-	-	-	-	-	-	-	121,905
2d.4	Subtotal Period 2d Period-Dependent Costs	229	2,167	46	11	-	202	18,062	3,197	23,914	21,892	2,022	-	-	2,216	-	-	-	44,324	72	210,621
2d.0	TOTAL PERIOD 2d COST	1,459	6,331	526	834	3,496	2,837	31,755	9,198	56,435	49,167	6,412	856	25,088	20,311	-	-	-	2,330,461	109,934	216,861
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	165	50	215	215	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	165	50	215	215	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	10,493	3,148	13,641	13,641	-	-	-	-	-	-	-	-	220,508	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	10,493	3,148	13,641	13,641	-	-	-	-	-	-	-	-	220,508	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,339	201	1,540	1,540	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	265	40	305	-	305	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,604	241	1,845	1,540	305	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	402	40	443	443	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	957	-	-	-	-	-	239	1,196	1,196	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	2	-	31	-	9	48	48	-	-	-	337	-	-	-	6,734	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	281	28	309	309	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	153	15	168	-	168	-	-	-	-	-	-	-	-	-
2f.4.8	ISFSI Operating Costs	-	-	-	-	-	-	40	6	46	-	46	-	-	-	-	-	-	-	-	-
2f.4.9	Security Staff Cost	-	-	-	-	-	-	1,566	235	1,800	220	1,581	-	-	-	-	-	-	-	-	30,559
2f.4.10	DOC Staff Cost	-	-	-	-	-	-	4,071	611	4,682	4,682	-	-	-	-	-	-	-	-	-	46,622
2f.4.11	Utility Staff Cost	-	-	-	-	-	-	5,138	771	5,909	5,371	538	-	-	-	-	-	-	-	-	59,942
2f.4	Subtotal Period 2f Period-Dependent Costs	-	957	7	2	-	31	11,739	1,967	14,702	12,370	2,332	-	-	337	-	-	-	6,734	11	137,123
2f.0	TOTAL PERIOD 2f COST	-	957	7	2	-	31	24,001	5,405	30,402	27,765	2,637	-	-	337	-	-	-	6,734	220,519	140,243
PERIOD 2 TOTALS		8,839	81,222	19,524	12,110	49,762	44,399	291,534	104,458	611,846	544,083	56,063	11,700	374,854	148,527	963	393	-	24,441,130	1,405,931	2,942,371

Table C-2  
Vogtle Electric Generating Plant Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor	-	2,402	-	-	-	-	-	360	2,762	-	-	2,762	-	-	-	-	-	-	28,779	-
3b.1.1.2	Administration Building	-	326	-	-	-	-	-	49	374	-	-	374	-	-	-	-	-	-	3,112	-
3b.1.1.3	Auxiliary Building	-	4,871	-	-	-	-	-	731	5,602	-	-	5,602	-	-	-	-	-	-	25,553	-
3b.1.1.4	Barge Unloading Facility	-	42	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	266	-
Demolition of Remaining Site Buildings (continued)																					
3b.1.1.5	Circulating Water Intake Canal	-	1,027	-	-	-	-	-	154	1,181	-	-	1,181	-	-	-	-	-	-	16,972	-
3b.1.1.6	Control Building	-	2,481	-	-	-	-	-	372	2,853	-	-	2,853	-	-	-	-	-	-	16,818	-
3b.1.1.7	Cooling Tower Foundation	-	2,524	-	-	-	-	-	379	2,903	-	-	2,903	-	-	-	-	-	-	40,191	-
3b.1.1.8	Diesel Generator Building	-	376	-	-	-	-	-	56	432	-	-	432	-	-	-	-	-	-	2,431	-
3b.1.1.9	FLEX Building	-	360	-	-	-	-	-	54	414	-	-	414	-	-	-	-	-	-	2,870	-
3b.1.1.10	Health Physics Building	-	12	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	72	-
3b.1.1.11	Heavy Haul Road (ISFSI)	-	215	-	-	-	-	-	32	247	-	-	247	-	-	-	-	-	-	1,310	-
3b.1.1.12	Miscellaneous Site Buildings	-	2,835	-	-	-	-	-	425	3,260	-	-	3,260	-	-	-	-	-	-	30,320	-
3b.1.1.13	Nuclear Service Cooling Water Facilities	-	714	-	-	-	-	-	107	821	-	-	821	-	-	-	-	-	-	4,620	-
3b.1.1.14	Radwaste Processing Facility	-	89	-	-	-	-	-	13	102	-	-	102	-	-	-	-	-	-	546	-
3b.1.1.15	Radwaste Solidification Building	-	1,942	-	-	-	-	-	291	2,233	-	-	2,233	-	-	-	-	-	-	14,471	-
3b.1.1.16	Radwaste Transfer & Alternate Buildings	-	320	-	-	-	-	-	48	368	-	-	368	-	-	-	-	-	-	2,253	-
3b.1.1.17	River Intake Structure	-	112	-	-	-	-	-	17	129	-	-	129	-	-	-	-	-	-	933	-
3b.1.1.18	Service Building	-	630	-	-	-	-	-	94	724	-	-	724	-	-	-	-	-	-	5,981	-
3b.1.1.19	Sewage Treatment Expansion	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	27	-
3b.1.1.20	Station Tunnels	-	417	-	-	-	-	-	63	480	-	-	480	-	-	-	-	-	-	5,350	-
3b.1.1.21	Storage Area & Tanks	-	603	-	-	-	-	-	90	693	-	-	693	-	-	-	-	-	-	5,134	-
3b.1.1.22	Turbine Building	-	1,408	-	-	-	-	-	211	1,620	-	-	1,620	-	-	-	-	-	-	22,941	-
3b.1.1.23	Turbine Pedestal	-	435	-	-	-	-	-	65	500	-	-	500	-	-	-	-	-	-	2,695	-
3b.1.1.24	Fuel Handling Building	-	1,070	-	-	-	-	-	160	1,230	-	-	1,230	-	-	-	-	-	-	5,242	-
3b.1.1	Totals	-	25,213	-	-	-	-	-	3,782	28,995	-	-	28,995	-	-	-	-	-	-	238,887	-
Site Closeout Activities																					
3b.1.2	BackFill Site	-	6,065	-	-	-	-	-	910	6,974	-	-	6,974	-	-	-	-	-	-	12,207	-
3b.1.3	Grade & landscape site	-	1,559	-	-	-	-	-	234	1,793	-	-	1,793	-	-	-	-	-	-	3,577	-
3b.1.4	Final report to NRC	-	-	-	-	-	-	80	12	93	93	-	-	-	-	-	-	-	-	-	668
3b.1	Subtotal Period 3b Activity Costs	-	32,837	-	-	-	-	80	4,938	37,855	93	-	37,762	-	-	-	-	-	-	254,670	668
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	1,448	-	-	-	-	7	218	1,673	-	-	1,673	-	-	-	-	-	-	7,673	-
3b.2.2	Hyperbolic Cooling Tower Demolition	-	3,576	-	-	-	-	-	536	4,113	-	-	4,113	-	-	-	-	-	-	21,229	-
3b.2.3	Construction Debris	-	-	-	-	-	-	715	107	822	-	-	822	-	-	-	-	-	-	-	-
3b.2.4	Cofferdam - Service Water Intake	-	964	-	-	-	-	-	145	1,108	-	-	1,108	-	-	-	-	-	-	8,721	-
3b.2.5	Vehicle Barrier Disposition	-	230	-	-	-	-	-	34	264	-	-	264	-	-	-	-	-	-	2,520	-
3b.2	Subtotal Period 3b Additional Costs	-	6,218	-	-	-	-	722	1,041	7,981	-	-	7,981	-	-	-	-	-	-	40,143	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	222	-	-	-	-	-	33	255	-	-	255	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	802	120	922	-	922	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	222	-	-	-	-	802	154	1,178	-	922	255	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	716	72	788	788	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	8,020	-	-	-	-	-	1,203	9,223	-	-	9,223	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	157	24	180	-	180	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	305	30	335	-	335	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	544	54	598	-	598	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	142	21	163	-	163	-	-	-	-	-	-	-	-	-
3b.4.8	Security Staff Cost	-	-	-	-	-	-	5,574	836	6,410	(0)	5,628	782	-	-	-	-	-	-	-	108,790
3b.4.9	DOC Staff Cost	-	-	-	-	-	-	13,363	2,005	15,368	-	-	15,368	-	-	-	-	-	-	-	147,842
3b.4.10	Utility Staff Cost	-	-	-	-	-	-	8,243	1,236	9,479	0	1,915	7,565	-	-	-	-	-	-	-	94,145
3b.4	Subtotal Period 3b Period-Dependent Costs	-	8,020	-	-	-	-	29,044	5,481	42,545	788	8,820	32,937	-	-	-	-	-	-	-	350,777
3b.0	TOTAL PERIOD 3b COST	-	47,296	-	-	-	-	30,648	11,613	89,558	881	9,742	78,935	-	-	-	-	-	-	294,813	351,445
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,832	1,625	12,457	-	12,457	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	10,832	1,625	12,457	-	12,457	-	-	-	-	-	-	-	-	-

Table C-2  
Vogtle Electric Generating Plant Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	5,429	543	5,972	-	5,972	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	3,407	341	3,748	-	3,748	-	-	-	-	-	-	-	-	
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	4,120	412	4,532	-	4,532	-	-	-	-	-	-	-	-	
3c.4.6	ISFSI Operating Costs	-	-	-	-	-	-	1,077	162	1,238	-	1,238	-	-	-	-	-	-	-	-	
3c.4.7	Security Staff Cost	-	-	-	-	-	-	37,079	5,562	42,641	-	42,641	-	-	-	-	-	-	-	697,589	
3c.4.8	Utility Staff Cost	-	-	-	-	-	-	12,602	1,890	14,493	-	14,493	-	-	-	-	-	-	-	142,689	
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	63,714	8,909	72,623	-	72,623	-	-	-	-	-	-	-	840,278	
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	74,546	10,534	85,081	-	85,081	-	-	-	-	-	-	-	840,278	
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	704	-	-	11,892	-	1,960	14,555	14,555	-	-	-	-	-	-	2,061	410,142	-	-
3d.1.1	Totals	-	-	704	-	-	11,892	-	1,960	14,555	14,555	-	-	-	-	-	-	2,061	410,142	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	704	-	-	11,892	-	1,960	14,555	14,555	-	-	-	-	-	-	2,061	410,142	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	57	9	65	-	65	-	-	-	-	-	-	-	-	
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	57	9	65	-	65	-	-	-	-	-	-	-	-	
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	10	1	11	11	-	-	-	-	-	-	-	-	-	
3d.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	4	0	5	-	5	-	-	-	-	-	-	-	-	
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	
3d.4.6	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	
3d.4.7	Security Staff Cost	-	-	-	-	-	-	70	10	80	80	-	-	-	-	-	-	-	-	1,316	
3d.4.8	Utility Staff Cost	-	-	-	-	-	-	24	4	27	27	-	-	-	-	-	-	-	-	269	
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	118	17	135	119	16	-	-	-	-	-	-	-	1,586	
3d.0	TOTAL PERIOD 3d COST	-	-	704	-	-	11,892	175	1,985	14,755	14,674	81	-	-	-	-	-	2,061	410,142	-	1,586
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	244	185	1,316	-	2,278	1,574	1,399	6,997	6,997	-	-	-	45,264	-	-	-	2,431,346	11,456	1,233
3e.2	Subtotal Period 3e Additional Costs	-	244	185	1,316	-	2,278	1,574	1,399	6,997	6,997	-	-	-	45,264	-	-	-	2,431,346	11,456	1,233
Period 3e Collateral Costs																					
3e.3	Subtotal Period 3e Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	89	22	112	112	-	-	-	-	-	-	-	-	-	
3e.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3e.4.4	NRC ISFSI Fees	-	-	-	-	-	-	38	4	42	-	42	-	-	-	-	-	-	-	-	
3e.4.5	Security Staff Cost	-	-	-	-	-	-	469	117	586	586	-	-	-	-	-	-	-	-	9,733	
3e.4.6	Utility Staff Cost	-	-	-	-	-	-	170	42	212	212	-	-	-	-	-	-	-	-	1,912	
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	766	186	952	910	42	-	-	-	-	-	-	-	11,645	
3e.0	TOTAL PERIOD 3e COST	-	244	185	1,316	-	2,278	2,340	1,585	7,949	7,907	42	-	-	45,264	-	-	-	2,431,346	11,456	12,878
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Site Restoration ISFSI	-	3,321	-	-	-	-	399	558	4,278	-	-	4,278	-	-	-	-	-	-	37,112	80
3f.2	Subtotal Period 3f Additional Costs	-	3,321	-	-	-	-	399	558	4,278	-	-	4,278	-	-	-	-	-	-	37,112	80
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	49	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	-	
3f.3	Subtotal Period 3f Collateral Costs	-	49	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	-	

Table C-2  
Vogtle Electric Generating Plant Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2018 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.3	Plant energy budget	-	-	-	-	-	-	5	1	6	-	-	6	-	-	-	-	-	-	-	-
3f.4.4	Security Staff Cost	-	-	-	-	-	-	26	4	30	-	-	30	-	-	-	-	-	-	-	855
3f.4.5	Utility Staff Cost	-	-	-	-	-	-	73	11	84	-	-	84	-	-	-	-	-	-	-	769
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	103	16	119	-	-	119	-	-	-	-	-	-	-	1,624
3f.0	TOTAL PERIOD 3f COST	-	3,370	-	-	-	-	502	581	4,453	-	-	4,453	-	-	-	-	-	-	37,112	1,704
PERIOD 3 TOTALS		-	50,910	889	1,316	-	14,170	108,212	26,298	201,795	23,461	94,945	83,389	-	45,264	-	-	2,061	2,841,488	343,381	1,207,890
TOTAL COST TO DECOMMISSION		12,677	134,965	20,556	13,897	49,762	61,617	510,337	149,672	953,482	686,908	170,847	95,728	374,854	195,223	1,810	393	2,061	27,420,270	1,763,702	5,138,660

TOTAL COST TO DECOMMISSION WITH 18.62% CONTINGENCY:	\$953,482	thousands of 2018 dollars
TOTAL NRC LICENSE TERMINATION COST IS 72.04% OR:	\$686,908	thousands of 2018 dollars
SPENT FUEL MANAGEMENT COST IS 17.92% OR:	\$170,847	thousands of 2018 dollars
NON-NUCLEAR DEMOLITION COST IS 10.04% OR:	\$95,728	thousands of 2018 dollars
TOTAL PRIMARY SITE RADWASTE VOLUME BURIED:	103,261	Cubic Feet
TOTAL SECONDARY SITE RADWASTE VOLUME BURIED:	94,164	Cubic Feet
TOTAL TERTIARY SITE RADWASTE VOLUME BURIED:	0	Cubic Feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	2,061	Cubic Feet
TOTAL SCRAP METAL REMOVED:	80,366	Tons
TOTAL CRAFT LABOR REQUIREMENTS:	1,763,702	Man-hours

End Notes:  
n/a - indicates that this activity not charged as decommissioning expense  
a - indicates that this activity performed by decommissioning staff  
0 - indicates that this value is less than 0.5 but is non-zero  
A cell containing " - " indicates a zero value

## **APPENDIX D**

### **REQUIRED INFORMATION**

## **APPENDIX D REQUIRED INFORMATION**

In accordance with Title 10 of the Code of Federal Regulations (10 CFR), Part 50.75(g), "Reporting and Recordkeeping for Decommissioning Planning," each licensee will maintain records of information "...important to the safe and effective decommissioning of the facility." Information considered important includes "...records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to instances when significant contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete." SNC maintains drawings of structures that may be affected by these occurrences. A list of structures that are considered contaminated and may require decontamination is provided in Tables C-1 and C-2, Periods 2b and 2c ("Decontamination of Site Buildings"). In accordance with this requirement SNC has identified the following information<sup>[39]</sup>:

1. Trace contamination of the sludge in the waste water retention basins has been detected. Also the potential exists for trace contamination of the concrete walls. In addition, the soil around the basins may be contaminated due to past spills in this area.
2. The soil around the refueling water storage tank missile shield may be contaminated due to past leaks in the area.
3. Soil around the storm drain and roadway at the intersection of the Unit 1 NSCW tower going up to the Missile Shield doors. The approximate quantity of affected slightly contaminated dirt was four to six B-25 box loads (approx. 100 ft<sup>3</sup> per box).



**APPENDIX E**  
**ISFSI DECOMMISSIONING**

<b><u>Tables</u></b>	<b><u>Page</u></b>
ISFSI Decommissioning Cost Estimate .....	E-2

Table E  
Vogtle Electric Generating Plant  
ISFSI Decommissioning Cost Estimate  
DECON Decommissioning Alternative  
(thousands of 2018 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	473	473	-	-	1,312
Decontamination (activated disposition)	487	370	2,632	4,557	25	8,071	90,527	5,333	-
License Termination (radiological surveys)	-	-	-	-	2,157	2,157	-	17,580	-
Subtotal	487	370	2,632	4,557	2,655	10,701	90,527	22,912	1,312
Supporting Costs									
NRC and NRC Contractor Fees and Costs					494	494	-	-	1,153
Insurance					87	87	-	-	-
NRC ISFSI Fees					38	38	-	-	-
Security Staff Cost					469	469	-	-	9,733
Utility Staff Cost					170	170	-	-	1,912
Subtotal	-	-	-	-	1,257	1,257	-	-	12,798
Total (w/o contingency)	487	370	2,632	4,557	3,912	11,958	90,527	22,912	14,110
Total (w/25% contingency)	609	462	3,291	5,696	4,890	14,948			

The application of contingency (25%) is consistent with the evaluation criteria referenced by the NRC in NUREG-1757 ("Consolidated Decommissioning Guidance, Financial Assurance, Recordkeeping, and Timeliness," U.S. NRC's Office of Nuclear Material Safety and Safeguards, NUREG-1757, Vol. 3, Rev. 1, February 2012)