

10 CFR 50.75(f)(1)

RS-09-111

August 27, 2009

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001Clinton Power Station  
Facility Operating License No. NPF-62  
NRC Docket No. 50-461**Subject:** Submittal of Clinton Power Station Site-Specific SAFSTOR  
Decommissioning Cost Estimate**Reference:** Letter from Keith R. Jury (Exelon Generation Company) to U.S. NRC,  
"Decommissioning Funding Assurance Plan," dated July 29, 2009

In the referenced letter, Exelon Generation Company, LLC (EGC) committed to provide a site-specific SAFSTOR Decommissioning Cost Estimate (DCE) for Clinton Power Station (CPS). The DCE is provided as Attachment 1, and, in accordance with 10 CFR 50.75(b)(1), is greater than the amount specified in 10 CFR 50.75(c). The DCE has been performed assuming that CPS is granted license extension, since it is intended to reflect the most likely decommissioning scenario for CPS. However, this determination of the minimum funding requirement does not credit the additional 20-year license renewal period.

Attachment 2 shows the radiological decommissioning (license termination) cash flow based on the DCE in Attachment 1, assuming the SAFSTOR scenario, and does not include the costs of dismantling non-radiological systems and structures or the cost of managing and storing spent fuel onsite. EGC has not made a final determination of the decommissioning approach for CPS. For the purpose of choosing a decommissioning option to demonstrate adequacy of funding to meet regulatory requirements, the SAFSTOR option has been selected. EGC may choose a different decommissioning option in the future, recognizing that the chosen option must meet NRC requirements for decommissioning funding.

The costs presented in Attachment 2 occur 20 years earlier than those in the Attachment 1 DCE to model the current license expiration date. No credit is taken for license renewal. The cash flow analysis assumes a 2% annual real rate of return on trust fund dollars until plant shutdown and on remaining trust fund dollars through the decommissioning period. The site-specific estimate is based on a period of safe storage specifically described in the Attachment 1 DCE. The Attachment 1 DCE presents the results in 2007 dollars. These results are converted into 2009 dollars by using the latest site-specific escalation factor, which is re-calculated on an annual basis.

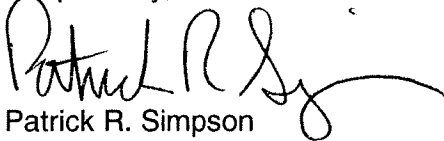
For CPS, the decommissioning funding assurance is provided by the prepayment method, coupled with an external trust fund, in accordance with 10 CFR 50.75(e)(1)(i). There are no additional amounts to be collected from ratepayers for CPS, nor are there any contracts relied upon pursuant to 10 CFR 50.75(e)(1)(v).

Attachment 3 presents the calculation of radiological decommissioning funding assurance. The Table in Attachment 3 compares the funding assurance, calculated using the NRC generic formula, as recently published by the NRC, to the funding assurance calculated using the site-specific DCE methodology, as allowed by 10 CFR 50.75(e)(1)(i). Based on the site-specific methodology, and July 31, 2009 trust fund values, CPS meets all NRC radiological decommissioning funding assurance requirements.

There are no new regulatory commitments contained in this letter.

If you have any questions about this letter, please contact Patrick Simpson at (630) 657-2823.

Respectfully,



Patrick R. Simpson  
Manager – Licensing  
Exelon Generation Company, LLC

- Attachments:
1. Clinton Power Station Decommissioning Cost Estimate
  2. Clinton Power Station Radiological Decommissioning Projected SAFSTOR Cash Flow
  3. Clinton Power Station NRC Funding Assurance Calculations

**ATTACHMENT 1**

**Clinton Power Station  
Decommissioning Cost Estimate**

**DECOMMISSIONING COST ANALYSIS**  
**for the**  
**CLINTON POWER STATION**



*prepared for*


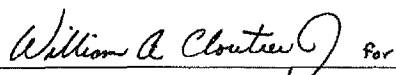

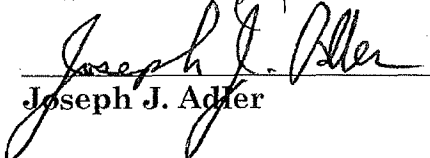
**AmerGen Energy, LLC**

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**October 2007**

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**REVISION LOG**

<b>No.</b>	<b>CRA No.</b>	<b>Date</b>	<b>Item Revised</b>	<b>Reason for Revision</b>
0			10-29-2007	Original Issue

## EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the Clinton Power Station (Clinton) for the identified decommissioning scenarios following a scheduled cessation of plant operations. The analysis relies upon site-specific, technical information, developed in an evaluation in 2003-04 <sup>[1]</sup> for AmerGen Energy, LLC (AmerGen), a wholly owned subsidiary of Exelon Corporation, and updated to reflect current assumptions pertaining to the disposition of the nuclear unit and relevant industry experience in undertaking such projects. The updated estimates are designed to provide AmerGen with sufficient information to assess their financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The primary goal of the decommissioning is the removal and disposal of the contaminated systems and structures so that the plant's operating license can be terminated. The analysis recognizes that spent fuel will be stored at the site in the fuel building's storage pool and/or in an independent spent fuel storage installation (ISFSI) until such time that it can be transferred to a Department of Energy (DOE) facility. Consequently, the estimates also include those costs to manage and subsequently decommission these storage facilities.

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 minimum cooling period of approximately five and one-half years for the spent fuel that resides in the fuel building's storage pool when operations cease. In the DECON and SAFSTOR scenarios, any residual fuel remaining in the pool after the cooling period is relocated to the ISFSI to await transfer to a DOE facility (the fuel is assumed to remain in the storage pool for the Delayed DECON scenario and transferred directly from the pool to an off-site DOE facility). The estimates also include the dismantling of non-essential structures and limited restoration of the site.

### Alternatives and Regulations

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule adopted on June 27, 1988.<sup>[2]</sup> In this rule,

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<sup>1</sup> "Decommissioning Cost Analysis for the Clinton Power Station," Document No. E16-1455-007, Rev. 0, TLG Services, Inc., May 2004

<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,

the NRC set forth financial criteria for decommissioning licensed nuclear power 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 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 Commission 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 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.

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Number 123 (p 24018 et seq.), June 27, 1988

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

<sup>4</sup> Ibid.

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

In 1996, the NRC amended its decommissioning regulations 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 allow for greater public participation and better define the transition 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 amendments relating to the initial activities and major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and processes described in these regulations.

### Decommissioning Scenarios

The following scenarios were evaluated and are representative of the alternatives available to the owner:

1. **DECON:** The plant's operating license currently expires on September 29, 2026. However, for purposes of this study, the license is assumed to be renewed for an additional 20 years (until 2046). The first scenario assumes that an ISFSI is constructed to accommodate any residual spent fuel so as to facilitate decontamination and dismantling activities within the fuel building. 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 2058.
2. **Delayed DECON:** In the second scenario, the unit is prepared for an abbreviated period of storage. The spent fuel discharged to the storage pool once operations cease remains in the pool until it can be transferred to a DOE facility. Decommissioning is delayed until the transfer of the fuel to the DOE is complete (i.e., in the year 2058). The unit is then decommissioned.
3. **SAFSTOR:** The nuclear unit is placed into safe-storage in the third scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent possible; termination of the license would conclude within the maximum required 60-year period. As in the DECON scenario, spent fuel is relocated to an ISFSI until it can be transferred to a DOE facility. Dormancy continues following the removal of spent fuel from the site, timed to allow final decommissioning and license termination to be completed within 60 years of final shutdown.

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

## Methodology

The methodology used to develop the estimates described within this document follows the basic approach originally presented in the cost estimating guidelines <sup>[7]</sup> developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes 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.

## Contingency

Consistent with standard cost estimating practice, contingencies are applied to the decontamination and dismantling costs 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>[8]</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 this analysis, 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, 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.

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<sup>7</sup> T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986

<sup>8</sup> Project and Cost Engineers' Handbook, Second Edition, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, p. 239

### Low-Level Radioactive Waste Disposal

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>[9]</sup> and its Amendments of 1985,<sup>[10]</sup> the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

AmerGen is currently able to access the disposal facility in Barnwell, South Carolina. However, in June 2000, South Carolina formally joined with Connecticut and New Jersey to form the Atlantic Compact. The legislation allows South Carolina to gradually limit access to the Barnwell facility, with only Atlantic Compact members having access to the facility after mid-year 2008. At that time, EnergySolutions’ disposal facility in Clive, Utah may be the only alternative destination for a majority of the waste forms generated from decontamination and dismantling. As such, the costs reported for direct disposal (burial) are primarily based upon Exelon’s current pricing agreement with EnergySolutions.

EnergySolutions does not have a license to dispose of the more highly radioactive waste (Class B and C as defined by 10 CFR §61) generated in the decontamination and dismantling of the reactor vessel. In the interim (at least until new waste disposal options become available) and for purposes of this analysis, waste disposal costs for this material (generally less than 2% of the total waste volume) are based upon Exelon’s currently negotiated cost of disposal at the Barnwell site.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising approximately 0.2% of the total waste volume) is generally not suitable for shallow-land disposal. This material is packaged in the same multipurpose canisters used for spent fuel storage/transport and designated for geologic disposal.

A significant portion of the metallic waste generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be surveyed on site or shipped off site to licensed facilities for further analysis, for processing and/or for conditioning/recovery. Reduction in the volume of low-level radioactive waste requiring disposal in a licensed low-level radioactive waste disposal facility can be accomplished through a variety of methods, including analyses and surveys or decontamination to eliminate the portion of waste that does

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<sup>9</sup> “Low-Level Radioactive Waste Policy Act of 1980,” Public Law 96-573, 1980

<sup>10</sup> “Low-Level Radioactive Waste Policy Amendments Act of 1985,” Public Law 99-240, 1986

not require disposal as radioactive waste, compaction, incineration or metal melt. The estimates reflect the savings from waste recovery/volume reduction.

### High-Level Radioactive Waste Management

Congress passed the “Nuclear Waste Policy Act”<sup>[11]</sup> (NWPA) in 1982, assigning the responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. Two permanent disposal facilities were envisioned, as well as an interim storage facility. To recover the cost, the legislation created a Nuclear Waste Fund through which money is collected from the sale of electricity generated by the power plants. The NWPA, along with the individual disposal 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 initiate the disposal of spent nuclear fuel and high level waste, as required by the NWPA and the utility contracts. As a result, utilities initiated legal action against the DOE. While legal actions continue, the DOE has no plans to receive spent fuel prior to completing the construction of its geologic repository.

Operation of DOE’s yet-to-be constructed repository is contingent upon the review and approval of the facility’s license application by the NRC and the successful resolution of pending litigation. The latest timetable for submittal of the license application is mid-2008. Assuming a timely review, DOE expects that receipt of fuel could begin as early as 2017,<sup>[12]</sup> although 2020 may be more likely according to the director of the DOE’s waste program.<sup>[13]</sup>

Once the repository is operational, fuel acceptance will be prioritized and spent fuel assemblies will need to meet certain acceptance criteria, including heat output. These conditions require that the fuel discharged upon the cessation of operations be actively cooled and stored for a minimum period at the generating site prior to transfer (a minimum of five years as defined in 10CFR§961 for standard fuel). As such, the NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor until title of the fuel is transferred to the Secretary of Energy, pursuant to 10CFR§50.54(bb).<sup>[14]</sup> This

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<sup>11</sup> “Nuclear Waste Policy Act of 1982 and Amendments,” U.S. Department of Energy’s Office of Civilian Radioactive Management, 1982

<sup>12</sup> “DOE Announces Yucca Mountain License Application Schedule”, U.S. Department of Energy’s Office of Public Affairs, Press Release July 19, 2006

<sup>13</sup> Remarks of OCRWM Director Ward Sproat to the National Academy of Science, November 2006

<sup>14</sup> U.S. Code of Federal Regulations, Title 10, Part 50, “Domestic Licensing of Production and Utilization Facilities,”

funding requirement is fulfilled through inclusion of certain cost elements in the decommissioning estimates, for example, associated with the isolation and continued operation of the spent fuel pool and/or ISFSI.

At shutdown, the spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core. In the DECON and SAFSTOR scenarios the assemblies are packaged into multipurpose canisters for transfer to a newly constructed ISFSI. A five and one-half year cooling period is provided for the final core to meet the conditions for dry storage.

Once the storage pool is emptied, the fuel building can be either decontaminated and dismantled or prepared for long-term storage. The ISFSI, which can be operated under the station's general license, will be designed to accommodate the dry storage casks needed to off-load the wet storage pool. In the Delayed DECON scenario, the storage pool remains operational and used for the interim storage of the fuel until the transfer to DOE can be completed (no ISFSI is required).

The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. For purposes of this analysis, acceptance of commercial spent fuel by the DOE is expected to begin in 2018. With a large fleet of reactors, Exelon is able to re-assign allocations between its units to minimize on-site storage costs. Assuming spent fuel from the older units is given priority and with a maximum rate of transfer of 3,000 metric tons of uranium (MTU)/year, the assemblies residing in the Clinton storage pool at the time of shutdown would be scheduled for pickup in the years 2056 through 2058 (assuming the cessation of plant operations in 2046). This equates to 64 multi-purpose canisters (at 68 assemblies per canister).

Exelon's strongly held position is that the DOE has a contractual obligation to accept Clinton's fuel in a timely manner and consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, at this time, including the cost of storing spent fuel in this study is the most reasonable approach because it insures the availability of sufficient decommissioning funds at the end of the station's life if, contrary to its contractual obligation, the DOE has not performed.



### Site Restoration

The efficient removal of the contaminated materials at the site will result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities will substantially damage power block structures, potentially weakening the footings and structural supports. Prompt demolition once the license is terminated 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 is more efficient and less costly than if the process were deferred. Experience at shutdown generating stations has shown that plant facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public and the demolition work force. Consequently, this analysis assumes that non-essential site structures within the restricted access area are removed to a nominal depth of three feet below the local grade level wherever possible. The site is then graded and stabilized.

### Summary

The costs to decommission Clinton were evaluated for several decommissioning scenarios, incorporating the attributes of both the DECON and SAFSTOR decommissioning alternatives. Regardless of the timing of the decommissioning activities, the estimates assume the eventual removal of all the contaminated and activated plant components and structural materials, such that the facility operator may then have unrestricted use of the site with no further requirement for an operating license. Delayed decommissioning is initiated after the spent fuel has been removed from the site and 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 can be completed. Once the transfer is complete, the storage facilities are also decommissioned.

The scenarios analyzed for the purpose of generating the estimates are 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 Appendices C, D, and E. Cost summaries for the various scenarios are provided at the end of this section for the major cost components.

**SUMMARY OF DECOMMISSIONING COST ELEMENTS  
DECON**  
(thousands of 2007 dollars)

<b>Activity</b>	<b>Total</b>
Decontamination	20,716
Removal	158,458
Packaging	15,829
Transportation	10,548
Waste Disposal	55,662
Off-site Waste Processing	25,564
Program Management <sup>[1]</sup>	298,887
Spent Fuel Pool Isolation	10,503
Spent Fuel Management	124,876
Insurance and Regulatory Fees	10,669
Energy	6,731
Characterization and Licensing Surveys	15,676
Property Taxes	22,305
Miscellaneous Equipment	5,972
Site O&M	3,666
<b>Total <sup>[2]</sup></b>	<b>786,061</b>
NRC License Termination	547,591
Spent Fuel Management	155,245
Site Restoration	83,225

<sup>[1]</sup> Includes engineering and security

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

**SUMMARY OF DECOMMISSIONING COST ELEMENTS  
DELAYED DECON**  
(thousands of 2007 dollars)

<b>Activity</b>	<b>Total</b>
Decontamination	28,052
Removal	148,111
Packaging	12,819
Transportation	7,604
Waste Disposal	37,773
Off-site Waste Processing	25,564
Program Management <sup>[1]</sup>	353,365
Spent Fuel Pool Isolation	10,503
Spent Fuel Management	31,915
Insurance and Regulatory Fees	15,732
Energy	8,872
Characterization and Licensing Surveys	17,100
Property Taxes	29,948
Miscellaneous Equipment	9,630
Site O&M	5,663
<b>Total <sup>[2]</sup></b>	<b>742,651</b>
NRC License Termination	476,232
Spent Fuel Management	181,048
Site Restoration	85,372

<sup>[1]</sup> Includes engineering and security

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

**SUMMARY OF DECOMMISSIONING COST ELEMENTS  
SAFSTOR**  
(thousands of 2007 dollars)

<b>Activity</b>	<b>Total</b>
Decontamination	27,039
Removal	152,473
Packaging	12,025
Transportation	6,251
Waste Disposal	30,714
Off-site Waste Processing	30,148
Program Management <sup>[1]</sup>	424,198
Spent Fuel Pool Isolation	10,503
Spent Fuel Management	123,640
Insurance and Regulatory Fees	46,990
Energy	12,765
Characterization and Licensing Surveys	17,100
Property Taxes	76,770
Miscellaneous Equipment	22,433
Site O&M	17,901
<b>Total <sup>[2]</sup></b>	<b>1,010,952</b>
NRC License Termination	691,981
Spent Fuel Management	233,606
Site Restoration	85,365

<sup>[1]</sup> Includes engineering and security

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

## **1. INTRODUCTION**

This report presents estimates of the cost to decommission the Clinton Power Station (Clinton), for the scenarios described in Section 2, following a scheduled cessation of plant operations. The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2003-04,<sup>[1]</sup> updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The current estimate is designed to provide AmerGen Energy, LLC (AmerGen), a wholly owned subsidiary of Exelon Corporation (Exelon), with sufficient information to assess their financial obligations, as they pertain to the eventual decommissioning of the nuclear unit. It is not a detailed engineering document, but a financial analysis prepared in advance of the detailed engineering that will be required to carry out the decommissioning

### **1.1 OBJECTIVES OF STUDY**

The objectives of this study are to prepare comprehensive estimates of the cost to decommission Clinton, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities. The plant's operating license currently expires on September 29, 2026. However, for purposes of this study, the license is assumed to be renewed for an additional 20 years (until 2046).

### **1.2 SITE DESCRIPTION**

Clinton is located in east central Illinois, approximately 60 miles northeast of Springfield. The station is comprised of a single boiling water reactor with supporting facilities.

The Nuclear Steam Supply System (NSSS) consists of a BWR/6 boiling water reactor system designed by General Electric. The reactor recirculation system is comprised of the reactor vessel and two recirculation pump loops external to the reactor vessel which provides the driving flow of water to the reactor vessel jet pumps. Each external loop contains one high-capacity, motor-driven recirculation pump and three motor-operated gate valves for pump maintenance. The recirculation loops are a part of the nuclear system process barrier and are located inside the containment structure. The design reactor thermal power level is 3473 Megawatts thermal (MWt). The corresponding net electrical output is approximately 1022 Megawatts electric (MWe).

The BWR-Mark III containment structure at Clinton consists of a lined, reinforced concrete cylinder with a hemispherical domed roof and a flat base slab. The drywell consists of a cylindrical reinforced concrete structure that surrounds the reactor vessel. The lower portion of the drywell is submerged in the suppression pool. The drywell and suppression pool are connected by three rows of circular vents which are located below the normal water level of the suppression pool.

Heat produced in the reactor is converted to electrical energy by the power conversion system. A turbine-generator system converts the thermal energy of the steam produced in the reactor into mechanical shaft power and then into electrical energy. The turbine consists of one high-pressure, double-flow turbine element, and two double-flow, low-pressure turbine elements all aligned in tandem. The generator is driven at 1800 rpm and rated at 1100 MVA. The exhaust steam from the turbine is condensed and deaerated in the main condenser. The heat rejected to the main condenser is removed by the circulating water system.

The circulating water system provides the heat sink required for removal of waste heat in the power plant's thermal cycle. The system has the principal function of removing heat by absorbing this energy in the main condenser. Water is withdrawn from Lake Clinton via the intake tunnels by the circulating water pumps. After passing through the plant condensers, the water is routed through the 3.4 mile long discharge flume back to the lake.

### **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

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\* Annotated references for citations in Sections 1-6 are provided in Section 7.

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. The rule also placed limits on the time allowed to complete the decommissioning process. For SAFSTOR, 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. The guidelines for ENTOMB are similar, providing the NRC with both sufficient leverage and flexibility to ensure that these deferred options are only used in situations where it is reasonable and consistent with the definition of decommissioning. At the conclusion of a 60-year dormancy period (or longer for ENTOMB 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 recent rulemaking permitting the controlled release of a site, the NRC has re-evaluated this alternative.<sup>[4]</sup> 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. However, 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 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.

The NRC published amendments to its decommissioning regulations in 1996.<sup>[6]</sup> When the regulations were originally 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 new 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 will 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 applications to the NRC to terminate the license, which will include a License Termination Plan (LTP).

### 1.3.1 Nuclear Waste Policy Act

Congress passed the “Nuclear Waste Policy Act”<sup>[7]</sup> (NWPA) in 1982, assigning the responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. Two permanent disposal facilities were envisioned, as well as an interim storage facility. To recover the cost, the legislation created a Nuclear Waste Fund through which money is collected from the sale of electricity generated by the power plants. NWPA, along with the individual disposal 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 initiate the disposal of spent nuclear fuel and 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 resolve the impasse.<sup>[8]</sup>



Operation of DOE's yet-to-be constructed repository is contingent upon the review and approval of the facility's license application by the NRC and the successful resolution of pending litigation. The latest timetable for submittal of the license application is mid-2008. Assuming a timely review, DOE expects that receipt of fuel could begin as early as 2017,<sup>[9]</sup> although 2020 may be more likely according to the director of the DOE's waste program.<sup>[10]</sup>

Once the repository is operational, fuel acceptance will be prioritized and spent fuel assemblies will need to meet certain acceptance criteria, including heat output. These conditions require that the fuel discharged upon the cessation of operations be actively cooled and stored for a minimum period at the generating site prior to transfer (five years as defined in 10CFR§961 for standard fuel). As such, the NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor until title of the fuel is transferred to the Secretary of Energy, pursuant to 10CFR§50.54(bb).<sup>[11]</sup> This funding requirement is fulfilled through inclusion of certain cost elements in the decommissioning estimate, for example, associated with the isolation and continued operation of the spent fuel pools and ISFSI.

At shutdown, the spent fuel pools are expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core. Over the next five and one-half years the assemblies are packaged into multipurpose canisters for transfer to the repository or to the ISFSI. It is assumed that this period provides the necessary cooling for the final core to meet DOE's transport system requirements for decay heat.

The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. For purposes of this analysis, the acceptance of commercial spent fuel by the DOE is expected to begin in 2018. Given this scenario and an anticipated rate of transfer, spent fuel is projected to remain at the Clinton site for approximately 12 years after the cessation of operations. Consequently, costs are included within the analysis for the continued operation of the storage pool and the construction of an ISFSI, as required, and for the long-term caretaking of the spent fuel at the site until the year 2058.

AmerGen will construct an independent spent fuel storage installation (ISFSI) to support decommissioning operations (DECON and

SAFSTOR scenarios). Once the storage pool is emptied, the fuel building is either decontaminated and dismantled or prepared for long-term storage. In the Delayed DECON scenario, the storage pool remains operational and is used for the interim storage of the fuel (i.e., no ISFSI is required).

Exelon's strongly held position is that the DOE has a contractual obligation to accept Clinton's fuel in a timely manner and consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, at this time, including the cost of storing spent fuel in this study is the most reasonable approach because it insures the availability of sufficient decommissioning funds at the end of the station's life if, contrary to its contractual obligation, the DOE has not performed.

### 1.3.2 Low-Level Radioactive Waste Acts

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. Congress passed the "Low-Level Radioactive Waste Policy Act" in 1980,<sup>[12]</sup> declaring the states as being ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. The federal law encouraged the formation of regional groups or compacts to implement this objective safely, efficiently, and economically, and set a target date of 1986 for implementation. After little progress, the "Low-Level Radioactive Waste Policy Amendments Act of 1985,"<sup>[13]</sup> extended the implementation schedule, with specific milestones and stiff sanctions for non-compliance. However, to date, no new compact facilities have been successfully sited, licensed, and constructed.

AmerGen is currently able to access the disposal facility in Barnwell, South Carolina. However, in June 2000, South Carolina formally joined with Connecticut and New Jersey to form the Atlantic Compact. The legislation allows South Carolina to gradually limit access to the Barnwell facility, with only Atlantic Compact members having access to the facility after mid-year 2008. At that time, EnergySolutions' disposal facility in Clive, Utah may be the only alternative destination for a majority of the waste forms generated from decontamination and dismantling. As such, the costs reported for direct disposal (burial) are

primarily based upon Exelon's current pricing agreement with EnergySolutions.

EnergySolutions does not have a license to dispose of the more highly radioactive waste (Class B and C as defined by 10 CFR §61) generated in the dismantling of the reactor vessel. In the interim (at least until new waste disposal options become available) and for purposes of this analysis, waste disposal costs for this material (generally less than 2% of the total waste volume) are based upon Exelon's currently negotiated cost of disposal at the Barnwell site.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising approximately 0.2% of the total waste volume) is generally not suitable for shallow-land disposal. This material is packaged in the same multipurpose canisters used for spent fuel storage/transport and designated for geologic disposal.

A significant portion of the metallic waste generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be surveyed on site or shipped off site to licensed facilities for further analysis, for processing and/or for conditioning/recovery. Reduction in the volume of low-level radioactive waste requiring disposal in a licensed low-level radioactive waste disposal facility can be accomplished through a variety of methods, including analyses and surveys or decontamination to eliminate the portion of waste that does not require disposal as radioactive waste, compaction, incineration or metal melt. 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>[14]</sup> amending 10 CFR §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 for Clinton assume that the 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>[15]</sup> An additional limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.<sup>[16]</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>[17]</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 ALTERNATIVES**

Detailed cost estimates were developed to decommission the Clinton for three variations of the approved decommissioning alternatives: DECON and SAFSTOR. Although the scenarios differ with respect to technique, process, cost, and schedule, they attain the same result: the ultimate release of the site for unrestricted use.

Three decommissioning scenarios were evaluated for the nuclear unit. The scenarios selected are representative of alternatives available to the owner and are defined as follows:

1. **DECON:** The plant's operating license currently expires on September 29, 2026. However, for purposes of this study, the license is assumed to be renewed for an additional 20 years (until 2046). The first scenario assumes that an ISFSI is constructed to accommodate any residual spent fuel so as to facilitate decontamination and dismantling activities within the fuel building. 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 2058.
2. **Delayed DECON:** In the second scenario, the unit is prepared for an abbreviated period of storage. The spent fuel discharged to the storage pool once operations cease remains in the pool until it can be transferred to a DOE facility. Decommissioning is delayed until the transfer of the fuel to the DOE is complete (i.e., in the year 2058). The unit is then decommissioned.
3. **SAFSTOR:** The nuclear unit is placed into safe-storage in the third scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent possible; termination of the license would conclude within the maximum required 60-year period. As in the DECON scenario, spent fuel is relocated to an ISFSI until it can be transferred to a DOE facility. Dormancy continues following the removal of spent fuel from the site, timed to allow final decommissioning and license termination to be completed within 60 years of final shutdown.

The following sections describe the basic activities associated with each 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 facilitate deactivation and closure. During the first phase, notification is to be provided to the NRC certifying the permanent cessation of operations and the removal of fuel from the reactor vessel. The licensee would then be 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 Clinton 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 DECON**

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.

### **2.1.1 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.

### 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 meeting 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 procedure, 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 GTCC, as defined by 10 CFR §61. Major components are further defined as comprising the reactor vessel and internals, large bore reactor 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 will not be 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 would have to 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.

### 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 radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and primary shield cores.
- An ISFSI is designed, licensed and constructed to support offloading the spent fuel pool in support of the decommissioning program.
- Isolation of the spent fuel storage pool and fuel handling systems, such that decommissioning operations can commence on the balance of the plant. Decommissioning operations are scheduled around the fuel handling areas to optimize the overall project schedule. The fuel is transferred to the ISFSI as it decays to the point that it meets the heat load criteria of the containers. Consequently, it is assumed that the fuel pool remain operational for approximately 5½ 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.

#### 2.1.2 Period 2- Decommissioning Operations

This period includes the physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful termination of the



10 CFR §50 operating license. 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. Modifications may be required to the containment structure to facilitate access of large/heavy equipment. Modifications may also be required to the refueling area of the reactor buildings 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.
- Transfer of the steam separator and dryer assemblies to the dryer-separator pool for segmentation. Segmentation by weight and activity maximizes the loading of the shielded transport casks. The operations are conducted under water using remotely operated tooling and contamination controls.
- Disconnection of the control blades from the drives on the vessel lower head. Blades are transferred to the spent fuel pool for packaging.
- Disassembly, segmentation, and packaging of the core shroud and in-core guide tubes. Some of the material is expected to exceed Class C disposal requirements. As such, those segments are packaged in a modified fuel storage canister for geologic disposal.

- Removal and segmentation of the remaining internals including the jet pump assemblies, fuel support castings, and core plate assembly.
- Draining and decontamination of the reactor well and the permanent sealing of the spent fuel transfer gate. Install a shielded platform for segmentation of the reactor vessel. 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. Sections are transferred to the dryer-separator pool for packaging and interim storage.
- Disconnection of the control rod drives and instrumentation tubes from reactor vessel lower head. The lower reactor head and vessel supporting structure are then segmented.
- Removal of the reactor recirculation pumps. Exterior surfaces are decontaminated and openings covered. Components can serve as their own burial containers provided that all penetrations are properly sealed.
- Demolition of the sacrificial shield activated concrete by controlled demolition.
- Transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage. Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer is expected to begin in 2056 and to be completed by the end of the year 2058.

At least two years prior to the anticipated date of license termination, an LTP is required. Submitted as a supplement to the Final Safety Analysis Report (FSAR) or its 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 meeting. LTP approval will be subject to any conditions and limitations as deemed appropriate by the Commission. 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 the drywell, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/contaminated concrete.
- Removal of the steel liners from the steam separator and dryer pool, reactor well, and spent fuel storage pool.
- Surveys of the decontaminated areas of the containment structure.
- Removal of the contaminated equipment and material from the turbine and radwaste buildings, and any other contaminated facility. Use radiation and contamination control techniques until radiation surveys indicate that the structures 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 will facilitate 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>[18]</sup> This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies 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 survey is 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 terminate the operating license 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 facility is suitable for release.

### 2.1.3 Period 3 - Site Restoration

Following completion of decommissioning operations, site restoration activities will begin. Efficient removal of the contaminated materials and verification that residual radionuclide concentrations are below the NRC limits will result in substantial damage to many of the structures. Although performed in a controlled, safe manner, blasting, coring, drilling, scarification (surface removal), and the other decontamination activities will substantially degrade power block structures including the reactor, turbine and radwaste buildings. Under certain circumstances, verifying that subsurface radionuclide concentrations meet NRC site release requirements will 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 as well as to future workers. Abandonment creates a breeding ground for vermin infestation as well as 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, as well as 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.

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 materials are trucked to an off-site area for disposal as construction debris.

#### 2.1.4 ISFSI Operations and Decommissioning

The ISFSI will continue to operate under a separate and independent license (10 CFR §72) following the termination of the §50 operating license. Assuming the DOE starts accepting fuel in 2018, transfer of spent fuel from Clinton is anticipated to begin in 2056 and continue through the year 2058.

At the conclusion of the spent fuel transfer process, the ISFSI will be decommissioned. The Commission will terminate the §72 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. Once the requirements are satisfied, the NRC can terminate the license for the ISFSI.

The assumed design for the ISFSI is based upon the use of a multi-purpose canister and a concrete overpack for pad storage. For purposes of this cost analysis, it is assumed that once the inner canisters containing the spent fuel assemblies have been removed, any required decontamination performed, and the license for the facility terminated, the modules can be dismantled using conventional techniques for the demolition of reinforced concrete. The concrete storage pad will then be removed, and the area graded and landscaped to conform to the surrounding environment.

## **2.2 SAFSTOR AND DELAYED DECOMMISSIONING**

The NRC defines SAFSTOR 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." The facility is left intact (during the dormancy period), with structures maintained in a sound condition. Systems not required to operate in support of the spent fuel pool or site surveillance and security are drained, de-energized, and secured. Minimal cleaning/removal of loose contamination and/or fixation and sealing of remaining contamination is performed. Access to contaminated areas is secured to provide controlled access for inspection and maintenance.

The engineering and planning requirements are similar to those for the DECON alternative, although a shorter time period is expected for these activities due to the more limited work scope. Site preparations are also similar to those for the DECON alternative. However, with the exception of the required radiation surveys and site characterizations, the mobilization and preparation of site facilities is less extensive.

The following discussion is appropriate for both the SAFSTOR and Delayed DECON scenarios, the primary differences being in the length of the dormancy period. In the Delayed DECON scenario, the fuel remains in the fuel building's storage pool until such time that the transfer to a DOE facility is complete. Decommissioning operations are assumed to begin once fuel is off site. By contrast, in the SAFSTOR scenario, the spent fuel is relocated to a newly constructed ISFSI. The plant remains in safe-storage after the fuel is removed from site. Decommissioning operations are initiated such that the license is terminated within the required 60-year time period.

### **2.2.1 Period 1 - Preparations**

Preparations for long-term storage include the planning for permanent defueling of the reactors, revision of technical specifications appropriate to the operating conditions and requirements, a characterization of the facility and major components, and the development of the PSDAR.

The process of placing the plant in safe-storage includes, but is not limited to, the following activities:

- Isolation of the spent fuel storage services and fuel handling systems located in the fuel building so that safe-storage operations may commence on the balance of the plant. This activity may be carried out by plant personnel in accordance with existing operating technical specifications. Activities are scheduled around the fuel handling systems to the greatest extent possible.
- In the SAFSTOR scenario an ISFSI is designed, licensed and constructed to support offloading the spent fuel pool in support of the decommissioning program.
- Draining and de-energizing of the non-contaminated systems not required to support continued site operations or maintenance.
- Disposing of contaminated filter elements and resin beds not required for processing wastes from layup activities for future operations.
- Draining of the reactor vessel, with the internals left in place and the vessel head secured.
- Draining and de-energizing non-essential, contaminated systems with decontamination as required for future maintenance and inspection.
- Preparing lighting and alarm systems whose continued use is required; de-energizing portions of fire protection, electric power, and HVAC systems whose continued use is not required.
- Cleaning of the loose surface contamination from building access pathways.
- Performing an interim radiation survey of plant, posting warning signs where appropriate.
- Erecting physical barriers and/or securing all access to radioactive or contaminated areas, except as required for inspection and maintenance.
- Installing security and surveillance monitoring equipment and relocating security fence around secured structures, as required.

### 2.2.2 Period 2 - Dormancy

The second phase identified by the NRC in its rule addresses licensed activities during a storage period and is applicable to the dormancy phases of the deferred decommissioning alternatives. Dormancy activities include a 24-hour security force, preventive and corrective

maintenance on security systems, area lighting, general building maintenance, heating and ventilation of buildings, routine radiological inspections of contaminated structures, maintenance of structural integrity, and a site environmental and radiation monitoring program. Resident maintenance personnel perform equipment maintenance, inspection activities, routine services to maintain safe conditions, adequate lighting, heating, and ventilation, and periodic preventive maintenance on essential site services.

An environmental surveillance program is carried out during the dormancy period to ensure that releases of radioactive material to the environment are prevented and/or detected and controlled. Appropriate emergency procedures are established and initiated for potential releases that exceed prescribed limits. The environmental surveillance program constitutes an abbreviated version of the program in effect during normal plant operations.

Security during the dormancy period is conducted primarily to prevent unauthorized entry and to protect the public from the consequences of its own actions. The security fence, sensors, alarms, and other surveillance equipment provide security. Fire and radiation alarms are also monitored and maintained. While remote surveillance is an option, it does not offer the immediate response time of a physical presence.

The transfer of the spent fuel to a DOE facility continues during this period until complete. Fuel is shipped from the pool or the ISFSI (depending upon the scenario). After an optional period of storage (such that license terminations are accomplished within 60 years of final shutdown), it is required that the licensee submit applications to terminate the license, along with an LTP (described in Section 2.1.2), thereby initiating the third phase.

### 2.2.3 Periods 3 and 4 - Delayed Decommissioning

Prior to the commencement of decommissioning operations, preparations are undertaken to reactivate site services and prepare for decommissioning. Preparations include engineering and planning, a detailed site characterization, and the assembly of a decommissioning management organization. Final planning for activities and the writing of activity specifications and detailed procedures are also initiated at this time.



Much of the work in developing a termination plan is relevant to the development of the detailed engineering plans and procedures. The activities associated with this phase and the follow-on decontamination and dismantling processes are detailed in Sections 2.1.1 and 2.1.2. The primary difference between the sequences anticipated for the DECON and deferred scenarios is the absence, in the latter, of any constraint on the availability of the fuel storage facilities located within the reactor buildings for decommissioning.

Variations in the length of the dormancy period are expected to have little effect upon the quantities of radioactive wastes generated from system and structure removal operations. Given the levels of radioactivity and spectrum of radionuclides expected from fifty to sixty years of plant operation, no plant process system identified as being contaminated upon final shutdown will become releasable due to the decay period alone, i.e., there is no significant reduction in the waste generated from the decommissioning activities. However, due to the lower activity levels, a greater percentage of the waste volume can be designated for off-site processing and recovery.

The delay in decommissioning also yields lower working area radiation levels. As such, the estimates for the delayed scenarios incorporate reduced ALARA controls for the lower occupational exposure potential.

Although the initial radiation levels due to  $^{60}\text{Co}$  will decrease during the dormancy period, the internal components of the reactor vessel will still exhibit sufficiently high radiation dose rates to require remote sectioning under water due to the presence of long-lived radionuclides such as  $^{94}\text{Nb}$ ,  $^{59}\text{Ni}$ , and  $^{63}\text{Ni}$ . Therefore, the dismantling procedures described for the DECON alternative would still be employed during deferred scenarios. Portions of the sacrificial shield will still be radioactive due to the presence of activated trace elements with long half-lives ( $^{152}\text{Eu}$  and  $^{154}\text{Eu}$ ). Decontamination will require controlled removal and disposal. It is assumed that radioactive corrosion products on inner surfaces of piping and components will not have decayed to levels that will permit unrestricted use or allow conventional removal. These systems and components will be surveyed as they are removed and disposed of in accordance with the existing radioactive release criteria.

#### 2.2.4 Period 5 - Site Restoration

Following completion of decommissioning operations, site-restoration activities can begin. If the site structures are to be dismantled, dismantling as a continuation of the decommissioning process is clearly the most appropriate and cost-effective option, as described in Section 2.1.3. The basis for the dismantling cost in the deferred scenarios is consistent with that described for DECON, presuming the removal of structures and site facilities to a nominal depth of three feet below grade and the limited restoration of the site.

### **3. COST ESTIMATE**

The cost estimates prepared for decommissioning Clinton consider the unique features of the site, including the NSSS, power generation systems, support services, site buildings, and ancillary facilities. The basis of the estimates, including the sources of information relied upon, the estimating methodology employed, site-specific considerations, and other pertinent assumptions, is described in this section.

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

The estimates were developed with site-specific, technical information developed in an evaluation prepared for AmerGen Energy in 2003-04. The information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes.

#### **3.2 METHODOLOGY**

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"<sup>[19]</sup> and the DOE "Decommissioning Handbook."<sup>[20]</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. The activity-dependent costs were 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 relied upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means.<sup>[21]</sup>

This analysis reflects 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 Pathfinder, Shoreham, Rancho Seco, Trojan, Yankee Rowe, Big Rock

Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, and San Onofre-1 nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

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, ensures 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.

### Work Difficulty Factors

TLG has historically applied work difficulty adjustment factors (WDFs) to account for the inefficiencies in working in a power plant environment. WDFs were 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 40% |
| • 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 radiologically 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 are based upon productivity information available from the "Building Construction Cost Data" publication.

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.

### **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 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 the 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>[22]</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 analysis 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 analysis, 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, can 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, now highly radioactive after a lifetime of exposure to core activity. The disposition of these components forms the basis of the critical path (schedule) for decommissioning operations. Cost and schedule are interdependent, 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 expected optimization, however, 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 ranged 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%
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%
Taxes and Fees	10%
Insurance	10%
Staffing	15%

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 estimate. For example, the composite contingency value reported for the DECON alternative is 18.6%. Values for the other alternatives are delineated within the detailed cost tables in Appendices D and E.

### 3.3.2 Financial Risk

In addition to the routine uncertainties addressed by contingency, another cost element that is sometimes necessary to consider when bounding decommissioning costs relates to uncertainty, or risk. 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, for example, in the start and rate of acceptance of spent fuel by the DOE).
- Pricing changes for basic inputs, such as labor, energy, materials, and burial.

It has been TLG’s experience that the results of a risk analysis, when compared with the base case estimate for decommissioning, indicate that the chances of the base decommissioning estimate’s being too high is a low probability, and the chances that the estimate is too low is a higher probability. This cost study, however, does not add any additional cost 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 estimate.



### **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 Management**

The cost to dispose of spent fuel generated from plant operations is not reflected within the estimates to decommission the Clinton site. Ultimate disposition of the spent fuel is within the province of the DOE's Waste Management System, as defined by the NWPA. As such, the disposal cost is financed by a 1 mill/kWhr surcharge paid into the DOE's waste fund during operations. However, the NRC requires licensees to establish a program to manage and provide funding for the management of all irradiated fuel at the reactors until title of the fuel is transferred to the Secretary of Energy. This funding requirement is fulfilled through inclusion of certain high-level waste cost elements within the estimate, as described below.

The total inventory of assemblies that will require handling during decommissioning is based upon several assumptions. The pickup of commercial fuel is assumed to begin in the year 2018. The maximum rate at which the fuel is removed from the commercial sites is based upon an annual capacity at the geologic repository of 3,000 metric tons of uranium (MTU). Any delay in the startup of the repository or decrease in the rate of acceptance will correspondingly prolong the transfer process and result in the fuel remaining at the site longer.

In the DECON and SAFSTOR scenarios, an ISFSI is constructed for the interim caretaking of the spent fuel until such time that the transfer of spent fuel to the DOE is complete. Assuming that the DOE commences repository operation in 2018, fuel is projected to be removed from the Clinton site by the year 2058. In the Delayed DECON scenario, the fuel remains in the storage pool.

Operation and maintenance costs for the storage facilities are included within the estimates and address the cost for staffing the facilities, as well as security, insurance, and licensing fees. The estimates include the costs to purchase (DECON and SAFSTOR scenarios), load, and

transfer the fuel storage canisters. Costs are also provided for the final disposition of the facilities once the transfer is complete.

### Repository Startup

Operation of the DOE's yet-to-be constructed geologic repository is contingent upon the review and approval of the facility's license application by the NRC, the successful resolution of pending litigation, and the development of a national transportation system. By comparison, the NRC's review of the application for an interim storage facility submitted by the Private Fuel Storage consortium began in 1997. The Nuclear Regulatory Commission granted an operating license for the facility in September 2005, after eight years of review. With a more technically complex and politically sensitive application for permanent disposal, it is not unreasonable to expect that NRC approval to construct the repository at Yucca Mountain will require at least as long a review period. Therefore, the spent fuel management plan described in this section is predicated upon the DOE initiating the pickup of commercial fuel in the year 2018.

### Spent Fuel Management Model

The Exelon nuclear fleet consists of 21 units at 11 sites in Illinois, Pennsylvania, and New Jersey, including the inactive units at Dresden, Peach Bottom, and Zion. The ability to complete the decommissioning of these units, particularly for the DECON and Delayed DECON alternatives, is highly dependent upon when the DOE is assumed to remove spent fuel from the sites.

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>[23]</sup> A computer model developed by Exelon Nuclear was used to determine when the DOE would provide allocations in the queue for removal of spent fuel from the individual sites. Repository operations were based upon annual industry-wide acceptance rates of 400 MTU/year for year 1, 600 MTU/year for year 2, 1200 MTU/year for year 3, 2000 MTU/year for year 4, and 3000 MTU/year for year 5 and beyond.<sup>[24]</sup>

ISFSIs are constructed as necessary to maintain full-core discharge capability at the individual sites. Once the DOE begins repository

operations, queue allocations are used to ship spent fuel from Exelon's operating sites. Spent fuel shipments are then made from decommissioning sites in the order of retirement.

#### Canister Design

A multi-purpose storage canister (similar to the HOLTEC HI-STORM system), with a 68-fuel assemblies capacity, is assumed for future cask acquisitions. A unit cost of \$500,000 is used for pricing the internal multi-purpose canister (MPC), with an additional cost of \$250,000 for the concrete overpack. The DOE is assumed to provide the MPC for fuel transferred directly from the pool to the DOE at no cost to the owner.

#### Canister Loading and Transfer

An average cost of \$250,000 is used for the labor to load/transport the spent fuel from the pool to the ISFSI pad, based upon Exelon experience. For estimating purposes, 50% of this cost is used to estimate the cost to transfer the fuel from the ISFSI to the DOE.

#### Operations and Maintenance

Annual costs (excluding labor) of approximately \$738,410 and \$82,164 are used for operation and maintenance of the spent fuel pool and the ISFSI, respectively.

#### ISFSI Design Considerations

A multi-purpose (storage and transport) dry shielded storage canister with a vertical, reinforced concrete storage overpack is used as a basis for the cost analyses. Approximately 50% of the overpacks are assumed to have some level of neutron-induced activation as a result of the long-term storage of the fuel (i.e., to levels exceeding free-release limits). Approximately 10% of the concrete and steel is assumed to be removed from the overpacks for controlled disposal. The cost to dispose of this material, as well as the demolition of the ISFSI facility, is included in the estimates.

### 3.4.2 Reactor Vessel and Internal Components

The NSSS (reactor vessel and reactor recirculation system components) will be decontaminated using chemical agents prior to the start of cutting operations (for DECON alternative only). A decontamination factor (average reduction) of 10 is assumed for the process.

The reactor pressure vessel and internal components are segmented for disposal in shielded, reusable transportation casks. Segmentation is performed in the dryer-separator pool, 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 cavity. Transportation cask specifications and transportation regulations will dictate segmentation and packaging methodology.

The dismantling of the reactor internals will generate radioactive waste considered unsuitable for shallow land disposal (i.e., GTCC). Although the material is not classified as high-level waste, the DOE has indicated it will accept this waste for disposal at the future high-level waste repository.<sup>[25]</sup> 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 as high-level waste, at a cost equivalent to that envisioned for the spent fuel. It is not anticipated that the DOE would 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 Clinton site.

Intact disposal of the reactor vessel and internal components can 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 Clinton ceases operation. Future viability of this option will depend upon the ultimate location of the disposal site, as well as the disposal site licensee's ability to accept highly radioactive packages and effectively isolate them from the environment. Additionally, with BWRs, the diameter of the reactor vessel may severely limit overland transport. Consequently, the study assumes the reactor vessel will require segmentation, as a bounding condition.

#### 3.4.3 Primary System Components

Reactor recirculation 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) is dropped below the nozzle zone. The piping is boxed and transported by shielded van. The reactor recirculation pumps and motors are lifted out intact, packaged, and transported for processing and/or disposal.

#### 3.4.4 Main Turbine and Condenser

The main turbine will be dismantled using conventional maintenance procedures. The turbine rotors and shafts will be removed to a laydown area. The lower turbine casings will be removed from their anchors by controlled demolition. The main condensers will also be disassembled and moved to a laydown area. Material is then prepared for transportation to an off-site recycling facility where it will be surveyed and designated for either decontamination or volume reduction, conventional disposal, or controlled disposal. Components will be

packaged and readied for transport in accordance with the intended disposition.

#### 3.4.5 Transportation Methods

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components will qualify as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49.<sup>[26]</sup> The contaminated material will be packaged in Industrial Packages (IP 1, IP-2, or IP-3, as defined in subpart 173.411) 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 §71, 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 would require that additional shielding be incorporated within the packaging so as to attenuate the dose to levels acceptable for transport.

Transport of the highly activated metal, produced in the segmentation of the reactor vessels and internal components, will be 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 was based upon the license limits of the available shielded transport casks. The segmentation scheme for the vessel and internal segments is designed to meet these limits.

The transport of large intact components (e.g., large heat exchangers and other oversized components) will be by a combination of truck, rail, and/or multi-wheeled transporter. Truck transport costs were estimated using published tariffs from Tri-State Motor Transit.<sup>[27]</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.

The mass of radioactive waste generated during the various decommissioning activities is reported by line-item in Appendices C, D and E, and summarized in Section 5. The Section 5 waste summaries are consistent with 10 CFR §61 classifications. Commercially available steel containers are 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 waste volumes are calculated on the exterior package dimensions for containerized material or a dimensional calculation for components serving as their own waste containers.

The more highly activated reactor components are transported in reusable, shielded truck casks with disposable liners. In calculating disposal costs, the burial fees are applied against the liner volume, with surcharges added for the special handling requirements and the radiological characteristics of the payload. Packaging efficiencies are lower for the highly activated materials (greater than Type A quantity waste), where high concentrations of gamma-emitting radionuclides limit the capacity of the shipping canisters.

Disposal fees are calculated using current disposal agreements, with surcharges added for the highly activated components, for example, generated in the segmentation of the reactor vessel. The cost to dispose of the majority of the material generated from the decontamination and dismantling activities (> 98%) is based upon Exelon's current disposal agreement with EnergySolutions for its facility in Clive, Utah.

Since the EnergySolutions facility is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the reactor vessel and segmentation of the components closest to the core, the cost of disposal of this material (< 2% of the total volume) at a yet-to-be determined facility were based upon Exelon's rates for the Barnwell facility.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising approximately 0.2% of the total waste volume) is generally not suitable for shallow-land disposal. This material is packaged in the same multipurpose canisters used for spent fuel storage/transport and designated for geologic disposal.

### 3.4.7 Site Conditions Following Decommissioning

The NRC will terminate (or amend) the site license 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 will end at this point. Building codes and environmental regulations will dictate the next step in the decommissioning process, as well as the owner's own future plans for the site.

Non-essential structures or buildings severely damaged in decontamination process are removed to a nominal depth of three feet below grade. Concrete rubble generated from demolition activities is processed and made available as clean fill. The excavations will be regraded such that the power block area will have a final contour consistent with adjacent surroundings.

The estimates do not assume the remediation of any significant volume of contaminated soil. This assumption may be affected by continued plant operations and/or future regulatory actions, such as the development of site-specific release criteria.

## 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

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

The craft labor required to decontaminate and dismantle the nuclear units will be 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 AmerGen or from comparable industry information.

AmerGen will hire a Decommissioning Operations Contractor (DOC) to manage the decommissioning. The owner 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 AmerGen.

### 3.5.3 Design Conditions

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 NSSS components to be shipped under current transportation regulations and disposal requirements.

The curie contents of the vessel and internals at final shutdown are derived from those listed in NUREG/CR-3474.<sup>[28]</sup> Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Clinton components, projected operating life, and different periods of decay. Additional short-lived isotopes were derived from CR-0130<sup>[29]</sup> and CR-0672,<sup>[30]</sup> and benchmarked to the long-lived values from CR-3474.

The disposal cost for the control blades removed from the vessel with the final core load is included within the estimates. Control blade residence time in the reactor is assumed to be controlled such that the blades do not become GTCC material. Disposition of any blades stored in the pool from operations is considered an operating expense and therefore not accounted for in the estimates.

Activation of the reactor building structures is confined to the sacrificial shield. More extensive activation (at very low levels) of the interior structures within containment has been detected at several reactors and their 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 from the reactor buildings will depend upon the site release criteria selected, as well as the designated end use for the site.

#### 3.5.4 General

##### Transition Activities

Existing warehouses will be cleared of non-essential material and remain for use by Exelon and its subcontractors. The plant'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.
- Processes operating waste inventories, i.e., the estimates do not address the disposition of any legacy wastes; the disposal of operating wastes during this initial period is not considered a decommissioning expense.

##### Scrap and Salvage

The existing plant equipment is considered obsolete and suitable for scrap as deadweight quantities only. Exelon will make economically reasonable efforts to salvage equipment following final plant shutdown. However, dismantling techniques assumed by TLG for equipment in this analysis are not consistent with removal techniques required for salvage (resale) of equipment. Experience has indicated that some buyers wanted equipment stripped down to very specific requirements before they would consider purchase. This required expensive rework after the equipment had been removed from its installed location. Since placing a salvage value on this machinery and equipment would be speculative, and the value would be small in comparison to the overall decommissioning expenses, this analysis

does not attempt to quantify the possible salvage value that an owner may realize based upon those efforts.

It is assumed, for purposes of this analysis, 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 do not include the additional cost for size reduction and preparation to meet “furnace ready” conditions. For example, the recovery of copper from electrical cabling may require the removal and disposition of any 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 is 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 property will be removed at no cost or credit to the decommissioning project. Disposition may include relocation to other facilities. Spare parts will also be made available for alternative use.

### 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 for the cost of energy consumption during decommissioning for tooling, lighting, ventilation, and essential services.

### 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 and the limits for coverage defined in the NRC’s proposed rulemaking “Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors.”<sup>[31]</sup> NRC’s financial protection requirements are based on various reactor (and spent fuel) configurations.

### Taxes

Property taxes are included for all decommissioning periods. Exelon provided a schedule of decreasing tax payments against the current tax assessment. These reductions continue until reaching a minimum property tax payment of \$1 million per year; this level is maintained for the balance of the decommissioning program.

### Site Modifications

The perimeter fence and in-plant security barriers will be moved, as appropriate, to conform to the Site Security Plan in force during the various stages of the project.

## **3.6 COST ESTIMATE SUMMARY**

A schedule of expenditures for each scenario is provided in Tables 3.1 through 3.3. Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in thousands of 2007 dollars. Costs are not inflated, escalated, or discounted over the period of expenditure. The annual expenditures are based upon the detailed activity costs reported in Appendices C through E, along with the schedules discussed in Section 4.

**TABLE 3.1  
SCHEDULE OF ANNUAL EXPENDITURES  
DECON**  
(thousands, 2007 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	15,748	9,144	285	12	2,681	27,870
2047	58,639	31,625	1,394	1,782	15,380	108,820
2048	59,993	24,661	1,339	22,385	13,296	121,675
2049	62,537	25,927	1,053	27,317	7,977	124,811
2050	58,334	16,463	837	7,290	5,167	88,091
2051	58,215	16,196	831	6,726	5,088	87,056
2052	41,364	7,751	538	5,599	4,253	59,505
2053	34,407	5,315	222	471	2,693	43,107
2054	25,128	12,462	111	0	2,458	40,159
2055	25,128	12,462	111	0	2,458	40,159
2056	6,297	3,330	11	0	2,301	11,938
2057	4,286	2,355	0	0	2,277	8,918
2058	4,248	2,663	0	2	11,618	18,532
2059	1,387	1,957	0	265	1,810	5,420
	455,713	172,312	6,731	71,849	79,457	786,061

**TABLE 3.2  
SCHEDULE OF ANNUAL EXPENDITURES  
DELAYED DECON**  
(thousands, 2007 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	10,580	253	285	12	2,657	13,787
2047	49,525	5,943	1,108	285	20,648	77,509
2048	18,586	1,634	438	138	4,853	25,649
2049	11,144	947	222	32	3,437	15,781
2050	11,144	947	222	32	3,437	15,781
2051	11,144	947	222	32	3,437	15,781
2052	11,175	951	222	32	3,447	15,826
2053	11,144	947	222	32	3,437	15,781
2054	11,144	947	222	32	3,437	15,781
2055	11,144	947	222	32	3,437	15,781
2056	11,750	2,676	222	32	3,447	18,126
2057	12,006	3,534	222	32	3,437	19,231
2058	12,068	3,534	224	32	3,434	19,292
2059	34,131	1,352	1,108	43	2,180	38,814
2060	47,182	11,702	1,083	13,187	7,470	80,624
2061	54,705	16,222	1,021	23,181	11,423	106,552
2062	58,212	10,055	831	11,704	4,523	85,326
2063	44,405	6,459	485	5,087	3,024	59,460
2064	24,256	10,878	131	6	1,172	36,444
2065	22,101	12,390	111	0	1,015	35,616
2066	9,749	5,465	49	0	448	15,710
	487,291	98,728	8,871	53,960	93,799	742,651

**TABLE 3.3  
SCHEDULE OF ANNUAL EXPENDITURES  
SAFSTOR**  
(thousands, 2007 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	13,507	9,036	285	12	2,681	25,521
2047	58,847	33,644	1,108	285	20,742	114,626
2048	21,722	11,041	438	138	5,158	38,498
2049	14,164	10,009	222	32	3,809	28,236
2050	14,164	10,009	222	32	3,809	28,236
2051	14,164	10,009	222	32	3,809	28,236
2052	7,165	2,634	138	30	2,805	12,772
2053	4,923	289	111	30	2,477	7,830
2054	4,923	289	111	30	2,477	7,830
2055	4,923	289	111	30	2,477	7,830
2056	5,513	2,018	111	30	2,484	10,156
2057	5,786	2,877	111	30	2,477	11,280
2058	5,779	2,874	111	30	2,476	11,270
2059	2,769	284	111	29	2,150	5,343
2060	2,776	284	111	29	2,156	5,357
2061	2,769	284	111	29	2,150	5,343
2062	2,769	284	111	29	2,150	5,343
2063	2,769	284	111	29	2,150	5,343
2064	2,776	284	111	29	2,156	5,357
2065	2,769	284	111	29	2,150	5,343
2066	2,769	284	111	29	2,150	5,343
2067	2,769	284	111	29	2,150	5,343
2068	2,776	284	111	29	2,156	5,357
2069	2,769	284	111	29	2,150	5,343
2070	2,769	284	111	29	2,150	5,343
2071	2,769	284	111	29	2,150	5,343
2072	2,776	284	111	29	2,156	5,357
2073	2,769	284	111	29	2,150	5,343
2074	2,769	284	111	29	2,150	5,343
2075	2,769	284	111	29	2,150	5,343
2076	2,776	284	111	29	2,156	5,357
2077	2,769	284	111	29	2,150	5,343
2078	2,769	284	111	29	2,150	5,343
2079	2,769	284	111	29	2,150	5,343
2080	2,776	284	111	29	2,156	5,357
2081	2,769	284	111	29	2,150	5,343

**TABLE 3.3 (continued)**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR**  
(thousands, 2007 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2082	2,769	284	111	29	2,150	5,343
2083	2,769	284	111	29	2,150	5,343
2084	2,776	284	111	29	2,156	5,357
2085	2,769	284	111	29	2,150	5,343
2086	2,769	284	111	29	2,150	5,343
2087	2,769	284	111	29	2,150	5,343
2088	2,776	284	111	29	2,156	5,357
2089	2,769	284	111	29	2,150	5,343
2090	2,769	284	111	29	2,150	5,343
2091	2,769	284	111	29	2,150	5,343
2092	2,776	284	111	29	2,156	5,357
2093	2,769	284	111	29	2,150	5,343
2094	2,769	284	111	29	2,150	5,343
2095	2,769	284	111	29	2,150	5,343
2096	2,776	284	111	29	2,156	5,357
2097	2,769	284	111	29	2,150	5,343
2098	2,769	284	111	29	2,150	5,343
2099	2,769	284	111	29	2,150	5,343
2100	2,769	284	111	29	2,150	5,343
2101	13,847	657	463	33	2,161	17,161
2102	36,161	2,998	1,108	408	2,213	42,889
2103	52,705	16,052	1,061	20,938	10,972	101,728
2104	56,866	13,107	928	16,886	8,202	95,989
2105	58,036	9,564	831	11,235	4,983	84,649
2106	30,886	6,057	193	27	1,665	38,827
2107	22,170	12,909	111	0	1,036	36,226
2108	22,231	12,945	111	0	1,039	36,325
2109	182	106	1	0	9	298
	585,032	181,336	12,765	51,486	180,333	1,010,952



## **4. SCHEDULE ESTIMATE**

The schedules for the decommissioning scenarios considered in this study follow the sequence presented in the AIF/NESP-036 study, with minor changes to reflect recent experience and site-specific constraints. In addition, the scheduling has been revised to reflect the spent fuel management plans described in Section 3.4.1.

A schedule or sequence of activities is presented in Figure 4.1 for the DECON decommissioning alternative. The schedule is also representative of the work activities identified in the delayed dismantling scenarios, absent any spent fuel constraints. The scheduling sequence assumes that fuel is removed from the spent fuel pool within the first 5½ years after operations cease. The key activities listed in the schedule do not reflect a one-to-one correspondence with those activities in the cost tables, but reflect dividing some activities for clarity and combining others for convenience. The schedule was prepared using the "Microsoft Project 2003" computer software.<sup>[32]</sup>

### **4.1 SCHEDULE ESTIMATE ASSUMPTIONS**

The schedule reflects the results of a precedence network developed for the site decommissioning activities, i.e., a PERT (Program Evaluation and Review Technique) Software Package. The work activity durations used in the precedence network reflect the actual man-hour estimates from the cost tables, adjusted by stretching certain activities over their slack range and shifting the start and end dates of others. The following assumptions were made in the development of the DECON decommissioning schedule:

- The fuel building is isolated until such time that all spent fuel has been discharged from the spent fuel pool to the DOE or to the ISFSI. Decontamination and dismantling of the storage pool are initiated once the transfer of spent fuel to the ISFSI is complete.
- All work (except vessel and internals removal) is 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 are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.
- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal

and laydown space, and with the stringent safety measures necessary during demolition of heavy components and structures.

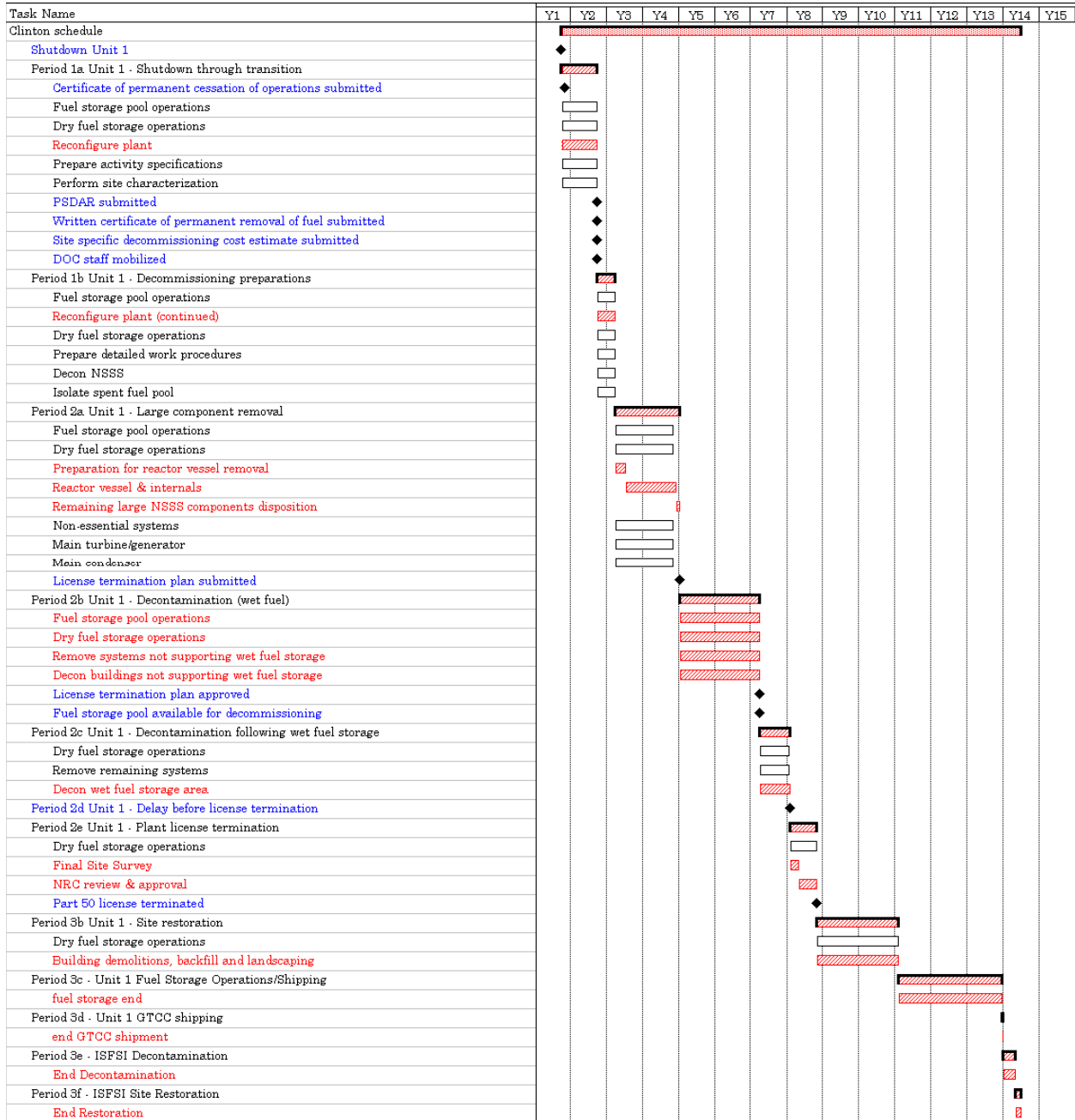
- For plant systems removal, the systems with the longest removal durations in areas on the critical path are considered to determine the duration of the activity.

## **4.2 PROJECT SCHEDULE**

The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the schedule for decommissioning Clinton. Durations are established between several milestones in each project period; these durations are used to establish a critical path for the entire project. In turn, the critical path duration for each period is 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 fuel building for final decontamination.

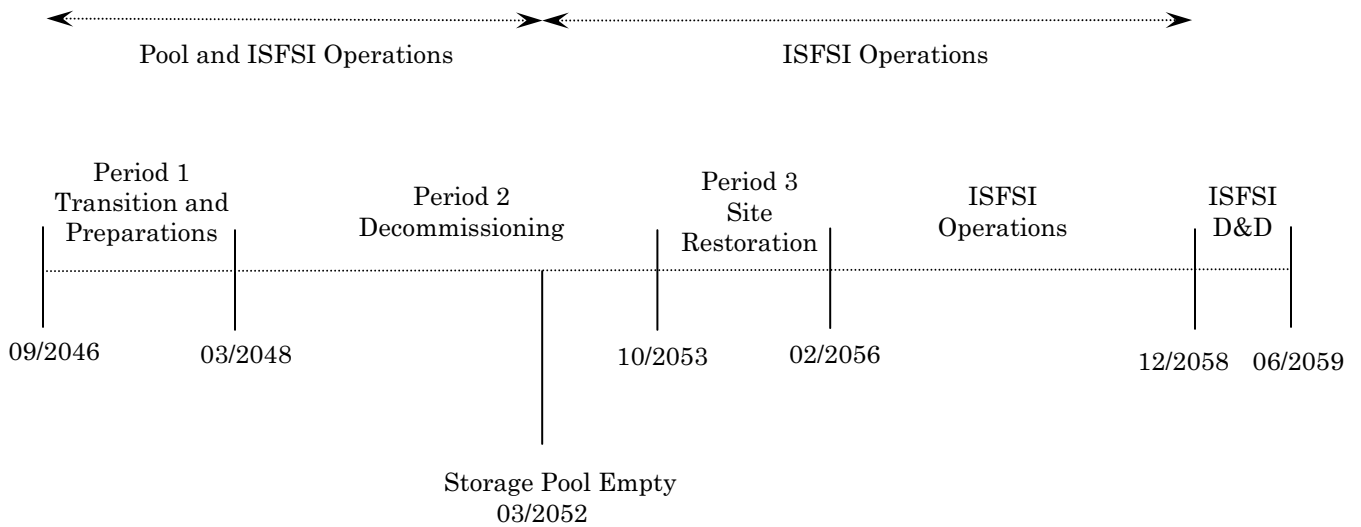
In Figure 4.1, the schedule is based upon years following the final shutdown date of September 29, 2046. Project timelines are provided in Figures 4.2 through 4.4; the milestone dates are based on this same shutdown date. The start of decommissioning activities in the Delayed Decommissioning scenario is concurrent with the end of the fuel transfer activity (i.e. to an off-site DOE facility).

**FIGURE 4.1  
ACTIVITY SCHEDULE**



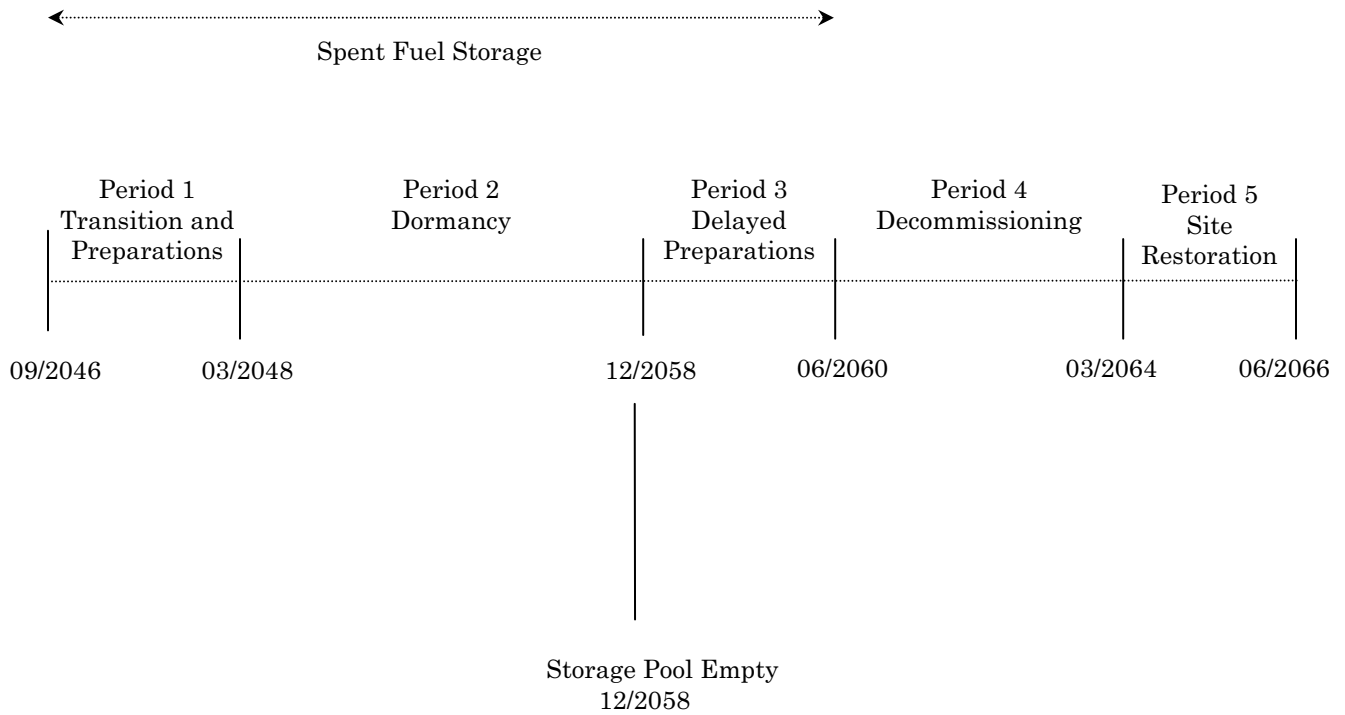
**FIGURE 4.2  
DECOMMISSIONING TIMELINE  
DECON  
(not to scale)**

(Shutdown September 29, 2046)



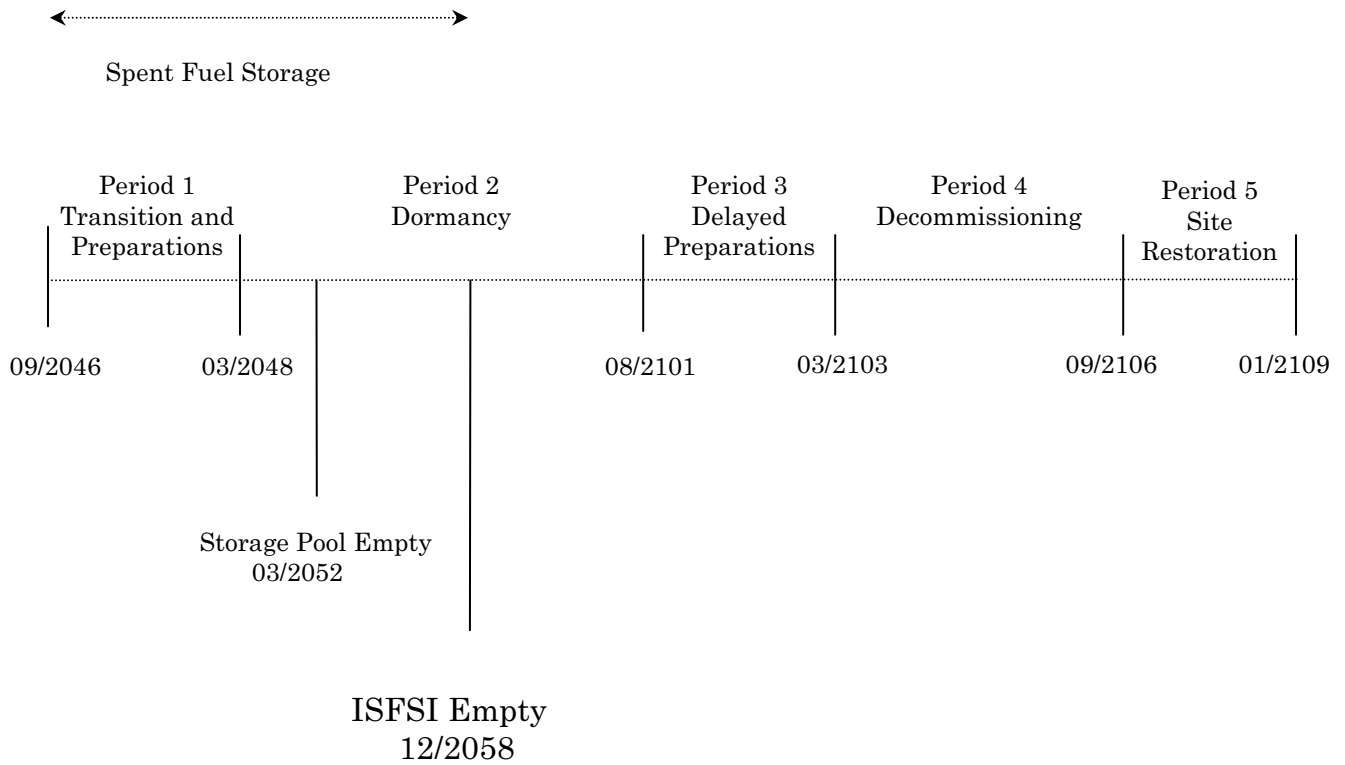
**FIGURE 4.3  
DECOMMISSIONING TIMELINE  
DELAYED DECON  
(not to scale)**

(Shutdown September 29, 2046)



**FIGURE 4.4  
DECOMMISSIONING TIMELINE  
SAFSTOR  
(not to scale)**

(Shutdown September 29, 2046)



## 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>[33]</sup> the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations delineates the production, utilization, and disposal of radioactive materials and processes. In particular, §71 defines radioactive material as it pertains to packaging and transportation and §61 specifies its disposition.

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 §173-178. Shipping containers are required to be Industrial Packages (IP-1, IP-2 or IP-3, as defined in subpart 173.411). 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 volumes of radioactive waste generated during the various decommissioning activities at the site is shown on a line-item basis in Appendices C, D, and E and summarized in Tables 5.1 through 5.3. The quantified waste volume summaries shown in these tables are consistent with §61 classifications. The volumes are calculated based on the exterior dimensions for containerized material and 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 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 Type A quantity 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 Clinton is primarily generated during Period 2 of the DECON alternative and Period 4 of the deferred alternatives. Material that is considered potentially contaminated when removed from the radiologically controlled area is sent to processing facilities in Tennessee for conditioning and disposal. Heavily contaminated components and activated materials are routed for controlled disposal. The disposal volumes reported in the tables reflect the savings resulting from reprocessing and recycling.

Disposal fees are calculated using current disposal agreements, with surcharges added for the highly activated components, for example, generated in the segmentation of the reactor vessel. The cost to dispose of the majority of the material generated from the decontamination and dismantling activities (> 98%) is based upon Exelon's current disposal agreement with EnergySolutions for its facility in Clive, Utah.

Since the EnergySolutions facility is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the reactor vessel and segmentation of the components closest to the core, the cost of disposal of this material (< 2% of the total volume) at a yet-to-be determined facility were based upon Exelon's rates for the Barnwell facility.



**TABLE 5.1  
DECOMMISSIONING WASTE SUMMARY  
DECON**

	Waste Class <sup>1</sup>	Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
EnergySolutions (Clive, Utah)			
Containerized	A	160,829	11,833,483
Bulk	A	33,347	3,363,716
Future Disposal Facility <sup>2</sup>			
	B	2,156	246,431
	C	689	43,240
Geologic Repository (Greater-than Class C)			
	>C	482	86,500
		<hr/>	<hr/>
Total <sup>3</sup>		197,503	15,573,370
Processed Waste (off-site)		505,717	21,170,880
Scrap Metal			150,712,000

<sup>1</sup> Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

<sup>2</sup> EnergySolutions is currently not able to receive Class B and C material

<sup>3</sup> Columns may not add due to rounding.

**TABLE 5.2  
DECOMMISSIONING WASTE SUMMARY  
DELAYED DECON**

	Waste Class <sup>1</sup>	Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
EnergySolutions (Clive, Utah)			
Containerized	A	160,392	11,621,662
Bulk	A	29,242	2,856,638
Future Disposal Facility <sup>2</sup>			
	B	1,502	157,200
	C	287	36,625
Geologic Repository (Greater-than Class C)			
	>C	482	86,500
		191,906	14,758,625
Total <sup>3</sup>			
Processed Waste (off-site)		505,717	21,170,880
Scrap Metal			150,712,000

<sup>1</sup> Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

<sup>2</sup> EnergySolutions is currently not able to receive Class B and C material

<sup>3</sup> Columns may not add due to rounding.

**TABLE 5.3  
DECOMMISSIONING WASTE SUMMARY  
SAFSTOR**

	Waste Class <sup>1</sup>	Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
EnergySolutions (Clive, Utah)			
Containerized	A	128,355	7,665,828
Bulk	A	23,784	2,407,445
Future Disposal Facility <sup>2</sup>			
	B	1,502	157,200
	C	287	36,625
Geologic Repository (Greater-than Class C)			
	>C	482	86,500
		154,411	10,353,598
Total <sup>3</sup>			
Processed Waste (off-site)		597,250	24,967,690
Scrap Metal			150,712,000

<sup>1</sup> Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

<sup>2</sup> EnergySolutions is currently not able to receive Class B and C material

<sup>3</sup> Columns may not add due to rounding.

## 6. RESULTS

The analysis to estimate the costs to decommission Clinton relied upon the site-specific, technical information developed for a previous analysis prepared in 2003-04. While not an engineering study, the estimates provide AmerGen with sufficient information to assess their financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report 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 decommissioning scenarios assume continued operation of the plant's spent fuel pool for a minimum of 5½ years following the cessation of operations for continued cooling of the assemblies. For the DECON and SAFSTOR scenarios, an ISFSI is constructed and used to safeguard the spent fuel, once sufficiently cooled, until such time that the DOE can complete the transfer of the assemblies to its repository. The spent fuel remains in the storage pool in the Delayed-DECON alternative.

The cost projected to promptly decommission (DECON) Clinton is estimated to be \$786.1 million. The majority of this cost (approximately 69.7%) is associated with the physical decontamination and dismantling of the nuclear unit so that the license can be terminated. Another 19.7% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 10.6% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 through 6.3, are either labor-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, as well as the duration of the program. It is assumed, for purposes of this analysis, that AmerGen will oversee the decommissioning program, using a DOC to manage the decommissioning labor force and the associated subcontractors. The size and composition of the management organization varies with the decommissioning phase and associated site activities. However, once the operating license is terminated, the staff is substantially reduced for the conventional demolition and restoration of the site, and the long-term care of the spent fuel (for the DECON alternative).

As described in this report, the spent fuel pool will remain operational for a minimum of 5½ years following the cessation of operations. The pool will be isolated

and an independent spent fuel island created. This will allow decommissioning operations to proceed in and around the pool areas. Over the 5½-year period, the spent fuel will be packaged into transportable steel canisters for loading into a DOE-provided transport cask (DECON and SAFSTOR alternatives). The canisters will be stored in concrete overpacks at the ISFSI until the DOE is able to receive them. Dry storage of the fuel under a separate license provides additional flexibility in the event the DOE is not able to meet the current timetable for completing the transfer of assemblies to an off-site facility and minimizes the associated caretaking expenses.

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 majority of the radioactive material is at EnergySolutions facility in Clive, Utah or some alternative facility. Highly activated components, requiring additional isolation from the environment, are packaged for geologic disposal. Disposal of these components is based upon a cost equivalent for spent fuel.

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 table for processing is all-inclusive, incorporating the ultimate disposition of the material.

Removal costs reflect the labor-intensive nature of the decommissioning process, as well as 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 can be more cost effective than deferral, due to the deterioration of the facilities (and therefore the working conditions) with time.

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

general expense, e.g., labor and fuel, of transporting material to the destinations identified in this report. For purposes of this analysis, material is primarily moved overland by truck.

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

License termination survey costs are 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, as well as for 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 either at a basic functional or regulatory level.

**TABLE 6.1  
SUMMARY OF DECOMMISSIONING COST ELEMENTS  
DECON**  
(thousands of 2007 dollars)

<b>Work Category</b>	<b>Cost</b>	<b>%</b>
Decontamination	20,716	2.6
Removal	158,458	20.2
Packaging	15,829	2.0
Transportation	10,548	1.3
Waste Disposal	55,662	7.1
Off-site Waste Processing	25,564	3.3
Program Management <sup>[1]</sup>	298,887	38.0
Spent Fuel Pool Isolation	10,503	1.3
Spent Fuel Management	124,876	15.9
Insurance and Regulatory Fees	10,669	1.4
Energy	6,731	0.9
Characterization and Licensing Surveys	15,676	2.0
Property Taxes	22,305	2.8
Miscellaneous Equipment	5,972	0.8
Site O&M	3,666	0.5
<b>Total <sup>[2]</sup></b>	<b>786,061</b>	<b>100.0</b>
NRC License Termination	547,591	69.7
Spent Fuel Management	155,245	19.7
Site Restoration	83,225	10.6

<sup>[1]</sup> Includes engineering and security

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

**TABLE 6.2**  
**SUMMARY OF DECOMMISSIONING COST ELEMENTS**  
**DELAYED DECON**  
(thousands of 2007 dollars)

<b>Work Category</b>	<b>Cost</b>	<b>%</b>
Decontamination	28,052	3.8
Removal	148,111	19.9
Packaging	12,819	1.7
Transportation	7,604	1.0
Waste Disposal	37,773	5.1
Off-site Waste Processing	25,564	3.4
Program Management <sup>[1]</sup>	353,365	47.6
Spent Fuel Pool Isolation	10,503	1.4
Spent Fuel Management	31,915	4.3
Insurance and Regulatory Fees	15,732	2.1
Energy	8,872	1.2
Characterization and Licensing Surveys	17,100	2.3
Property Taxes	29,948	4.0
Miscellaneous Equipment	9,630	1.3
Site O&M	5,663	0.8
<b>Total <sup>[2]</sup></b>	<b>742,651</b>	<b>100.0</b>
NRC License Termination	476,232	64.1
Spent Fuel Management	181,048	24.4
Site Restoration	85,372	11.5

<sup>[1]</sup> Includes engineering and security

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



**TABLE 6.3**  
**SUMMARY OF DECOMMISSIONING COST ELEMENTS**  
**SAFSTOR**  
(thousands of 2007 dollars)

<b>Work Category</b>	<b>Cost</b>	<b>%</b>
Decontamination	27,039	2.7
Removal	152,473	15.1
Packaging	12,025	1.2
Transportation	6,251	0.6
Waste Disposal	30,714	3.0
Off-site Waste Processing	30,148	3.0
Program Management <sup>[1]</sup>	424,198	42.0
Spent Fuel Pool Isolation	10,503	1.0
Spent Fuel Management	123,640	12.2
Insurance and Regulatory Fees	46,990	4.6
Energy	12,765	1.3
Characterization and Licensing Surveys	17,100	1.7
Property Taxes	76,770	7.6
Miscellaneous Equipment	22,433	2.2
Site O&M	17,901	1.8
<b>Total <sup>[2]</sup></b>	<b>1,010,952</b>	<b>100.0</b>
NRC License Termination	691,981	68.4
Spent Fuel Management	233,606	23.1
Site Restoration	85,365	8.4

<sup>[1]</sup> Includes engineering and security

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

## **7. REFERENCES**

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**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 (minutes)	Critical Duration (minutes)*
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, send to 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) 95

Adjusted work duration 478

+ Protective clothing adjustment (30% of adjusted duration) 143

Productive work duration 621

+ Work break adjustment (8.33 % of productive duration) 52

Total work duration (minutes) 673

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

\* Alpha designators indicate activities that can be performed in parallel

**APPENDIX A  
(Continued)**

**3. LABOR REQUIRED**

Crew	Number	Duration (Hours)	Rate (\$/hr)	Cost
Laborers	3.00	11.217	40.37	1358.49
Craftsmen	2.00	11.217	50.71	1137.63
Foreman	1.00	11.217	52.52	589.12
General Foreman	0.25	11.217	55.22	154.85
Fire Watch	0.05	11.217	40.37	22.64
Health Physics Technician	1.00	11.217	46.32	519.57
Total labor cost				<u>\$3,782.30</u>

**4. EQUIPMENT & CONSUMABLES COSTS**

Equipment Costs	none
Consumables/Materials Costs	
<ul style="list-style-type: none"> <li>• Blotting paper 50 @ \$0.46/sq ft {1}</li> <li>• Plastic sheets/bags 50 @ \$0.14/sq ft {2}</li> <li>• Gas torch consumables 1 @ \$7.60 x 1 /hr {3}</li> </ul>	<ul style="list-style-type: none"> <li>\$23.50</li> <li>\$7.00</li> <li>\$7.60</li> </ul>
Subtotal cost of equipment and materials	<u>\$37.60</u>
Overhead & profit on equipment and materials @ 16.25 %	<u>\$6.11</u>
Total costs, equipment & material	\$43.71

**TOTAL COST:**

Removal of contaminated heat exchanger <3000 pounds:	\$3,826.01
Total labor cost:	\$3,782.30
Total equipment/material costs:	\$43.71
Total craft labor man-hours required per unit:	81.88

## **5. NOTES AND REFERENCES**

- Work difficulty factors were developed in conjunction with the Atomic Industrial Forum's (now NEI) 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. [www.mcmaster.com](http://www.mcmaster.com) online catalog - Spill Control (7193T88)
  2. R.S. Means (2007) 01 56 13.60-0200, page 20
  3. R.S. Means (2007) 01 54 33.40-6360, page 608
- Material and consumable costs were adjusted using the regional indices for Bloomington, Illinois.



**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	0.44
Removal of clean pipe 0.25 to 2 inches diameter, \$/linear foot	4.67
Removal of clean pipe >2 to 4 inches diameter, \$/linear foot	6.62
Removal of clean pipe >4 to 8 inches diameter, \$/linear foot	12.84
Removal of clean pipe >8 to 14 inches diameter, \$/linear foot	24.91
Removal of clean pipe >14 to 20 inches diameter, \$/linear foot	32.31
Removal of clean pipe >20 to 36 inches diameter, \$/linear foot	47.55
Removal of clean pipe >36 inches diameter, \$/linear foot	56.54
Removal of clean valve >2 to 4 inches	84.97
Removal of clean valve >4 to 8 inches	128.39
Removal of clean valve >8 to 14 inches	249.12
Removal of clean valve >14 to 20 inches	323.06
Removal of clean valve >20 to 36 inches	475.52
Removal of clean valve >36 inches	565.36
Removal of clean pipe hanger for small bore piping	27.74
Removal of clean pipe hanger for large bore piping	102.07
Removal of clean pump, <300 pound	214.82
Removal of clean pump, 300-1000 pound	596.40
Removal of clean pump, 1000-10,000 pound	2,370.45
Removal of clean pump, >10,000 pound	4,578.23
Removal of clean pump motor, 300-1000 pound	251.29
Removal of clean pump motor, 1000-10,000 pound	987.83
Removal of clean pump motor, >10,000 pound	2,222.62
Removal of clean heat exchanger <3000 pound	1,269.19
Removal of clean heat exchanger >3000 pound	3,186.37
Removal of clean feedwater heater/deaerator	9,008.39
Removal of clean moisture separator/reheater	18,554.33
Removal of clean tank, <300 gallons	276.53
Removal of clean tank, 300-3000 gallon	875.31
Removal of clean tank, >3000 gallons, \$/square foot surface area	7.29

**APPENDIX B**

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

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of clean electrical equipment, <300 pound	118.03
Removal of clean electrical equipment, 300-1000 pound	409.11
Removal of clean electrical equipment, 1000-10,000 pound	818.23
Removal of clean electrical equipment, >10,000 pound	1,938.19
Removal of clean electrical transformer < 30 tons	1,346.04
Removal of clean electrical transformer > 30 tons	3,876.36
Removal of clean standby diesel generator, <100 kW	1,374.86
Removal of clean standby diesel generator, 100 kW to 1 MW	3,068.79
Removal of clean standby diesel generator, >1 MW	6,353.02
Removal of clean electrical cable tray, \$/linear foot	10.98
Removal of clean electrical conduit, \$/linear foot	4.79
Removal of clean mechanical equipment, <300 pound	118.03
Removal of clean mechanical equipment, 300-1000 pound	409.11
Removal of clean mechanical equipment, 1000-10,000 pound	818.23
Removal of clean mechanical equipment, >10,000 pound	1,938.19
Removal of clean HVAC equipment, <300 pound	118.03
Removal of clean HVAC equipment, 300-1000 pound	409.11
Removal of clean HVAC equipment, 1000-10,000 pound	818.23
Removal of clean HVAC equipment, >10,000 pound	1,938.19
Removal of clean HVAC ductwork, \$/pound	0.46
Removal of contaminated instrument and sampling tubing, \$/linear foot	1.38
Removal of contaminated pipe 0.25 to 2 inches diameter, \$/linear foot	18.22
Removal of contaminated pipe >2 to 4 inches diameter, \$/linear foot	31.81
Removal of contaminated pipe >4 to 8 inches diameter, \$/linear foot	50.44
Removal of contaminated pipe >8 to 14 inches diameter, \$/linear foot	99.94
Removal of contaminated pipe >14 to 20 inches diameter, \$/linear foot	120.35
Removal of contaminated pipe >20 to 36 inches diameter, \$/linear foot	167.29
Removal of contaminated pipe >36 inches diameter, \$/linear foot	198.10
Removal of contaminated valve >2 to 4 inches	389.16
Removal of contaminated valve >4 to 8 inches	468.84

**APPENDIX B**

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

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of contaminated valve >8 to 14 inches	964.54
Removal of contaminated valve >14 to 20 inches	1,227.69
Removal of contaminated valve >20 to 36 inches	1,638.04
Removal of contaminated valve >36 inches	1,946.10
Removal of contaminated pipe hanger for small bore piping	95.16
Removal of contaminated pipe hanger for large bore piping	314.68
Removal of contaminated pump, <300 pound	833.51
Removal of contaminated pump, 300-1000 pound	1,925.74
Removal of contaminated pump, 1000-10,000 pound	6,317.24
Removal of contaminated pump, >10,000 pound	15,387.15
Removal of contaminated pump motor, 300-1000 pound	810.97
Removal of contaminated pump motor, 1000-10,000 pound	2,563.34
Removal of contaminated pump motor, >10,000 pound	5,754.95
Removal of contaminated heat exchanger <3000 pound	3,826.01
Removal of contaminated heat exchanger >3000 pound	11,057.37
Removal of contaminated feedwater heater/deaerator	27,067.28
Removal of contaminated moisture separator/reheater	59,257.58
Removal of contaminated tank, <300 gallons	1,383.82
Removal of contaminated tank, >300 gallons, \$/square foot	27.17
Removal of contaminated electrical equipment, <300 pound	651.00
Removal of contaminated electrical equipment, 300-1000 pound	1,568.59
Removal of contaminated electrical equipment, 1000-10,000 pound	3,019.73
Removal of contaminated electrical equipment, >10,000 pound	5,879.30
Removal of contaminated electrical cable tray, \$/linear foot	31.40
Removal of contaminated electrical conduit, \$/linear foot	14.37
Removal of contaminated mechanical equipment, <300 pound	724.84
Removal of contaminated mechanical equipment, 300-1000 pound	1,734.48
Removal of contaminated mechanical equipment, 1000-10,000 pound	3,333.70
Removal of contaminated mechanical equipment, >10,000 pound	5,879.30
Removal of contaminated HVAC equipment, <300 pound	724.84

**APPENDIX B**

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

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Removal of contaminated HVAC equipment, 300-1000 pound	1,734.48
Removal of contaminated HVAC equipment, 1000-10,000 pound	3,333.70
Removal of contaminated HVAC equipment, >10,000 pound	5,879.30
Removal of contaminated HVAC ductwork, \$/pound	1.90
Removal/plasma arc cut of contaminated thin metal components, \$/linear in.	3.45
Additional decontamination of surface by washing, \$/square foot	7.11
Additional decontamination of surfaces by hydrolasing, \$/square foot	30.74
Decontamination rig hook up and flush, \$/ 250 foot length	6,155.66
Chemical flush of components/systems, \$/gallon	12.74
Removal of clean standard reinforced concrete, \$/cubic yard	115.91
Removal of grade slab concrete, \$/cubic yard	157.76
Removal of clean concrete floors, \$/cubic yard	308.75
Removal of sections of clean concrete floors, \$/cubic yard	914.22
Removal of clean heavily rein concrete w/#9 rebar, \$/cubic yard	206.24
Removal of contaminated heavily rein concrete w/#9 rebar, \$/cubic yard	1,835.23
Removal of clean heavily rein concrete w/#18 rebar, \$/cubic yard	260.73
Removal of contaminated heavily rein concrete w/#18 rebar, \$/cubic yard	2,429.54
Removal heavily rein concrete w/#18 rebar & steel embedments, \$/cubic yard	395.41
Removal of below-grade suspended floors, \$/cubic yard	308.75
Removal of clean monolithic concrete structures, \$/cubic yard	777.20
Removal of contaminated monolithic concrete structures, \$/cubic yard	1,834.53
Removal of clean foundation concrete, \$/cubic yard	609.46
Removal of contaminated foundation concrete, \$/cubic yard	1,708.95
Explosive demolition of bulk concrete, \$/cubic yard	26.33
Removal of clean hollow masonry block wall, \$/cubic yard	86.49
Removal of contaminated hollow masonry block wall, \$/cubic yard	291.29
Removal of clean solid masonry block wall, \$/cubic yard	86.49
Removal of contaminated solid masonry block wall, \$/cubic yard	291.29
Backfill of below-grade voids, \$/cubic yard	17.17
Removal of subterranean tunnels/voids, \$/linear foot	97.18

**APPENDIX B**

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

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Placement of concrete for below-grade voids, \$/cubic yard	126.19
Excavation of clean material, \$/cubic yard	2.34
Excavation of contaminated material, \$/cubic yard	34.53
Removal of clean concrete rubble (tipping fee included), \$/cubic yard	176.67
Removal of contaminated concrete rubble, \$/cubic yard	22.28
Removal of building by volume, \$/cubic foot	0.26
Removal of clean building metal siding, \$/square foot	1.02
Removal of contaminated building metal siding, \$/square foot	3.62
Removal of standard asphalt roofing, \$/square foot	2.05
Removal of transite panels, \$/square foot	2.06
Scarifying contaminated concrete surfaces (drill & spall), \$/square foot	12.18
Scabbling contaminated concrete floors, \$/square foot	7.14
Scabbling contaminated concrete walls, \$/square foot	18.59
Scabbling contaminated ceilings, \$/square foot	63.56
Scabbling structural steel, \$/square foot	5.98
Removal of clean overhead crane/monorail < 10 ton capacity	568.59
Removal of contaminated overhead crane/monorail < 10 ton capacity	1,615.30
Removal of clean overhead crane/monorail >10-50 ton capacity	1,364.64
Removal of contaminated overhead crane/monorail >10-50 ton capacity	3,876.03
Removal of polar crane > 50 ton capacity	5,681.55
Removal of gantry crane > 50 ton capacity	24,227.29
Removal of structural steel, \$/pound	0.19
Removal of clean steel floor grating, \$/square foot	3.95
Removal of contaminated steel floor grating, \$/square foot	11.57
Removal of clean free standing steel liner, \$/square foot	10.93
Removal of contaminated free standing steel liner, \$/square foot	31.81
Removal of clean concrete-anchored steel liner, \$/square foot	5.47
Removal of contaminated concrete-anchored steel liner, \$/square foot	37.06
Placement of scaffolding in clean areas, \$/square foot	13.71
Placement of scaffolding in contaminated areas, \$/square foot	23.31

**APPENDIX B**

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

<b>Unit Cost Factor</b>	<b>Cost/Unit</b>
Landscaping with topsoil, \$/acre	17,857.85
Cost of CPC B-88 LSA box & preparation for use	1,576.14
Cost of CPC B-25 LSA box & preparation for use	1,412.58
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,208.16
Cost of CPC B-144 LSA box & preparation for use	6,188.48
Cost of LSA drum & preparation for use	131.05
Cost of cask liner for CNSI 14 195 cask	158.68
Cost of cask liner for CNSI 8 120A cask (resins)	6,290.96
Cost of cask liner for CNSI 8 120A cask (filters)	1,025.30
Decontamination of surfaces with vacuuming, \$/square foot	0.62

**APPENDIX C**  
**DETAILED COST ANALYSIS**  
**DECON**



Table C  
Clinton Power Station  
DECON Decommissioning Cost Estimate  
(Thousands of 2007 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				
<b>PERIOD Ia - Shutdown through Transition</b>																					
Period Ia Direct Decommissioning Activities																					
Ia.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,300
Ia.1.2	Notification of Cessation of Operations	-	-	-	-	-	-	n/a	a	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.3	Remove fuel & source material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.4	Notification of Permanent Defueling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.5	Deactivate plant systems & process waste	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
Ia.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	4,600
Ia.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.8	Perform detailed rad survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ia.1.9	Estimate by-product inventory	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
Ia.1.10	End product description	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
Ia.1.11	Detailed by-product inventory	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,300
Ia.1.12	Define major work sequence	-	-	-	-	-	-	680	102	782	782	-	-	-	-	-	-	-	-	-	7,500
Ia.1.13	Perform SER and EA	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	-	3,100
Ia.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	454	68	522	522	-	-	-	-	-	-	-	-	-	5,000
Ia.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	372	56	427	427	-	-	-	-	-	-	-	-	-	4,096
Ia.1.16	Receive NRC approval of termination plan	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																					
Ia.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	446	67	513	462	-	51	-	-	-	-	-	-	-	4,920
Ia.1.17.2	Plant systems	-	-	-	-	-	-	378	57	435	391	-	43	-	-	-	-	-	-	-	4,167
Ia.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	500
Ia.1.17.4	Reactor internals	-	-	-	-	-	-	644	97	741	741	-	-	-	-	-	-	-	-	-	7,100
Ia.1.17.5	Reactor vessel	-	-	-	-	-	-	590	88	678	678	-	-	-	-	-	-	-	-	-	6,500
Ia.1.17.6	Sterilized shield	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	500
Ia.1.17.7	Moisture separator/reheaters	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
Ia.1.17.8	Reinforced concrete	-	-	-	-	-	-	145	22	167	83	-	83	-	-	-	-	-	-	-	1,600
Ia.1.17.9	Main Turbine	-	-	-	-	-	-	189	28	218	218	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17.10	Main Condensers	-	-	-	-	-	-	189	28	218	218	-	-	-	-	-	-	-	-	-	2,088
Ia.1.17.11	Pressure suppression structure	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
Ia.1.17.12	Drywell	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	1,600
Ia.1.17.13	Plant structures & buildings	-	-	-	-	-	-	283	42	325	163	-	163	-	-	-	-	-	-	-	3,120
Ia.1.17.14	Waste management	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	4,600
Ia.1.17.15	Facility & site closure	-	-	-	-	-	-	82	12	94	47	-	47	-	-	-	-	-	-	-	900
Ia.1.17	Total	-	-	-	-	-	-	3,871	551	4,422	4,064	-	388	-	-	-	-	-	-	-	42,663
Planning & Site Preparations																					
Ia.1.18	Prepare dismantling sequence	-	-	-	-	-	-	218	33	250	250	-	-	-	-	-	-	-	-	-	2,400
Ia.1.19	Plant prep. & temp. specs	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
Ia.1.20	Design water clean-up system	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,400
Ia.1.21	Rigging/Cont. Chtrl Envirps/fooding/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
Ia.1.22	Procure caskeyners & containers	-	-	-	-	-	-	112	17	128	128	-	-	-	-	-	-	-	-	-	1,200
Ia.1	Subtotal Period Ia Activity Costs	-	-	-	-	-	-	11,597	1,740	13,336	12,948	-	388	-	-	-	-	-	-	-	75,609
Period Ia Collateral Costs																					
Ia.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	39,540	5,931	45,471	-	45,471	-	-	-	-	-	-	-	-	-
Ia.3	Subtotal Period Ia Collateral Costs	-	-	-	-	-	-	39,540	5,931	45,471	-	45,471	-	-	-	-	-	-	-	-	-

Table C  
Clinton Power Station  
DECON Decommissioning Cost Estimate  
(Thousands of 2007 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		Burial Volumes		Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
														Cu. Feet	Cu. Feet	Class A Cu. Feet	Class B Cu. Feet			
Period Ia Period-Dependent Costs																				
Ia.4.1	Insurance	-	-	-	-	-	-	1,320	132	1,452	1,452	-	-	-	-	-	-	-	-	-
Ia.4.2	Property taxes	-	-	-	-	-	-	6,312	631	6,943	6,943	-	-	-	-	-	-	-	-	-
Ia.4.3	Health physics supplies	377	-	-	-	-	-	-	94	471	471	-	-	-	-	-	-	-	-	-
Ia.4.4	Heavy equipment rental	349	-	-	-	-	-	-	52	401	401	-	-	-	-	-	-	-	-	-
Ia.4.5	Disposal of DAW generated	-	-	14	6	-	38	-	12	70	70	-	-	-	-	-	-	13,531	21	-
Ia.4.6	Plant energy budget	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-
Ia.4.7	NRC Fees	-	-	-	-	-	-	258	26	284	284	-	-	-	-	-	-	-	-	-
Ia.4.8	Emergency Planning Fees	-	-	-	-	-	-	450	45	495	495	-	-	-	-	-	-	-	-	-
Ia.4.9	Site O&M Cost	-	-	-	-	-	-	250	37	287	287	-	-	-	-	-	-	-	-	-
Ia.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	738	111	849	849	-	-	-	-	-	-	-	-	-
Ia.4.11	ISFSI Operating Costs	-	-	-	-	-	-	82	12	94	94	-	-	-	-	-	-	-	-	-
Ia.4.12	Security Staff Cost	-	-	-	-	-	-	5,955	893	6,848	6,848	-	-	-	-	-	-	-	-	-
Ia.4.13	Utility Staff Cost	-	-	-	-	-	-	26,183	3,927	30,110	30,110	-	-	-	-	-	-	-	-	-
Ia.4	Subtotal Period Ia Period-Dependent Costs	-	726	14	6	-	38	42,511	6,118	49,413	47,975	-	-	-	675	-	-	13,531	21	580,871
Ia.0	TOTAL PERIOD Ia COST	-	726	14	6	-	38	93,648	13,789	108,220	60,924	-	388	-	675	-	-	13,531	21	659,480
PERIOD Ib - Decommissioning Preparations																				
Period Ib Direct Decommissioning Activities																				
Detailed Work Procedures																				
Ib.1.1.1	Plant systems	-	-	-	-	-	-	429	64	494	444	-	-	-	-	-	-	-	-	-
Ib.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-
Ib.1.1.3	Reactor internals	-	-	-	-	-	-	363	54	417	417	-	-	-	-	-	-	-	-	-
Ib.1.1.4	Remaining buildings	-	-	-	-	-	-	122	18	141	35	-	-	106	-	-	-	-	-	-
Ib.1.1.5	CRD housings & NIs	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-
Ib.1.1.6	Incore instrumentation	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-
Ib.1.1.7	Removal primary containment	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-
Ib.1.1.8	Reactor vessel	-	-	-	-	-	-	329	49	379	379	-	-	-	-	-	-	-	-	-
Ib.1.1.9	Facility closure	-	-	-	-	-	-	109	16	125	63	-	-	63	-	-	-	-	-	-
Ib.1.1.10	Sterilized shield	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-
Ib.1.1.11	Reinforced concrete	-	-	-	-	-	-	91	14	104	52	-	-	52	-	-	-	-	-	-
Ib.1.1.12	Main Turbine	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-
Ib.1.1.13	Main Condensers	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-
Ib.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-
Ib.1.1.15	Radiation building	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-
Ib.1.1.16	Reactor building	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-
Ib.1.1	Total	-	-	-	-	-	-	3,060	499	3,519	3,193	-	-	-	327	-	-	-	-	-
Ib.1.2	Decon NSSS	430	-	-	-	-	-	-	215	645	645	-	-	-	-	-	-	-	-	1,067
Ib.1	Subtotal Period Ib Activity Costs	430	-	-	-	-	-	3,060	674	4,164	3,838	-	-	-	-	-	-	-	-	1,067
Period Ib Additional Costs																				
Ib.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	9,133	1,370	10,503	10,503	-	-	-	-	-	-	-	-	-
Ib.2.2	Site Characterization	-	-	-	-	-	-	897	269	1,167	1,167	-	-	-	-	-	-	-	-	-
Ib.2.3	Hazardous liquid disposal	-	-	-	7	-	411	-	104	925	925	-	-	-	-	-	-	89,546	-	-
Ib.2.4	Contaminated asbestos disposal	-	-	-	8	-	5	-	2	15	15	-	-	-	-	-	-	1,800	-	-
Ib.2.5	Clean asbestos disposal	-	-	-	0	-	2	-	0	2	2	-	-	-	-	-	-	1,800	-	-
Ib.2	Subtotal Period Ib Additional Costs	-	-	-	15	-	416	10,033	1,746	12,210	12,210	-	-	-	-	-	-	1,631	-	-

Table C  
Clinton Power Station  
DECON Decommissioning Cost Estimate  
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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		Burial Volumes		Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
														Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet			
Period 1b Collateral Costs																				
1b.3.1	Decon equipment	726	-	-	-	-	-	-	109	834	834	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	-	124	953	-	-	-	-	-	-	-	-	-
1b.3.3	Process liquid waste	28	-	47	270	-	2,284	-	630	3,260	3,260	-	-	-	-	183	721	90,984	176	-
1b.3.4	Small tool allowance	-	1	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-
1b.3.5	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-
1b.3.6	Decon rig	1,243	-	-	-	-	-	-	186	1,430	1,430	-	-	-	-	-	-	-	-	-
1b.3.7	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,000	900	6,900	6,900	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,997	958	47	270	-	2,284	6,829	2,094	14,479	7,579	-	-	-	-	183	721	90,984	176	-
Period 1b Period-Dependent Costs																				
1b.4.1	Decon supplies	22	-	-	-	-	-	662	6	28	28	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	2,110	211	2,321	2,321	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	193	-	-	-	-	-	48	242	242	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	175	-	-	-	-	-	26	201	201	201	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	-	-	-	-	-	-	6	37	37	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	3	-	20	-	145	1,111	1,111	-	-	-	-	-	-	7,109	11	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	966	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	225	23	248	248	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	370	55	425	425	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	2,986	448	3,434	3,434	-	-	-	-	-	-	-	-	-
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	41,336	620	47,966	47,966	-	-	-	-	-	-	-	-	-
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	9,311	1,397	10,708	10,708	-	-	-	-	-	-	-	-	-
1b.4	Subtotal Period 1b Period-Dependent Costs	22	368	8	3	-	20	21,062	3,089	24,572	23,851	721	-	-	-	355	-	7,109	11	-
1b.0	TOTAL PERIOD 1b COST	2,449	1,326	55	288	-	2,720	40,984	7,603	55,425	47,478	7,621	327	-	2,169	2,844	721	189,439	1,254	324,450
PERIOD 1 TOTALS		2,449	2,052	69	294	-	2,758	134,632	21,391	163,646	108,401	54,530	715	-	2,844	2,844	721	202,970	1,274	983,990
PERIOD 2a - Large Component Removal																				
Period 2a Direct Decommissioning Activities																				
Nuclear Steam Supply System Removal																				
2a.1.1.1	Recirculation System Piping & Valves	49	45	8	12	-	69	-	63	277	277	-	-	-	-	530	-	64,091	1,943	-
2a.1.1.2	Recirculation Pumps & Motors	49	42	13	31	-	263	-	110	327	327	-	-	-	250	2,473	-	187,000	1,998	-
2a.1.1.3	CRDMs & NIE Removal	199	158	921	111	-	203	-	239	1,231	1,231	-	-	-	-	6,985	-	131,119	4,284	-
2a.1.1.4	Reactor Vessel Internals	166	2,726	5,033	2,034	-	15,013	280	11,443	36,695	36,695	-	-	-	-	1,753	689	337,865	39,200	1,700
2a.1.1.5	Reactor Vessel	51	5,751	1,904	890	-	2,046	280	6,107	17,019	17,019	-	-	-	-	12,291	-	1,319,880	39,200	1,700
2a.1.1	Totals	545	8,722	7,279	3,038	-	17,023	560	17,962	55,749	55,749	-	-	-	250	24,032	1,435	2,059,553	89,625	3,400
Removal of Major Equipment																				
2a.1.2	Main Turbine/Generator	-	348	885	180	-	2,586	132	628	4,780	4,780	-	-	-	54,728	1,613	-	2,607,544	7,309	-
2a.1.3	Main Condensers	-	1,174	952	194	-	2,781	163	876	6,139	6,139	-	-	-	95,848	1,735	-	2,803,515	24,651	-
Casings from Clean Building Demolition																				
2a.1.4.1	Reactor Building	-	905	-	-	-	-	-	136	1,041	1,041	-	-	-	-	-	-	-	11,450	-
2a.1.4.2	Auxiliary Building	-	216	-	-	-	-	-	32	248	248	-	-	-	-	-	-	-	2,382	-
2a.1.4.3	Roadway Building	-	500	-	-	-	-	-	75	575	575	-	-	-	-	-	-	-	6,493	-
2a.1.4.4	Turbine Building	-	508	-	-	-	-	-	76	585	585	-	-	-	-	-	-	-	6,771	-

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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					
2a.1.4.5	Fuel Building	-	237	-	-	-	-	-	36	273	273	-	-	-	-	-	-	-	-	2,912	-	
2a.1.4	Totals	-	2,367	-	-	-	-	-	355	2,722	2,722	-	-	-	-	-	-	-	-	-	30,209	-
Cascading Costs from Clean Building Demolition (continued)																						
Disposal of Plant Systems																						
2a.1.5.1	Acid Feed & Handling	-	484	13	19	1	21	-	10	59	59	-	-	488	-	-	-	-	19,822	533	-	
2a.1.5.2	Auxiliary Steam	-	36	-	-	-	319	-	5	42	1,008	-	-	7,493	-	-	-	-	304,278	9,740	-	
2a.1.5.3	Breathing Air	-	16	-	-	-	8	-	2	18	-	-	42	-	-	-	-	-	-	820	-	
2a.1.5.4	CO2 & Generator Purge	-	13	-	-	-	0	-	5	26	26	-	18	183	-	-	-	-	7,431	256	-	
2a.1.5.5	Cautic Handling	395	391	39	36	0	94	168	361	1,484	1,484	-	-	2,211	2,121	-	-	-	249,802	14,872	-	
2a.1.5.6	Chem Raw Waste Reprocessing & Disposal	-	1,035	27	40	679	-	-	369	2,149	2,149	-	-	15,914	-	-	-	-	646,286	20,760	-	
2a.1.5.7	Chilled Water - RCA	-	166	-	-	-	191	-	25	191	-	-	191	-	-	-	-	-	3,682	-	-	
2a.1.5.8	Chilled Water Non-RCA	-	44	-	-	-	7	-	7	51	-	-	51	-	-	-	-	-	-	953	-	
2a.1.5.9	Chlorination	-	161	16	24	400	-	-	105	706	706	-	-	9,379	-	-	-	-	380,577	3,419	-	
2a.1.5.10	Circulating Water - RCA	-	51	-	-	-	8	-	8	58	-	-	58	-	-	-	-	-	-	1,090	-	
2a.1.5.11	Circulating Water Non-RCA	-	90	5	5	8	24	-	31	162	162	-	-	187	253	-	-	-	30,046	1,844	-	
2a.1.5.12	Crnmtt Aux & Fuel Bldg Equip Drains	-	156	8	8	34	32	-	54	292	292	-	-	792	367	-	-	-	62,536	3,212	-	
2a.1.5.13	Crnmtt Aux & Fuel Bldg Floor Drains	-	119	-	-	-	-	-	18	137	-	-	137	-	-	-	-	-	-	2,622	-	
2a.1.5.14	Component Cooling Water Non-RCA	-	904	159	174	584	772	-	549	3,142	3,142	-	-	13,689	8,197	-	-	-	1,281,159	19,496	-	
2a.1.5.15	Condensate	-	855	161	178	543	806	-	539	3,082	3,082	-	-	12,724	8,568	-	-	-	1,284,382	18,468	-	
2a.1.5.16	Condensate Booster	690	690	46	45	188	188	-	259	1,416	1,416	-	-	4,398	2,104	-	-	-	357,430	14,429	-	
2a.1.5.17	Condensate Polishing	-	179	17	25	430	-	-	115	767	767	-	-	10,094	-	-	-	-	409,927	3,731	-	
2a.1.5.18	Containment Combustible Gas	-	75	4	4	33	14	-	28	198	198	-	-	781	147	-	-	-	44,863	1,568	-	
2a.1.5.19	Containment Non-Combustible Gas	-	617	41	40	181	163	-	232	1,275	1,275	-	-	4,242	1,929	-	-	-	327,937	12,878	-	
2a.1.5.20	Cycled Cooling	-	138	11	15	118	42	-	179	1,012	1,012	-	-	5,664	655	-	-	-	288,770	9,748	-	
2a.1.5.21	Drywell Cooling	-	72	2	4	51	3	-	27	139	139	-	-	2,764	451	-	-	-	192,087	2,951	-	
2a.1.5.22	Drywell Purge	-	473	54	63	236	271	-	296	1,333	1,333	-	-	5,551	2,875	-	-	-	51,154	1,484	-	
2a.1.5.23	ECCS Equipment Cooling	-	519	88	100	331	445	-	315	1,799	1,799	-	-	7,772	4,722	-	-	-	482,498	10,135	-	
2a.1.5.24	Extraction Steam	-	1,238	112	126	507	527	-	548	3,058	3,058	-	-	11,869	5,704	-	-	-	739,273	11,221	-	
2a.1.5.25	Feedwater Heater Drains Turbine Cycle	-	193	13	13	29	62	-	71	382	382	-	-	685	664	-	-	-	985,659	26,301	-	
2a.1.5.26	Feedwater Heater Drains Turbine Cycle	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	87,316	4,010	-	
2a.1.5.27	Feedwater Heater Misc.	-	25	0	1	10	-	-	8	44	44	-	-	243	-	-	-	-	9,883	469	-	
2a.1.5.28	Filtered Water	-	16	0	1	9	-	-	6	32	32	-	-	207	-	-	-	-	8,423	339	-	
2a.1.5.29	Generator Hydrogen Seal Oil	-	251	36	39	131	170	-	134	761	761	-	-	3,077	1,807	-	-	-	287,030	5,388	-	
2a.1.5.30	Generator Stator Cooling	-	22	0	0	7	-	-	7	36	36	-	-	168	-	-	-	-	6,515	403	-	
2a.1.5.31	High Pressure Core Spray	-	209	14	14	90	49	-	82	469	469	-	-	2,116	646	-	-	-	132,517	4,399	-	
2a.1.5.32	Hydrogen	-	42	1	1	1	3	-	11	58	58	-	-	30	29	-	-	-	3,822	928	-	
2a.1.5.33	Laundry Equip & Flr Drains RW Reprocess	-	5	-	-	-	-	-	6	365	365	-	-	1,535	1,028	-	-	-	154,545	2,081	-	
2a.1.5.34	Leak Detection	-	97	21	21	65	97	-	64	365	365	-	-	2,665	71	-	-	-	114,605	4,249	-	
2a.1.5.35	Local Instrument Panels	-	10	0	1	10	-	-	4	25	25	-	-	2,665	71	-	-	-	614,246	17,632	-	
2a.1.5.36	Low Pressure Core Spray	-	222	5	8	114	7	-	76	431	431	-	-	6,957	3,685	-	-	-	51,157	429	-	
2a.1.5.37	Machine Shop Equipment	-	833	74	80	298	347	-	359	1,891	1,891	-	-	23	47	-	-	-	98,255	3,395	-	
2a.1.5.38	Machine Shop Ventilation	-	21	1	1	1	1	-	7	35	35	-	-	2,419	-	-	-	-	4,416	116	-	
2a.1.5.39	Main Steam	-	184	4	6	103	-	-	63	360	360	-	-	518	715	-	-	-	85,161	4,912	-	
2a.1.5.40	Main Steam Isolation Valve	-	208	-	-	-	-	-	31	239	239	-	-	19	-	-	-	-	-	357	-	
2a.1.5.41	Make-up Demineralizer - RCA	-	240	15	14	22	67	-	2	49	49	-	-	34	-	-	-	-	-	643	-	
2a.1.5.42	Make-up Demineralizer Non-RCA	-	16	-	-	-	-	-	4	34	34	-	-	17	-	-	-	-	-	363	-	
2a.1.5.43	Makeup Condensate Storage	-	30	-	-	-	-	-	5	27	27	-	-	243	-	-	-	-	98,602	1,894	-	
2a.1.5.44	Misc. Building Drains	-	90	4	6	104	-	-	39	243	243	-	-	1,796	698	-	-	-	127,607	4,557	-	
2a.1.5.45	Misc. Building Ventilation	-	0	-	-	-	-	-	84	463	463	-	-	-	-	-	-	-	-	-	-	
2a.1.5.46	Nuclear Boiler	-	17	-	-	-	-	-	3	97	97	-	-	-	-	-	-	-	-	363	-	
2a.1.5.47	Oil Transfer	-	216	15	15	77	57	-	84	463	463	-	-	-	-	-	-	-	-	1,894	-	
2a.1.5.48	Reactor Core Isolation Cooling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table C  
Clinton Power Station  
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(Thousands of 2007 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	On-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			Burial Volumes			Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours		
														Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	Cu. Feet	Class A Cu. Feet				Class B Cu. Feet	Class C Cu. Feet
Disposal of Plant Systems (continued)																								
2a.1.5.49	Refrigeration Piping	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	-	-	388	-	
2a.1.5.50	Sanitary	-	151	-	-	-	-	-	23	174	-	-	174	-	-	-	-	-	-	-	-	3,202	-	
2a.1.5.51	Screen House & MU Pump House Ventilation	-	31	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	-	-	736	-	
2a.1.5.52	Standby Liquid Control	-	26	1	-	18	-	-	9	55	55	-	36	-	-	-	-	-	-	-	-	529	-	
2a.1.5.53	Switchgear/Heat Removal	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	-	-	356	-	
2a.1.5.54	Turbine Building Closed Cooling Water	-	148	4	5	90	-	-	52	299	299	-	-	-	-	-	-	-	-	-	-	2,948	-	
2a.1.5.55	Turbine Electrohydraulic Control	-	9	0	0	4	9	-	3	16	16	-	-	-	-	-	-	-	-	-	-	185	-	
2a.1.5.56	Turbine Gen Misc Drains & Vents	-	335	40	50	453	130	-	196	1,205	1,205	-	-	-	-	-	-	-	-	-	-	14,138	-	
2a.1.5.57	Turbine Oil	-	54	4	5	37	18	-	25	144	144	-	-	-	-	-	-	-	-	-	-	555,788	-	
2a.1.5.58	Turbine-Gen Aux & Misc Devices	-	240	51	62	289	250	-	180	1,073	1,073	-	-	-	-	-	-	-	-	-	-	52,601	-	
2a.1.5.59	Turbine-Gen Aux & Misc Devices	-	13,063	1,131	1,280	6,974	4,732	-	5,922	33,558	32,510	-	1,048	-	-	-	-	-	-	-	-	513,573	-	
2a.1.5	Totals	396	13,063	1,131	1,280	6,974	4,732	-	5,922	33,558	32,510	-	1,048	-	-	-	-	-	-	-	-	11,205,730	280,825	
2a.1.6	Scaffolding in support of decommissioning	-	3,063	50	11	140	17	-	798	4,080	4,080	-	-	-	-	-	-	-	-	-	-	150,174	70,739	
2a.1	Subtotal Period 2a Activity Costs	941	28,737	10,296	4,704	12,489	22,750	580	26,540	107,027	105,979	-	1,048	-	-	-	-	-	-	-	-	18,827,220	506,388	
Period 2a Additional Costs																								
2a.2.1	Disposal of stored turbine rotors	-	17	100	40	743	-	-	130	1,030	1,030	-	-	-	-	-	-	-	-	-	-	707,558	352	
2a.2	Subtotal Period 2a Additional Costs	-	17	100	40	743	-	-	130	1,030	1,030	-	-	-	-	-	-	-	-	-	-	707,558	352	
Period 2a Collateral Costs																								
2a.3.1	Process liquid waste	138	-	65	359	-	138	-	164	864	864	-	-	-	-	-	-	-	-	-	-	89,037	241	
2a.3.2	Small tool allowance	-	375	-	-	-	-	23,000	96	431	388	-	43	-	-	-	-	-	-	-	-	-	-	-
2a.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	-	3,450	26,450	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	138	375	65	359	-	138	23,000	3,670	27,745	1,252	-	43	-	-	-	-	-	-	-	-	89,037	241	
Period 2a Period-Dependent Costs																								
2a.4.1	Decom supplies	79	-	-	-	-	-	-	20	99	99	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	905	91	996	996	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	3,380	339	3,729	3,356	-	373	-	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,450	-	-	-	-	-	613	3,063	3,063	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,043	-	-	-	-	-	496	3,500	3,500	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	212	87	-	556	-	173	1,028	1,028	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	1,635	245	1,880	1,880	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	614	61	676	676	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	357	36	393	393	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.10	Site O&M Cost	-	-	-	-	-	-	446	67	513	513	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,318	198	1,516	1,516	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.12	SF&SI Operating Costs	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	8,912	1,357	10,269	10,248	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	15,424	2,764	21,188	21,188	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	33,174	4,976	38,150	38,150	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.4	Subtotal Period 2a Period-Dependent Costs	79	5,493	212	87	-	556	69,323	11,397	87,148	84,697	-	373	-	-	-	-	-	-	-	-	199,586	304	
2a.0	TOTAL PERIOD 2a COST	1,156	34,622	10,673	5,190	13,241	23,443	92,884	41,738	222,949	192,958	-	1,464	-	-	-	-	-	-	-	-	19,823,200	504,285	

Table C  
Clinton Power Station  
DECON Decommissioning Cost Estimate  
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Activity Index	Activity Description	Decom 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		Burial Volumes		Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
														Cu. Feet	Cu. Feet	Class A Cu. Feet	Class B Cu. Feet				Class C Cu. Feet
<b>PERIOD 2b - Site Decontamination</b>																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Component Cooling Water - RCA	-	178	4	6	101	4	-	61	350	350	-	-	2,361	-	-	-	95,865	3,548	-	
2b.1.1.2	Containment Monitoring	-	56	1	1	4	4	-	16	83	83	-	-	98	-	-	-	7,962	1,241	-	
2b.1.1.3	Control Rod Drive	-	397	19	19	57	88	-	135	715	715	-	-	1,333	-	-	-	137,526	8,291	-	
2b.1.1.4	Diesel Fuel Oil	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	1,256	-	
2b.1.1.5	Diesel General	-	52	-	-	-	-	-	8	60	-	-	88	-	-	-	-	-	1,133	-	
2b.1.1.6	Diesel-Generator Room Ventilation	-	77	-	-	-	-	-	12	88	-	-	88	-	-	-	-	-	1,817	-	
2b.1.1.7	Drains-Laudry to Radwaste	-	17	-	1	1	4	-	232	1,777	-	-	1,777	-	-	-	-	4,837	340	-	
2b.1.1.8	Electrical - Clean RCA	-	1,545	-	-	-	-	-	2,032	11,087	11,087	-	-	74,814	-	-	-	3,038,544	126,548	-	
2b.1.1.9	Equip Drain Radwaste Reprocessing	-	6,131	125	188	3,190	271	-	414	2,261	2,261	-	177	7,207	-	-	-	511,230	23,620	-	
2b.1.1.10	Equip Drain Radwaste Reprocessing	-	1,132	69	67	307	271	-	23	177	-	-	-	-	-	-	-	-	3,416	-	
2b.1.1.11	Fire Protection Non-RCA	-	154	-	-	-	-	-	282	1,558	1,558	-	-	-	-	-	-	439,585	14,712	-	
2b.1.1.12	Floor Drain Radwaste Reprocessing	-	705	54	55	235	227	-	12	73	-	-	-	540	-	-	-	25,200	663	-	
2b.1.1.13	HVAC - Auxiliary Building	-	31	-	2	23	3	-	36	279	-	-	279	-	-	-	-	163,158	5,975	-	
2b.1.1.14	HVAC - Control Room	-	242	-	-	-	-	-	107	611	611	-	-	3,782	-	-	-	281,272	9,695	-	
2b.1.1.15	HVAC - Fuel Building	-	313	-	8	11	10	-	173	982	982	-	-	6,035	-	-	-	78,082	2,607	-	
2b.1.1.16	HVAC - Laboratory	-	504	13	18	257	17	-	271	271	271	-	-	1,499	-	-	-	411,319	13,769	-	
2b.1.1.17	HVAC - Off Gas Building	-	128	6	7	64	18	-	253	1,449	1,449	-	-	9,269	-	-	-	1,145	-	-	
2b.1.1.18	HVAC - Radwaste Building	-	713	21	30	385	37	-	8	60	-	-	60	-	-	-	-	320,323	11,248	-	
2b.1.1.19	HVAC - Service Building	-	52	-	-	-	-	-	204	1,167	1,167	-	-	7,421	-	-	-	109,971	7,089	-	
2b.1.1.20	HVAC - Turbine Building	-	589	15	22	316	20	-	112	613	613	-	7	2,708	-	-	-	91,689	3,537	-	
2b.1.1.21	Hoists Cranes & Elevators	-	6	-	-	-	-	-	3	20	-	-	-	-	-	-	-	3,532	389	-	
2b.1.1.22	Instrument Air - RCA	-	374	5	7	115	-	-	63	349	349	-	20	1,490	-	-	-	123,583	3,532	-	
2b.1.1.23	Instrument Air - Non-RCA	-	17	-	-	-	-	-	65	384	384	-	-	3,043	-	-	-	23,024	1,902	-	
2b.1.1.24	Off Gas	-	176	5	10	64	33	-	29	130	130	-	-	140	-	-	-	25,067	1,390	-	
2b.1.1.25	Plant Service Water - RCA	-	156	5	8	130	-	-	23	180	180	-	180	253	-	-	-	141,994	8,682	-	
2b.1.1.26	Plant Service Water - Non-RCA	-	93	4	3	11	13	-	29	154	154	-	-	140	-	-	-	648,075	14,073	-	
2b.1.1.27	Process Radiation Monitoring	-	20	-	-	-	-	-	224	931	931	-	-	6,526	-	-	-	100,556	4,507	-	
2b.1.1.28	Reactor Recirculation	20	47	4	4	6	21	-	7	421	421	-	7	2,476	-	-	-	60,155	1,829	-	
2b.1.1.29	Reactor Water Clean-up	230	286	20	21	48	101	-	35	195	195	-	16	1,481	-	-	-	275,491	19,866	-	
2b.1.1.30	Residual Heat Removal	462	538	87	89	278	402	-	424	1,781	1,781	-	114	3,684	-	-	-	24,299	1,586	-	
2b.1.1.31	Screen Wash	-	6	-	-	-	-	-	21	118	118	-	-	913	-	-	-	65,367	2,296	-	
2b.1.1.32	Service Air - RCA	-	230	4	6	106	-	-	22	4	4	-	-	313	-	-	-	24,299	1,586	-	
2b.1.1.33	Service Air - Non-RCA	-	14	-	-	-	-	-	2	16	-	-	-	1,481	-	-	-	64,491	1,065	-	
2b.1.1.34	Shutdown Service Water - RCA	-	92	2	4	63	-	-	15	114	114	-	-	3,684	-	-	-	152,620	4,124	-	
2b.1.1.35	Shutdown Service Water - Non-RCA	-	99	-	-	-	-	-	3	20	-	-	-	1,490	-	-	-	100,556	4,507	-	
2b.1.1.36	Solid Radwaste Reprocessing & Disposal	435	506	33	33	157	132	-	424	1,781	1,781	-	114	3,684	-	-	-	275,491	19,866	-	
2b.1.1.37	Standy Gas Treatment	-	67	-	2	22	4	-	21	118	118	-	-	913	-	-	-	65,367	2,296	-	
2b.1.1.38	Suppression Pool Cleanup & Transfer	-	108	8	8	26	46	-	28	238	238	-	-	615	-	-	-	24,299	1,586	-	
2b.1.1.39	Suppression Pool Make-up	-	49	7	8	32	36	-	28	160	160	-	-	742	-	-	-	64,491	1,065	-	
2b.1.1.40	Turb OG RW Chnl & DG Bldg Equip Drains	-	203	11	10	18	46	-	119	692	692	-	-	425	-	-	-	157,636	8,623	-	
2b.1.1.41	Turb OG RW Chnl & DG Bldg Equip Drains	-	229	20	19	91	75	-	6,000	32,565	30,104	-	2,850	147,259	-	-	-	7,509,222	358,965	-	
2b.1.1	Totals	1,146	16,704	558	662	6,279	1,605	-	997	51,000	5,100	-	-	3,711	-	-	-	187,718	88,424	-	
2b.1.2	Scuffolding in support of decommissioning	-	3,829	62	14	175	22	-	2,891	12,236	12,236	-	-	7,794	-	-	-	2,570,182	127,462	-	
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	2,786	3,509	412	464	330	1,843	-	248	968	968	-	-	1,171	-	-	-	217,579	10,157	-	
2b.1.3.2	Auxiliary Building	324	192	29	38	50	87	-	248	968	968	-	-	1,171	-	-	-	217,579	10,157	-	

Table C  
Clinton Power Station  
DECON Decommissioning Cost Estimate  
(Thousands of 2007 Dollars)

Activity Index	Activity Description	Decom 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		Burial Volumes		Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
														Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet			
Decontamination of Site Buildings (continued)																				
2b.1.3.3	Control Building	374	145	29	38	2	91	-	255	935	935	-	-	56	-	-	-	184,349	10,282	-
2b.1.3.4	Diesel Generator Building	108	38	8	10	-	25	-	72	263	263	-	-	-	-	-	-	49,962	2,911	-
2b.1.3.5	Radiation Building	1,269	575	105	140	45	330	-	899	3,364	3,364	-	-	1,067	-	-	-	701,151	36,363	-
2b.1.3.6	Turbine Building	1,135	605	97	129	117	298	-	840	3,221	3,221	-	-	2,735	-	-	-	699,469	34,324	-
2b.1.3	Totals	5,997	5,064	681	820	544	2,674	-	5,206	20,986	20,986	-	-	12,763	-	-	-	4,423,191	221,509	-
2b.1	Subtotal Period 2b Activity Costs	7,144	25,397	1,301	1,496	6,989	4,301	-	12,203	59,040	56,190	-	2,850	163,733	-	-	-	12,120,130	668,896	-
Period 2b Collateral Costs																				
2b.3.1	Process liquid waste	231	-	190	1,072	-	501	-	421	2,415	2,415	-	-	-	-	-	-	323,419	707	-
2b.3.2	Small fuel allowance	-	493	-	-	-	-	22,000	74	967	967	-	-	-	-	-	-	-	-	-
2b.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	22,000	3,300	25,300	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	231	493	190	1,072	-	501	22,000	3,795	28,282	2,982	-	-	-	-	-	-	3,628	-	707
Period 2b Period-Dependent Costs																				
2b.4.1	Decon supplies	2,012	-	-	-	-	-	-	503	2,515	2,515	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,122	112	1,234	1,234	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,212	221	2,433	2,433	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	3,182	-	-	-	-	-	795	3,977	3,977	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	3,742	-	-	-	-	-	561	4,304	4,304	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	255	105	-	670	-	209	1,240	1,240	-	-	-	-	-	-	12,008	-	366
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,600	240	1,840	1,840	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	761	76	838	838	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	442	44	487	487	-	-	-	-	-	-	-	-	-
2b.4.10	Site O&M Cost	-	-	-	-	-	-	553	83	636	636	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,634	245	1,879	1,879	-	-	-	-	-	-	-	-	-
2b.4.12	Radwaste Processing Equipment/Services	-	-	-	-	-	-	411	62	473	473	-	-	-	-	-	-	-	-	-
2b.4.13	RSFSI Operating Costs	-	-	-	-	-	-	182	27	209	209	-	-	209	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	11,044	1,657	12,701	12,701	-	-	-	-	-	-	-	-	292,094
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	21,946	3,282	25,228	25,228	-	-	-	-	-	-	-	-	337,051
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	39,471	5,921	45,391	45,391	-	-	-	-	-	-	-	-	625,623
2b.4	Subtotal Period 2b Period-Dependent Costs	2,012	6,924	255	105	-	670	81,379	14,049	105,394	102,820	-	-	2,574	-	-	-	240,639	366	1,254,709
2b.0	TOTAL PERIOD 2b COST	9,387	33,014	1,747	2,673	6,989	5,472	103,379	30,046	192,717	161,992	-	2,850	163,733	-	-	-	12,684,190	669,970	1,254,709
PERIOD 2c - Decontamination Following Wet Fuel Storage																				
Period 2c Direct Decommissioning Activities																				
2c.1.1	Remove spent fuel racks	500	45	92	104	-	572	-	429	1,740	1,740	-	-	-	-	-	-	544,392	1,017	-
Disposal of Plant Systems																				
2c.1.2.1	Electrical - Contaminated	-	1,014	16	23	385	20	-	314	1,722	1,722	-	-	7,867	-	-	-	338,266	21,336	-
2c.1.2.2	Fire Protection - RCA	-	616	15	2	385	-	-	217	1,255	1,255	-	-	9,018	-	-	-	306,214	12,406	-
2c.1.2.3	Fuel Handling & Transfer	-	24	2	2	7	9	-	10	55	55	-	-	173	-	-	-	15,919	321	-
2c.1.2.4	Fuel Pool Cooling & Cleanup	-	874	92	92	277	417	-	387	2,139	2,139	-	-	6,503	-	-	-	660,961	18,344	-
2c.1.2.5	Fuel Support	-	99	10	12	47	82	-	48	268	268	-	-	1,100	-	-	-	94,533	2,141	-
2c.1.2.6	HVAC - Containment Building	-	734	33	45	477	35	-	288	1,669	1,669	-	-	11,185	-	-	-	942,563	14,340	-
2c.1.2.7	Portable Water	-	111	-	14	32	68	-	141	733	733	-	12	758	-	-	-	95,460	9,361	-
2c.1.2.8	Process Sampling	-	459	-	19	14	63	-	146	784	784	-	12	36,603	-	-	-	2,113,916	78,881	-
2c.1.2	Totals	-	3,850	187	212	1,561	659	-	1,406	7,804	7,842	-	12	36,603	-	-	-	544,392	1,017	-

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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		Burial Volumes		Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
														Cu. Feet	Cu. Feet	Class A Cu. Feet	Class B Cu. Feet			
Decontamination of Site Buildings																				
2c.1.3.1	Fuel Building	821	785	33	43	110	94	-	656	2,542	2,542	-	-	2,574	1,829	-	-	284,744	32,703	-
2c.1.3	Totals	821	785	33	43	110	94	-	656	2,542	2,542	-	-	2,574	1,829	-	-	284,744	32,703	-
2c.1.4	Scaffolding in support of decommissioning	-	766	12	3	35	4	-	199	1,020	1,020	-	-	742	46	-	-	37,544	17,685	-
2c.1	Subtotal Period 2c: Activity Costs	1,321	5,425	324	361	1,706	1,328	-	2,690	13,156	13,143	-	12	39,919	15,001	-	-	2,980,496	130,286	-
Period 2c: Collateral Costs																				
2c.3.1	Process liquid waste	121	-	44	240	-	77	-	120	603	603	-	-	-	833	-	-	49,965	162	-
2c.3.2	Small tool allowance	-	103	-	-	-	-	-	16	119	119	-	-	-	-	-	-	-	-	-
2c.3.3	Decommissioning Equipment Disposition	-	-	100	27	284	35	-	65	511	511	-	-	6,000	373	-	-	303,307	88	-
2c.3	Subtotal Period 2c: Collateral Costs	121	103	144	267	284	113	-	201	1,233	1,233	-	-	6,000	1,206	-	-	333,472	251	-
Period 2c: Period-Dependent Costs																				
2c.4.1	Decon supplies	223	-	-	-	-	-	-	56	278	278	-	-	-	-	-	-	-	-	-
2c.4.2	Insurance	-	-	-	-	-	-	429	43	472	472	-	-	-	-	-	-	-	-	-
2c.4.3	Property taxes	-	-	-	-	-	-	846	85	931	931	-	-	-	-	-	-	-	-	-
2c.4.4	Health physics supplies	-	747	-	-	-	-	-	187	934	934	-	-	-	-	-	-	-	-	-
2c.4.5	Heavy equipment rental	-	1,431	-	-	-	-	-	215	1,646	1,646	-	-	-	-	-	-	-	-	-
2c.4.6	Disposal of DAW generated	-	-	101	42	-	266	-	83	492	492	-	-	4,767	-	-	95,523	145	-	-
2c.4.7	Plant energy budget	-	-	-	-	-	-	326	49	375	375	-	-	-	-	-	-	-	-	-
2c.4.8	NRC Fees	-	-	-	-	-	-	291	29	320	320	-	-	-	-	-	-	-	-	-
2c.4.9	Emergency Planning Fees	-	-	-	-	-	-	169	17	186	186	-	-	-	-	-	-	-	-	-
2c.4.10	Site O&M Cost	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-
2c.4.11	Rawaste Processing Equipment/Services	-	-	-	-	-	-	315	47	362	362	-	-	-	-	-	-	-	-	-
2c.4.12	ISFSI Operating Costs	-	-	-	-	-	-	70	10	80	80	-	-	-	-	-	-	-	-	-
2c.4.13	Security Staff Cost	-	-	-	-	-	-	2,220	333	2,553	2,553	-	-	-	-	-	-	-	-	-
2c.4.14	DOC Staff Cost	-	-	-	-	-	-	5,862	879	6,741	6,741	-	-	-	-	-	-	-	-	-
2c.4.15	Utility Staff Cost	-	-	-	-	-	-	11,138	1,671	12,809	12,809	-	-	-	-	-	-	-	-	-
2c.4	Subtotal Period 2c: Period-Dependent Costs	223	2,178	101	42	-	266	21,878	3,795	28,423	28,157	-	-	4,767	-	-	95,523	145	-	-
2c.0	TOTAL PERIOD 2c: COST	1,665	7,707	570	670	1,989	1,707	21,878	6,626	42,811	42,533	-	12	45,919	20,974	-	3,429,491	130,682	319,153	-
PERIOD 2c - License Termination																				
Period 2c: Direct Decommissioning Activities																				
2c.1.1	ORISE confirmatory survey	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-
2c.1.2	Permitte license	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c: Activity Costs	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-
Period 2c: Additional Costs																				
2c.2.1	Final Site Survey	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	-
2c.2	Subtotal Period 2c: Additional Costs	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	-
Period 2c: Collateral Costs																				
2c.3.1	DOC staff/retention expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-
2c.3	Subtotal Period 2c: Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-
Period 2c: Period-Dependent Costs																				
2c.4.1	Insurance	-	-	-	-	-	-	350	35	385	385	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	745	74	819	819	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	1,034	-	-	-	-	-	298	1,292	1,292	-	-	-	-	-	-	-	-	-



Table C  
Clinton Power Station  
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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				
Period 2a: Period-Dependent Costs (continued)																					
2c.4.4	Disposal of DAW generated	-	-	8	3	-	22	-	7	40	40	-	-	-	-	-	-	-	-	-	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	144	-	165	165	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	256	26	282	282	-	-	-	-	-	-	-	-	-	-
2c.4.7	Emergency Planning Fees	-	-	-	-	-	-	149	15	164	164	-	-	-	-	-	-	-	-	-	-
2c.4.8	Site O&M Cost	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	-
2c.4.9	ISFSI Operating Costs	-	-	-	-	-	-	61	9	70	70	-	-	-	-	-	-	-	-	-	-
2c.4.10	Security Staff Cost	-	-	-	-	-	-	1,910	287	2,197	2,197	-	-	-	-	-	-	-	-	-	-
2c.4.11	DOC Staff Cost	-	-	-	-	-	-	3,905	586	4,490	4,490	-	-	-	-	-	-	-	-	-	-
2c.4.12	Utility Staff Cost	-	-	-	-	-	-	5,574	836	6,410	6,410	-	-	-	-	-	-	-	-	-	-
2c.4	Subtotal Period 2a: Period-Dependent Costs	-	1,034	8	3	-	22	13,280	2,182	16,294	16,294	234	-	-	389	-	-	7,792	12	187,291	187,291
2c.0	TOTAL PERIOD 2a: COST	-	1,034	8	3	-	22	25,269	5,655	31,891	31,756	234	-	-	389	-	-	7,792	230,152	187,291	187,291
PERIOD 2 TOTALS		12,210	76,377	12,997	8,536	22,229	30,644	245,409	84,005	490,468	429,240	56,902	4,326	505,717	187,075	1,435	689	35,944,680	1,535,088	2,810,547	2,810,547
PERIOD 3b - Site Restoration																					
Period 3b: Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	5,134	-	-	-	-	-	770	5,904	-	-	5,904	-	-	-	-	-	-	-	65,001
3b.1.1.2	Auxiliary Building	-	1,945	-	-	-	-	-	282	2,236	-	-	2,236	-	-	-	-	-	-	-	23,242
3b.1.1.3	Circulating Water Screenhouse	-	3,165	-	-	-	-	-	475	3,640	-	-	3,640	-	-	-	-	-	-	-	38,383
3b.1.1.4	Control Building	-	4,641	-	-	-	-	-	696	5,337	-	-	5,337	-	-	-	-	-	-	-	66,578
3b.1.1.5	Diesel Generator Building	-	1,618	-	-	-	-	-	243	1,860	-	-	1,860	-	-	-	-	-	-	-	20,234
3b.1.1.6	Make-Up Water Pump House	-	344	-	-	-	-	-	52	396	-	-	396	-	-	-	-	-	-	-	5,100
3b.1.1.7	Miscellaneous Site Work	-	1,504	-	-	-	-	-	226	1,729	-	-	1,729	-	-	-	-	-	-	-	21,227
3b.1.1.8	Miscellaneous Structures	-	2,442	-	-	-	-	-	396	2,838	-	-	2,838	-	-	-	-	-	-	-	44,561
3b.1.1.9	Radiation Building	-	4,302	-	-	-	-	-	675	5,177	-	-	5,177	-	-	-	-	-	-	-	58,440
3b.1.1.10	Service Building	-	353	-	-	-	-	-	53	406	-	-	406	-	-	-	-	-	-	-	5,585
3b.1.1.11	Transformer and Tank Pads	-	147	-	-	-	-	-	22	169	-	-	169	-	-	-	-	-	-	-	2,463
3b.1.1.12	Turbine Building	-	4,693	-	-	-	-	-	704	5,397	-	-	5,397	-	-	-	-	-	-	-	63,415
3b.1.1.13	Turbine Pedestal	-	1,080	-	-	-	-	-	162	1,243	-	-	1,243	-	-	-	-	-	-	-	12,474
3b.1.1.14	Fuel Building	-	2,139	-	-	-	-	-	324	2,463	-	-	2,463	-	-	-	-	-	-	-	26,720
3b.1.1	Totals	-	33,727	-	-	-	-	-	5,059	38,786	-	-	38,786	-	-	-	-	-	-	-	443,422
Site Closeout Activities																					
3b.1.2	Backfill Site	-	57	-	-	-	-	-	9	66	-	-	66	-	-	-	-	-	-	-	201
3b.1.3	Grate & landscape site	-	1,408	-	-	-	-	-	211	1,619	-	-	1,619	-	-	-	-	-	-	-	4,449
3b.1.4	Final report to NRC	-	-	-	-	-	-	141	21	163	163	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	35,192	-	-	-	-	141	5,300	40,634	163	-	40,471	-	-	-	-	-	-	-	448,071
Period 3b: Additional Costs																					
3b.2.1	Concrete Crushing	-	1,281	-	-	-	-	-	193	1,482	-	-	1,482	-	-	-	-	-	-	-	7,355
3b.2.2	Screenhouse Offstream	-	934	-	-	-	-	-	140	1,074	-	-	1,074	-	-	-	-	-	-	-	10,159
3b.2.3	Discharge Frame Backfill	-	3,741	-	-	-	-	-	561	4,302	-	-	4,302	-	-	-	-	-	-	-	23,391
3b.2.4	Unit 2 Excavation Backfill	-	1,226	-	-	-	-	-	154	1,410	-	-	1,410	-	-	-	-	-	-	-	13,128
3b.2	Subtotal Period 3b Additional Costs	-	7,183	-	-	-	-	-	1,079	8,269	-	-	8,269	-	-	-	-	-	-	-	94,573
Period 3b: Collateral Costs																					
3b.3.1	Small tool allowance	-	386	-	-	-	-	-	58	444	-	-	444	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	191	29	220	-	220	-	-	-	-	-	-	-	-	-

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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			Burial Volumes			Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
														Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	Cu. Feet	Class A Cu. Feet			
3b.3	Subtotal Period 3b Collateral Costs	-	386	-	-	-	-	191	87	664	-	220	444	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																						
3b.4.1	Insurance	-	-	-	-	-	-	1,063	106	1,169	-	1,169	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	2,264	226	2,491	0	2,092	398	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,246	-	-	-	-	-	787	6,033	-	-	6,033	-	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	-	33	251	-	-	251	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	489	49	537	-	537	-	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	453	45	498	-	498	-	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	186	28	214	-	214	-	-	-	-	-	-	-	-	-	-
3b.4.8	Site O&M Cost	-	-	-	-	-	-	566	85	651	-	651	-	-	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	5,808	871	6,679	-	5,544	1,136	-	-	-	-	-	-	-	-	153,586
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	11,330	1,699	13,029	-	-	13,029	-	-	-	-	-	-	-	-	160,674
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	5,584	1,288	9,872	0	2,369	7,503	-	-	-	-	-	-	-	-	128,776
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,246	-	-	-	-	30,961	5,218	41,425	0	12,424	29,001	-	-	-	-	-	-	-	-	443,006
3b.0	TOTAL PERIOD 3b COST	-	48,007	-	-	-	-	31,302	11,683	90,991	163	12,644	78,184	-	-	-	-	-	-	-	-	502,644
<b>PERIOD 3c - Fuel Storage Operations/Shipping</b>																						
Period 3c Direct Decommissioning Activities																						
Period 3c Collateral Costs																						
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	7,809	1,171	8,980	-	8,980	-	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	7,809	1,171	8,980	-	8,980	-	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																						
3c.4.1	Insurance	-	-	-	-	-	-	1,342	134	1,476	-	1,476	-	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	2,398	240	2,637	-	2,637	-	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	617	62	679	-	679	-	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	572	57	629	-	629	-	-	-	-	-	-	-	-	-	-
3c.4.6	Site O&M Cost	-	-	-	-	-	-	715	107	822	-	822	-	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	235	35	270	-	270	-	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	6,091	914	7,005	-	7,005	-	-	-	-	-	-	-	-	-	161,074
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	2,617	393	3,010	-	3,010	-	-	-	-	-	-	-	-	-	40,269
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	14,586	1,942	16,328	-	16,328	-	-	-	-	-	-	-	-	-	201,343
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	22,395	3,113	25,508	-	25,508	-	-	-	-	-	-	-	-	-	201,343
<b>PERIOD 3d - GTCC shipping</b>																						
Period 3d Direct Decommissioning Activities																						
Nuclear Steam Supply System Removal																						
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	375	-	-	-	8,132	1,260	9,787	9,787	-	-	-	-	-	-	-	-	-	-	86,500
3d.1.1	Totals	-	-	375	-	-	-	8,132	1,260	9,787	9,787	-	-	-	-	-	-	-	-	-	-	86,500
3d.1	Subtotal Period 3d Activity Costs	-	-	375	-	-	-	8,132	1,260	9,787	9,787	-	-	-	-	-	-	-	-	-	-	86,500
Period 3d Period-Dependent Costs																						
3d.4.1	Insurance	-	-	-	-	-	-	21	2	23	-	23	-	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C  
Clinton Power Station  
DECON Decommissioning Cost Estimate  
(Thousands of 2007 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Processing Costs	On-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		Burial Volumes		Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Cu. Feet	Class C	Class A	Class B				Cu. Feet
Period 3d Period-Dependent Costs (continued)																						
3d4.4	NRC ISFSI Fees	-	-	-	-	-	-	-	9	1	10	-	-	-	-	-	-	-	-	-	-	
3d4.5	Emergency Planning Fees	-	-	-	-	-	-	-	9	1	10	-	-	-	-	-	-	-	-	-	-	
3d4.6	Site O&M Cost	-	-	-	-	-	-	-	11	2	13	-	-	-	-	-	-	-	-	-	-	
3d4.7	ISFSI Operating Costs	-	-	-	-	-	-	-	4	1	4	-	-	-	-	-	-	-	-	-	-	
3d4.8	Security Staff Cost	-	-	-	-	-	-	-	93	14	107	-	-	-	-	-	-	-	-	-	2,469	
3d4.9	Utility Staff Cost	-	-	-	-	-	-	-	40	6	46	-	-	-	-	-	-	-	-	-	617	
3d4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	-	187	26	213	-	-	-	-	-	-	-	-	-	3,086	
3d0	TOTAL PERIOD 3d COST	-	-	375	-	-	-	8,152	187	1,286	10,000	9,787	-	213	-	-	-	482	86,500	-	-	3,086
PERIOD 3e - ISFSI Decontamination																						
Period 3e Direct Decommissioning Activities																						
Period 3e Additional Costs																						
3e2.1	ISFSI License Termination	724	-	3	85	-	-	-	1,170	423	2,617	-	2,617	-	-	-	-	4,257	-	510,109	11,226	2,560
3e2	Subtotal Period 3e Additional Costs	724	-	3	85	-	-	-	1,170	423	2,617	-	2,617	-	-	-	-	4,257	-	510,109	11,226	2,560
Period 3e Collateral Costs																						
3e3.1	Small tool allowance	7	-	-	-	-	-	-	-	1	8	-	8	-	-	-	-	-	-	-	-	-
3e3	Subtotal Period 3e Collateral Costs	7	-	-	-	-	-	-	-	1	8	-	8	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																						
3e4.1	Insurance	-	-	-	-	-	-	-	158	16	174	-	174	-	-	-	-	-	-	-	-	-
3e4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e4.3	Heavy equipment rental	225	-	-	-	-	-	-	-	34	259	-	259	-	-	-	-	-	-	-	-	-
3e4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e4.5	Site O&M Cost	-	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	5,096
3e4.6	Security Staff Cost	-	-	-	-	-	-	-	193	29	222	-	222	-	-	-	-	-	-	-	-	3,866
3e4.7	Utility Staff Cost	225	-	-	-	-	-	-	258	39	297	-	297	-	-	-	-	-	-	-	-	8,961
3e4	Subtotal Period 3e Period-Dependent Costs	225	-	-	-	-	-	-	693	130	1,048	-	1,048	-	-	-	-	-	-	-	-	-
3e0	TOTAL PERIOD 3e COST	955	-	3	85	-	-	214	1,862	553	3,672	-	3,672	-	-	-	-	4,257	510,109	11,226	-	11,521
PERIOD 3f - ISFSI Site Restoration																						
Period 3f Direct Decommissioning Activities																						
Period 3f Additional Costs																						
3f2.1	ISFSI Site Restoration	1,186	-	-	-	-	-	-	42	184	1,412	-	1,412	-	-	-	-	-	-	-	3,120	160
3f2	Subtotal Period 3f Additional Costs	1,186	-	-	-	-	-	-	42	184	1,412	-	1,412	-	-	-	-	-	-	-	3,120	160
Period 3f Collateral Costs																						
3f3.1	Small tool allowance	2	-	-	-	-	-	-	-	0	3	-	3	-	-	-	-	-	-	-	-	-
3f3	Subtotal Period 3f Collateral Costs	2	-	-	-	-	-	-	-	0	3	-	3	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																						
3f4.1	Insurance	-	-	-	-	-	-	-	16	2	17	-	17	-	-	-	-	-	-	-	-	-
3f4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f4.3	Heavy equipment rental	73	-	-	-	-	-	-	-	11	84	-	84	-	-	-	-	-	-	-	-	-
3f4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f4.5	Site O&M Cost	-	-	-	-	-	-	-	40	6	46	-	46	-	-	-	-	-	-	-	-	-

Table C  
Clinton Power Station  
DECON Decommissioning Cost Estimate  
(Thousands of 2007 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	On-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		Burial Volumes		Burial/Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
														Cu. Feet	Cu. Feet	Class A Cu. Feet	Class B Cu. Feet			
Period 3 <sup>rd</sup> Period-Dependent Costs (continued)																				
33.4.6	Security Staff Cost	-	-	-	-	-	-	91	14	104	-	104	-	-	-	-	-	-	-	2,403
33.4.7	Utility Staff Cost	-	-	-	-	-	-	96	14	111	-	111	-	-	-	-	-	-	-	1,491
33.4	Subtotal Period 3 <sup>rd</sup> Period-Dependent Costs	-	73	-	-	-	-	243	47	363	-	363	-	-	-	-	-	-	-	3,894
33.0	TOTAL PERIOD 3 <sup>rd</sup> COST	-	1,262	-	-	-	-	285	231	1,777	-	1,777	-	-	-	-	-	-	3,120	4,054
<b>PERIOD 3 TOTALS</b>		-	50,224	378	85	-	8,365	56,030	16,867	131,948	9,949	43,814	78,184	-	482	596,609	516,990	664,600	-	664,600
TOTAL COST TO DECOMMISSION		14,680	128,652	13,444	8,914	22,229	41,768	434,071	122,323	786,061	547,591	155,245	85,225	482	36,744,250	2,053,353	4,455,077	-	4,455,077	-

TOTAL COST TO DECOMMISSION WITH 18.43% CONTINGENCY:	\$786,061	thousands of 2007 dollars
TOTAL NRC LICENSE TERMINATION COST IS 69.66% OR:	\$547,591	thousands of 2007 dollars
SPENT FUEL MANAGEMENT COST IS 19.75% OR:	\$155,245	thousands of 2007 dollars
NON-NUCLEAR DEMOLITION COST IS 10.59% OR:	\$83,225	thousands of 2007 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	197,021	cubic feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	482	cubic feet
TOTAL SCRAP METAL REMOVED:	75,356	tons
TOTAL CRAFT LABOR REQUIREMENTS:	2,053,353	man-hours

End Notes:

- a/g - 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**  
**DETAILED COST ANALYSIS**  
**DELAYED DECON**

Table D  
Clinton Power Station  
Delayed DECON Decommissioning Cost Estimate  
(Thousands of 2007 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.	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet			
<b>PERIOD 1a - Shutdown through Transition</b>																				
Period 1a Direct Decommissioning Activities																				
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	363	109	471	471	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	1,300
1a.1.3	Notification of Cessation of Operations	-	-	-	-	-	-	n/a	a	a	-	-	-	-	-	-	-	-	-	-
1a.1.4	Remove fuel & source material	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.5	Notification of Permanent Defueling	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.6	Deactivate plant systems & process waste	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	2,000
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	1,300
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-
1a.1.9	Perform detailed rad survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	136	20	156	156	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	454	68	522	522	-	-	-	-	-	-	-	-	5,000
<b>Activity Specifications</b>																				
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	446	67	513	513	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	378	57	435	435	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	283	42	325	325	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	1,470	220	1,690	1,690	-	-	-	-	-	-	-	-	16,207
<b>Detailed Work Procedures</b>																				
1a.1.17.1	Plant systems	-	-	-	-	-	-	107	16	123	123	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	216	32	249	249	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	9	1	10	10	-	-	-	-	-	-	-	-	100
1a.1.19	Drain/de-energize non-cont. systems	-	-	-	-	-	-	a	a	a	-	-	-	-	-	-	-	-	-	-
1a.1.20	Drain & dry NSSS	-	-	-	-	-	-	a	a	a	-	-	-	-	-	-	-	-	-	-
1a.1.21	Drain/de-energize contaminated systems	-	-	-	-	-	-	a	a	a	-	-	-	-	-	-	-	-	-	-
1a.1.22	Decon/secure contaminated systems	-	-	-	-	-	-	a	a	a	-	-	-	-	-	-	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	3,618	597	4,215	4,215	-	-	-	-	-	-	-	-	35,890
<b>Period 1a Period-Dependent Costs</b>																				
1a.4.1	Insurance	-	-	-	-	-	-	1,320	132	1,452	1,452	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	6,312	631	6,943	6,943	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	-	-	-	-	-	-	94	471	471	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	377	-	-	-	-	-	-	52	401	401	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	349	-	-	6	-	38	-	12	70	70	-	-	-	-	-	-	-	-	21
1a.4.6	Plant energy budget	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	238	26	264	264	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	450	45	495	495	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	250	37	287	287	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	738	111	849	849	-	-	-	-	-	-	-	-	-
1a.4.11	Security Staff Cost	-	-	-	-	-	-	5,955	893	6,848	6,848	-	-	-	-	-	-	-	-	157,471
1a.4.12	Utility Staff Cost	-	-	-	-	-	-	26,183	3,927	30,110	30,110	-	-	-	-	-	-	-	-	423,400

Table D  
Clinton Power Station  
Delayed DECON Decommissioning Cost Estimate  
(Thousands of 2007 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 Lc. Term. 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
1a.4	Subtotal Period 1a Period-Dependent Costs	-	726	14	6	-	38	42,429	6,106	49,319	47,975	1,343	-	-	-	-	13,531	21	580,871	
1a.0	TOTAL PERIOD 1a COST	-	726	14	6	-	38	46,047	6,703	53,533	52,190	1,343	-	-	-	-	13,531	21	616,761	
<b>PERIOD 1b - SAFSTOR Limited DECON Activities</b>																				
Period 1b Direct Decommissioning Activities																				
Decontamination of Site Buildings																				
1b.1.1.1	Reactor Building	2,771	-	-	-	-	-	-	1,385	4,156	4,156	-	-	-	-	-	-	-	-	-
1b.1.1.2	Auxiliary Building	305	-	-	-	-	-	-	153	458	458	-	-	-	-	-	-	-	-	56,016
1b.1.1.3	Control Building	353	-	-	-	-	-	-	177	530	530	-	-	-	-	-	-	-	-	6,485
1b.1.1.4	Diesel Generator Building	103	-	-	-	-	-	-	51	154	154	-	-	-	-	-	-	-	-	7,503
1b.1.1.5	Radiation Building	1,185	-	-	-	-	-	-	597	1,782	1,782	-	-	-	-	-	-	-	-	2,182
1b.1.1.6	Turbine Building	1,069	-	-	-	-	-	-	534	1,603	1,603	-	-	-	-	-	-	-	-	25,369
1b.1.1.7	Fuel Building	800	-	-	-	-	-	-	400	1,199	1,199	-	-	-	-	-	-	-	-	22,689
1b.1.1	Totals	6,595	-	-	-	-	-	-	3,298	9,893	9,893	-	-	-	-	-	-	-	-	16,275
1b.1	Subtotal Period 1b Activity Costs	6,595	-	-	-	-	-	-	3,298	9,893	9,893	-	-	-	-	-	-	-	-	136,519
Period 1b Additional Costs																				
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	9,133	1,370	10,503	10,503	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	9,133	1,370	10,503	10,503	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																				
1b.3.1	Decon equipment	726	-	-	-	-	-	-	109	834	834	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	179	-	-	-	-	113	-	177	883	883	-	-	-	-	-	-	-	-	-
1b.3.3	Small tool allowance	103	-	-	-	-	-	-	15	119	119	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	904	103	64	351	-	113	-	301	1,836	1,836	-	-	-	-	-	-	-	-	-
Period 1b Period-Dependent Costs																				
1b.4.1	Decon supplies	2,110	-	-	-	-	-	-	528	2,638	2,638	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	333	33	366	366	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,061	106	1,167	1,167	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	573	-	-	-	-	-	143	716	716	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	88	-	-	-	-	-	13	101	101	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	-	13	-	85	-	26	157	157	-	-	-	-	-	-	-	-	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	243	36	279	279	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	65	7	72	72	-	-	-	-	-	-	-	-	46
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	113	9	125	125	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,501	225	1,726	1,726	-	-	-	-	-	-	-	-	-
1b.4.12	Security Staff Cost	-	-	-	-	-	-	6,599	990	7,589	7,589	-	-	-	-	-	-	-	-	39,691
1b.4.13	Utility Staff Cost	-	-	-	-	-	-	10,164	2,157	14,884	14,884	-	-	-	-	-	-	-	-	106,720
1b.4	Subtotal Period 1b Period-Dependent Costs	2,110	661	32	13	-	85	10,164	2,157	15,223	14,884	339	-	-	-	-	30,535	46	-	146,411
1b.0	TOTAL PERIOD 1b COST	9,610	764	96	364	-	198	19,298	7,125	37,455	37,116	339	-	-	-	-	103,580	136,803	-	146,411

Table D  
Clinton Power Station  
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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					
<b>PERIOD 1c - Preparations for SAFSTOR Dormancy</b>																						
Period 1c Direct Decommissioning Activities																						
Ic.1.1	Prepare support equipment for storage	-	405	-	-	-	-	-	61	466	466	-	-	-	-	-	-	-	-	3,000	-	
Ic.1.2	Install containment pressure equal lines	-	35	-	-	-	-	-	5	41	41	-	-	-	-	-	-	-	-	700	-	
Ic.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	14,885	-	
Ic.1.4	Secure building accesses	-	-	-	-	-	-	-	8	61	61	-	-	-	-	-	-	-	-	-	583	
Ic.1.5	Prepare & submit interim report	-	-	-	-	-	-	-	294	1,520	1,520	-	-	-	-	-	-	-	-	18,583	583	
Ic.1	Subtotal Period 1c Activity Costs	-	440	-	-	-	-	786	294	1,520	1,520	-	-	-	-	-	-	-	-	18,583	583	
Period 1c Collateral Costs																						
Ic.3.1	Process liquid waste	133	-	47	260	-	84	-	131	655	655	-	-	-	-	-	-	-	904	-	176	-
Ic.3.2	Small tool allowance	-	3	-	-	-	-	-	0	4	4	-	-	-	-	-	-	-	-	-	-	-
Ic.3	Subtotal Period 1c Collateral Costs	133	3	47	260	-	84	-	132	659	659	-	-	-	-	-	-	-	904	-	176	-
Period 1c Period-Dependent Costs																						
Ic.4.1	Insurance	-	-	-	-	-	-	329	33	362	362	-	-	-	-	-	-	-	-	-	-	-
Ic.4.2	Property taxes	-	-	-	-	-	-	1,049	105	1,154	1,154	-	-	-	-	-	-	-	-	-	-	-
Ic.4.3	Health physics supplies	160	-	-	-	-	-	-	40	199	199	-	-	-	-	-	-	-	-	-	-	-
Ic.4.4	Heavy equipment rental	87	-	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	-	-	-
Ic.4.5	Disposal of DAW generated	-	-	4	1	-	9	-	3	17	17	-	-	-	-	-	-	-	168	-	5	-
Ic.4.6	Plant energy budget	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-	-
Ic.4.7	NRC Fees	-	-	-	-	-	-	64	6	71	71	-	-	-	-	-	-	-	-	-	-	-
Ic.4.8	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	123	-	-	-	-	-	-	-	-	-	-	-
Ic.4.9	Site O&M Cost	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-	-
Ic.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	184	28	212	212	-	-	-	-	-	-	-	-	-	-	-
Ic.4.11	Security Staff Cost	-	-	-	-	-	-	1,485	223	1,707	1,707	-	-	-	-	-	-	-	-	-	-	-
Ic.4.12	Utility Staff Cost	-	-	-	-	-	-	6,528	979	7,507	7,507	-	-	-	-	-	-	-	-	-	-	-
Ic.4	Subtotal Period 1c Period-Dependent Costs	-	247	4	1	-	9	10,054	1,486	11,801	11,466	-	-	-	-	-	-	-	168	-	5	-
Ic.0	TOTAL PERIOD 1c COST	133	690	51	262	-	93	10,839	1,912	13,980	13,645	-	-	-	-	-	-	-	1,072	-	18,774	145,403
PERIOD 1 TOTALS		9,743	2,180	162	652	-	329	76,184	15,740	104,968	102,952	-	-	-	-	-	-	-	4,488	-	155,598	908,576
<b>PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage</b>																						
Period 2a Direct Decommissioning Activities																						
2a.1.1	Quarterly Inspection	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.2	Semi-annual environmental survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.3	Prepare reports	-	-	-	-	-	-	1,345	202	1,547	-	-	-	-	-	-	-	-	-	1,547	-	-
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	1,353	338	1,691	-	-	-	-	-	-	-	-	-	1,691	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	2,698	540	3,237	-	-	-	-	-	-	-	-	-	3,237	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	5,436	1,080	6,516	-	-	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																						
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	16,000	2,400	18,400	-	-	-	-	-	-	-	-	-	-	18,400	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	16,000	2,400	18,400	-	-	-	-	-	-	-	-	-	-	18,400	-
Period 2a Period-Dependent Costs																						
2a.4.1	Insurance	-	-	-	-	-	-	5,455	546	6,001	-	-	-	-	-	-	-	-	-	-	6,001	-
2a.4.2	Property taxes	-	-	-	-	-	-	12,360	1,256	13,596	-	-	-	-	-	-	-	-	-	-	13,596	-



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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	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				
Period 2a Period-Dependent Costs (continued)																					
2a.4.3	Health physics supplies	-	926	-	-	-	-	-	231	1,157	-	1,157	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	104	43	-	272	-	85	504	-	504	-	-	-	-	-	-	-	-	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	2,074	311	2,385	-	2,385	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	2,921	232	3,153	-	2,953	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	2,191	215	2,366	-	2,366	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	2,689	403	3,092	-	3,092	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	7,941	1,191	9,132	-	9,132	-	-	-	-	-	-	-	-	-
2a.4.10	Security Staff Cost	-	-	-	-	-	-	45,200	6,780	51,981	-	51,981	-	-	-	-	-	-	-	-	1,195,234
2a.4.11	Utility Staff Cost	-	-	-	-	-	-	56,198	8,430	64,628	-	64,628	-	-	-	-	-	-	-	-	830,491
2a.4	Subtotal Period 2a Period-Dependent Costs	-	926	104	43	-	272	136,388	19,660	157,393	-	157,393	-	-	-	-	-	-	-	-	97,849
2a.0	TOTAL PERIOD 2a COST	-	926	104	43	-	272	155,086	22,600	179,031	-	179,031	-	-	-	-	-	-	-	-	97,849
PERIOD 2 TOTALS																					
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3a.1.4	End product description	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define main work sequence	-	-	-	-	-	-	102	102	782	782	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SFR and EA	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	494	68	522	522	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	372	36	427	427	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	668	100	769	692	-	-	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	378	57	435	391	-	-	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	644	97	741	741	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	590	88	678	678	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Sacrificial shield	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Moisture separators/reheaters	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	145	22	167	83	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	189	28	218	218	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.9	Main Condensers	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.11	Drywell	-	-	-	-	-	-	283	42	325	163	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.13	Waste management	-	-	-	-	-	-	82	12	94	47	-	-	-	-	-	-	-	-	-	900
3a.1.11.14	Facility & site closeout	-	-	-	-	-	-	4,098	607	4,655	4,242	-	-	-	-	-	-	-	-	-	44,633
3a.1.11	Total	-	-	-	-	-	-	218	33	250	250	-	-	-	-	-	-	-	-	-	2,400
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.13	Plant prep. & temp. svees	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,400
3a.1.14	Design water clean-up system	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.15	Rigging/Cont. Contrl Env/ps/tooling/etc.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A		Class B		Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet			
3a.1.16	Procure cashliners & containers	-	-	-	-	-	-	112	17	128	128	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	11,501	1,725	13,227	12,813	-	413	-	-	-	-	-	-	-	77,559
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	458	46	504	504	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	999	100	1,099	1,099	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	330	-	-	-	-	-	-	82	412	412	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	349	-	-	-	-	-	-	52	401	401	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	-	5	-	32	-	10	89	89	-	-	-	570	-	-	-	-	-	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	-	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	258	26	284	284	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	250	37	287	287	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	2,465	370	2,835	2,835	-	-	-	-	-	-	-	-	-	-
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	16,145	2,422	18,567	18,567	-	-	-	-	-	-	-	-	-	65,179
3a.4	Subtotal Period 3a Period-Dependent Costs	678	-	-	5	-	32	21,539	3,290	25,556	25,556	-	-	-	570	-	-	-	-	-	258,629
3a.0	TOTAL PERIOD 3a COST	678	-	-	5	-	32	33,040	5,015	38,782	38,369	-	413	-	570	-	-	-	-	-	323,807
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	429	64	494	444	-	-	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	963	54	417	417	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	122	18	141	85	-	-	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD housings & NIs	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	Incore instrumentation	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Removal primary contamination	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	329	49	379	379	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closure	-	-	-	-	-	-	109	16	125	63	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	91	14	104	52	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.11	Main Turbine	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12	Main Condensers	-	-	-	-	-	-	189	28	217	218	-	-	-	-	-	-	-	-	-	2,088
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.14	Radwaste building	-	-	-	-	-	-	248	37	285	256	-	-	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	2,970	445	3,415	3,088	-	-	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	2,970	445	3,415	3,088	-	-	-	-	-	-	-	-	-	32,741
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	887	269	1,167	1,167	-	-	-	-	-	-	-	-	-	-
3b.2.2	Hazardous liquid disposal	-	-	-	7	-	411	-	104	523	523	-	-	-	-	-	-	-	-	-	89,546
3b.2.3	Contaminated asbestos disposal	-	-	-	8	-	5	-	2	15	15	-	-	-	60	-	-	-	-	-	1,800
3b.2.4	Clean asbestos disposal	-	-	-	-	-	-	2	0	2	2	-	-	-	-	-	-	-	-	-	-
3b.2	Subtotal Period 3b Additional Costs	-	-	-	15	-	416	900	376	1,707	1,707	-	-	-	1,631	-	-	-	-	-	91,346
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	726	-	-	-	-	-	-	109	834	834	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	-	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-

Table D  
Clinton Power Station  
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(Thousands of 2007 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	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				
3b.3	Subtotal Period 3b Collateral Costs	726	957	-	-	-	-	829	377	2,887	2,887	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	22	-	-	-	-	-	254	6	28	28	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	501	25	280	280	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	50	50	51	51	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	182	-	-	-	-	-	-	46	228	228	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	175	-	-	-	-	-	-	26	201	201	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	7	3	-	18	-	6	33	33	-	-	-	-	-	-	-	-	-	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	483	72	556	556	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,236	185	1,421	1,421	-	-	-	-	-	-	-	-	-	-
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,799	570	4,369	4,369	-	-	-	-	-	-	-	-	-	-
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	8,094	1,214	9,309	9,309	-	-	-	-	-	-	-	-	-	-
3b.4	Subtotal Period 3b Period-Dependent Costs	22	357	7	3	-	18	14,622	2,232	17,261	17,261	-	-	-	-	-	-	-	-	-	-
3b.0	TOTAL PERIOD 3b COST	748	1,314	7	18	-	434	19,320	3,430	25,271	24,944	-	327	-	1,954	-	-	97,822	10	253,648	-
PERIOD 3 TOTALS																					
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	10	40	8	9	-	99	-	42	209	209	-	-	-	530	-	-	64,091	1,078	-	-
4a.1.1.2	Recirculation Pumps & Motors	10	38	13	29	18	263	-	89	460	460	-	-	-	2,473	-	-	187,000	1,145	-	-
4a.1.1.3	CRDMs & NIS Removal	42	158	321	82	-	203	-	196	962	962	-	-	-	6,985	-	-	131,119	4,212	-	-
4a.1.1.4	Reactor Vessel Internals	112	2,300	3,613	973	-	5,407	213	5,663	18,281	18,281	-	-	-	1,753	1,502	-	342,025	28,950	1,290	-
4a.1.1.5	Vessel & Internals GTCC Disposal	-	-	-	-	-	-	-	1,223	9,374	9,374	-	-	-	-	-	-	482	86,500	-	-
4a.1.1.6	Reactor Vessel	-	5,325	1,351	375	-	2,056	213	5,485	14,805	14,805	-	-	-	13,057	-	-	1,326,615	28,950	1,290	-
4a.1.1	Totals	175	7,861	5,307	1,468	18	16,180	425	12,657	44,091	44,091	-	-	250	24,798	1,502	287	2,137,350	64,336	2,580	-
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	307	885	180	2,586	152	-	618	4,729	4,729	-	-	54,728	1,613	-	-	2,607,544	6,446	-	-
4a.1.3	Main Condensers	-	1,051	952	194	2,781	163	-	845	5,985	5,985	-	-	58,848	1,735	-	-	2,803,815	22,050	-	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	905	-	-	-	-	-	136	1,041	1,041	-	-	-	-	-	-	-	11,450	-	-
4a.1.4.2	Auxiliary Building	-	216	-	-	-	-	-	248	248	248	-	-	-	-	-	-	-	2,582	-	-
4a.1.4.3	Radwaste Building	-	500	-	-	-	-	-	75	575	575	-	-	-	-	-	-	-	6,493	-	-
4a.1.4.4	Turbine Building	-	508	-	-	-	-	-	76	585	585	-	-	-	-	-	-	-	6,771	-	-
4a.1.4.5	Fuel Building	-	237	-	-	-	-	-	36	273	273	-	-	-	-	-	-	-	2,912	-	-
4a.1.4	Totals	-	2,367	-	-	-	-	-	355	2,722	2,722	-	-	-	-	-	-	-	30,209	-	-
Disposal of Plant Systems																					
4a.1.5.1	Acid Feed & Handling	-	26	1	1	21	-	-	10	59	59	-	-	488	-	-	-	19,822	533	-	-
4a.1.5.2	Auxiliary Steam	-	484	13	19	319	-	-	173	1,008	1,008	-	-	7,493	-	-	-	304,278	9,740	-	-
4a.1.5.3	Breathing Air	-	36	-	-	-	-	-	5	42	42	-	-	-	-	-	-	-	820	-	-
4a.1.5.4	CO2 & Generator Purge	-	16	-	-	-	-	-	2	18	18	-	-	42	-	-	-	-	349	-	-
4a.1.5.5	Caustic Handling	-	13	0	0	8	-	-	5	26	26	-	-	183	-	-	-	7,431	256	-	-
4a.1.5.6	Chem Radwaste Reprocessing & Disposal	-	351	39	36	94	168	-	153	841	841	-	-	2,211	2,121	-	-	249,902	7,339	-	-

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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	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			
4a.1.5.7	Chilled Water - RCA	-	1,035	27	40	679	-	-	369	2,149	2,149	-	-	15,914	-	-	646,286	20,760	-	
4a.1.5.8	Chilled Water Non-RCA	-	166	-	-	-	-	-	25	191	191	-	191	-	-	-	-	3,682	-	
4a.1.5.9	Chlorination	-	44	-	-	-	-	-	7	51	51	-	51	-	-	-	-	953	-	
4a.1.5.10	Circulating Water - RCA	-	161	16	24	400	-	-	105	706	706	-	9,379	-	-	380,877	3,419	-		
4a.1.5.11	Circulating Water Non-RCA	-	51	-	-	-	-	-	8	58	58	-	58	-	-	-	-	1,090	-	
4a.1.5.12	Crntmnt Aux & Fuel Bldg Equip Drains	-	81	5	5	8	24	-	28	150	150	-	187	-	-	30,046	1,627	-		
4a.1.5.13	Crntmnt Aux & Fuel Bldg Floor Drains	-	139	8	8	34	32	-	50	271	271	-	792	-	-	62,936	2,852	-		
4a.1.5.14	Component Cooling Water Non-RCA	-	119	-	-	-	-	-	18	137	137	-	137	-	-	-	-	2,622	-	
4a.1.5.15	Condensate	-	810	159	174	584	772	-	525	3,024	3,024	-	13,689	-	-	1,291,159	17,379	-		
4a.1.5.16	Condensate Booster	-	766	161	178	543	806	-	517	2,971	2,971	-	12,724	-	-	1,284,382	16,493	-		
4a.1.5.17	Condensate Polishing	-	619	46	45	188	188	-	241	1,327	1,327	-	4,398	-	-	357,430	12,843	-		
4a.1.5.18	Condenser Vacuum	-	179	17	25	430	-	-	115	767	767	-	10,094	-	-	409,927	3,731	-		
4a.1.5.19	Containment Combustible Gas	-	67	4	4	33	14	-	26	149	149	-	781	-	-	44,863	1,396	-		
4a.1.5.20	Cycled Condensate	-	555	41	40	181	163	-	217	1,197	1,197	-	4,242	-	-	327,937	11,485	-		
4a.1.5.21	Drywell Cooling	-	437	20	25	242	62	-	167	952	952	-	5,664	-	-	288,770	8,570	-		
4a.1.5.22	Drywell Purge	-	124	11	15	118	42	-	63	373	373	-	2,764	-	-	152,687	2,624	-		
4a.1.5.23	ECCS Equipment Cooling	-	65	2	4	51	3	-	25	150	150	-	1,190	-	-	51,154	1,312	-		
4a.1.5.24	Extraction Steam	-	424	54	63	236	271	-	224	1,272	1,272	-	5,531	-	-	482,498	9,036	-		
4a.1.5.26	Feedwater Heater Drains Turbine Cycle	-	464	88	100	331	445	-	301	1,730	1,730	-	7,772	-	-	739,273	9,995	-		
4a.1.5.27	Feedwater Heater Misc.	-	1,109	112	126	507	527	-	515	2,897	2,897	-	11,899	-	-	985,459	23,395	-		
4a.1.5.28	Filtered Water	-	172	13	13	29	62	-	66	357	357	-	685	-	-	87,316	3,553	-		
4a.1.5.29	Generator Hydrogen Seal Oil	-	25	0	1	10	-	-	8	44	44	-	4	-	-	-	86	-		
4a.1.5.30	Generator Stator Cooling	-	16	0	1	9	-	-	6	32	32	-	207	-	-	9,883	469	-		
4a.1.5.31	High Pressure Core Spray	-	225	36	39	131	170	-	128	728	728	-	3,077	-	-	287,000	4,792	-		
4a.1.5.32	Hydrogen	-	22	0	0	7	-	-	7	36	36	-	168	-	-	6,815	403	-		
4a.1.5.33	Laundry Equip & Flr Drains RW Reprocess	-	189	14	14	90	49	-	77	433	433	-	2,116	-	-	132,817	3,941	-		
4a.1.5.34	Leak Detection	-	37	1	1	1	3	-	10	53	53	-	30	-	-	3,822	837	-		
4a.1.5.35	Local Instrument Panels	-	5	-	-	-	-	-	1	6	6	-	6	-	-	-	116	-		
4a.1.5.36	Low Pressure Core Spray	-	86	21	21	65	97	-	61	352	352	-	1,535	-	-	154,545	1,855	-		
4a.1.5.37	Machine Shop Equipment	-	10	0	1	10	-	-	4	25	25	-	225	-	-	9,119	216	-		
4a.1.5.38	Machine Shop Ventilation	-	201	5	8	114	7	-	71	405	405	-	2,665	-	-	114,605	3,671	-		
4a.1.5.39	Main Steam	-	746	74	80	298	347	-	337	1,882	1,882	-	6,987	-	-	614,246	15,676	-		
4a.1.5.40	Main Steam Isolation Valve	-	19	1	1	1	4	-	6	33	33	-	23	-	-	47	381	-		
4a.1.5.41	Make-up Demineralizer - RCA	-	184	4	6	103	-	-	63	360	360	-	2,419	-	-	98,255	3,595	-		
4a.1.5.42	Make-up Demineralizer Non-RCA	-	208	-	-	-	-	-	31	239	239	-	239	-	-	-	4,416	-		
4a.1.5.43	Makeup Condensate Storage	-	216	15	14	22	67	-	78	412	412	-	518	-	-	85,161	4,359	-		
4a.1.5.44	Misc. Building Drains	-	16	-	-	-	-	-	2	19	19	-	19	-	-	-	357	-		
4a.1.5.45	Miscellaneous Ventilation	-	30	-	-	-	-	-	4	34	34	-	34	-	-	-	643	-		
4a.1.5.46	Nuclear Boiler	-	15	1	1	1	3	-	5	24	24	-	17	-	-	3,359	324	-		
4a.1.5.47	Oil Transfer	-	90	4	6	104	-	-	39	243	243	-	2,429	-	-	98,662	1,834	-		
4a.1.5.48	Reactor Core Isolation Cooling	-	194	15	15	77	57	-	78	436	436	-	1,796	-	-	127,607	4,075	-		
4a.1.5.49	Refrigeration Piping	-	17	-	-	-	-	-	3	20	20	-	20	-	-	-	388	-		
4a.1.5.50	Sanitizers	-	151	-	-	-	-	-	23	174	174	-	174	-	-	-	3,202	-		
4a.1.5.51	Screen Houses & MU Pump House Ventilation	-	31	-	-	-	-	-	5	36	36	-	36	-	-	-	736	-		
4a.1.5.52	Standby Liquid Control	-	26	1	1	18	-	-	9	55	55	-	413	-	-	16,763	529	-		
4a.1.5.53	Swirlgear Heat Removal	-	16	-	-	-	-	-	2	19	19	-	19	-	-	-	356	-		
4a.1.5.54	Turbine Building Closed Cooling Water	-	148	4	5	90	-	-	52	289	289	-	2,106	-	-	85,531	2,948	-		
4a.1.5.55	Turbine Electrohydraulic Control	-	9	0	4	4	-	-	3	16	16	-	84	-	-	3,405	185	-		
4a.1.5.56	Turbine Gen Misc Drains & Vents	-	45	2	2	6	9	-	15	80	80	-	136	-	-	14,138	900	-		
4a.1.5.57	Turbine Gland Seal Steam	-	300	40	50	453	130	-	187	1,161	1,161	-	10,629	-	-	555,788	6,310	-		
4a.1.5.58	Turbine Oil	-	48	4	4	37	18	-	23	137	137	-	866	-	-	52,601	1,021	-		

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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total 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				
Disposal of Plant Systems (continued)																				
4a.1.5.59	Turbine-Gen Aux. & Misc Devices	-	214	51	62	289	250	-	174	1,041	-	-	6,779	2,656	-	-	513,573	4,683	-	
4a.1.5	Totals	-	12,060	1,131	1,280	6,974	4,792	-	5,473	31,710	-	1,048	163,551	51,880	-	-	11,205,730	251,495	-	
Scaffolding in support of decommissioning																				
4a.1.6	Scaffolding in support of decommissioning	-	2,745	50	11	140	17	-	718	3,682	-	-	2,969	185	-	-	150,174	63,258	-	
4a.1	Subtotal Period 4a Activity Costs	175	26,391	8,324	3,134	12,499	21,305	425	20,667	92,919	-	1,048	290,345	80,211	1,502	287	482	18,904,620	437,793	2,580
Period 4a Additional Costs																				
4a.2.1	Disposal of stored turbine rotors	-	17	100	40	743	-	-	130	1,030	-	-	15,719	-	-	-	707,358	352	-	
4a.2	Subtotal Period 4a Additional Costs	-	17	100	40	743	-	-	130	1,030	-	-	15,719	-	-	-	707,358	352	-	
Period 4a Collateral Costs																				
4a.3.1	Process liquid waste	55	-	20	111	-	36	-	55	278	-	-	-	386	-	-	-	23,185	75	-
4a.3.2	Small tool allowance	-	325	-	-	-	-	-	49	373	-	-	-	-	-	-	-	-	-	
4a.3	Subtotal Period 4a Collateral Costs	55	325	20	111	-	36	-	104	652	-	-	-	386	-	-	-	23,185	75	-
Period 4a Period-Dependent Costs																				
4a.4.1	Decon supplies	60	-	-	-	-	-	-	15	75	-	-	-	-	-	-	-	-	-	
4a.4.2	Insurance	-	-	-	-	-	-	690	-	759	-	-	-	-	-	-	-	-	-	
4a.4.3	Property taxes	-	-	-	-	-	-	1,361	-	1,347	-	-	-	-	-	-	-	-	-	
4a.4.4	Health physics supplies	2,037	-	-	-	-	-	-	509	2,547	-	-	-	-	-	-	-	-	-	
4a.4.5	Heavy equipment rental	2,320	-	-	-	-	-	-	348	2,668	-	-	-	-	-	-	-	-	-	
4a.4.6	Disposal of DAW generated	-	-	177	73	-	464	-	145	859	-	-	-	8,323	-	-	166,794	254	-	
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,246	187	1,433	-	-	-	-	-	-	-	-	-	
4a.4.8	NRC Fees	-	-	-	-	-	-	468	47	515	-	-	-	-	-	-	-	-	-	
4a.4.9	Site O&M Cost	-	-	-	-	-	-	340	51	391	-	-	-	-	-	-	-	-	-	
4a.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	506	76	582	-	-	-	-	-	-	-	-	-	
4a.4.11	Security Staff Cost	-	-	-	-	-	-	3,356	503	3,860	-	-	-	-	-	-	-	-	-	
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	12,669	1,900	14,569	-	-	-	-	-	-	-	-	-	
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	22,201	3,350	25,531	-	-	-	-	-	-	-	-	-	
4a.4	Subtotal Period 4a Period-Dependent Costs	60	4,357	177	73	-	464	42,838	7,317	55,286	-	150	-	8,323	-	-	166,794	254	639,710	
4a.0	TOTAL PERIOD 4a COST	291	31,090	8,621	3,357	13,241	21,805	43,263	28,218	149,887	-	1,235	296,064	88,920	1,502	287	482	19,801,950	438,475	642,290
PERIOD 4b - Site Decontamination																				
Period 4b Direct Decommissioning Activities																				
4b.1.1	Remove spent fuel rods	452	45	92	104	-	572	-	405	1,668	-	-	-	6,066	-	-	544,292	1,017	-	
Disposal of Plant Systems																				
4b.1.2.1	Component Cooling Water - RCA	-	178	4	6	101	-	-	61	350	-	-	2,361	-	-	-	95,865	3,548	-	
4b.1.2.2	Containment Monitoring	-	50	1	1	4	4	-	15	76	-	-	98	44	-	-	7,962	1,115	-	
4b.1.2.3	Control Rod Drive	-	357	19	19	57	88	-	124	684	-	-	1,333	930	-	-	137,526	7,399	-	
4b.1.2.4	Diesel Fuel Oil	-	59	-	-	-	-	-	9	68	-	-	-	-	-	-	-	1,256	-	
4b.1.2.5	Diesel General	-	52	-	-	-	-	-	8	60	-	-	-	-	-	-	-	1,133	-	
4b.1.2.6	Diesel-Generator Room Ventilation	-	77	-	-	-	-	-	12	88	-	-	-	-	-	-	-	88	-	
4b.1.2.7	Drains-Laundry to Radwaste	-	15	-	1	1	4	-	5	27	-	-	34	39	-	-	4,837	302	-	
4b.1.2.8	Electrical - Clean Non-RCA	1,545	-	-	-	-	-	-	232	1,777	-	-	-	-	-	-	-	-	-	
4b.1.2.9	Electrical - Clean RCA	6,131	-	125	188	3,190	-	2,052	11,657	11,657	-	-	74,814	-	-	-	3,038,244	126,548	-	
4b.1.2.10	Electrical - Contaminated	909	-	16	23	335	-	385	1,591	1,591	-	-	7,867	209	-	-	338,266	19,043	-	
4b.1.2.11	Equip Drain Radwaste Reprocessing	1,018	-	69	67	307	271	-	385	2,118	-	-	7,207	3,254	-	-	551,230	21,073	-	
4b.1.2.12	Fire Protection - RCA	-	616	15	23	385	-	-	217	1,255	-	-	9,018	-	-	-	366,214	12,406	-	

Table D  
Clinton Power Station  
Delayed DECON Decommissioning Cost Estimate  
(Thousands of 2007 Dollars)

Activity Index	Activity Description	Decom Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	NRC Lic. Term. Costs		Spent Fuel Management Costs	Site Restoration Costs	Processed Volume		Burial Volumes		Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
											Lic. Term. Costs	Costs			Cu. Feet	Cu. Feet	Class A Cu. Feet	Class B Cu. Feet				Class C Cu. Feet
4b.1.2.13	Disposal of Plant Systems (continued)	-	154	-	-	-	-	-	23	177	-	-	-	177	-	-	-	-	-	-	3,416	-
4b.1.2.14	Floor Drain Radwaste Reprocessing	-	634	54	55	235	227	264	1,468	1,468	1,468	-	-	-	5,507	2,655	-	-	439,585	-	13,131	-
4b.1.2.15	Fuel Handling & Transfer	-	22	2	2	7	9	9	9	82	82	-	-	-	173	99	-	-	15,919	-	465	-
4b.1.2.16	Fuel Pool Cooling & Cleanup	-	783	92	92	277	417	365	2,026	2,026	2,026	-	-	-	6,503	4,489	-	-	660,961	-	16,306	-
4b.1.2.17	Fuel Support	-	88	10	12	47	52	45	285	285	285	-	-	-	1,100	556	-	-	94,583	-	1,906	-
4b.1.2.18	HVAC - Auxiliary Building	-	28	3	2	23	3	12	69	69	69	-	-	-	540	36	-	-	25,200	-	583	-
4b.1.2.19	HVAC - Containment Building	-	661	33	45	477	93	270	1,579	1,579	1,579	-	-	-	11,185	985	-	-	542,563	-	12,668	-
4b.1.2.20	HVAC - Control Room	-	242	-	-	-	-	36	279	279	-	-	-	279	-	-	-	-	-	-	5,686	-
4b.1.2.21	HVAC - Fuel Building	-	283	8	11	161	10	100	574	574	574	-	-	-	3,782	107	-	-	163,158	-	5,156	-
4b.1.2.22	HVAC - Laboratory	-	456	13	18	257	17	161	921	921	921	-	-	-	6,035	181	-	-	261,272	-	8,390	-
4b.1.2.23	HVAC - Off Gas Building	-	115	6	7	64	18	45	255	255	255	-	-	-	1,499	192	-	-	78,082	-	2,299	-
4b.1.2.24	HVAC - Radwaste Building	-	644	21	30	395	37	236	1,363	1,363	1,363	-	-	-	9,269	389	-	-	411,319	-	11,921	-
4b.1.2.25	HVAC - Service Building	-	52	-	-	-	-	8	60	60	-	-	-	60	-	-	-	-	-	-	1,145	-
4b.1.2.26	HVAC - Turbine Building	-	532	15	22	316	20	190	1,097	1,097	1,097	-	-	-	7,421	211	-	-	320,323	-	9,709	-
4b.1.2.27	Hoists Cranes & Elevators	-	6	-	-	-	-	1	7	7	-	-	-	7	-	-	-	-	-	-	123	-
4b.1.2.28	Instrument Air - RCA	-	374	5	7	115	-	112	613	613	613	-	-	-	2,708	-	-	-	109,971	-	7,089	-
4b.1.2.29	Instrument Air Non-RCA	-	17	-	-	-	-	3	20	20	-	-	-	20	-	-	-	-	-	-	389	-
4b.1.2.30	Off Gas	-	154	9	10	64	33	59	328	328	328	-	-	-	1,490	352	-	-	91,689	-	3,152	-
4b.1.2.31	Plant Service Water - RCA	-	176	5	8	130	-	65	384	384	384	-	-	-	3,043	-	-	-	123,583	-	3,532	-
4b.1.2.32	Plant Service Water Non-RCA	-	156	-	-	-	-	23	180	180	-	-	-	180	-	-	-	-	-	-	3,494	-
4b.1.2.33	Portable Water	-	11	-	-	-	-	2	12	12	-	-	-	12	-	-	-	-	-	-	231	-
4b.1.2.34	Process Radiation Monitoring	-	84	4	3	11	13	27	142	142	142	-	-	-	253	142	-	-	23,024	-	1,694	-
4b.1.2.35	Process Sampling	-	414	19	14	32	68	129	678	678	678	-	-	-	758	722	-	-	95,460	-	8,370	-
4b.1.2.36	Reactor Recirculation	-	42	4	4	6	21	18	95	95	95	-	-	-	140	923	-	-	25,687	-	876	-
4b.1.2.37	Reactor Water Clean-up	-	257	20	21	48	101	102	549	549	549	-	-	-	1,133	1,086	-	-	141,994	-	5,295	-
4b.1.2.38	Residual Heat Removal	-	481	87	89	278	402	285	1,623	1,623	1,623	-	-	-	6,526	4,271	-	-	648,075	-	10,242	-
4b.1.2.39	Screen Wash	-	6	-	-	-	-	1	7	7	-	-	-	7	-	-	-	-	-	-	132	-
4b.1.2.40	Service Air - RCA	-	230	4	6	106	-	75	421	421	421	-	-	-	2,476	-	-	-	100,556	-	4,507	-
4b.1.2.41	Service Air Non-RCA	-	14	-	-	-	-	2	16	16	-	-	-	16	-	-	-	-	-	-	309	-
4b.1.2.42	Shutdown Service Water - RCA	-	92	2	4	63	-	33	195	195	195	-	-	-	1,481	-	-	-	60,155	-	1,829	-
4b.1.2.43	Shutdown Service Water Non-RCA	-	99	-	-	-	-	15	114	114	-	-	-	114	-	-	-	-	-	-	2,196	-
4b.1.2.44	Solid Radwaste Reprocessing & Disposal	-	509	33	33	157	132	192	1,057	1,057	1,057	-	-	-	3,684	1,568	-	-	275,491	-	10,528	-
4b.1.2.45	Standby Gas Treatment	-	60	2	2	22	4	20	109	109	109	-	-	-	513	39	-	-	24,299	-	1,226	-
4b.1.2.46	Suppression Pool Cleanup & Transfer	-	96	9	9	26	43	41	224	224	224	-	-	-	615	453	-	-	65,567	-	2,006	-
4b.1.2.47	Suppression Pool Make-up	-	44	7	8	32	36	27	154	154	154	-	-	-	742	383	-	-	64,491	-	947	-
4b.1.2.48	Turb OG RW Cntrl & DG Bldg Equip Drains	-	181	11	10	18	48	63	330	330	330	-	-	-	425	512	-	-	62,620	-	3,649	-
4b.1.2.49	Turb OG RW Cntrl & DG Bldg Floor Drains	-	295	20	19	91	75	111	610	610	610	-	-	-	2,128	890	-	-	157,436	-	6,080	-
4b.1.2	Totals	-	19,502	746	873	7,840	2,284	6,574	37,799	37,799	37,799	-	-	2,862	183,862	25,018	-	-	9,623,137	-	398,872	-
4b.1.3	Scaffolding in support of decommissioning	-	4,118	74	17	210	26	1,078	5,523	5,523	5,523	-	-	-	4,453	277	-	-	225,261	-	94,887	-
4b.1.4	Decommissioning of Site Buildings	-	2,504	3,131	464	330	1,843	2,656	11,341	11,341	11,341	-	-	-	7,734	24,635	-	-	2,570,182	-	113,912	-
4b.1.4.1	Reactor Building	-	293	171	38	50	87	895	895	895	895	-	-	-	1,171	1,733	-	-	217,879	-	9,073	-
4b.1.4.2	Auxiliary Building	-	338	130	29	2	91	253	862	862	862	-	-	-	56	1,825	-	-	184,549	-	9,146	-
4b.1.4.3	Control Building	-	98	34	8	-	25	66	242	242	242	-	-	-	300	-	-	-	49,962	-	2,594	-
4b.1.4.4	Diesel Generator Building	-	1,146	513	105	45	330	1,067	3,105	3,105	3,105	-	-	-	1,067	6,612	-	-	701,151	-	32,401	-
4b.1.4.5	Radwaste Building	-	1,027	589	129	117	298	769	2,976	2,976	2,976	-	-	-	2,735	5,944	-	-	689,469	-	30,575	-
4b.1.4.6	Turbine Building	-	738	700	33	43	110	594	2,312	2,312	2,312	-	-	-	2,574	1,829	-	-	284,744	-	28,187	-
4b.1.4.7	Fuel Building	-	6,147	5,218	714	863	2,767	5,369	21,732	21,732	21,732	-	-	-	15,337	43,078	-	-	4,707,935	-	226,888	-
4b.1.4	Totals	-	6,599	28,882	1,625	1,857	8,704	13,425	66,722	66,722	66,722	-	-	2,862	203,652	74,439	-	-	15,100,620	-	722,664	-

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Clinton Power Station  
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Lic. Term. Costs	NRC Management Costs	Site Restoration Costs	Processed Volume			Burial Volumes			Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours		
													Cu. Feet	Cu. Feet	Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				Class A Cu. Feet	Class B Cu. Feet
Period 4b Collateral Costs																							
4b.3.1	Process liquid waste	218	-	80	439	-	142	-	218	1,097	1,097	-	-	-	-	-	-	-	-	-	-	-	
4b.3.2	Small tool allowance	-	540	-	-	-	-	-	81	621	621	-	-	-	-	-	-	-	-	-	-	297	
4b.3.3	Decommissioning Equipment Disposition	-	-	100	27	284	35	-	65	511	511	-	-	-	-	-	-	-	-	-	-	-	
4b.3	Subtotal Period 4b Collateral Costs	218	540	180	466	284	177	-	365	2,229	2,229	-	-	-	-	-	-	-	-	-	-	-	
Period 4b Period-Dependent Costs																							
4b.4.1	Decon supplies	2,169	-	-	-	-	-	-	542	2,711	2,711	-	-	-	-	-	-	-	-	-	-	-	
4b.4.2	Insurance	-	-	-	-	-	-	799	80	878	878	-	-	-	-	-	-	-	-	-	-	-	
4b.4.3	Property taxes	-	-	-	-	-	-	1,574	187	1,762	1,762	-	-	-	-	-	-	-	-	-	-	-	
4b.4.4	Health physics supplies	-	3,103	-	-	-	-	-	776	3,879	3,879	-	-	-	-	-	-	-	-	-	-	-	
4b.4.5	Heavy equipment rental	-	2,663	-	-	-	-	-	399	3,063	3,063	-	-	-	-	-	-	-	-	-	-	-	
4b.4.6	Disposal of DAW generated	-	-	257	106	-	675	-	210	1,249	1,249	-	-	-	-	-	-	-	-	-	-	-	
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,139	171	1,309	1,309	-	-	-	-	-	-	-	-	-	-	-	
4b.4.8	NRC Fees	-	-	-	-	-	-	54	54	596	596	-	-	-	-	-	-	-	-	-	-	-	
4b.4.9	Site O&M Cost	-	-	-	-	-	-	394	59	453	453	-	-	-	-	-	-	-	-	-	-	-	
4b.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	586	88	673	673	-	-	-	-	-	-	-	-	-	-	-	
4b.4.11	Security Staff Cost	-	-	-	-	-	-	3,883	582	4,465	4,465	-	-	-	-	-	-	-	-	-	-	-	
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	14,266	2,140	16,406	16,406	-	-	-	-	-	-	-	-	-	-	-	
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	24,393	3,659	28,052	28,052	-	-	-	-	-	-	-	-	-	-	-	
4b.4	Subtotal Period 4b Period-Dependent Costs	2,169	5,767	257	106	-	675	47,574	8,918	65,467	65,467	-	-	-	-	-	-	-	-	-	-	-	
4b.0	TOTAL PERIOD 4b COST	8,986	35,188	2,063	2,429	8,988	6,481	47,574	22,708	134,418	131,555	2,862	209,652	88,434	-	-	-	-	-	-	-	-	710,536
PERIOD 4c - License Termination																							
Period 4c Direct Decommissioning Activities																							
4c.1.1	ORISE confirmatory survey	-	-	-	-	-	-	-	42	183	183	-	-	-	-	-	-	-	-	-	-	-	
4c.1.2	Terminate license	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-	
4c.1	Subtotal Period 4c Activity Costs	-	-	-	-	-	-	-	42	183	183	-	-	-	-	-	-	-	-	-	-	-	
Period 4c Additional Costs																							
4c.2.1	Final Site Survey	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	-	-	-	
4c.2	Subtotal Period 4c Additional Costs	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	-	-	-	
Period 4c Collateral Costs																							
4c.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-	-	
4c.3	Subtotal Period 4c Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-	-	
Period 4c Period-Dependent Costs																							
4c.4.1	Insurance	-	-	-	-	-	-	74	7	82	82	-	-	-	-	-	-	-	-	-	-	-	
4c.4.2	Property taxes	-	-	-	-	-	-	745	74	819	819	-	-	-	-	-	-	-	-	-	-	-	
4c.4.3	Health physics supplies	-	1,032	-	-	-	-	-	258	1,290	1,290	-	-	-	-	-	-	-	-	-	-	-	
4c.4.4	Disposal of DAW generated	-	-	-	3	-	21	-	7	40	40	-	-	-	-	-	-	-	-	-	-	-	
4c.4.5	Plant energy budget	-	-	8	-	-	-	-	144	165	165	-	-	-	-	-	-	-	-	-	-	-	
4c.4.6	NRC Fees	-	-	-	-	-	-	956	26	282	282	-	-	-	-	-	-	-	-	-	-	-	
4c.4.7	Site O&M Cost	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	-	-	
4c.4.8	Security Staff Cost	-	-	-	-	-	-	705	106	811	811	-	-	-	-	-	-	-	-	-	-	-	
4c.4.9	DOC Staff Cost	-	-	-	-	-	-	3,905	586	4,490	4,490	-	-	-	-	-	-	-	-	-	-	-	
4c.4.10	Utility Staff Cost	-	-	-	-	-	-	5,167	775	5,942	5,942	-	-	-	-	-	-	-	-	-	-	-	
4c.4	Subtotal Period 4c Period-Dependent Costs	-	1,032	8	3	-	21	11,182	1,888	14,135	14,135	-	-	-	-	-	-	-	-	-	-	-	
4c.0	TOTAL PERIOD 4c COST	-	1,032	8	3	-	21	23,172	5,361	29,597	29,597	-	-	-	-	-	-	-	-	-	-	-	

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Clinton Power Station  
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total	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				
<b>PERIOD 4 TOTALS</b>		9,276	67,310	10,693	5,790	22,229	28,308	114,009	56,287	313,902	309,805	-	4,097	505,717	177,739	1,502	287	482	35,547,720	1,392,045	1,502,037
<b>PERIOD 5b - Site Restoration</b>																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	5,134	-	-	-	-	-	770	5,904	-	-	5,904	-	-	-	-	-	-	65,001	-
5b.1.1.2	Auxiliary Building	-	1,945	-	-	-	-	-	292	2,236	-	-	2,236	-	-	-	-	-	-	23,242	-
5b.1.1.3	Circulating Water Screenhouse	-	3,165	-	-	-	-	-	475	3,640	-	-	3,640	-	-	-	-	-	-	38,383	-
5b.1.1.4	Control Building	-	4,641	-	-	-	-	-	696	5,337	-	-	5,337	-	-	-	-	-	-	56,578	-
5b.1.1.5	Diesel Generator Building	-	1,618	-	-	-	-	-	243	1,860	-	-	1,860	-	-	-	-	-	-	20,234	-
5b.1.1.6	Make-Up Water Pump House	-	344	-	-	-	-	-	52	396	-	-	396	-	-	-	-	-	-	5,100	-
5b.1.1.7	Miscellaneous Site Work	-	1,504	-	-	-	-	-	226	1,729	-	-	1,729	-	-	-	-	-	-	21,227	-
5b.1.1.8	Miscellaneous Structures	-	2,442	-	-	-	-	-	366	2,808	-	-	2,808	-	-	-	-	-	-	44,561	-
5b.1.1.9	Radwaste Building	-	4,502	-	-	-	-	-	675	5,177	-	-	5,177	-	-	-	-	-	-	58,440	-
5b.1.1.10	Service Building	-	353	-	-	-	-	-	53	406	-	-	406	-	-	-	-	-	-	5,585	-
5b.1.1.11	Transformer and Tank Pads	-	147	-	-	-	-	-	22	169	-	-	169	-	-	-	-	-	-	2,463	-
5b.1.1.12	Turbine Building	-	4,693	-	-	-	-	-	704	5,397	-	-	5,397	-	-	-	-	-	-	63,415	-
5b.1.1.13	Turbine Pedestal	-	1,080	-	-	-	-	-	162	1,243	-	-	1,243	-	-	-	-	-	-	12,474	-
5b.1.1.14	Fuel Building	-	2,159	-	-	-	-	-	324	2,483	-	-	2,483	-	-	-	-	-	-	26,720	-
5b.1.1	Totals	-	33,727	-	-	-	-	-	5,059	38,786	-	-	38,786	-	-	-	-	-	-	443,422	-
Site Closeout Activities																					
5b.1.2	Back-Fill Site	-	57	-	-	-	-	-	9	66	-	-	66	-	-	-	-	-	-	201	-
5b.1.3	Grade & landscape site	-	1,408	-	-	-	-	-	211	1,619	-	-	1,619	-	-	-	-	-	-	4,449	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	-	21	163	163	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	35,192	-	-	-	-	141	5,300	40,634	163	-	40,471	-	-	-	-	-	-	448,071	1,560
Period 5b Additional Costs																					
5b.2.1	Concrete Crushing	-	1,281	-	-	-	-	8	183	1,482	-	-	1,482	-	-	-	-	-	-	7,355	-
5b.2.2	Screenhouse Cofferdam	-	934	-	-	-	-	-	140	1,074	-	-	1,074	-	-	-	-	-	-	10,159	-
5b.2.3	Discharge Flume Backfill	-	3,741	-	-	-	-	-	561	4,302	-	-	4,302	-	-	-	-	-	-	23,931	-
5b.2.4	Unit 2 Excavation Backfill	-	1,226	-	-	-	-	-	184	1,410	-	-	1,410	-	-	-	-	-	-	13,128	-
5b.2	Subtotal Period 5b Additional Costs	-	7,183	-	-	-	-	8	1,079	8,269	-	-	8,269	-	-	-	-	-	-	54,573	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	386	-	-	-	-	-	58	444	-	-	444	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	386	-	-	-	-	-	58	444	-	-	444	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	226	23	249	-	-	249	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,264	126	1,391	-	-	1,391	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	5,246	-	-	-	-	-	787	6,033	-	-	6,033	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	218	33	251	-	-	251	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	566	85	651	-	-	651	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	2,145	322	2,466	-	-	2,466	-	-	-	-	-	-	-	56,709
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,330	1,689	13,029	-	-	13,029	-	-	-	-	-	-	-	160,074
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	6,331	990	7,280	-	-	7,280	-	-	-	-	-	-	-	92,151
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,246	-	-	-	-	22,080	4,024	31,350	-	-	31,350	-	-	-	-	-	-	-	309,534
5b.0	TOTAL PERIOD 5b COST	-	48,007	-	-	-	-	22,229	10,461	80,697	163	-	80,534	-	-	-	-	-	-	502,644	311,094



Table D  
Clinton Power Station  
Delayed DECON Decommissioning Cost Estimate  
(Thousands of 2007 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				
PERIOD 5 TOTALS			48,007					22,229	10,461	80,697	163		80,534						502,644	311,094	
TOTAL COST TO DECOMMISSION		19,767	120,414	10,977	6,487	22,229	29,376	419,868	113,532	742,651	476,232	181,048	85,372	505,717	482	287	1,502	189,634	35,929,510	2,050,463	5,402,447

TOTAL COST TO DECOMMISSION WITH 18.05% CONTINGENCY:	\$742,651	thousands of 2007 dollars
TOTAL NRC LICENSE TERMINATION COST IS 64.13% OR:	\$476,232	thousands of 2007 dollars
SPENT FUEL MANAGEMENT COST IS 24.38% OR:	\$181,048	thousands of 2007 dollars
NON-NUCLEAR DEMOLITION COST IS 11.5% OR:	\$85,372	thousands of 2007 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	191,424	cubic feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	482	cubic feet
TOTAL SCRAP METAL REMOVED:	75,356	tons
TOTAL CRAFT LABOR REQUIREMENTS:	2,050,463	man-hours

End Notes:  
na - 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 E**  
**DETAILED COST ANALYSIS**  
**SAFSTOR**

Table E  
Clinton Power Station  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2007 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	Bridal Volumes			Bridal / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A	Class B	Class C				
<b>PERIOD 1a - Shutdown through Transition</b>																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	363	109	471	471	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,300
1a.1.3	Notification of Cessation of Operations	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.4	Remove fuel & source material	-	-	-	-	-	-	-	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-
1a.1.5	Notification of Permanent Defueling	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Dealtail by-product description	-	-	-	-	-	-	136	20	156	156	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	454	68	522	522	-	-	-	-	-	-	-	-	-	5,000
<b>Activity Specifications</b>																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	446	67	513	513	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	378	57	435	435	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	283	42	325	325	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	1,470	220	1,690	1,690	-	-	-	-	-	-	-	-	-	16,207
<b>Detailed Work Procedures</b>																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	107	16	123	123	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closure & dormancy	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	216	32	249	249	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Pressure vacuum drying system	-	-	-	-	-	-	9	1	10	10	-	-	-	-	-	-	-	-	-	100
1a.1.19	Design/procure non-cont. systems	-	-	-	-	-	-	a	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design/procure contaminated systems	-	-	-	-	-	-	a	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.21	Design/procure contaminated systems	-	-	-	-	-	-	a	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.22	Decommission contaminated systems	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	3,618	597	4,215	4,215	-	-	-	-	-	-	-	-	-	35,890
<b>Period 1a Collateral Costs</b>																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	39,540	5,931	45,471	-	45,471	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	39,540	5,931	45,471	-	45,471	-	-	-	-	-	-	-	-	-
<b>Period 1a Period-Dependent Costs</b>																					
1a.4.1	Insurance	-	-	-	-	-	-	1,320	132	1,452	1,452	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	6,312	631	6,943	6,943	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	-	-	-	-	-	377	94	471	471	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	-	-	-	-	-	-	52	401	401	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	-	-	-	-	38	12	70	70	-	-	-	-	-	-	-	-	-	21
1a.4.6	Plant energy budget	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	258	26	284	284	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	450	45	495	-	-	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	250	37	287	287	-	-	-	-	-	-	-	-	-	-

Table E  
Clinton Power Station  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2007 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 Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Bridal Volumes			Bridal / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
														Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Period 1a - Period-Dependent Costs (continued)																				
Ia.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	738	111	849	-	-	-	-	-	-	-	-	-	
Ia.4.11	ISFSI Operating Costs	-	-	-	-	-	-	82	12	94	-	-	-	-	-	-	-	-	-	
Ia.4.12	Security Staff Cost	-	-	-	-	-	-	5,955	893	6,848	-	-	-	-	-	-	-	-	157,471	
Ia.4.13	Utility Staff Cost	-	-	-	-	-	-	26,183	3,927	30,110	-	-	-	-	-	-	-	-	423,400	
Ia.4	Subtotal Period 1a Period-Dependent Costs	-	726	14	6	-	38	42,511	6,118	49,413	47,975	1,438	-	-	675	-	-	13,531	21	860,871
Ia.0	TOTAL PERIOD 1a COST	-	726	14	6	-	38	85,669	12,646	98,069	52,190	46,909	-	-	675	-	-	13,531	21	616,761
<b>PERIOD 1b - SAFSTOR Limited DECON Activities</b>																				
Period 1b Direct Decommissioning Activities																				
Decontamination of Site Buildings																				
Ib.1.1.1	Reactor Building	2,771	-	-	-	-	-	-	1,385	4,156	4,156	-	-	-	-	-	-	-	-	56,016
Ib.1.1.2	Auxiliary Building	305	-	-	-	-	-	-	153	458	458	-	-	-	-	-	-	-	-	6,485
Ib.1.1.3	Control Building	353	-	-	-	-	-	-	177	530	530	-	-	-	-	-	-	-	-	7,503
Ib.1.1.4	Diesel Generator Building	103	-	-	-	-	-	-	51	154	154	-	-	-	-	-	-	-	-	2,182
Ib.1.1.5	Fuel Building	800	-	-	-	-	-	-	400	1,199	1,199	-	-	-	-	-	-	-	-	16,275
Ib.1.1.6	Radwaste Building	1,195	-	-	-	-	-	-	597	1,792	1,792	-	-	-	-	-	-	-	-	25,369
Ib.1.1.7	Turbine Building	1,069	-	-	-	-	-	-	534	1,603	1,603	-	-	-	-	-	-	-	-	22,689
Ib.1.1	Totals	6,595	-	-	-	-	-	-	3,298	9,893	9,893	-	-	-	-	-	-	-	-	136,519
Ib.1	Subtotal Period 1b Activity Costs	6,595	-	-	-	-	-	-	3,298	9,893	9,893	-	-	-	-	-	-	-	-	136,519
Period 1b Additional Costs																				
Ib.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	9,133	1,370	10,503	10,503	-	-	-	-	-	-	-	-	-
Ib.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	9,133	1,370	10,503	10,503	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																				
Ib.3.1	Decon equipment	726	-	-	-	-	-	-	109	834	834	-	-	-	-	-	-	-	-	237
Ib.3.2	Process liquid waste	179	-	-	-	-	-	-	177	863	863	-	-	-	-	-	-	-	-	-
Ib.3.3	Small fuel allowance	-	103	-	-	-	-	-	5	119	119	-	-	-	-	-	-	-	-	-
Ib.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-
Ib.3	Subtotal Period 1b Collateral Costs	904	103	64	351	-	113	3,000	751	5,286	1,836	3,450	-	-	-	-	-	-	-	237
Period 1b Period-Dependent Costs																				
Ib.4.1	Decon supplies	1,899	-	-	-	-	-	-	475	2,374	2,374	-	-	-	-	-	-	-	-	-
Ib.4.2	Insurance	-	-	-	-	-	-	333	33	366	366	-	-	-	-	-	-	-	-	-
Ib.4.3	Property taxes	-	-	-	-	-	-	1,061	106	1,167	1,167	-	-	-	-	-	-	-	-	-
Ib.4.4	Health physics supplies	573	-	-	-	-	-	-	143	716	716	-	-	-	-	-	-	-	-	-
Ib.4.5	Heavy equipment rental	88	-	-	-	-	-	-	13	101	101	-	-	-	-	-	-	-	-	-
Ib.4.6	Disposal of DAW generated	-	-	32	13	-	85	-	26	157	157	-	-	-	-	-	-	-	-	46
Ib.4.7	Plant energy budget	-	-	-	-	-	-	243	36	279	279	-	-	-	1,524	-	-	-	-	-
Ib.4.8	NRC Fees	-	-	-	-	-	-	65	7	72	72	-	-	-	-	-	-	-	-	-
Ib.4.9	Emergency Planning Fees	-	-	-	-	-	-	113	11	125	125	-	-	-	-	-	-	-	-	-
Ib.4.10	Site O&M Cost	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-
Ib.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-
Ib.4.12	ISFSI Operating Costs	-	-	-	-	-	-	21	3	24	24	-	-	-	-	-	-	-	-	-
Ib.4.13	Security Staff Cost	-	-	-	-	-	-	1,501	225	1,726	1,726	-	-	-	-	-	-	-	-	39,691
Ib.4.14	Utility Staff Cost	-	-	-	-	-	-	6,599	990	7,589	7,589	-	-	-	-	-	-	-	-	106,720
Ib.4	Subtotal Period 1b Period-Dependent Costs	1,899	661	32	13	-	85	10,185	2,107	14,983	14,920	382	-	-	1,524	-	-	30,535	46	146,411
Ib.0	TOTAL PERIOD 1b COST	9,399	764	96	364	-	198	22,318	7,525	40,665	36,853	3,812	-	-	2,741	-	-	103,560	136,803	146,411

Table E  
Clinton Power Station  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2007 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	Bridal Volumes			Bridal / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
Ic.1.1	Prepare support equipment for storage	-	405	-	-	-	-	-	61	466	466	-	-	-	-	-	-	-	-	-	-
Ic.1.2	Install containment pressure equal. lines	-	35	-	-	-	-	-	5	41	41	-	-	-	-	-	-	-	-	-	3,000
Ic.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	-	700
Ic.1.4	Secure building accesses	-	-	-	-	-	-	-	a	8	61	-	-	-	-	-	-	-	-	-	14,893
Ic.1.5	Prepare & submit interim report	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	583
Ic.1	Subtotal Period 1c Activity Costs	-	440	-	-	-	-	786	294	1,520	1,520	-	-	-	-	-	-	-	-	-	18,583
Period 1c Collateral Costs																					
Ic.3.1	Process liquid waste	133	-	47	280	-	84	-	131	655	655	-	-	-	-	904	-	-	-	-	54,218
Ic.3.2	Small tool allowance	-	3	-	-	-	-	3,000	450	3,450	4	-	-	-	-	-	-	-	-	-	-
Ic.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,000	582	4,109	659	-	-	-	-	904	-	-	-	-	176
Ic.3	Subtotal Period 1c Collateral Costs	133	3	47	280	-	84	3,000	582	4,109	659	-	-	-	-	904	-	-	-	-	176
Period 1c Period-Dependent Costs																					
Ic.4.1	Insurance	-	-	-	-	-	-	329	33	362	362	-	-	-	-	-	-	-	-	-	-
Ic.4.2	Property taxes	-	-	-	-	-	-	1,049	105	1,154	1,154	-	-	-	-	-	-	-	-	-	-
Ic.4.3	Health physics supplies	-	160	-	-	-	-	-	40	199	199	-	-	-	-	-	-	-	-	-	-
Ic.4.4	Heavy equipment rental	-	87	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	-	-
Ic.4.5	Disposal of DAW generated	-	-	4	1	-	9	-	3	17	17	-	-	-	-	168	-	-	-	-	5
Ic.4.6	Plant energy budget	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-
Ic.4.7	NRC Fees	-	-	-	-	-	-	64	6	71	71	-	-	-	-	-	-	-	-	-	-
Ic.4.8	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	-	-	-	-	-	-	-	-	-	-
Ic.4.9	Site O&M Cost	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
Ic.4.10	Spent Fuel Foot O&M	-	-	-	-	-	-	184	28	212	-	-	-	-	-	-	-	-	-	-	-
Ic.4.11	SFSI Operating Costs	-	-	-	-	-	-	20	3	24	-	-	-	-	-	-	-	-	-	-	-
Ic.4.12	Security Start Cost	-	-	-	-	-	-	1,465	223	1,707	1,707	-	-	-	-	-	-	-	-	-	39,260
Ic.4.13	Utility Start Cost	-	-	-	-	-	-	6,928	939	7,907	7,907	-	-	-	-	-	-	-	-	-	103,360
Ic.4	Subtotal Period 1c Period-Dependent Costs	-	247	4	1	-	9	10,074	1,459	11,824	11,466	-	-	-	-	168	-	-	-	-	144,520
Ic.0	TOTAL PERIOD 1c COST	133	680	51	282	-	93	13,860	2,365	17,453	13,645	-	-	-	-	1,072	-	-	-	-	57,592
	PERIOD 1 TOTALS	9,532	2,180	162	632	-	329	121,847	22,536	157,217	102,688	-	-	-	-	4,488	-	-	-	-	174,703
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.2	Semi-annual environmental survey	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
2a.1.3	Prepare reports	-	-	-	-	-	-	500	75	575	-	-	-	-	-	-	-	-	-	-	-
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	503	126	629	-	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	1,003	201	1,203	-	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	1,003	201	1,203	-	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	45,000	6,750	51,750	51,750	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	45,000	6,750	51,750	51,750	-	-	-	-	-	-	-	-	-	-

Table E  
Clinton Power Station  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2007 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	Bridal Volumes			Bridal / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A - Cu. Feet	Class B - Cu. Feet	Class C - Cu. Feet				
Period 2a - Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	2,028	203	2,230	-	-	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	5,603	560	6,163	-	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	344	-	-	-	-	-	86	430	-	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	39	16	-	101	-	32	187	-	-	-	-	-	-	-	-	-	-	55
2a.4.5	Plant energy budget	-	-	-	-	-	-	771	116	887	-	-	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	863	86	949	-	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	799	80	879	-	-	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	999	150	1,149	-	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	2,952	443	3,394	-	-	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	328	49	378	-	-	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	16,801	2,520	19,321	-	-	-	-	-	-	-	-	-	-	444,257
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	20,888	3,133	24,021	-	-	-	-	-	-	-	-	-	-	308,686
2a.4	Subtotal Period 2a, Period-Dependent Costs	-	344	39	16	-	101	52,031	7,458	59,989	-	-	-	-	-	-	-	-	-	-	55
2a.0	TOTAL PERIOD 2a COST	-	344	39	16	-	101	98,034	14,408	112,942	-	-	-	-	-	-	-	-	-	-	55
PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
2b.1.2	Semi-annual environmental survey	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
2b.1.3	Prepare reports	-	-	-	-	-	-	845	127	972	-	-	-	-	-	-	-	-	-	-	-
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	850	212	1,062	-	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	1,695	339	2,034	-	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	8,000	1,200	9,200	-	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,000	1,200	9,200	-	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	8,000	1,200	9,200	-	-	-	-	-	-	-	-	-	-	-
2b.0	TOTAL PERIOD 2b COST	-	-	-	-	-	-	161	53,723	7,681	62,147	-	-	-	-	-	-	-	-	-	88
PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Quarterly Inspection	-	-	-	-	-	-	3,172	317	3,489	-	-	-	-	-	-	-	-	-	-	-
2c.1.2	Semi-annual environmental survey	-	-	-	-	-	-	6,757	676	7,433	-	-	-	-	-	-	-	-	-	-	-
2c.1.3	Prepare reports	-	-	-	-	-	-	496	124	620	-	-	-	-	-	-	-	-	-	-	-
2c.1.4	Disposal of DAW generated	-	-	61	25	-	161	-	50	297	-	-	-	-	-	-	-	-	-	-	88
2c.1.5	Plant energy budget	-	-	-	-	-	-	652	98	749	-	-	-	-	-	-	-	-	-	-	-
2c.1.6	NRC Fees	-	-	-	-	-	-	1,458	146	1,604	-	-	-	-	-	-	-	-	-	-	-
2c.1.7	Emergency Planning Fees	-	-	-	-	-	-	1,351	135	1,487	-	-	-	-	-	-	-	-	-	-	-
2c.1.8	Site O&M Cost	-	-	-	-	-	-	1,689	253	1,943	-	-	-	-	-	-	-	-	-	-	-
2c.1.9	ISFSI Operating Costs	-	-	-	-	-	-	555	83	638	-	-	-	-	-	-	-	-	-	-	-
2c.1.10	Security Staff Cost	-	-	-	-	-	-	14,400	2,160	16,560	-	-	-	-	-	-	-	-	-	-	380,777
2c.1.11	Utility Staff Cost	-	-	-	-	-	-	13,994	2,099	16,093	-	-	-	-	-	-	-	-	-	-	225,646
2c.1	Subtotal Period 2b, Period-Dependent Costs	-	496	61	25	-	161	44,028	6,141	50,913	-	-	-	-	-	-	-	-	-	-	88
2c.0	TOTAL PERIOD 2c COST	-	496	61	25	-	161	53,723	7,681	62,147	-	-	-	-	-	-	-	-	-	-	88

Table E  
Clinton Power Station  
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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	Bridal Volumes			Bridal / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours			
															Class A - Cu. Feet	Class B - Cu. Feet	Class C - Cu. Feet						
2c.1.5	Maintenance supplies	-	-	-	-	-	-	5,364	1,341	6,706	6,706	-	-	-	-	-	-	-	-	-	-		
2c.1	Subtotal Period 2c. Activity Costs	-	-	-	-	-	-	10,697	2,141	12,839	12,839	-	-	-	-	-	-	-	-	-	-		
Period 2c. Period-Dependent Costs																							
2c.4.1	Insurance	-	-	-	-	-	-	19,538	1,954	21,492	21,492	-	-	-	-	-	-	-	-	-	-	-	
2c.4.2	Property taxes	-	-	-	-	-	-	42,647	4,265	46,912	46,912	-	-	-	-	-	-	-	-	-	-	-	
2c.4.3	Health physics supplies	-	-	-	-	-	-	-	736	3,682	3,682	-	-	-	-	-	-	-	-	-	-	-	
2c.4.4	Disposal of DAW generated	2,946	-	-	-	-	-	-	309	1,833	1,833	-	-	-	-	-	-	-	-	-	-	-	
2c.4.5	Plant energy budget	-	-	378	156	-	991	-	617	4,729	4,729	-	-	-	-	-	-	-	-	-	-	542	
2c.4.6	NRC Fees	-	-	-	-	-	-	4,112	920	10,124	10,124	-	-	-	-	-	-	-	-	-	-	-	
2c.4.7	Site O&M Cost	-	-	-	-	-	-	9,203	920	10,124	10,124	-	-	-	-	-	-	-	-	-	-	-	
2c.4.8	Security Staff Cost	-	-	-	-	-	-	10,662	1,599	12,261	12,261	-	-	-	-	-	-	-	-	-	-	-	
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	50,493	7,574	58,066	58,066	-	-	-	-	-	-	-	-	-	-	1,335,171	
2c.4	Subtotal Period 2c. Period-Dependent Costs	-	2,946	378	156	-	991	185,412	25,288	215,169	215,169	-	-	-	-	-	-	-	-	-	-	778,850	
2c.0	TOTAL PERIOD 2c. COST	-	2,946	378	156	-	991	196,109	27,429	228,008	228,008	-	-	-	-	-	-	-	-	-	-	542	
PERIOD 2 TOTALS																							
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																							
Period 3a Direct Decommissioning Activities																							
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	-	
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	-	-	
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	
3a.1.4	End product description	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	-	-	
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	-	
3a.1.6	Define major work sequence	-	-	-	-	-	-	680	102	782	782	-	-	-	-	-	-	-	-	-	-	-	
3a.1.7	Perform SER and EA	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	-	-	-	
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	404	66	322	322	-	-	-	-	-	-	-	-	-	-	-	
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	372	56	427	427	-	-	-	-	-	-	-	-	-	-	-	
3a.1.10	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	
Activity Specifications																							
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	668	100	769	692	-	77	-	-	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	378	57	435	391	-	43	-	-	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	644	97	741	741	-	-	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	590	88	678	678	-	-	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Sacrificial shield	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Moisture separators/reheaters	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	-	-	1,000
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	145	22	167	83	-	83	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	189	28	218	218	-	-	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.9	Main Condensers	-	-	-	-	-	-	189	28	218	218	-	-	-	-	-	-	-	-	-	-	-	2,000
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.11	Drywell	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	283	42	325	163	-	163	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.13	Waste management	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	-	-	900
3a.1.11.14	Facility & site dosout	-	-	-	-	-	-	82	12	94	47	-	47	-	-	-	-	-	-	-	-	-	44,633
3a.1.11	Total	-	-	-	-	-	-	4,048	607	4,655	4,242	-	413	-	-	-	-	-	-	-	-	-	-
Planning & Site Preparations																							
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	218	33	250	250	-	-	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. evacs	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-	-	-

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Clinton Power Station  
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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	Bridal Volumes			Bridal / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A	Class B	Class C				
															Class A	Class B	Class C				
3a.1.1.4	Design water clean-up system	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,400
3a.1.1.5	Rigging/Coat. Cont. Envelopes/cooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	1,230
3a.1.1.6	Presence checks/followers & containers	-	-	-	-	-	-	112	17	128	128	-	-	-	-	-	-	-	-	-	77,550
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	11,501	1,725	13,227	12,813	-	413	-	-	-	-	-	-	-	-
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	458	46	504	504	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	999	100	1,099	1,099	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	330	-	-	-	-	-	-	82	412	412	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	349	-	-	-	-	-	-	52	401	401	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	12	5	-	32	-	10	59	59	-	-	-	570	-	-	-	-	11,419	17
3a.4.6	Plant energy budget	-	-	-	-	-	-	964	145	1,108	1,108	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	258	26	284	284	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	250	37	287	287	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	2,465	370	2,835	2,835	-	-	-	-	-	-	-	-	-	65,179
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	16,145	2,422	18,566	18,566	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	678	12	5	-	32	21,539	3,290	25,556	25,556	-	-	-	570	-	-	-	-	11,419	17
3a.0	TOTAL PERIOD 3a COST	-	678	12	5	-	32	33,040	5,015	38,782	38,369	-	413	-	570	-	-	-	-	11,419	17
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	429	64	494	444	-	-	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	363	54	417	417	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	122	18	141	135	-	-	-	-	-	-	-	-	-	1,580
3b.1.1.4	CRD housings & NIS	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	In-core instrumentation	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Remove primary containment	-	-	-	-	-	-	329	49	379	379	-	-	-	-	-	-	-	-	-	3,620
3b.1.1.7	Reactor	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.8	Fueler chest	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	91	14	104	92	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.11	Main Turbine	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-	2,088
3b.1.1.12	Main Condensers	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	248	37	285	266	-	-	-	-	-	-	-	-	-	2,730
3b.1.1.14	Radiation building	-	-	-	-	-	-	248	37	285	266	-	-	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	2,970	445	3,415	3,088	-	-	-	-	-	-	-	-	-	32,741
3b.1.1	Total	-	-	-	-	-	-	2,970	445	3,415	3,088	-	-	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	2,970	445	3,415	3,088	-	-	-	-	-	-	-	-	-	32,741
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	7	-	411	897	269	1,167	1,167	-	-	-	-	-	-	-	-	-	-
3b.2.2	hazardous liquid disposal	-	-	-	8	-	5	-	104	523	523	-	-	-	1,571	-	-	-	-	-	89,546
3b.2.3	Contaminated asbestos disposal	-	-	-	-	-	-	-	2	15	15	-	-	-	60	-	-	-	-	-	1,800
3b.2.4	Clean asbestos disposal	-	-	-	-	-	-	2	0	2	2	-	-	-	-	-	-	-	-	-	-
3b.2	Subtotal Period 3b Additional Costs	-	-	-	15	-	416	900	376	1,707	1,707	-	-	-	1,631	-	-	-	-	-	91,346



Table E  
Clinton Power Station  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2007 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	Bridal Volumes			Bridal/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	726	-	-	-	-	-	-	109	834	834	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	-	829	-	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	726	957	-	-	-	-	829	377	2,887	2,887	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	22	-	-	-	-	-	-	6	28	28	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	254	25	280	280	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	501	50	551	551	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	182	-	-	-	-	-	46	228	228	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	175	-	-	-	-	-	26	201	201	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	7	3	-	18	-	6	33	33	-	-	-	-	-	-	-	6,476	10	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	483	72	556	556	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,236	185	1,421	1,421	-	-	-	-	-	-	-	-	-	32,679
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,799	570	4,369	4,369	-	-	-	-	-	-	-	-	-	129,669
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	8,094	1,214	9,309	9,309	-	-	-	-	-	-	-	-	-	220,907
3b.4	Subtotal Period 3b Period-Dependent Costs	22	357	7	3	-	18	14,622	2,232	17,261	17,261	-	-	-	-	-	-	-	6,476	10	-
3b.0	TOTAL PERIOD 3b COST	748	1,314	7	18	-	454	19,320	3,430	25,271	24,944	-	327	-	-	-	-	-	97,822	10	253,648
3b.0	TOTAL PERIOD 3b COST	748	1,992	19	23	-	466	52,360	8,445	64,053	63,313	-	740	-	-	-	-	-	109,241	27	655,014
<b>PERIOD 3 TOTALS</b>																					
<b>PERIOD 4a - Large Component Removal</b>																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	10	40	8	6	31	50	-	34	179	179	-	-	265	-	-	-	61,459	1,078	-	-
4a.1.1.2	CRDAs & NR Bumps & Motors	10	38	13	20	107	132	-	66	389	389	-	-	1,467	-	-	-	151,400	1,114	-	-
4a.1.1.3	CRDAs & NR Bumpouts	42	155	921	82	-	203	-	156	662	662	-	-	-	-	-	-	131,110	4,312	-	-
4a.1.1.4	Reactor Vessel Internals	63	2,203	3,456	687	-	3,966	197	4,727	15,279	15,279	-	-	-	-	-	-	3,474,905	26,617	1,197	-
4a.1.1.5	Vessel & Internals GTCC Disposal	-	5,228	1,242	375	-	8,132	-	9,374	9,374	9,374	-	-	-	-	-	-	482	86,500	-	-
4a.1.1.6	Reactor Vessel	-	-	-	-	-	2,056	197	5,383	14,481	14,481	-	-	-	-	-	-	13,057	26,617	1,197	-
4a.1.1.1	Totals	125	7,667	5,041	1,130	138	14,539	394	11,590	40,664	40,664	-	-	1,752	23,956	1,502	287	482	2,140,598	59,669	2,393
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	307	903	161	2,722	-	-	600	4,693	4,693	-	-	57,609	-	-	-	-	2,592,393	6,446	-
4a.1.3	Main Condensers	-	1,051	971	173	2,927	-	-	825	5,947	5,947	-	-	61,945	-	-	-	-	2,757,524	22,050	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	905	-	-	-	-	-	136	1,041	1,041	-	-	-	-	-	-	-	-	11,450	-
4a.1.4.2	Auxiliary Building	-	216	-	-	-	-	-	32	248	248	-	-	-	-	-	-	-	-	2,582	-
4a.1.4.3	Fuel Building	-	237	-	-	-	-	-	36	273	273	-	-	-	-	-	-	-	-	2,912	-
4a.1.4.4	Radiaste Building	-	500	-	-	-	-	-	75	575	575	-	-	-	-	-	-	-	-	6,483	-
4a.1.4.5	Turbine Building	-	508	-	-	-	-	-	76	585	585	-	-	-	-	-	-	-	-	6,771	-
4a.1.4	Totals	-	2,367	-	-	-	-	-	355	2,722	2,722	-	-	-	-	-	-	-	-	30,209	-
Disposal of Plant Systems																					
4a.1.5.1	Acid Feed & Handling	-	26	1	1	21	-	-	10	59	59	-	-	488	-	-	-	-	-	19,822	533
4a.1.5.2	Auxiliary Steam	-	484	13	19	319	-	-	173	1,008	1,008	-	-	7,493	-	-	-	-	-	304,278	9,740
4a.1.5.3	Breathing Air	-	36	-	-	-	-	-	5	42	42	-	-	-	-	-	-	-	-	-	820

**Table E**  
**Clinton Power Station**  
**SAFSTOR Decommissioning Cost Estimate**  
(Thousands of 2007 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	Bridal Volumes			Bridal/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours		
															Class A	Class B	Class C					
4a.1.5.4	Disposal of Plant Systems (continued)																					
4a.1.5.4	CO2 & Generator Purge	16							2	18				18							349	
4a.1.5.5	Casite Handling	13			0	8			5	26	26			183							256	
4a.1.5.6	Chem Radioactive Reprocessing & Disposal	351	29	29	29	143	114		145	810	810			3,354	1,375						7,319	
4a.1.5.7	Chilled Water - RCA	1,035	27	40		679			369	2,149	2,149			15,914							20,760	
4a.1.5.8	Chilled Water Non-RCA	166							25	191											3,682	
4a.1.5.9	Chlorination	44							7	51											953	
4a.1.5.10	Circulating Water - RCA	161	16		24	400			105	706	706			9,379							3,419	
4a.1.5.11	Circulating Water Non-RCA	51							8	58											1,090	
4a.1.5.12	Grummt Aux & Fuel Bldg Equip Drains	81	4	4	4	14	17		27	146	146			325	180						29,340	
4a.1.5.13	Grummt Aux & Fuel Bldg Floor Drains	139	5	6	6	49	15		47	262	262			1,145	168						2,845	
4a.1.5.14	Component Cooling Water Non-RCA	119							18	137											2,622	
4a.1.5.15	Condensate	810	93	118	977	330			459	2,787	2,787			22,921	3,507						12,454,444	
4a.1.5.16	Condensate Booster	766	100	126	906	398			456	2,750	2,750			21,259	4,224						16,349	
4a.1.5.17	Condensate Polishing	619	31	34	285	100			228	1,277	1,277			10,094	1,088						348,255	
4a.1.5.18	Condenser Vacuum	179	17	25	430				115	767	767			10,094	1,088						409,927	
4a.1.5.19	Containment Combustible Gas	67	2	3	46				24	141	141			1,069							43,421	
4a.1.5.20	Cycled Condensate	555	26	30	254	82			204	1,150	1,150			5,945	910						319,550	
4a.1.5.21	Drywell Cooling	437	11	18	297				157	919	919			3,655							282,437	
4a.1.5.22	Drywell Purge	124	6	9	156				56	351	351			3,655							148,412	
4a.1.5.23	ECCS Equipment Cooling	65	2	3	53				25	148	148			1,252							50,856	
4a.1.5.24	Extraction Steam	424	37	46	353	140			205	1,205	1,205			8,276	1,486						469,355	
4a.1.5.25	Feedwater	464	55	70	544	206			265	1,605	1,605			12,765	2,191						714,912	
4a.1.5.26	Feedwater Heater Drains Turbine Cycle	1,109	74	91	744	262			476	2,757	2,757			17,466	2,804						998,507	
4a.1.5.27	Feedwater Heater Misc.	172	9	10	62	37			62	342	342			1,223	389						54,542	
4a.1.5.28	Filtered Water	4							1	4											88	
4a.1.5.29	Generator Hydrogen Seal Oil	25	0	1	10				8	44	44			243							9,883	
4a.1.5.30	Generator Stator Cooling	16	0	1	9				6	32	32			207							8,423	
4a.1.5.31	High Pressure Core Spray	225	20	25	224	66			112	672	672			5,250	702						276,214	
4a.1.5.32	Hydrogen	22	0	0	7				7	36	36			168							6,615	
4a.1.5.33	Laundry Equip & Fir Drains RW Reprocess	189	8	10	117	19			72	416	416			2,742	231						129,925	
4a.1.5.34	Leak Detection	37	0	0	4				10	51	51			86							836	
4a.1.5.35	Local Instrument Panels	6							1	316	316			2,907	329						147,560	
4a.1.5.36	Local Pressure Core Spray	86	10	13	124	31			51	316	316			2,907	329						1,898	
4a.1.5.37	Local Pressure Core Spray	10	0	1	10				4	25	25			2,825							9,119	
4a.1.5.38	Machine Shop Ventilation	201	5	7	120				70	401	401			2,806							113,939	
4a.1.5.39	Main Steam	746	50	60	442	185			313	1,797	1,797			10,374	1,946						597,645	
4a.1.5.40	Main Steam Isolation Valve	19	1	1	2	3			6	32	32			44							5,045	
4a.1.5.41	Make-up Demineralizer - RCA	184	4	6	103				63	360	360			2,419							3,595	
4a.1.5.42	Make-up Demineralizer Non-RCA	208							31	239	239			991	474						4,416	
4a.1.5.43	Make-up Condensate Storage	216	11	11	42	45			74	399	399			239							82,690	
4a.1.5.44	Misc. Building Drains	16							2	19	19										337	
4a.1.5.45	Miscellaneous Ventilation	30							4	34											643	
4a.1.5.46	Nuclear Boiler	15	0	0	104	2			5	24	24			34							323	
4a.1.5.47	Oil Transfer	90	4	6	104				39	243	243			2,429	21						98,662	
4a.1.5.48	Reactor Core Isolation Cooling	194	9	11	106	24			73	417	417			2,491	275						124,231	
4a.1.5.49	Refrigeration Piping	17							20	174	174										388	
4a.1.5.50	Sanitary	151							23	174	174										3,202	
4a.1.5.51	Screen House & MU Pump House Ventilation	31							5	36	36										736	
4a.1.5.52	Standby Liquid Control	26	1	1	18				2	19	19										529	
4a.1.5.53	Switchgear Heat Removal	16							2	19	19										356	
4a.1.5.54	Turbine Building Closed Cooling Water	148	4	5	90				52	299	299			2,106							2,948	
4a.1.5.55	Turbine Electrohydraulic Control	9	0	4					3	16	16			84							185	
4a.1.5.56	Turbine Gen Misc Drains & Vents	45	1	1	14				14	74	74			323							13,132	

Table E  
Clinton Power Station  
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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	Bridal Volumes			Bridal/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Disposal of Plant Systems (continued)																					
4a.1.5.57	Turbine Gland Seal Steam	-	300	22	34	570	-	-	168	1,092	1,092	-	-	13,358	-	-	-	542,467	6,268	-	
4a.1.5.58	Turbine Oil	-	48	2	3	53	-	-	21	127	127	-	-	1,250	-	-	-	50,775	1,016	-	
4a.1.5.59	Turbine-Gen Aux & Misc Devices	-	214	20	30	513	-	-	137	914	914	-	-	12,031	-	-	-	488,573	4,614	-	
4a.1.5	Totals	-	12,060	727	931	9,396	2,077	-	5,065	30,257	29,209	-	1,048	220,355	-	-	-	10,927,060	250,572	-	
4a.1.6	Scaffolding in support of decommissioning	-	2,745	50	11	140	17	-	718	3,682	3,682	-	-	2,969	185	-	-	150,174	63,258	-	
4a.1	Subtotal Period 4a Activity Costs	125	26,197	7,692	2,426	15,323	16,653	394	19,153	87,965	86,917	-	1,048	344,629	46,496	1,502	287	482	18,597,750	432,203	2,393
Period 4a Additional Costs																					
4a.2.1	Disposal of stored turbine rotors	-	17	100	40	743	-	-	130	1,030	1,030	-	-	15,719	-	-	-	-	707,358	352	-
4a.2	Subtotal Period 4a Additional Costs	-	17	100	40	743	-	-	130	1,030	1,030	-	-	15,719	-	-	-	-	707,358	352	-
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	21	-	9	48	-	15	-	22	115	115	-	-	-	166	-	-	-	9,977	32	-
4a.3.2	Small tool allowance	-	321	-	-	-	-	-	48	369	332	-	-	37	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	21	321	9	48	-	15	-	70	484	447	-	-	37	166	-	-	-	9,977	32	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	57	-	-	-	-	-	-	14	71	71	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	649	65	713	713	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	1,279	128	1,406	1,266	-	141	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,987	-	-	-	-	-	497	2,484	2,484	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,180	-	-	-	-	-	327	2,507	2,507	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	174	72	-	467	-	143	846	846	-	-	-	8,196	-	-	-	161,251	250	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,171	176	1,347	1,347	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	440	44	484	484	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	-
4a.4.10	Stewards Processing Equipment/Services	-	-	-	-	-	-	476	47	523	523	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	3,104	473	3,627	3,627	-	-	-	-	-	-	-	-	-	-
4a.4.12	UIC Staff Cost	-	-	-	-	-	-	1,136	136	1,269	1,269	-	-	-	-	-	-	-	-	-	-
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	30,381	3,129	33,510	33,510	-	-	-	-	-	-	-	-	-	-
4a.4	Subtotal Period 4a Period-Dependent Costs	57	4,167	174	72	-	457	40,252	6,900	52,079	51,938	-	141	-	8,196	-	-	-	164,251	250	-
4a.0	TOTAL PERIOD 4a COST	203	30,702	7,976	2,586	16,066	17,126	40,647	26,253	141,558	140,332	-	1,225	360,348	54,858	1,502	287	482	19,479,330	432,838	603,489
<b>PERIOD 4b - Site Decontamination</b>																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	452	45	92	104	-	572	-	405	1,668	1,668	-	-	-	6,066	-	-	-	544,292	1,017	-
Disposal of Plant Systems																					
4b.1.2.1	Component Cooling Water - RCA	-	178	4	6	101	-	-	61	350	350	-	-	2,361	-	-	-	95,865	3,548	-	
4b.1.2.2	Containment Monitoring	-	50	0	0	8	-	-	14	73	73	-	-	185	-	-	-	7,495	1,113	-	
4b.1.2.3	Control Rod Drive	-	357	14	15	88	53	-	119	645	645	-	-	2,064	559	-	-	133,952	7,387	-	
4b.1.2.4	Diesel Fuel Oil	-	59	-	-	-	-	-	9	68	68	-	68	-	-	-	-	-	1,256	-	
4b.1.2.5	Diesel Generator	-	52	-	-	-	-	-	8	60	60	-	-	-	-	-	-	-	1,183	-	
4b.1.2.6	Diesel Generator Room Ventilation	-	77	-	-	-	-	-	12	88	88	-	-	-	-	-	-	-	1,817	-	
4b.1.2.7	Drains-Laundry to Radwaste	-	15	1	1	3	2	-	5	26	26	-	-	65	23	-	-	4,677	301	-	
4b.1.2.8	Electrical - Clean Non-RCA	-	1,545	-	-	-	-	-	232	1,777	1,777	-	1,777	-	-	-	-	-	33,545	-	
4b.1.2.9	Electrical - Clean RCA	-	6,131	125	188	3,190	-	-	2,052	11,687	11,687	-	-	74,814	-	-	-	3,038,244	126,548	-	
4b.1.2.10	Electrical - Contaminated	-	909	13	21	353	-	-	285	1,581	1,581	-	-	8,281	-	-	-	336,300	19,037	-	
4b.1.2.11	Equip Drain Radwaste Reprocessing	-	1,018	44	51	423	142	-	365	2,043	2,043	-	-	9,913	1,584	-	-	537,960	21,022	-	

Table E  
Clinton Power Station  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2007 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	NEC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Bridal Volumes			Bridal/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
db-1.2.12	Disposal of Plant Systems (continued)																				
db-1.2.12	Flare Protection - RCA	616		15	23	385			217	1,255	1,255			9,018				366,214	12,406		
db-1.2.13	Flare Protection Non-RCA	634							23	1,177			177					429,512	3,416		
db-1.2.14	Floor Drain Radwaste Reprocessing	154		37	42	323	128		249	1,413	1,413			7,582	1,406			13,094	13,094		
db-1.2.15	Fuel Handling & Transfer	22		1	2	11	5		9	50	50			262	54			15,494	464		
db-1.2.16	Fuel Pool Cooling & Cleanup	783		54	63	480	189		330	1,898	1,898			11,250	2,020			636,883	16,214		
db-1.2.17	Fuel Support	88		7	9	70	26		41	242	242			1,649	278			91,923	1,898		
db-1.2.18	HVAC - Auxiliary Building	28		1	2	26			11	68	68			612	68			24,559	592		
db-1.2.19	HVAC - Containment Building	661		21	33	560			256	1,532	1,532			13,132				533,296	12,643		
db-1.2.20	HVAC - Control Room	242							36	279			279					5,686	5,686		
db-1.2.21	HVAC - Fuel Building	283		6	10	170			99	569	569			3,993				162,145	5,153		
db-1.2.22	HVAC - Laboratory	456		10	16	273			158	913	913			6,392				259,566	8,385		
db-1.2.23	HVAC - OF Gas Building	115		3	5	80			42	245	245			1,876				76,166	2,292		
db-1.2.24	HVAC - Radwaste Building	644		16	25	428			231	1,345	1,345			10,038				407,637	11,910		
db-1.2.25	HVAC - Service Building	52							8	60	60			60				1,145	1,145		
db-1.2.26	HVAC - Turbine Building	532		13	20	334			187	1,087	1,087			7,839				318,337	9,704		
db-1.2.27	Hoists Cranes & Elevators	6							1	7	7			7				123	123		
db-1.2.28	Instrument Air - RCA	374		5	7	115			112	613	613			2,708				109,971	7,089		
db-1.2.29	Instrument Air Non-RCA	17							3	20	20			2,172				88,201	3,189		
db-1.2.30	Off Gas	154		4	5	93			54	309	309			2,172				123,583	3,582		
db-1.2.31	Plant Service Water - RCA	176		5	8	130			23	180	180			3,043				123,583	3,582		
db-1.2.32	Plant Service Water Non-RCA	156							23	180	180			180				3,494	3,494		
db-1.2.33	Potable Water	11							2	12	12			12				231	231		
db-1.2.34	Process Radiation Monitoring	84		1	1	23			25	134	134			529				21,497	1,687		
db-1.2.35	Process Sampling	414		3	5	92			119	634	634			2,157				57,602	5,330		
db-1.2.36	Reactor Recirculation	42		3	3	11	15		17	91	91			266	139			25,061	874		
db-1.2.37	Reactor Water Clean-up	257		15	17	74	72		97	533	533			1,738	766			139,001	5,284		
db-1.2.38	Residual Heat Removal	481		47	58	496	157		247	1,487	1,487			11,630	1,672			622,251	10,146		
db-1.2.39	Screen Wash	6							1	7	7			7				132	132		
db-1.2.40	Service Air - RCA	230		4	6	106			75	421	421			2,476				100,566	4,507		
db-1.2.41	Service Air Non-RCA	14							2	16	16			16				60,155	1,369		
db-1.2.42	Shutdown Service Water - RCA	92		2	4	63			33	195	195			1,481				1,829	1,829		
db-1.2.43	Shutdown Service Water Non-RCA	99							185	1,020	1,020			114				2,594	2,594		
db-1.2.44	Solid Radioactive Waste - RCA	500		22	25	214	68		176	1,020	1,020			5,026	756			268,960	10,594		
db-1.2.45	Standby Gas Transfer	60		1	1	25			107	107	107			889				23,913	1,294		
db-1.2.46	Suppression Pool Cleanup & Transfer	96		6	6	46	20		38	212	212			1,086	213			63,215	1,997		
db-1.2.47	Suppression Pool Makeup	44		5	6	48	18		24	145	145			1,117	193			62,702	942		
db-1.2.48	Turb OG RW Cont & DG Bldg Equip Demos	181		8	8	33	33		104	585	585			3,905	366			153,049	6,082		
db-1.2.49	Turb OG RW Cont & DG Bldg Equip Demos	295		12	13	128			60	321	321			11,630	1,672			153,049	6,082		
db-1.2	Totals	19,502		529	705	9,002	959		6,375	37,073	34,210		2,862	211,112	10,382			9,457,092	399,374		
db-1.3	Scarfolding in support of decommissioning	4,118		74	17	210	26		1,078	5,523	5,523			4,453	277			225,261	94,887		
db-1.4.1	Decommissioning of Site Buildings	2,497		404	454	330	1,817		2,627	11,196	11,196			7,734	24,125			2,519,185	112,645		
db-1.4.1.1	Reactor Building	285		16	21	50	45		194	723	723			1,171	895			134,128	7,994		
db-1.4.1.2	Auxiliary Building	329		14	19	2	46		197	675	675			56	915			93,484	7,972		
db-1.4.1.3	Control Building	95		4	5	110	50		56	191	191			2,122	242			24,981	2,272		
db-1.4.1.4	Diesel Generator Building	729		20	25	110	50		557	2,122	2,122			2,574	959			197,780	27,889		
db-1.4.1.5	Fuel Building	1,114		54	71	45	167		693	2,432	2,432			1,067	3,336			373,533	28,179		
db-1.4.1.6	Radwaste Building	997		339	52	117	152		654	2,379	2,379			2,735	3,035			408,574	26,826		
db-1.4.1.7	Turbine Building	6,046		4,522	564	654	2,289		4,980	19,718	19,718			15,337	33,515			3,751,664	213,778		
db-1.4	Totals	6,498		2,259	1,489	9,866	3,846		12,837	63,982	61,119		2,862	230,902	50,241			14,008,310	709,055		

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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	Bridal Volumes			Bridal / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A - Cu. Feet	Class B - Cu. Feet	Class C - Cu. Feet				
Period 4b Additional Costs																					
4b-2.1	ISFSI License Termination	-	723	2	85	-	214	1,162	421	2,607	-	2,607	-	-	-	-	-	-	510,082	11,114	2,560
4b-2	Subtotal Period 4b Additional Costs	-	723	2	85	-	214	1,162	421	2,607	-	2,607	-	-	-	-	-	-	510,082	11,114	2,560
Period 4b Collateral Costs																					
4b-3.1	Process liquid waste	83	-	35	193	-	62	-	90	463	463	-	-	-	-	-	-	-	40,127	130	-
4b-3.2	Small tool allowances	-	597	-	-	-	-	-	81	618	618	-	-	-	-	-	-	-	303,507	88	-
4b-3.3	Decommissioning Equipment Disposition	-	-	100	27	284	35	-	65	511	511	-	-	-	-	-	-	-	343,633	219	-
4b-3	Subtotal Period 4b Collateral Costs	83	597	135	219	284	97	-	235	1,591	1,591	-	-	-	-	-	-	-	343,633	219	-
Period 4b Period-Dependent Costs																					
4b-4.1	Decon supplies	1,958	-	-	-	-	-	-	490	2,448	2,448	-	-	-	-	-	-	-	-	-	-
4b-4.2	Insurance	-	-	-	-	-	-	799	80	878	878	-	-	-	-	-	-	-	-	-	-
4b-4.3	Property taxes	-	-	-	-	-	-	1,574	157	1,732	1,732	-	-	-	-	-	-	-	-	-	-
4b-4.4	Health physics supplies	-	3,094	-	-	-	-	-	774	3,868	3,868	-	-	-	-	-	-	-	-	-	-
4b-4.5	Heavy equipment rental	-	2,063	-	-	-	-	-	399	3,063	3,063	-	-	-	-	-	-	-	-	-	-
4b-4.6	Disposal of DAW generated	-	-	253	104	-	664	-	207	1,228	1,228	-	-	-	-	-	-	-	238,427	363	-
4b-4.7	Plant energy budget	-	-	-	-	-	-	1,139	171	1,309	1,309	-	-	-	-	-	-	-	-	-	-
4b-4.8	NRC Fees	-	-	-	-	-	-	542	54	596	596	-	-	-	-	-	-	-	-	-	-
4b-4.9	Site O&M Cost	-	-	-	-	-	-	394	59	453	453	-	-	-	-	-	-	-	-	-	-
4b-4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	586	88	673	673	-	-	-	-	-	-	-	-	-	-
4b-4.11	Security Staff Cost	-	-	-	-	-	-	3,883	582	4,465	4,465	-	-	-	-	-	-	-	-	-	-
4b-4.12	DOC Staff Cost	-	-	-	-	-	-	14,266	2,140	16,406	16,406	-	-	-	-	-	-	-	-	-	-
4b-4.13	Utility Staff Cost	-	-	-	-	-	-	24,393	3,659	28,052	28,052	-	-	-	-	-	-	-	-	-	-
4b-4	Subtotal Period 4b Period-Dependent Costs	1,958	5,757	253	104	-	664	47,574	8,860	65,171	65,171	-	-	-	-	-	-	-	238,427	363	710,536
4b-0	TOTAL PERIOD 4b COST	8,539	35,203	1,650	1,897	10,150	4,821	48,736	22,354	133,351	127,851	2,607	2,862	236,902	67,436	-	-	15,100,450	720,751	715,096	
PERIOD 4c - License Termination																					
Period 4c Direct Decommissioning Activities																					
4c-1.1	DRSE confirmatory survey	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-	-
4c-1.2	Termination license	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4c-1	Subtotal Period 4c Activity Costs	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-	-
Period 4c Additional Costs																					
4c-2.1	Final Site Survey	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	230,140	-
4c-2	Subtotal Period 4c Additional Costs	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	230,140	-
Period 4c Collateral Costs																					
4c-3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
4c-3	Subtotal Period 4c Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
Period 4c Period-Dependent Costs																					
4c-4.1	Insurance	-	-	-	-	-	-	74	7	82	82	-	-	-	-	-	-	-	-	-	-
4c-4.2	Property taxes	-	-	-	-	-	-	745	74	819	819	-	-	-	-	-	-	-	-	-	-
4c-4.3	Health physics supplies	-	1,032	-	-	-	-	-	258	1,290	1,290	-	-	-	-	-	-	-	-	-	-
4c-4.4	Disposal of DAW generated	-	-	8	3	-	21	-	7	40	40	-	-	-	-	-	-	-	7,712	12	-
4c-4.5	Plant energy budget	-	-	-	-	-	-	144	22	165	165	-	-	-	-	-	-	-	-	-	-
4c-4.6	NRC Fees	-	-	-	-	-	-	256	26	282	282	-	-	-	-	-	-	-	-	-	-
4c-4.7	Site O&M Cost	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	-
4c-4.8	Security Staff Cost	-	-	-	-	-	-	705	106	811	811	-	-	-	-	-	-	-	-	-	-
4c-4.9	DOC Staff Cost	-	-	-	-	-	-	3,905	586	4,490	4,490	-	-	-	-	-	-	-	-	-	-
4c-4.10	Utility Staff Cost	-	-	-	-	-	-	5,167	775	5,942	5,942	-	-	-	-	-	-	-	-	-	-

Table E  
Clinton Power Station  
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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	Class A			Class B			Class C			Bridal/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
															Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet	Cu. Feet			
4e.4	Subtotal Period 4e Period-Dependent Costs	-	1,032	8	3	-	21	11,182	1,888	14,135	14,135	-	-	-	-	385	-	-	-	-	-	-	7,712	12	149,211	
4e.0	TOTAL PERIOD 4e COST	-	1,032	8	3	-	21	23,172	5,361	29,597	29,597	-	-	-	-	385	-	-	-	-	-	-	7,712	230,152	149,211	
	PERIOD 4 TOTALS	8,742	66,937	9,633	4,486	26,216	21,969	112,554	53,968	304,506	297,811	2,807	4,088	597,250	122,679	1,502	287	482	34,587,500	1,883,740	1,465,796					
	PERIOD 5b - Site Restoration																									
	Period 5b Direct Decommissioning Activities																									
	Demolition of Remaining Site Buildings																									
	5b.1.1.1 Reactor Building	-	5,134	-	-	-	-	-	770	5,904	-	-	5,904	-	-	-	-	-	-	-	-	-	-	65,001	-	
	5b.1.1.2 Auxiliary Building	-	1,945	-	-	-	-	-	292	2,236	-	-	2,236	-	-	-	-	-	-	-	-	-	-	23,242	-	
	5b.1.1.3 Circulating Water Screenhouse	-	3,165	-	-	-	-	-	475	3,640	-	-	3,640	-	-	-	-	-	-	-	-	-	-	38,383	-	
	5b.1.1.4 Control Building	-	4,641	-	-	-	-	-	696	5,337	-	-	5,337	-	-	-	-	-	-	-	-	-	-	56,578	-	
	5b.1.1.5 Diesel Generator Building	-	1,618	-	-	-	-	-	243	1,860	-	-	1,860	-	-	-	-	-	-	-	-	-	-	20,234	-	
	5b.1.1.6 Fuel Building	-	2,159	-	-	-	-	-	324	2,483	-	-	2,483	-	-	-	-	-	-	-	-	-	-	26,720	-	
	5b.1.1.7 Make-Up Water Pump House	-	344	-	-	-	-	-	52	396	-	-	396	-	-	-	-	-	-	-	-	-	-	5,100	-	
	5b.1.1.8 Miscellaneous Site Work	-	1,504	-	-	-	-	-	226	1,729	-	-	1,729	-	-	-	-	-	-	-	-	-	-	21,227	-	
	5b.1.1.9 Miscellaneous Structures	-	2,442	-	-	-	-	-	366	2,808	-	-	2,808	-	-	-	-	-	-	-	-	-	-	44,561	-	
	5b.1.1.10 Radwaste Building	-	4,502	-	-	-	-	-	675	5,177	-	-	5,177	-	-	-	-	-	-	-	-	-	-	58,440	-	
	5b.1.1.11 Service Building	-	353	-	-	-	-	-	53	406	-	-	406	-	-	-	-	-	-	-	-	-	-	5,585	-	
	5b.1.1.12 Transformer and Tank Pads	-	147	-	-	-	-	-	22	169	-	-	169	-	-	-	-	-	-	-	-	-	-	2,463	-	
	5b.1.1.13 Turbine Building	-	4,693	-	-	-	-	-	704	5,397	-	-	5,397	-	-	-	-	-	-	-	-	-	-	68,415	-	
	5b.1.1.14 Turbine Pedestal	-	1,080	-	-	-	-	-	162	1,243	-	-	1,243	-	-	-	-	-	-	-	-	-	-	12,474	-	
	5b.1.1 Totals	-	33,727	-	-	-	-	-	5,059	38,786	-	-	38,786	-	-	-	-	-	-	-	-	-	-	445,422	-	
	Site Closeout Activities																									
	5b.1.2 Backfill Site	-	57	-	-	-	-	-	9	66	-	-	66	-	-	-	-	-	-	-	-	-	-	201	-	
	5b.1.3 Grade & landscape site	-	1,405	-	-	-	-	-	211	1,619	-	-	1,619	-	-	-	-	-	-	-	-	-	-	4,449	-	
	5b.1.4 Grunt report to NRC	-	-	-	-	-	-	-	-21	163	163	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	5b.1 Subtotal Period 5b Activity Costs	-	35,192	-	-	-	-	141	5,300	40,634	163	-	40,471	-	-	-	-	-	-	-	-	-	-	445,071	1,560	
	Period 5b Additional Costs																									
	5b.2.1 Concrete Cracking	-	1,281	-	-	-	-	8	193	1,482	-	-	1,482	-	-	-	-	-	-	-	-	-	-	7,355	-	
	5b.2.2 ISFSI Site Restoration	-	1,158	-	-	-	-	42	180	1,338	-	-	1,338	-	-	-	-	-	-	-	-	-	-	3,069	160	
	5b.2.3 Screenhouse Cofferdam	-	834	-	-	-	-	-	140	1,074	-	-	1,074	-	-	-	-	-	-	-	-	-	-	10,159	-	
	5b.2.4 Discharge Flume Backfill	-	3,741	-	-	-	-	-	561	4,302	-	-	4,302	-	-	-	-	-	-	-	-	-	-	23,931	-	
	5b.2.5 Unit 2 Excavation Backfill	-	1,226	-	-	-	-	-	184	1,410	-	-	1,410	-	-	-	-	-	-	-	-	-	-	13,128	-	
	5b.2 Subtotal Period 5b Additional Costs	-	8,341	-	-	-	-	49	1,259	9,649	-	-	9,649	-	-	-	-	-	-	-	-	-	-	57,642	160	
	Period 5b Collateral Costs																									
	5b.3.1 Small tool allowance	-	388	-	-	-	-	-	58	446	-	-	446	-	-	-	-	-	-	-	-	-	-	-	-	
	5b.3 Subtotal Period 5b Collateral Costs	-	388	-	-	-	-	-	58	446	-	-	446	-	-	-	-	-	-	-	-	-	-	-	-	
	Period 5b Period-Dependent Costs																									
	5b.4.1 Insurance	-	-	-	-	-	-	226	23	249	-	-	249	-	-	-	-	-	-	-	-	-	-	-	-	
	5b.4.2 Property taxes	-	-	-	-	-	-	1,264	126	1,391	-	-	1,391	-	-	-	-	-	-	-	-	-	-	-	-	
	5b.4.3 Heavy equipment rental	-	5,246	-	-	-	-	-	787	6,033	-	-	6,033	-	-	-	-	-	-	-	-	-	-	-	-	
	5b.4.4 Plant energy budget	-	-	-	-	-	-	218	33	251	-	-	251	-	-	-	-	-	-	-	-	-	-	-	-	
	5b.4.5 Site O&M Cost	-	-	-	-	-	-	566	85	651	-	-	651	-	-	-	-	-	-	-	-	-	-	-	-	
	5b.4.6 Security Staff Cost	-	-	-	-	-	-	2,145	322	2,466	-	-	2,466	-	-	-	-	-	-	-	-	-	-	-	-	
	5b.4.7 DOC Staff Cost	-	-	-	-	-	-	11,330	1,699	13,029	-	-	13,029	-	-	-	-	-	-	-	-	-	-	-	-	
	5b.4.8 Utility Staff Cost	-	-	-	-	-	-	6,331	950	7,280	-	-	7,280	-	-	-	-	-	-	-	-	-	-	-	-	

Table E  
Clinton Power Station  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2007 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			GTCC Cu. Feet	Burial/Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,246	-	-	-	-	22,080	4,024	31,350	-	-	31,350	-	-	-	-	-	-	-	309,534	
5b.0	TOTAL PERIOD 5b COST	-	49,167	-	-	-	-	22,271	10,641	82,079	163	1,380	80,637	-	-	-	-	-	-	-	505,713	311,254
	<b>PERIOD 5 TOTALS</b>	-	49,167	-	-	-	-	22,271	10,641	82,079	163	1,380	80,637	-	-	-	-	-	-	-	505,713	311,254
	TOTAL COST TO DECOMMISSION	19,021	124,062	10,292	5,338	26,216	24,017	656,869	145,108	1,010,952	691,981	233,606	85,365	597,250	152,139	1,502	287	482	35,321,280	2,045,763	6,814,027	

TOTAL COST TO DECOMMISSION WITH 16.76% CONTINGENCY: \$1,010,952 thousands of 2007 dollars  
 TOTAL NRC LICENSE TERMINATION COST IS 68.45% OR: \$691,981 thousands of 2007 dollars  
 SPENT FUEL MANAGEMENT COST IS 23.11% OR: \$233,606 thousands of 2007 dollars  
 NON-NUCLEAR DEMOLITION COST IS 8.44% OR: \$85,365 thousands of 2007 dollars  
 TOTAL LOW-LEVEL RADIOACTIVE WASTE BURIED (EXCLUDING GTCC): 153,929 cubic feet  
 TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED: 482 cubic feet  
 TOTAL SCRAP METAL REMOVED: 75,356 tons  
 TOTAL CRAFT LABOR REQUIREMENTS: 2,045,763 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 0.0 but is non-zero.  
 a cell containing "-" indicates a zero value

## ATTACHMENT 2

### Clinton Power Station Radiological Decommissioning Projected SAFSTOR Cash Flow (dollars, thousands)

Year	Radiological Decommissioning Cost (July 31, 2009 dollars)	Radiological Decommissioning Cost less Decommissioning Period Credit
2026	\$14,402	\$14,402
2027	\$81,329	\$79,734
2028	\$14,299	\$13,744
2029	\$5,725	\$5,395
2030	\$5,725	\$5,289
2031	\$5,725	\$5,185
2032	\$5,740	\$5,097
2033	\$5,725	\$4,984
2034	\$5,725	\$4,886
2035	\$5,725	\$4,790
2036	\$5,740	\$4,709
2037	\$5,725	\$4,604
2038	\$5,741	\$4,527
2039	\$5,725	\$4,425
2040	\$5,740	\$4,350
2041	\$5,725	\$4,254
2042	\$5,725	\$4,170
2043	\$5,725	\$4,088
2044	\$5,740	\$4,019
2045	\$5,725	\$3,930
2046	\$5,725	\$3,853
2047	\$5,725	\$3,777
2048	\$5,740	\$3,713
2049	\$5,725	\$3,630
2050	\$5,725	\$3,559
2051	\$5,725	\$3,489
2052	\$5,740	\$3,430
2053	\$5,725	\$3,354
2054	\$5,725	\$3,288
2055	\$5,725	\$3,224
2056	\$5,740	\$3,169
2057	\$5,725	\$3,098
2058	\$5,725	\$3,038
2059	\$5,725	\$2,978
2060	\$5,740	\$2,928
2061	\$5,725	\$2,862
2062	\$5,725	\$2,806
2063	\$5,725	\$2,751
2064	\$5,740	\$2,705
2065	\$5,725	\$2,645
2066	\$5,725	\$2,593
2067	\$5,725	\$2,542



**ATTACHMENT 2**

**Clinton Power Station  
Radiological Decommissioning Projected SAFSTOR Cash Flow (continued)**  
(dollars, thousands)

<b>Year</b>	<b>Radiological Decommissioning Cost (July 31, 2009 dollars)</b>	<b>Radiological Decommissioning Cost less Decommissioning Period Credit</b>
2068	\$5,740	\$2,499
2069	\$5,725	\$2,443
2070	\$5,725	\$2,395
2071	\$5,725	\$2,348
2072	\$5,740	\$2,309
2073	\$5,725	\$2,257
2074	\$5,725	\$2,213
2075	\$5,725	\$2,169
2076	\$5,740	\$2,133
2077	\$5,725	\$2,085
2078	\$5,725	\$2,044
2079	\$5,725	\$2,004
2080	\$5,725	\$1,965
2081	\$18,231	\$6,135
2082	\$45,423	\$14,985
2083	\$108,023	\$34,939
2084	\$100,273	\$31,796
2085	\$86,981	\$27,040
2086	\$31,733	\$9,672
2087	\$77	\$23
2088	\$77	\$23
2089	\$1	\$0
<b>Total</b>	<b>\$798,737</b>	<b>\$409,492</b>
	<b>Total Decommissioning Period Credit:</b>	<b>\$389,245</b>

**ATTACHMENT 3**

**Clinton Power Station  
NRC Funding Assurance Calculations**

July 31, 2009  
(dollars, thousands)

	<b>NRC Generic Formula</b>	<b>CPS Site-Specific SAFSTOR Decommissioning Cost Estimate</b>
Required Minimum at July 31, 2009 (A)	\$576,567	\$798,737
Trust Fund Amount at July 31, 2009 (B)	\$320,699	\$320,699
Shutdown Date	9/29/2026	9/29/2026
Years to Shutdown (C)	17.175	17.175
Earnings Credit to shutdown (D) = (B) x ((1 + 2%) ^ (C) - 1)	\$129,919	\$129,919
Projected Trust Fund Amount at shutdown (E) = (B) + (D)	\$450,618	\$450,618
Decommissioning Period Earnings Credit (F)	\$33,500	\$389,245
Total Projected Trust Fund Amount (G) = (E) + (F)	\$484,118	\$839,863
Difference (H) = (G) - (A)	(\$92,449)	\$41,126
<b>Prepayment Difference – Surplus/(Shortfall) (J) = (H) / (1 + 2%) ^ (C)</b>	<b>(\$65,795)</b>	<b>\$29,269</b>