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10 CFR 50.75(f)(1)

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U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Clinton 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 to 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

prepared by

TLG Services, Inc.
Bridgewater, Connecticut

October 2007

APPROVALS

Project Manager	William A. Cloutier **William A. Cloutier, Jr.**	10/29/2007 **Date**
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Quality Assurance Manager (acting)	Joseph J. Adler **Joseph J. Adler**	10/29/07 **Date**

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No.	CRA No.	Date	Item Revised	Reason for Revision
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 [1] 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.[2] In this rule,

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

2 U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72 "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, 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."[3]
>
> 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."[4] 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."[5] 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.

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

3 Ibid. Page FR24022, Column 3

4 Ibid.

5 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.[6] 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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6 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 [7] 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."[8] 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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7 T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986

8 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,[9] and its Amendments of 1985,[10] 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

9 "Low-Level Radioactive Waste Policy Act of 1980," Public Law 96-573, 1980
10 "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" [11] (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,[12] although 2020 may be more likely according to the director of the DOE's waste program.[13]

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).[14] This

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11 "Nuclear Waste Policy Act of 1982 and Amendments," U.S. Department of Energy's Office of Civilian Radioactive Management, 1982

12 "DOE Announces Yucca Mountain License Application Schedule", U.S. Department of Energy's Office of Public Affairs, Press Release July 19, 2006

13 Remarks of OCRWM Director Ward Sproat to the National Academy of Science, November 2006

14 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.

Subpart 54 (bb), "Conditions of Licenses"

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)

Activity	Total
Decontamination	20,716
Removal	158,458
Packaging	15,829
Transportation	10,548
Waste Disposal	55,662
Off-site Waste Processing	25,564
Program Management [1]	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
Total [2]	786,061
NRC License Termination	547,591
Spent Fuel Management	155,245
Site Restoration	83,225

[1] Includes engineering and security
[2] Columns may not add due to rounding

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

Activity	Total
Decontamination	28,052
Removal	148,111
Packaging	12,819
Transportation	7,604
Waste Disposal	37,773
Off-site Waste Processing	25,564
Program Management [1]	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
Total [2]	742,651
NRC License Termination	476,232
Spent Fuel Management	181,048
Site Restoration	85,372

[1] Includes engineering and security
[2] Columns may not add due to rounding

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

Activity	Total
Decontamination	27,039
Removal	152,473
Packaging	12,025
Transportation	6,251
Waste Disposal	30,714
Off-site Waste Processing	30,148
Program Management [1]	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
Total [2]	1,010,952
NRC License Termination	691,981
Spent Fuel Management	233,606
Site Restoration	85,365

[1] Includes engineering and security
[2] 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,[1] 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.[2]* 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,[3]" 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

* 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.[4] 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.[5] 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.[6] 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"[7] (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.[8]

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,[9] although 2020 may be more likely according to the director of the DOE's waste program.[10]

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).[11] 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,[12] 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,"[13] 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,"[14] 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).[15] An additional limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.[16]

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) [17] 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 de-activation 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)."[18] 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}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}Nb, ^{59}Ni, and ^{63}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}Eu and ^{154}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,"[19] and the DOE "Decommissioning Handbook."[20] 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.[21]

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[22] 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").[23] 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.[24]

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.[25] 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.[26] 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.[27]

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., ^{137}Cs, ^{90}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.[28] 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[29] and CR-0672,[30] 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."[31] 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.[32]

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

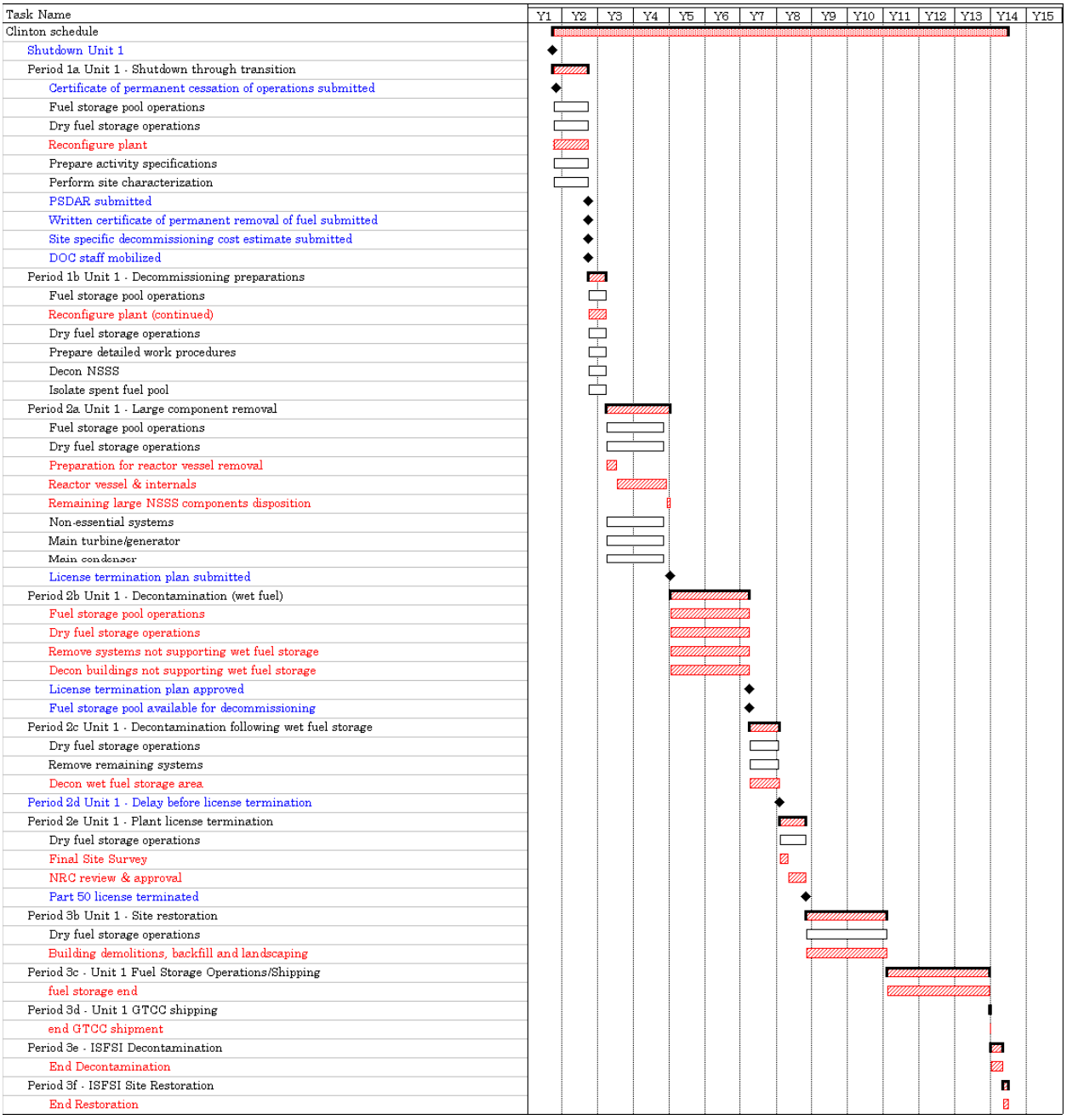


FIGURE 4.2
DECOMMISSIONING TIMELINE
DECON
(not to scale)

(Shutdown September 29, 2046)

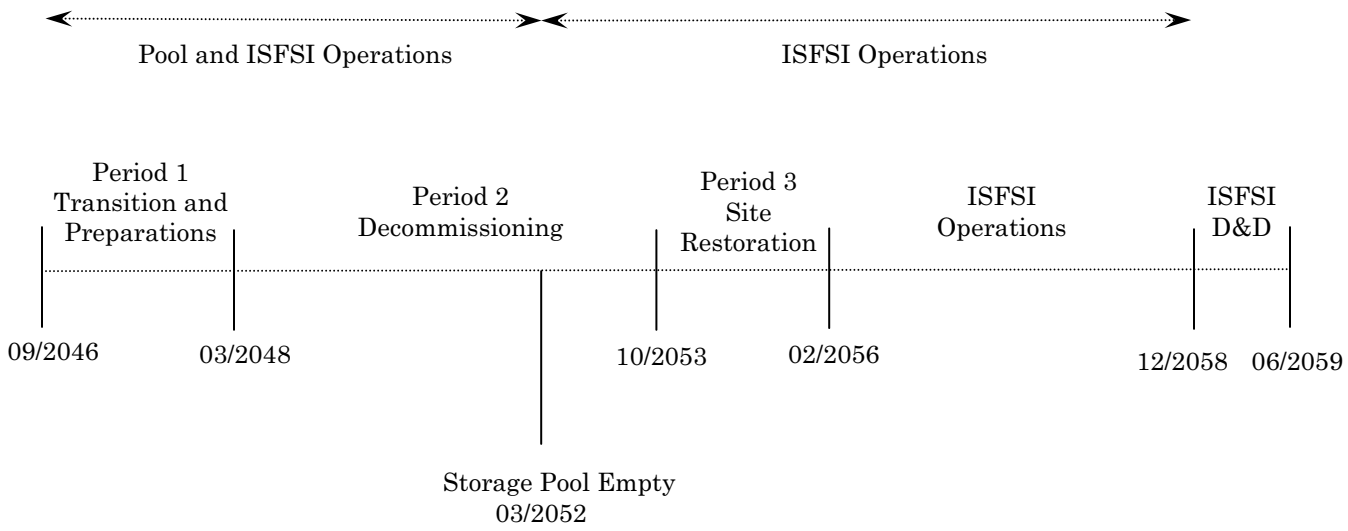


FIGURE 4.3
DECOMMISSIONING TIMELINE
DELAYED DECON
(not to scale)

(Shutdown September 29, 2046)

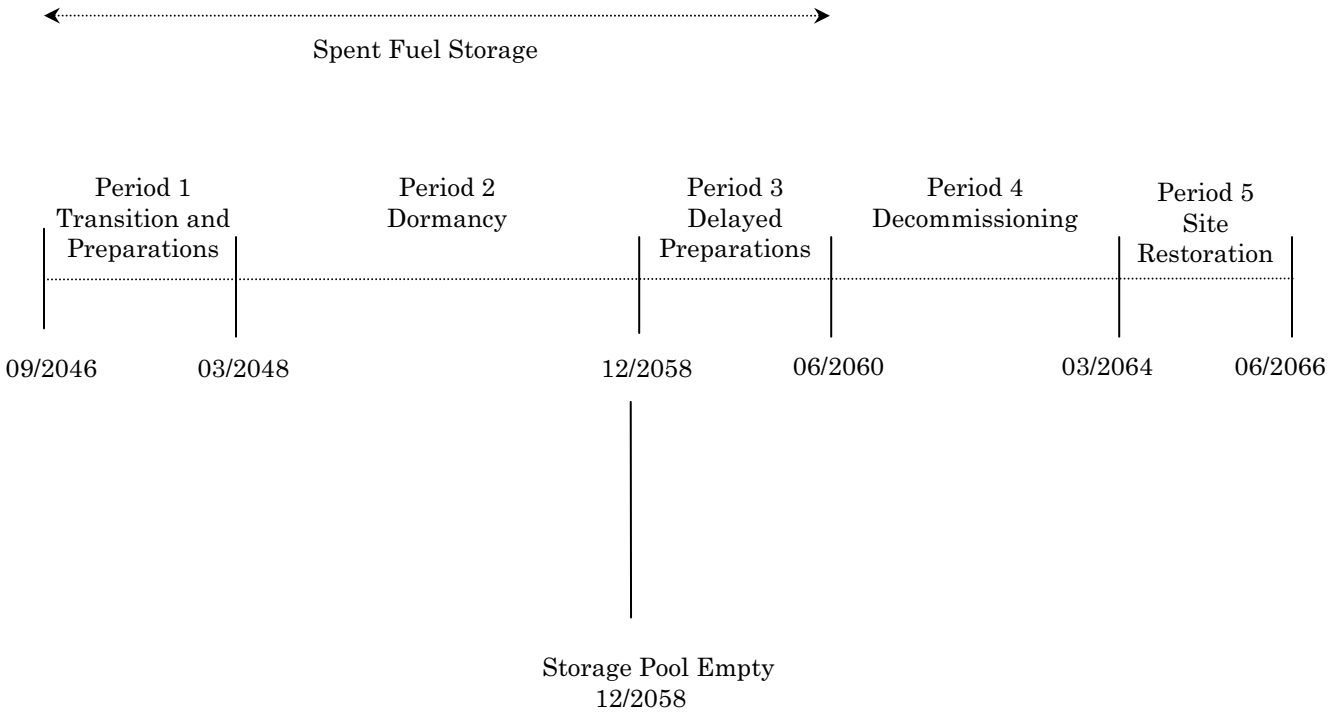
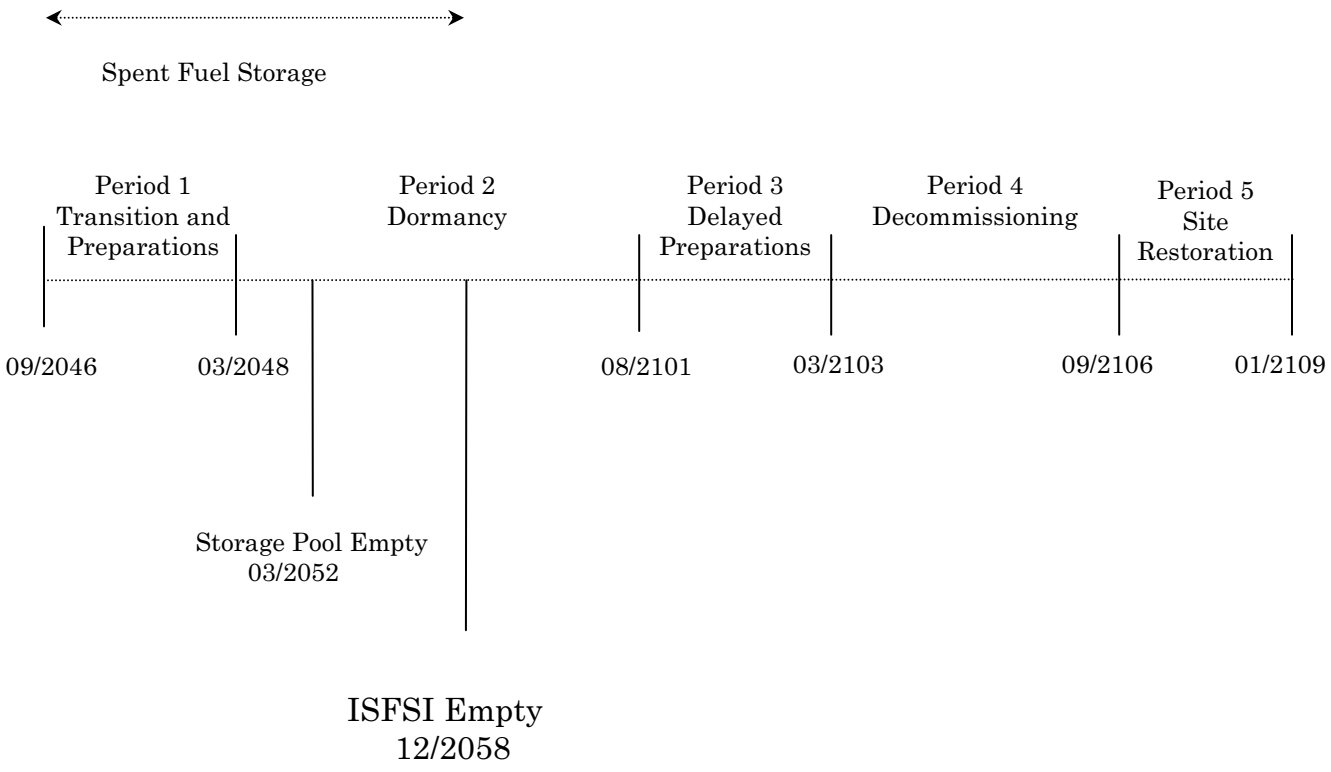


FIGURE 4.4
DECOMMISSIONING TIMELINE
SAFSTOR
(not to scale)

(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,[33] 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}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[1]	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 [2]			
	B	2,156	246,431
	C	689	43,240
Geologic Repository (Greater-than Class C)			
	>C	482	86,500
Total [3]		197,503	15,573,370
Processed Waste (off-site)		505,717	21,170,880
Scrap Metal			150,712,000

1 Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
2 EnergySolutions is currently not able to receive Class B and C material
3 Columns may not add due to rounding.

TABLE 5.2
DECOMMISSIONING WASTE SUMMARY
DELAYED DECON

	Waste Class[1]	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 [2]			
	B	1,502	157,200
	C	287	36,625
Geologic Repository (Greater-than Class C)			
	>C	482	86,500
Total [3]		191,906	14,758,625
Processed Waste (off-site)		505,717	21,170,880
Scrap Metal			150,712,000

1 Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
2 EnergySolutions is currently not able to receive Class B and C material
3 Columns may not add due to rounding.

TABLE 5.3
DECOMMISSIONING WASTE SUMMARY
SAFSTOR

	Waste Class[1]	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 [2]			
	B	1,502	157,200
	C	287	36,625
Geologic Repository (Greater-than Class C)			
	>C	482	86,500
Total [3]		154,411	10,353,598
Processed Waste (off-site)		597,250	24,967,690
Scrap Metal			150,712,000

1 Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
2 EnergySolutions is currently not able to receive Class B and C material
3 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)

Work Category	Cost	%
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 [1]	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
Total [2]	786,061	100.0
NRC License Termination	547,591	69.7
Spent Fuel Management	155,245	19.7
Site Restoration	83,225	10.6

[1] Includes engineering and security
[2] Columns may not add due to rounding

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

Work Category	Cost	%
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 [1]	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
Total [2]	742,651	100.0
NRC License Termination	476,232	64.1
Spent Fuel Management	181,048	24.4
Site Restoration	85,372	11.5

[1] Includes engineering and security
[2] Columns may not add due to rounding

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

Work Category	Cost	%
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 [1]	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
Total [2]	1,010,952	100.0
NRC License Termination	691,981	68.4
Spent Fuel Management	233,606	23.1
Site Restoration	85,365	8.4

[1] Includes engineering and security
[2] Columns may not add due to rounding

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

24. "Civilian Radioactive Waste Management System Total System Description," Revision 02 (TDR-CRW-SE-000002), DOE/RW-0500, September 2001

25. "Strategy for Management and Disposal of Greater-Than-Class C Low-Level Radioactive Waste," Federal Register Volume 60, Number 48 (p 13424 et seq.), March 1995

26. U.S. Department of Transportation, Title 49 of the Code of Federal Regulations, "Transportation," Parts 173 through 178, 1996

27. Tri-State Motor Transit Company, published tariffs, Interstate Commerce Commission (ICC), Docket No. MC-427719 Rules Tariff, March 2004, Radioactive Materials Tariff, January 2004

28. J.C. Evans et al., "Long-Lived Activation Products in Reactor Materials" NUREG/CR-3474, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. August 1984

29. R.I. Smith, G.J. Konzek, W.E. Kennedy, Jr., "Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station," NUREG/CR-0130 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. June 1978

30. H.D. Oak, et al., "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station," NUREG/CR-0672 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. June 1980

31. "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors," 10 CFR Parts 50 and 140, Federal Register Notice, Vol. 62, No. 210, October 30, 1997

32. "Microsoft Project 2003," Microsoft Corporation, Redmond, WA, 2003

33. "Atomic Energy Act of 1954," (68 Stat. 919)

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	60	60
	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				$3,782.30

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
• Blotting paper 50 @ $0.46/sq ft {1}	$23.50
• Plastic sheets/bags 50 @ $0.14/sq ft {2}	$7.00
• Gas torch consumables 1 @ $7.60 x 1 /hr {3}	$7.60
Subtotal cost of equipment and materials	$37.60
Overhead & profit on equipment and materials @ 16.25 %	$6.11
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 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)

Unit Cost Factor	Cost/Unit
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)

Unit Cost Factor	Cost/Unit
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)

Unit Cost Factor	Cost/Unit
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)

Unit Cost Factor	Cost/Unit
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)

Unit Cost Factor	Cost/Unit
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)

Unit Cost Factor	Cost/Unit
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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	680	102	782	782	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	454	68	522	522	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	372	56	427	427	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	446	67	513	462	-	51	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	378	57	435	391	-	43	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	644	97	741	741	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	590	88	678	678	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	145	22	167	83	-	83	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	189	28	218	218	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	189	28	218	218	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	283	42	325	163	-	163	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	82	12	94	47	-	47	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	3,871	581	4,452	4,064	-	388	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	218	33	250	250	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	112	17	128	128	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	11,597	1,740	13,336	12,948	-	388	-	-	-	-	-	-	-	78,609
Period 1a Collateral Costs																					
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	-	-	-	-	-	-	-	-	-

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	GTCC Cu. Feet			
Period 1a Period-Dependent Costs																					
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	-	349	-	-	-	-	-	52	401	401	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	6	-	38	-	12	70	70	-	-	-	675	-	-	-	13,531	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	-	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	ISFSI Operating Costs	-	-	-	-	-	-	82	12	94	-	94	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	5,955	893	6,848	6,848	-	-	-	-	-	-	-	-	-	157,471
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	26,183	3,927	30,110	30,110	-	-	-	-	-	-	-	-	-	423,400
1a.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	580,871
1a.0	TOTAL PERIOD 1a COST	-	726	14	6	-	38	93,648	13,789	108,220	60,924	46,909	388	-	675	-	-	-	13,531	21	659,480
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	429	64	494	444	-	49	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	363	54	417	417	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	122	18	141	35	-	106	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	329	49	379	379	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	109	16	125	63	-	63	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	91	14	104	52	-	52	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	189	28	218	218	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	248	37	285	256	-	28	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	248	37	285	256	-	28	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	3,060	459	3,519	3,193	-	327	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	430	-	-	-	-	-	-	215	645	645	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	430	-	-	-	-	-	3,060	674	4,164	3,838	-	327	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	9,133	1,370	10,503	10,503	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	897	269	1,167	1,167	-	-	-	-	-	-	-	-	-	-
1b.2.3	Hazardous liquid disposal	-	-	-	7	-	411	-	104	523	523	-	-	-	1,571	-	-	-	89,546	-	-
1b.2.4	Contaminated asbestos disposal	-	-	-	8	-	5	-	2	15	15	-	-	-	60	-	-	-	1,800	-	-
1b.2.5	Clean asbestos disposal	-	-	-	-	-	-	2	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	15	-	416	10,033	1,746	12,210	12,210	-	-	-	1,631	-	-	-	91,346	-	-

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 Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	726	-	-	-	-	-	-	109	834	834	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	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	6,900	-	-	183	721	-	-	90,984	176	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	22	-	-	-	-	-	-	6	28	28	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	662	66	728	728	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,110	211	2,321	2,321	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	193	-	-	-	-	-	48	242	242	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	175	-	-	-	-	-	26	201	201	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	3	-	20	-	6	37	37	-	-	-	355	-	-	-	7,109	11	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	966	145	1,111	1,111	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	78,951
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	4,136	620	4,756	4,756	-	-	-	-	-	-	-	-	-	63,789
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	9,311	1,397	10,708	10,708	-	-	-	-	-	-	-	-	-	147,969
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	290,709
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	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	721	-	-	202,970	1,274	983,930
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	-	99	-	63	277	277	-	-	-	530	-	-	-	64,091	1,943	-
2a.1.1.2	Recirculation Pumps & Motors	49	42	13	31	18	263	-	110	527	527	-	-	250	2,473	-	-	-	187,000	1,998	-
2a.1.1.3	CRDMs & NIs Removal	199	158	321	111	-	203	-	239	1,231	1,231	-	-	-	6,985	-	-	-	131,119	7,284	-
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	1,435	689	-	357,865	39,200	1,700
2a.1.1.5	Reactor Vessel	81	5,751	1,904	850	-	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	18	17,625	560	17,962	55,749	55,749	-	-	250	24,032	1,435	689	-	2,059,955	89,625	3,400
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	348	885	180	2,586	152	-	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	-	-	58,848	1,735	-	-	-	2,803,815	24,681	-
Cascading Costs 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	-	-	-	-	-	-	-	-	2,582	-
2a.1.4.3	Radwaste Building	-	500	-	-	-	-	-	75	575	575	-	-	-	-	-	-	-	-	6,493	-
2a.1.4.4	Turbine Building	-	508	-	-	-	-	-	76	585	585	-	-	-	-	-	-	-	-	6,771	-

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	GTCC Cu. Feet			
Cascading Costs from Clean Building Demolition (continued)																					
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	-
Disposal of Plant Systems																					
2a.1.5.1	Acid Feed & Handling	-	26	1	1	21	-	-	10	59	59	-	-	488	-	-	-	-	19,822	533	-
2a.1.5.2	Auxiliary Steam	-	484	13	19	319	-	-	173	1,008	1,008	-	-	7,493	-	-	-	-	304,278	9,740	-
2a.1.5.3	Breathing Air	-	36	-	-	-	-	-	5	42	-	-	42	-	-	-	-	-	-	820	-
2a.1.5.4	CO2 & Generator Purge	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	349	-
2a.1.5.5	Caustic Handling	-	13	0	0	8	-	-	5	26	26	-	-	183	-	-	-	-	7,431	256	-
2a.1.5.6	Chem Radwaste Reprocessing & Disposal	395	391	39	36	94	168	-	361	1,484	1,484	-	-	2,211	2,121	-	-	-	249,902	14,872	-
2a.1.5.7	Chilled Water - RCA	-	1,035	27	40	679	-	-	369	2,149	2,149	-	-	15,914	-	-	-	-	646,286	20,760	-
2a.1.5.8	Chilled Water Non-RCA	-	166	-	-	-	-	-	25	191	-	-	191	-	-	-	-	-	-	3,682	-
2a.1.5.9	Chlorination	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	953	-
2a.1.5.10	Circulating Water - RCA	-	161	16	24	400	-	-	105	706	706	-	-	9,379	-	-	-	-	380,877	3,419	-
2a.1.5.11	Circulating Water Non-RCA	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	1,090	-
2a.1.5.12	Cntnmnt Aux & Fuel Bldg Equip Drains	-	90	5	5	8	24	-	31	162	162	-	-	187	253	-	-	-	30,046	1,844	-
2a.1.5.13	Cntnmnt Aux & Fuel Bldg Floor Drains	-	156	8	8	34	32	-	54	292	292	-	-	792	367	-	-	-	62,936	3,212	-
2a.1.5.14	Component Cooling Water Non-RCA	-	119	-	-	-	-	-	18	137	-	-	137	-	-	-	-	-	-	2,622	-
2a.1.5.15	Condensate	-	904	159	174	584	772	-	549	3,142	3,142	-	-	13,689	8,197	-	-	-	1,291,159	19,496	-
2a.1.5.16	Condensate Booster	-	855	161	178	543	806	-	539	3,082	3,082	-	-	12,724	8,568	-	-	-	1,284,382	18,468	-
2a.1.5.17	Condensate Polishing	-	690	46	45	188	188	-	259	1,416	1,416	-	-	4,398	2,104	-	-	-	357,430	14,429	-
2a.1.5.18	Condenser Vacuum	-	179	17	25	430	-	-	115	767	767	-	-	10,094	-	-	-	-	409,927	3,731	-
2a.1.5.19	Containment Combustible Gas	-	75	4	4	33	14	-	28	158	158	-	-	781	147	-	-	-	44,863	1,568	-
2a.1.5.20	Cycled Condensate	-	617	41	40	181	163	-	232	1,275	1,275	-	-	4,242	1,929	-	-	-	327,937	12,878	-
2a.1.5.21	Drywell Cooling	-	485	20	25	242	62	-	179	1,012	1,012	-	-	5,664	655	-	-	-	288,770	9,748	-
2a.1.5.22	Drywell Purge	-	138	11	15	118	42	-	66	391	391	-	-	2,764	451	-	-	-	152,687	2,951	-
2a.1.5.23	ECCS Equipment Cooling	-	72	2	4	51	3	-	27	159	159	-	-	1,190	32	-	-	-	51,154	1,484	-
2a.1.5.24	Extraction Steam	-	473	54	63	236	271	-	236	1,333	1,333	-	-	5,531	2,875	-	-	-	482,498	10,135	-
2a.1.5.25	Feedwater	-	519	88	100	331	445	-	315	1,799	1,799	-	-	7,772	4,722	-	-	-	739,273	11,221	-
2a.1.5.26	Feedwater Heater Drains Turbine Cycle	-	1,238	112	126	507	527	-	548	3,058	3,058	-	-	11,899	5,704	-	-	-	985,459	26,301	-
2a.1.5.27	Feedwater Heater Misc.	-	193	13	13	29	62	-	71	382	382	-	-	685	664	-	-	-	87,316	4,010	-
2a.1.5.28	Filtered Water	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	86	-
2a.1.5.29	Generator Hydrogen Seal Oil	-	25	0	1	10	-	-	8	44	44	-	-	243	-	-	-	-	9,883	469	-
2a.1.5.30	Generator Stator Cooling	-	16	0	1	9	-	-	6	32	32	-	-	207	-	-	-	-	8,423	339	-
2a.1.5.31	High Pressure Core Spray	-	251	36	39	131	170	-	134	761	761	-	-	3,077	1,807	-	-	-	287,030	5,388	-
2a.1.5.32	Hydrogen	-	22	0	0	7	-	-	7	36	36	-	-	168	-	-	-	-	6,815	403	-
2a.1.5.33	Laundry Equip & Flr Drains RW Reprocess	-	209	14	14	90	49	-	82	459	459	-	-	2,116	646	-	-	-	132,817	4,399	-
2a.1.5.34	Leak Detection	-	42	1	1	1	3	-	11	58	58	-	-	30	29	-	-	-	3,822	928	-
2a.1.5.35	Local Instrument Panels	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	116	-
2a.1.5.36	Low Pressure Core Spray	-	97	21	21	65	97	-	64	365	365	-	-	1,535	1,028	-	-	-	154,545	2,081	-
2a.1.5.37	Machine Shop Equipment	-	10	0	1	10	-	-	4	25	25	-	-	225	-	-	-	-	9,119	216	-
2a.1.5.38	Machine Shop Ventilation	-	222	5	8	114	7	-	76	431	431	-	-	2,665	71	-	-	-	114,605	4,249	-
2a.1.5.39	Main Steam	-	833	74	80	298	347	-	359	1,991	1,991	-	-	6,987	3,685	-	-	-	614,246	17,632	-
2a.1.5.40	Main Steam Isolation Valve	-	21	1	1	1	4	-	7	35	35	-	-	23	47	-	-	-	5,157	429	-
2a.1.5.41	Make-up Demineralizer - RCA	-	184	4	6	103	-	-	63	360	360	-	-	2,419	-	-	-	-	98,255	3,595	-
2a.1.5.42	Make-up Demineralizer Non-RCA	-	208	-	-	-	-	-	31	239	-	-	239	-	-	-	-	-	-	4,416	-
2a.1.5.43	Makeup Condensate Storage	-	240	15	14	22	67	-	84	442	442	-	-	518	715	-	-	-	85,161	4,912	-
2a.1.5.44	Misc. Building Drains	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	357	-
2a.1.5.45	Miscellaneous Ventilation	-	30	-	-	-	-	-	4	34	-	-	34	-	-	-	-	-	-	643	-
2a.1.5.46	Nuclear Boiler	0	17	1	1	1	3	-	5	27	27	-	-	17	30	-	-	-	3,359	363	-
2a.1.5.47	Oil Transfer	-	90	4	6	104	-	-	39	243	243	-	-	2,429	-	-	-	-	98,662	1,834	-
2a.1.5.48	Reactor Core Isolation Cooling	-	216	15	15	77	57	-	84	463	463	-	-	1,796	698	-	-	-	127,607	4,557	-

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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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
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	1	18	-	-	9	55	55	-	-	413	-	-	-	-	16,763	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	-	-	2,106	-	-	-	-	85,531	2,948	-
2a.1.5.55	Turbine Electrohydraulic Control	-	9	0	0	4	-	-	3	16	16	-	-	84	-	-	-	-	3,405	185	-
2a.1.5.56	Turbine Gen Misc Drains & Vents	-	50	2	2	6	9	-	16	86	86	-	-	136	96	-	-	-	14,138	1,013	-
2a.1.5.57	Turbine Gland Seal Steam	-	335	40	50	453	130	-	196	1,205	1,205	-	-	10,629	1,384	-	-	-	555,788	7,100	-
2a.1.5.58	Turbine Oil	-	54	4	5	37	18	-	25	144	144	-	-	866	199	-	-	-	52,601	1,145	-
2a.1.5.59	Turbine-Gen Aux & Misc Devices	-	240	51	62	289	250	-	180	1,073	1,073	-	-	6,779	2,656	-	-	-	513,573	5,243	-
2a.1.5	Totals	396	13,063	1,131	1,280	6,974	4,792	-	5,922	33,558	32,510	-	1,048	163,551	51,880	-	-	-	11,205,730	280,825	-
2a.1.6	Scaffolding in support of decommissioning	-	3,063	50	11	140	17	-	798	4,080	4,080	-	-	2,969	185	-	-	-	150,174	70,739	-
2a.1	Subtotal Period 2a Activity Costs	941	28,737	10,296	4,704	12,499	22,750	560	26,540	107,027	105,979	-	1,048	280,345	79,444	1,435	689	-	18,827,220	503,388	3,400
Period 2a Additional Costs																					
2a.2.1	Disposal of stored turbine rotors	-	17	100	40	743	-	-	130	1,030	1,030	-	-	15,719	-	-	-	-	707,358	352	-
2a.2	Subtotal Period 2a Additional Costs	-	17	100	40	743	-	-	130	1,030	1,030	-	-	15,719	-	-	-	-	707,358	352	-
Period 2a Collateral Costs																					
2a.3.1	Process liquid waste	138	-	65	359	-	138	-	164	864	864	-	-	-	1,234	-	-	-	89,037	241	-
2a.3.2	Small tool allowance	-	375	-	-	-	-	-	56	431	388	-	43	-	-	-	-	-	-	-	-
2a.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	23,000	3,450	26,450	-	26,450	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	138	375	65	359	-	138	23,000	3,670	27,745	1,252	26,450	43	-	1,234	-	-	-	89,037	241	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	79	-	-	-	-	-	-	20	99	99	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	905	91	996	996	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	3,390	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	-	-	-	-	-	456	3,500	3,500	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	212	87	-	556	-	173	1,028	1,028	-	-	-	9,960	-	-	-	199,586	304	-
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	ISFSI Operating Costs	-	-	-	-	-	-	147	22	169	-	169	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	8,912	1,337	10,248	10,248	-	-	-	-	-	-	-	-	-	235,651
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	18,424	2,764	21,188	21,188	-	-	-	-	-	-	-	-	-	283,154
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	33,174	4,976	38,150	38,150	-	-	-	-	-	-	-	-	-	527,189
2a.4	Subtotal Period 2a Period-Dependent Costs	79	5,493	212	87	-	556	69,323	11,397	87,148	84,697	2,077	373	-	9,960	-	-	-	199,586	304	1,045,994
2a.0	TOTAL PERIOD 2a COST	1,158	34,622	10,673	5,190	13,241	23,443	92,884	41,738	222,949	192,958	28,527	1,464	296,064	90,638	1,435	689	-	19,823,200	504,285	1,049,394

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	GTCC Cu. Feet			
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Component Cooling Water - RCA	-	178	4	6	101	-	-	61	350	350	-	-	2,361	-	-	-	-	95,865	3,548	-
2b.1.1.2	Containment Monitoring	-	56	1	1	4	4	-	16	83	83	-	-	98	44	-	-	-	7,962	1,241	-
2b.1.1.3	Control Rod Drive	-	397	19	19	57	88	-	135	715	715	-	-	1,333	930	-	-	-	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	-	-	60	-	-	-	-	-	-	1,133	-
2b.1.1.6	Diesel-Generator Room Ventilation	-	77	-	-	-	-	-	12	88	-	-	88	-	-	-	-	-	-	1,817	-
2b.1.1.7	Drains-Laundry to Radwaste	-	17	1	1	1	4	-	5	29	29	-	-	34	39	-	-	-	4,837	340	-
2b.1.1.8	Electrical - Clean Non-RCA	-	1,545	-	-	-	-	-	232	1,777	-	-	1,777	-	-	-	-	-	-	33,545	-
2b.1.1.9	Electrical - Clean RCA	-	6,131	125	188	3,190	-	-	2,052	11,687	11,687	-	-	74,814	-	-	-	-	3,038,244	126,548	-
2b.1.1.10	Equip Drain Radwaste Reprocessing	-	1,132	69	67	307	271	-	414	2,261	2,261	-	-	7,207	3,254	-	-	-	551,230	23,620	-
2b.1.1.11	Fire Protection Non-RCA	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	3,416	-
2b.1.1.12	Floor Drain Radwaste Reprocessing	-	705	54	55	235	227	-	282	1,558	1,558	-	-	5,507	2,655	-	-	-	439,585	14,712	-
2b.1.1.13	HVAC - Auxiliary Building	-	31	1	2	23	3	-	12	73	73	-	-	540	36	-	-	-	25,200	663	-
2b.1.1.14	HVAC - Control Room	-	242	-	-	-	-	-	36	279	-	-	279	-	-	-	-	-	-	5,686	-
2b.1.1.15	HVAC - Fuel Building	-	313	8	11	161	10	-	107	611	611	-	-	3,782	107	-	-	-	163,158	5,975	-
2b.1.1.16	HVAC - Laboratory	-	504	13	18	257	17	-	173	982	982	-	-	6,035	181	-	-	-	261,272	9,695	-
2b.1.1.17	HVAC - Off Gas Building	-	128	6	7	64	18	-	48	271	271	-	-	1,499	192	-	-	-	78,082	2,607	-
2b.1.1.18	HVAC - Radwaste Building	-	713	21	30	395	37	-	253	1,449	1,449	-	-	9,269	389	-	-	-	411,319	13,769	-
2b.1.1.19	HVAC - Service Building	-	52	-	-	-	-	-	8	60	-	-	60	-	-	-	-	-	-	1,145	-
2b.1.1.20	HVAC - Turbine Building	-	589	15	22	316	20	-	204	1,167	1,167	-	-	7,421	211	-	-	-	320,323	11,248	-
2b.1.1.21	Hoists Cranes & Elevators	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	123	-
2b.1.1.22	Instrument Air - RCA	-	374	5	7	115	-	-	112	613	613	-	-	2,708	-	-	-	-	109,971	7,089	-
2b.1.1.23	Instrument Air Non-RCA	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	389	-
2b.1.1.24	Off Gas	-	171	9	10	64	33	-	63	349	349	-	-	1,490	352	-	-	-	91,689	3,537	-
2b.1.1.25	Plant Service Water - RCA	-	176	5	8	130	-	-	65	384	384	-	-	3,043	-	-	-	-	123,583	3,532	-
2b.1.1.26	Plant Service Water Non-RCA	-	156	-	-	-	-	-	23	180	-	-	180	-	-	-	-	-	-	3,494	-
2b.1.1.27	Process Radiation Monitoring	-	93	4	3	11	13	-	29	154	154	-	-	253	142	-	-	-	23,024	1,902	-
2b.1.1.28	Reactor Recirculation	20	47	4	4	6	21	-	29	130	130	-	-	140	223	-	-	-	25,667	1,390	-
2b.1.1.29	Reactor Water Clean-up	230	286	20	21	48	101	-	224	931	931	-	-	1,133	1,086	-	-	-	141,994	8,682	-
2b.1.1.30	Residual Heat Removal	462	538	87	89	278	402	-	530	2,386	2,386	-	-	6,526	4,271	-	-	-	648,075	14,073	-
2b.1.1.31	Screen Wash	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	132	-
2b.1.1.32	Service Air - RCA	-	230	4	6	106	-	-	75	421	421	-	-	2,476	-	-	-	-	100,556	4,507	-
2b.1.1.33	Service Air Non-RCA	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	309	-
2b.1.1.34	Shutdown Service Water - RCA	-	92	2	4	63	-	-	33	195	195	-	-	1,481	-	-	-	-	60,155	1,829	-
2b.1.1.35	Shutdown Service Water Non-RCA	-	99	-	-	-	-	-	15	114	-	-	114	-	-	-	-	-	-	2,196	-
2b.1.1.36	Solid Radwaste Reprocessing & Disposal	435	566	33	33	157	132	-	424	1,781	1,781	-	-	3,684	1,568	-	-	-	275,491	19,866	-
2b.1.1.37	Standby Gas Treatment	-	67	2	2	22	4	-	21	118	118	-	-	513	39	-	-	-	24,299	1,386	-
2b.1.1.38	Suppression Pool Cleanup & Transfer	-	108	9	9	26	43	-	44	238	238	-	-	615	453	-	-	-	65,567	2,256	-
2b.1.1.39	Suppression Pool Make-up	-	49	7	8	32	36	-	28	160	160	-	-	742	383	-	-	-	64,491	1,065	-
2b.1.1.40	Turb OG RW Cntrl & DG Bldg Equip Drains	-	203	11	10	18	48	-	68	357	357	-	-	425	512	-	-	-	62,620	4,124	-
2b.1.1.41	Turb OG RW Cntrl & DG Bldg Floor Drains	-	329	20	19	91	75	-	119	652	652	-	-	2,128	890	-	-	-	157,436	6,825	-
2b.1.1	Totals	1,146	16,704	558	662	6,279	1,605	-	6,000	32,955	30,104	-	2,850	147,259	17,958	-	-	-	7,509,222	358,963	-
2b.1.2	Scaffolding in support of decommissioning	-	3,829	62	14	175	22	-	997	5,100	5,100	-	-	3,711	231	-	-	-	187,718	88,424	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	2,786	3,509	412	464	330	1,843	-	2,891	12,236	12,236	-	-	7,734	24,635	-	-	-	2,570,182	127,462	-
2b.1.3.2	Auxiliary Building	324	192	29	38	50	87	-	248	968	968	-	-	1,171	1,733	-	-	-	217,879	10,187	-

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 Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Decontamination of Site Buildings (continued)																					
2b.1.3.3	Control Building	374	145	29	38	2	91	-	255	935	935	-	-	56	1,825	-	-	-	184,549	10,262	-
2b.1.3.4	Diesel Generator Building	108	38	8	10	-	25	-	72	263	263	-	-	-	500	-	-	-	49,962	2,911	-
2b.1.3.5	Radwaste Building	1,269	575	105	140	45	330	-	899	3,364	3,364	-	-	1,067	6,612	-	-	-	701,151	36,363	-
2b.1.3.6	Turbine Building	1,135	605	97	129	117	298	-	840	3,221	3,221	-	-	2,735	5,944	-	-	-	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	41,249	-	-	-	4,423,191	221,509	-
2b.1	Subtotal Period 2b Activity Costs	7,144	25,597	1,301	1,496	6,999	4,301	-	12,203	59,040	56,190	-	2,850	163,733	59,438	-	-	-	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	-	-	-	3,628	-	-	-	323,419	707	-
2b.3.2	Small tool allowance	-	493	-	-	-	-	-	74	567	567	-	-	-	-	-	-	-	-	-	-
2b.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	22,000	3,300	25,300	-	25,300	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	231	493	190	1,072	-	501	22,000	3,795	28,282	2,982	25,300	-	-	3,628	-	-	-	323,419	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	-	-	-	240,639	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	ISFSI Operating Costs	-	-	-	-	-	-	182	27	209	-	209	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	11,044	1,657	12,701	12,701	-	-	-	-	-	-	-	-	-	292,034
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	21,946	3,292	25,238	25,238	-	-	-	-	-	-	-	-	-	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	-	-	12,008	-	-	-	240,639	366	1,254,709
2b.0	TOTAL PERIOD 2b COST	9,387	33,014	1,747	2,673	6,999	5,472	103,379	30,046	192,717	161,992	27,874	2,850	163,733	75,074	-	-	-	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	-	-	-	6,066	-	-	-	544,292	1,017	-
Disposal of Plant Systems																					
2c.1.2.1	Electrical - Contaminated	-	1,014	16	23	335	20	-	314	1,722	1,722	-	-	7,867	209	-	-	-	338,266	21,336	-
2c.1.2.2	Fire Protection - RCA	-	616	15	23	385	-	-	217	1,255	1,255	-	-	9,018	-	-	-	-	366,214	12,406	-
2c.1.2.3	Fuel Handling & Transfer	-	24	2	2	7	9	-	10	55	55	-	-	173	99	-	-	-	15,919	521	-
2c.1.2.4	Fuel Pool Cooling & Cleanup	-	874	92	92	277	417	-	387	2,139	2,139	-	-	6,503	4,489	-	-	-	660,961	18,344	-
2c.1.2.5	Fuel Support	-	99	10	12	47	52	-	48	268	268	-	-	1,100	556	-	-	-	94,533	2,141	-
2c.1.2.6	HVAC - Containment Building	-	734	33	45	477	93	-	288	1,669	1,669	-	-	11,185	985	-	-	-	542,563	14,540	-
2c.1.2.7	Potable Water	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	231	-
2c.1.2.8	Process Sampling	-	459	19	14	32	68	-	141	733	733	-	-	758	722	-	-	-	95,460	9,361	-
2c.1.2	Totals	-	3,830	187	212	1,561	659	-	1,406	7,854	7,842	-	12	36,603	7,060	-	-	-	2,113,916	78,881	-

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	GTCC 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	-	-	-	303,507	88	-
2c.3	Subtotal Period 2c Collateral Costs	121	103	144	267	284	113	-	201	1,233	1,233	-	-	6,000	1,206	-	-	-	353,472	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	Radwaste 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	-	-	-	-	-	-	-	-	-	58,710
2c.4.14	DOC Staff Cost	-	-	-	-	-	-	5,862	879	6,741	6,741	-	-	-	-	-	-	-	-	-	88,286
2c.4.15	Utility Staff Cost	-	-	-	-	-	-	11,138	1,671	12,809	12,809	-	-	-	-	-	-	-	-	-	172,157
2c.4	Subtotal Period 2c Period-Dependent Costs	223	2,178	101	42	-	266	21,878	3,735	28,423	28,157	266	-	-	4,767	-	-	-	95,523	145	319,153
2c.0	TOTAL PERIOD 2c COST	1,665	7,707	570	670	1,989	1,707	21,878	6,626	42,811	42,533	266	12	45,919	20,974	-	-	-	3,429,491	130,682	319,153
PERIOD 2e - License Termination																					
Period 2e Direct Decommissioning Activities																					
2e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-	-
2e.1.2	Terminate license									a											
2e.1	Subtotal Period 2e Activity Costs	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-	-
Period 2e Additional Costs																					
2e.2.1	Final Site Survey	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	230,140	-
2e.2	Subtotal Period 2e Additional Costs	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	230,140	-
Period 2e Collateral Costs																					
2e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance	-	-	-	-	-	-	350	35	385	385	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	745	74	819	819	-	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	1,034	-	-	-	-	-	258	1,292	1,292	-	-	-	-	-	-	-	-	-	-

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	GTCC Cu. Feet			
Period 2e Period-Dependent Costs (continued)																					
2e.4.4	Disposal of DAW generated	-	-	8	3	-	22	-	7	40	40	-	-	-	389	-	-	-	7,792	12	-
2e.4.5	Plant energy budget	-	-	-	-	-	-	144	22	165	165	-	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	256	26	282	282	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	149	15	164	-	164	-	-	-	-	-	-	-	-	-
2e.4.8	Site O&M Cost	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	-
2e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	61	9	70	-	70	-	-	-	-	-	-	-	-	-
2e.4.10	Security Staff Cost	-	-	-	-	-	-	1,910	287	2,197	2,197	-	-	-	-	-	-	-	-	-	50,514
2e.4.11	DOC Staff Cost	-	-	-	-	-	-	3,905	586	4,490	4,490	-	-	-	-	-	-	-	-	-	56,731
2e.4.12	Utility Staff Cost	-	-	-	-	-	-	5,574	836	6,410	6,410	-	-	-	-	-	-	-	-	-	80,046
2e.4	Subtotal Period 2e Period-Dependent Costs	-	1,034	8	3	-	22	13,280	2,182	16,529	16,294	234	-	-	389	-	-	-	7,792	12	187,291
2e.0	TOTAL PERIOD 2e COST	-	1,034	8	3	-	22	25,269	5,655	31,991	31,756	234	-	-	389	-	-	-	7,792	230,152	187,291
PERIOD 2 TOTALS		12,210	76,377	12,997	8,536	22,229	30,644	243,409	84,065	490,468	429,240	56,902	4,326	505,717	187,075	1,435	689	-	35,944,680	1,535,088	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	-	-	-	-	-	292	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	-	-	-	-	-	-	56,578	-
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	-	-	-	-	-	366	2,808	-	-	2,808	-	-	-	-	-	-	44,561	-
3b.1.1.9	Radwaste Building	-	4,502	-	-	-	-	-	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	-	2,159	-	-	-	-	-	324	2,483	-	-	2,483	-	-	-	-	-	-	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	Grade & 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	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	1,281	-	-	-	-	8	193	1,482	-	-	1,482	-	-	-	-	-	-	7,355	-
3b.2.2	Screenhouse Cofferdam	-	934	-	-	-	-	-	140	1,074	-	-	1,074	-	-	-	-	-	-	10,159	-
3b.2.3	Discharge Flume Backfill	-	3,741	-	-	-	-	-	561	4,302	-	-	4,302	-	-	-	-	-	-	23,931	-
3b.2.4	Unit 2 Excavation Backfill	-	1,226	-	-	-	-	-	184	1,410	-	-	1,410	-	-	-	-	-	-	13,128	-
3b.2	Subtotal Period 3b Additional Costs	-	7,183	-	-	-	-	8	1,079	8,269	-	-	8,269	-	-	-	-	-	-	54,573	-
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	-	-	-	-	-	-	-	-	-

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	GTCC 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	-	-	-	-	-	-	218	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	-	-	-	-	-	-	8,584	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	-	-	-	-	-	-	-	443,036
3b.0	TOTAL PERIOD 3b COST	-	48,007	-	-	-	-	31,302	11,683	90,991	163	12,644	78,184	-	-	-	-	-	-	502,644	444,596
PERIOD 3c - Fuel Storage Operations/Shipping																					
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	16,528	-	16,528	-	-	-	-	-	-	-	-	201,343
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	22,395	3,113	25,508	-	25,508	-	-	-	-	-	-	-	-	201,343
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	375	-	-	8,152	-	1,260	9,787	9,787	-	-	-	-	-	-	482	86,500	-	-
3d.1.1	Totals	-	-	375	-	-	8,152	-	1,260	9,787	9,787	-	-	-	-	-	-	482	86,500	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	375	-	-	8,152	-	1,260	9,787	9,787	-	-	-	-	-	-	482	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	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3d Period-Dependent Costs (continued)																					
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	9	1	10	-	10	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	9	1	10	-	10	-	-	-	-	-	-	-	-	-
3d.4.6	Site O&M Cost	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-
3d.4.7	ISFSI Operating Costs	-	-	-	-	-	-	4	1	4	-	4	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	93	14	107	-	107	-	-	-	-	-	-	-	-	2,469
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	40	6	46	-	46	-	-	-	-	-	-	-	-	617
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	187	26	213	-	213	-	-	-	-	-	-	-	-	3,086
3d.0	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																					
3e.2.1	ISFSI License Termination	-	724	3	85	-	214	1,170	423	2,617	-	2,617	-	-	4,257	-	-	-	510,109	11,226	2,560
3e.2	Subtotal Period 3e Additional Costs	-	724	3	85	-	214	1,170	423	2,617	-	2,617	-	-	4,257	-	-	-	510,109	11,226	2,560
Period 3e Collateral Costs																					
3e.3.1	Small tool allowance	-	7	-	-	-	-	-	1	8	-	8	-	-	-	-	-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	7	-	-	-	-	-	1	8	-	8	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	158	16	174	-	174	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.3	Heavy equipment rental	-	225	-	-	-	-	-	34	259	-	259	-	-	-	-	-	-	-	-	-
3e.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.5	Site O&M Cost	-	-	-	-	-	-	84	13	97	-	97	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	193	29	222	-	222	-	-	-	-	-	-	-	-	5,096
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	258	39	297	-	297	-	-	-	-	-	-	-	-	3,866
3e.4	Subtotal Period 3e Period-Dependent Costs	-	225	-	-	-	-	693	130	1,048	-	1,048	-	-	-	-	-	-	-	-	8,961
3e.0	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																					
3f.2.1	ISFSI Site Restoration	-	1,186	-	-	-	-	42	184	1,412	-	1,412	-	-	-	-	-	-	-	3,120	160
3f.2	Subtotal Period 3f Additional Costs	-	1,186	-	-	-	-	42	184	1,412	-	1,412	-	-	-	-	-	-	-	3,120	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	2	-	-	-	-	-	0	3	-	3	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	2	-	-	-	-	-	0	3	-	3	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	16	2	17	-	17	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	73	-	-	-	-	-	11	84	-	84	-	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.5	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	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3f Period-Dependent Costs (continued)																					
3f.4.6	Security Staff Cost	-	-	-	-	-	-	91	14	104	-	104	-	-	-	-	-	-	-	-	2,403
3f.4.7	Utility Staff Cost	-	-	-	-	-	-	96	14	111	-	111	-	-	-	-	-	-	-	-	1,491
3f.4	Subtotal Period 3f Period-Dependent Costs	-	73	-	-	-	-	243	47	363	-	363	-	-	-	-	-	-	-	-	3,894
3f.0	TOTAL PERIOD 3f COST	-	1,262	-	-	-	-	285	231	1,777	-	1,777	-	-	-	-	-	-	-	3,120	4,054
PERIOD 3 TOTALS		-	50,224	378	85	-	8,365	56,030	16,867	131,948	9,949	43,814	78,184	-	4,257	-	-	482	596,609	516,990	664,600
TOTAL COST TO DECOMMISSION		14,660	128,652	13,444	8,914	22,229	41,768	434,071	122,323	786,061	547,591	155,245	83,225	505,717	194,176	2,156	689	482	36,744,250	2,053,353	4,459,077

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

APPENDIX D

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.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	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											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									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											
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
Activity Specifications																					
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
Detailed Work Procedures																					
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											
1a.1.20	Drain & dry NSSS									a											
1a.1.21	Drain/de-energize contaminated systems									a											
1a.1.22	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	3,618	597	4,215	4,215	-	-	-	-	-	-	-	-	-	35,890
Period 1a Period-Dependent Costs																					
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	-	349	-	-	-	-	-	52	401	401	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	6	-	38	-	12	70	70	-	-	-	675	-	-	-	13,531	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	-	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 Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
1a.4	Subtotal Period 1a Period-Dependent Costs	-	726	14	6	-	38	42,429	6,106	49,319	47,975	1,343	-	-	675	-	-	-	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	-	-	675	-	-	-	13,531	21	616,761
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	2,771	-	-	-	-	-	-	1,385	4,156	4,156	-	-	-	-	-	-	-	-	56,016	-
1b.1.1.2	Auxiliary Building	305	-	-	-	-	-	-	153	458	458	-	-	-	-	-	-	-	-	6,485	-
1b.1.1.3	Control Building	353	-	-	-	-	-	-	177	530	530	-	-	-	-	-	-	-	-	7,503	-
1b.1.1.4	Diesel Generator Building	103	-	-	-	-	-	-	51	154	154	-	-	-	-	-	-	-	-	2,182	-
1b.1.1.5	Radwaste Building	1,195	-	-	-	-	-	-	597	1,792	1,792	-	-	-	-	-	-	-	-	25,369	-
1b.1.1.6	Turbine Building	1,069	-	-	-	-	-	-	534	1,603	1,603	-	-	-	-	-	-	-	-	22,689	-
1b.1.1.7	Fuel Building	800	-	-	-	-	-	-	400	1,199	1,199	-	-	-	-	-	-	-	-	16,275	-
1b.1.1	Totals	6,595	-	-	-	-	-	-	3,298	9,893	9,893	-	-	-	-	-	-	-	-	136,519	-
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	-	64	351	-	113	-	177	883	883	-	-	-	1,217	-	-	-	73,045	237	-
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	-	-	-	1,217	-	-	-	73,045	237	-
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	-	-	32	13	-	85	-	26	157	157	-	-	-	1,524	-	-	-	30,535	46	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	243	36	279	279	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	65	7	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	113	11	125	-	125	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	186	28	214	-	214	-	-	-	-	-	-	-	-	-
1b.4.12	Security Staff Cost	-	-	-	-	-	-	1,501	225	1,726	1,726	-	-	-	-	-	-	-	-	-	39,691
1b.4.13	Utility Staff Cost	-	-	-	-	-	-	6,599	990	7,589	7,589	-	-	-	-	-	-	-	-	-	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	-	-	1,524	-	-	-	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	-	-	2,741	-	-	-	103,580	136,803	146,411

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: Class A Cu. Feet	Burial Volumes: Class B Cu. Feet	Burial Volumes: Class C Cu. Feet	Burial Volumes: GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	405	-	-	-	-	-	61	466	466	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	35	-	-	-	-	-	5	41	41	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	14,893	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	440	-	-	-	-	786	294	1,520	1,520	-	-	-	-	-	-	-	-	18,593	583
Period 1c Collateral Costs																					
1c.3.1	Process liquid waste	133	-	47	260	-	84	-	131	655	655	-	-	-	904	-	-	-	54,218	176	-
1c.3.2	Small tool allowance	-	3	-	-	-	-	-	0	4	4	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	133	3	47	260	-	84	-	132	659	659	-	-	-	904	-	-	-	54,218	176	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	329	33	362	362	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	1,049	105	1,154	1,154	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	160	-	-	-	-	-	40	199	199	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	87	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	4	1	-	9	-	3	17	17	-	-	-	168	-	-	-	3,374	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	64	6	71	71	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	184	28	212	-	212	-	-	-	-	-	-	-	-	-
1c.4.11	Security Staff Cost	-	-	-	-	-	-	1,485	223	1,707	1,707	-	-	-	-	-	-	-	-	-	39,260
1c.4.12	Utility Staff Cost	-	-	-	-	-	-	6,528	979	7,507	7,507	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	247	4	1	-	9	10,054	1,486	11,801	11,466	335	-	-	168	-	-	-	3,374	5	144,820
1c.0	TOTAL PERIOD 1c COST	133	690	51	262	-	93	10,839	1,912	13,980	13,645	335	-	-	1,072	-	-	-	57,592	18,774	145,403
PERIOD 1 TOTALS		9,743	2,180	162	632	-	329	76,184	15,740	104,968	102,952	2,017	-	-	4,488	-	-	-	174,703	155,598	908,576
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									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	1,345	202	1,547	-	1,547	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	1,353	338	1,691	-	1,691	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	2,698	540	3,237	-	3,237	-	-	-	-	-	-	-	-	-
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	1,236	13,596	-	13,596	-	-	-	-	-	-	-	-	-

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	GTCC 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	-	-	4,883	-	-	-	97,849	149	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	2,074	311	2,385	-	2,385	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	2,321	232	2,553	-	2,553	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	2,151	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	-	-	4,883	-	-	-	97,849	149	2,025,726
2a.0	TOTAL PERIOD 2a COST	-	926	104	43	-	272	155,086	22,600	179,031	-	179,031	-	-	4,883	-	-	-	97,849	149	2,025,726
PERIOD 2 TOTALS		-	926	104	43	-	272	155,086	22,600	179,031	-	179,031	-	-	4,883	-	-	-	97,849	149	2,025,726
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									a											
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 major work sequence	-	-	-	-	-	-	680	102	782	782	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	454	68	522	522	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	372	56	427	427	-	-	-	-	-	-	-	-	-	4,096
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	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
3a.1.11.11	Drywell	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	283	42	325	163	-	163	-	-	-	-	-	-	-	3,120
3a.1.11.13	Waste management	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.14	Facility & site closeout	-	-	-	-	-	-	82	12	94	47	-	47	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	4,048	607	4,655	4,242	-	413	-	-	-	-	-	-	-	44,633
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	218	33	250	250	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-

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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	GTCC Cu. Feet			
3a.1.16	Procure casks/liners & 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	-	-	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	323,807
3a.0	TOTAL PERIOD 3a COST	-	678	12	5	-	32	33,040	5,015	38,782	38,369	-	413	-	570	-	-	-	11,419	17	401,366
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	429	64	494	444	-	49	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	363	54	417	417	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	122	18	141	35	-	106	-	-	-	-	-	-	-	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 containment	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	329	49	379	379	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	109	16	125	63	-	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	-	52	-	-	-	-	-	-	-	1,000
3b.1.1.11	Main Turbine	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12	Main Condensers	-	-	-	-	-	-	189	28	218	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	-	28	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	248	37	285	256	-	28	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	2,970	445	3,415	3,088	-	327	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	2,970	445	3,415	3,088	-	327	-	-	-	-	-	-	-	32,741
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	897	269	1,167	1,167	-	-	-	-	-	-	-	-	-	-
3b.2.2	Hazardous liquid disposal	-	-	-	7	-	411	-	104	523	523	-	-	-	1,571	-	-	-	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	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-

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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	GTCC 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	-	-	-	-	-	-	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	-	-	-	323	-	-	-	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	-	-	-	-	-	-	-	-	-	58,560
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	8,094	1,214	9,309	9,309	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	22	357	7	3	-	18	14,622	2,232	17,261	17,261	-	-	-	323	-	-	-	6,476	10	220,907
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		748	1,992	19	23	-	466	52,360	8,445	64,053	63,313	-	740	-	2,524	-	-	-	109,241	27	655,014
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	-	-	250	2,473	-	-	-	187,000	1,145	-
4a.1.1.3	CRDMs & NIs Removal	42	158	321	82	-	203	-	156	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	287	-	342,025	28,950	1,290
4a.1.1.5	Vessel & Internals GTCC Disposal	-	-	-	-	-	8,152	-	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	482	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	-	-	-	-	-	32	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	-	-	-	-	-	-	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 Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
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	-	-	-	-	-	-	3,682	-
4a.1.5.9	Chlorination	-	44	-	-	-	-	-	7	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	-	-	-	-	-	-	1,090	-
4a.1.5.12	Cntnmnt Aux & Fuel Bldg Equip Drains	-	81	5	5	8	24	-	28	150	150	-	-	187	253	-	-	-	30,046	1,627	-
4a.1.5.13	Cntnmnt Aux & Fuel Bldg Floor Drains	-	139	8	8	34	32	-	50	271	271	-	-	792	367	-	-	-	62,936	2,852	-
4a.1.5.14	Component Cooling Water Non-RCA	-	119	-	-	-	-	-	18	137	-	-	137	-	-	-	-	-	-	2,622	-
4a.1.5.15	Condensate	-	810	159	174	584	772	-	525	3,024	3,024	-	-	13,689	8,197	-	-	-	1,291,159	17,379	-
4a.1.5.16	Condensate Booster	-	766	161	178	543	806	-	517	2,971	2,971	-	-	12,724	8,568	-	-	-	1,284,382	16,493	-
4a.1.5.17	Condensate Polishing	-	619	46	45	188	188	-	241	1,327	1,327	-	-	4,398	2,104	-	-	-	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	147	-	-	-	44,863	1,396	-
4a.1.5.20	Cycled Condensate	-	555	41	40	181	163	-	217	1,197	1,197	-	-	4,242	1,929	-	-	-	327,937	11,485	-
4a.1.5.21	Drywell Cooling	-	437	20	25	242	62	-	167	952	952	-	-	5,664	655	-	-	-	288,770	8,570	-
4a.1.5.22	Drywell Purge	-	124	11	15	118	42	-	63	373	373	-	-	2,764	451	-	-	-	152,687	2,624	-
4a.1.5.23	ECCS Equipment Cooling	-	65	2	4	51	3	-	25	150	150	-	-	1,190	32	-	-	-	51,154	1,312	-
4a.1.5.24	Extraction Steam	-	424	54	63	236	271	-	224	1,272	1,272	-	-	5,531	2,875	-	-	-	482,498	9,036	-
4a.1.5.25	Feedwater	-	464	88	100	331	445	-	301	1,730	1,730	-	-	7,772	4,722	-	-	-	739,273	9,995	-
4a.1.5.26	Feedwater Heater Drains Turbine Cycle	-	1,109	112	126	507	527	-	515	2,897	2,897	-	-	11,899	5,704	-	-	-	985,459	23,395	-
4a.1.5.27	Feedwater Heater Misc.	-	172	13	13	29	62	-	66	357	357	-	-	685	664	-	-	-	87,316	3,553	-
4a.1.5.28	Filtered Water	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	86	-
4a.1.5.29	Generator Hydrogen Seal Oil	-	25	0	1	10	-	-	8	44	44	-	-	243	-	-	-	-	9,883	469	-
4a.1.5.30	Generator Stator Cooling	-	16	0	1	9	-	-	6	32	32	-	-	207	-	-	-	-	8,423	339	-
4a.1.5.31	High Pressure Core Spray	-	225	36	39	131	170	-	128	728	728	-	-	3,077	1,807	-	-	-	287,030	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	646	-	-	-	132,817	3,941	-
4a.1.5.34	Leak Detection	-	37	1	1	1	3	-	10	53	53	-	-	30	29	-	-	-	3,822	837	-
4a.1.5.35	Local Instrument Panels	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	116	-
4a.1.5.36	Low Pressure Core Spray	-	86	21	21	65	97	-	61	352	352	-	-	1,535	1,028	-	-	-	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	71	-	-	-	114,605	3,671	-
4a.1.5.39	Main Steam	-	746	74	80	298	347	-	337	1,882	1,882	-	-	6,987	3,685	-	-	-	614,246	15,676	-
4a.1.5.40	Main Steam Isolation Valve	-	19	1	1	1	4	-	6	33	33	-	-	23	47	-	-	-	5,157	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	-	-	-	-	-	-	4,416	-
4a.1.5.43	Makeup Condensate Storage	-	216	15	14	22	67	-	78	412	412	-	-	518	715	-	-	-	85,161	4,359	-
4a.1.5.44	Misc. Building Drains	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	357	-
4a.1.5.45	Miscellaneous Ventilation	-	30	-	-	-	-	-	4	34	-	-	34	-	-	-	-	-	-	643	-
4a.1.5.46	Nuclear Boiler	-	15	1	1	1	3	-	5	24	24	-	-	17	30	-	-	-	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	698	-	-	-	127,607	4,075	-
4a.1.5.49	Refrigeration Piping	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	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	-	-	9	55	55	-	-	413	-	-	-	-	16,763	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	-	-	-	-	85,531	2,948	-
4a.1.5.55	Turbine Electrohydraulic Control	-	9	0	0	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	96	-	-	-	14,138	900	-
4a.1.5.57	Turbine Gland Seal Steam	-	300	40	50	453	130	-	187	1,161	1,161	-	-	10,629	1,384	-	-	-	555,788	6,310	-
4a.1.5.58	Turbine Oil	-	48	4	5	37	18	-	23	137	137	-	-	866	199	-	-	-	52,601	1,021	-

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	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4a.1.5.59	Turbine-Gen Aux & Misc Devices	-	214	51	62	289	250	-	174	1,041	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	30,662	-	1,048	163,551	51,880	-	-	-	11,205,730	251,495	-
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	175	26,391	8,324	3,134	12,499	21,305	425	20,667	92,919	91,871	-	1,048	280,345	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	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	55	-	20	111	-	36	-	55	278	278	-	-	-	386	-	-	-	23,185	75	-
4a.3.2	Small tool allowance	-	325	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	55	325	20	111	-	36	-	104	652	614	-	37	-	386	-	-	-	23,185	75	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	60	-	-	-	-	-	-	15	75	75	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	690	69	759	759	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	1,361	136	1,497	1,347	-	150	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,037	-	-	-	-	-	509	2,547	2,547	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,320	-	-	-	-	-	348	2,668	2,668	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	177	73	-	464	-	145	859	859	-	-	-	8,323	-	-	-	166,794	254	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,246	187	1,433	1,433	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	468	47	515	515	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	340	51	391	391	-	-	-	-	-	-	-	-	-	-
4a.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	506	76	582	582	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	3,356	503	3,860	3,860	-	-	-	-	-	-	-	-	-	88,750
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	12,669	1,900	14,569	14,569	-	-	-	-	-	-	-	-	-	195,960
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	22,201	3,330	25,531	25,531	-	-	-	-	-	-	-	-	-	355,000
4a.4	Subtotal Period 4a Period-Dependent Costs	60	4,357	177	73	-	464	42,838	7,317	55,286	55,137	-	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	148,652	-	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 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	1	1	4	4	-	15	76	76	-	-	98	44	-	-	-	7,962	1,115	-
4b.1.2.3	Control Rod Drive	-	357	19	19	57	88	-	124	664	664	-	-	1,333	930	-	-	-	137,526	7,399	-
4b.1.2.4	Diesel Fuel Oil	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	1,256	-
4b.1.2.5	Diesel General	-	52	-	-	-	-	-	8	60	-	-	60	-	-	-	-	-	-	1,133	-
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	1	4	-	5	27	27	-	-	34	39	-	-	-	4,837	302	-
4b.1.2.8	Electrical - Clean Non-RCA	-	1,545	-	-	-	-	-	232	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	16	23	335	20	-	288	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	2,118	-	-	7,207	3,254	-	-	-	551,230	21,073	-
4b.1.2.12	Fire Protection - RCA	-	616	15	23	385	-	-	217	1,255	1,255	-	-	9,018	-	-	-	-	366,214	12,406	-

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															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.13	Fire Protection Non-RCA	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	3,416	-
4b.1.2.14	Floor Drain Radwaste Reprocessing	-	634	54	55	235	227	-	264	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	52	52	-	-	173	99	-	-	-	15,919	465	-
4b.1.2.16	Fuel Pool Cooling & Cleanup	-	783	92	92	277	417	-	365	2,026	2,026	-	-	6,503	4,489	-	-	-	660,961	16,306	-
4b.1.2.17	Fuel Support	-	88	10	12	47	52	-	45	255	255	-	-	1,100	556	-	-	-	94,533	1,906	-
4b.1.2.18	HVAC - Auxiliary Building	-	28	1	2	23	3	-	12	69	69	-	-	540	36	-	-	-	25,200	593	-
4b.1.2.19	HVAC - Containment Building	-	661	33	45	477	93	-	270	1,579	1,579	-	-	11,185	985	-	-	-	542,563	12,668	-
4b.1.2.20	HVAC - Control Room	-	242	-	-	-	-	-	36	279	-	-	279	-	-	-	-	-	-	5,686	-
4b.1.2.21	HVAC - Fuel Building	-	283	8	11	161	10	-	100	574	574	-	-	3,782	107	-	-	-	163,158	5,156	-
4b.1.2.22	HVAC - Laboratory	-	456	13	18	257	17	-	161	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	-	-	1,499	192	-	-	-	78,082	2,299	-
4b.1.2.24	HVAC - Radwaste Building	-	644	21	30	395	37	-	236	1,363	1,363	-	-	9,269	389	-	-	-	411,319	11,921	-
4b.1.2.25	HVAC - Service Building	-	52	-	-	-	-	-	8	60	-	-	60	-	-	-	-	-	-	1,145	-
4b.1.2.26	HVAC - Turbine Building	-	532	15	22	316	20	-	190	1,097	1,097	-	-	7,421	211	-	-	-	320,323	9,709	-
4b.1.2.27	Hoists Cranes & Elevators	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	123	-
4b.1.2.28	Instrument Air - RCA	-	374	5	7	115	-	-	112	613	613	-	-	2,708	-	-	-	-	109,971	7,089	-
4b.1.2.29	Instrument Air Non-RCA	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	389	-
4b.1.2.30	Off Gas	-	154	9	10	64	33	-	59	328	328	-	-	1,490	352	-	-	-	91,689	3,152	-
4b.1.2.31	Plant Service Water - RCA	-	176	5	8	130	-	-	65	384	384	-	-	3,043	-	-	-	-	123,583	3,532	-
4b.1.2.32	Plant Service Water Non-RCA	-	156	-	-	-	-	-	23	180	-	-	180	-	-	-	-	-	-	3,494	-
4b.1.2.33	Potable Water	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	231	-
4b.1.2.34	Process Radiation Monitoring	-	84	4	3	11	13	-	27	142	142	-	-	253	142	-	-	-	23,024	1,694	-
4b.1.2.35	Process Sampling	-	414	19	14	32	68	-	129	678	678	-	-	758	722	-	-	-	95,460	8,370	-
4b.1.2.36	Reactor Recirculation	-	42	4	4	6	21	-	18	95	95	-	-	140	223	-	-	-	25,667	876	-
4b.1.2.37	Reactor Water Clean-up	-	257	20	21	48	101	-	102	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	-	-	6,526	4,271	-	-	-	648,075	10,242	-
4b.1.2.39	Screen Wash	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	132	-
4b.1.2.40	Service Air - RCA	-	230	4	6	106	-	-	75	421	421	-	-	2,476	-	-	-	-	100,556	4,507	-
4b.1.2.41	Service Air Non-RCA	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	309	-
4b.1.2.42	Shutdown Service Water - RCA	-	92	2	4	63	-	-	33	195	195	-	-	1,481	-	-	-	-	60,155	1,829	-
4b.1.2.43	Shutdown Service Water Non-RCA	-	99	-	-	-	-	-	15	114	-	-	114	-	-	-	-	-	-	2,196	-
4b.1.2.44	Solid Radwaste Reprocessing & Disposal	-	509	33	33	157	132	-	192	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	-	-	513	39	-	-	-	24,299	1,226	-
4b.1.2.46	Suppression Pool Cleanup & Transfer	-	96	9	9	26	43	-	41	224	224	-	-	615	453	-	-	-	65,567	2,006	-
4b.1.2.47	Suppression Pool Make-up	-	44	7	8	32	36	-	27	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	-	-	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	-	-	2,128	890	-	-	-	157,436	6,080	-
4b.1.2	Totals	-	19,502	746	873	7,840	2,264	-	6,574	37,799	34,936	-	2,862	183,862	25,018	-	-	-	9,623,137	399,872	-
4b.1.3	Scaffolding in support of decommissioning	-	4,118	74	17	210	26	-	1,078	5,523	5,523	-	-	4,453	277	-	-	-	225,261	94,887	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	2,504	3,131	412	464	330	1,843	-	2,656	11,341	11,341	-	-	7,734	24,635	-	-	-	2,570,182	113,912	-
4b.1.4.2	Auxiliary Building	293	171	29	38	50	87	-	227	895	895	-	-	1,171	1,733	-	-	-	217,879	9,073	-
4b.1.4.3	Control Building	338	130	29	38	2	91	-	233	862	862	-	-	56	1,825	-	-	-	184,549	9,146	-
4b.1.4.4	Diesel Generator Building	98	34	8	10	-	25	-	66	242	242	-	-	-	500	-	-	-	49,962	2,594	-
4b.1.4.5	Radwaste Building	1,148	513	105	140	45	330	-	823	3,105	3,105	-	-	1,067	6,612	-	-	-	701,151	32,401	-
4b.1.4.6	Turbine Building	1,027	539	97	129	117	298	-	769	2,976	2,976	-	-	2,735	5,944	-	-	-	699,469	30,575	-
4b.1.4.7	Fuel Building	738	700	33	43	110	94	-	594	2,312	2,312	-	-	2,574	1,829	-	-	-	284,744	29,187	-
4b.1.4	Totals	6,147	5,218	714	863	654	2,767	-	5,369	21,732	21,732	-	-	15,337	43,078	-	-	-	4,707,935	226,888	-
4b.1	Subtotal Period 4b Activity Costs	6,599	28,882	1,625	1,857	8,704	5,629	-	13,425	66,722	63,859	-	2,862	203,652	74,439	-	-	-	15,100,620	722,664	-

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	GTCC Cu. Feet			
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	218	-	80	439	-	142	-	218	1,097	1,097	-	-	-	1,525	-	-	-	91,513	297	-
4b.3.2	Small tool allowance	-	540	-	-	-	-	-	81	621	621	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	100	27	284	35	-	65	511	511	-	-	6,000	373	-	-	-	303,507	88	-
4b.3	Subtotal Period 4b Collateral Costs	218	540	180	466	284	177	-	365	2,229	2,229	-	-	6,000	1,899	-	-	-	395,019	386	-
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	157	1,732	1,732	-	-	-	-	-	-	-	-	-	-
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	-	-	-	12,096	-	-	-	242,405	369	-
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	-	-	-	-	-	-	-	-	-	102,679
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	14,266	2,140	16,406	16,406	-	-	-	-	-	-	-	-	-	220,143
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	24,393	3,659	28,052	28,052	-	-	-	-	-	-	-	-	-	387,714
4b.4	Subtotal Period 4b Period-Dependent Costs	2,169	5,767	257	106	-	675	47,574	8,918	65,467	65,467	-	-	-	12,096	-	-	-	242,405	369	710,536
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	-	-	-	15,738,050	723,418	710,536
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	Final Site Survey	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	230,140	-
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	230,140	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	74	7	82	82	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	745	74	819	819	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	1,032	-	-	-	-	-	258	1,290	1,290	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	8	3	-	21	-	7	40	40	-	-	-	385	-	-	-	7,712	12	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	144	22	165	165	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	256	26	282	282	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	705	106	811	811	-	-	-	-	-	-	-	-	-	18,651
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,905	586	4,490	4,490	-	-	-	-	-	-	-	-	-	56,731
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	5,167	775	5,942	5,942	-	-	-	-	-	-	-	-	-	73,829
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

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	GTCC Cu. Feet			
PERIOD 4 TOTALS		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
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	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	BackFill 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	-	-	-	-	-	-	141	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	193	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	1,699	13,029	-	-	13,029	-	-	-	-	-	-	-	160,674
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	6,331	950	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	GTCC 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	189,634	1,502	287	482	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:
n/a - indicates that this activity not charged as decommissioning expense.
a - indicates that this activity performed by decommissioning staff.
0 - indicates that this value is less than 0.5 but is non-zero.
a cell containing " - " indicates a zero value

APPENDIX 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	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a - Shutdown through Transition																					
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											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									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											
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
Activity Specifications																					
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
Detailed Work Procedures																					
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											
1a.1.20	Drain & dry NSSS									a											
1a.1.21	Drain/de-energize contaminated systems									a											
1a.1.22	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	3,618	597	4,215	4,215	-	-	-	-	-	-	-	-	-	35,890
Period 1a Collateral Costs																					
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	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
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	-	349	-	-	-	-	-	52	401	401	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	6	-	38	-	12	70	70	-	-	-	675	-	-	-	13,531	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	-	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 Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1a Period-Dependent Costs (continued)																					
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	738	111	849	-	849	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	82	12	94	-	94	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	5,955	893	6,848	6,848	-	-	-	-	-	-	-	-	-	157,471
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	26,183	3,927	30,110	30,110	-	-	-	-	-	-	-	-	-	423,400
1a.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	580,871
1a.0	TOTAL PERIOD 1a COST	-	726	14	6	-	38	85,669	12,646	99,099	52,190	46,909	-	-	675	-	-	-	13,531	21	616,761
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	2,771	-	-	-	-	-	-	1,385	4,156	4,156	-	-	-	-	-	-	-	-	56,016	-
1b.1.1.2	Auxiliary Building	305	-	-	-	-	-	-	153	458	458	-	-	-	-	-	-	-	-	6,485	-
1b.1.1.3	Control Building	353	-	-	-	-	-	-	177	530	530	-	-	-	-	-	-	-	-	7,503	-
1b.1.1.4	Diesel Generator Building	103	-	-	-	-	-	-	51	154	154	-	-	-	-	-	-	-	-	2,182	-
1b.1.1.5	Fuel Building	800	-	-	-	-	-	-	400	1,199	1,199	-	-	-	-	-	-	-	-	16,275	-
1b.1.1.6	Radwaste Building	1,195	-	-	-	-	-	-	597	1,792	1,792	-	-	-	-	-	-	-	-	25,369	-
1b.1.1.7	Turbine Building	1,069	-	-	-	-	-	-	534	1,603	1,603	-	-	-	-	-	-	-	-	22,689	-
1b.1.1	Totals	6,595	-	-	-	-	-	-	3,298	9,893	9,893	-	-	-	-	-	-	-	-	136,519	-
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	-	64	351	-	113	-	177	883	883	-	-	-	1,217	-	-	-	73,045	237	-
1b.3.3	Small tool allowance	-	103	-	-	-	-	-	15	119	119	-	-	-	-	-	-	-	-	-	-
1b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,000	450	3,450	-	3,450	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	904	103	64	351	-	113	3,000	751	5,286	1,836	3,450	-	-	1,217	-	-	-	73,045	237	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,899	-	-	-	-	-	-	475	2,374	2,374	-	-	-	-	-	-	-	-	-	-
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	-	-	32	13	-	85	-	26	157	157	-	-	-	1,524	-	-	-	30,535	46	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	243	36	279	279	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	65	7	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	113	11	125	-	125	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	186	28	214	-	214	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	21	3	24	-	24	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	1,501	225	1,726	1,726	-	-	-	-	-	-	-	-	-	39,691
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	6,599	990	7,589	7,589	-	-	-	-	-	-	-	-	-	106,720
1b.4	Subtotal Period 1b Period-Dependent Costs	1,899	661	32	13	-	85	10,185	2,107	14,983	14,620	362	-	-	1,524	-	-	-	30,535	46	146,411
1b.0	TOTAL PERIOD 1b COST	9,399	764	96	364	-	198	22,318	7,525	40,665	36,853	3,812	-	-	2,741	-	-	-	103,580	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	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	405	-	-	-	-	-	61	466	466	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	35	-	-	-	-	-	5	41	41	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	14,893	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	440	-	-	-	-	786	294	1,520	1,520	-	-	-	-	-	-	-	-	18,593	583
Period 1c Collateral Costs																					
1c.3.1	Process liquid waste	133	-	47	260	-	84	-	131	655	655	-	-	-	904	-	-	-	54,218	176	-
1c.3.2	Small tool allowance	-	3	-	-	-	-	-	0	4	4	-	-	-	-	-	-	-	-	-	-
1c.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,000	450	3,450	-	3,450	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	133	3	47	260	-	84	3,000	582	4,109	659	3,450	-	-	904	-	-	-	54,218	176	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	329	33	362	362	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	1,049	105	1,154	1,154	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	160	-	-	-	-	-	40	199	199	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	87	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	4	1	-	9	-	3	17	17	-	-	-	168	-	-	-	3,374	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	64	6	71	71	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	112	11	123	-	123	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	62	9	72	72	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	184	28	212	-	212	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	20	3	24	-	24	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	1,485	223	1,707	1,707	-	-	-	-	-	-	-	-	-	39,260
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	6,528	979	7,507	7,507	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	247	4	1	-	9	10,074	1,489	11,824	11,466	358	-	-	168	-	-	-	3,374	5	144,820
1c.0	TOTAL PERIOD 1c COST	133	690	51	262	-	93	13,860	2,365	17,453	13,645	3,808	-	-	1,072	-	-	-	57,592	18,774	145,403
PERIOD 1 TOTALS		9,532	2,180	162	632	-	329	121,847	22,536	157,217	102,688	54,530	-	-	4,488	-	-	-	174,703	155,598	908,576
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									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	500	75	575	-	575	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	503	126	629	-	629	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	1,003	201	1,203	-	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
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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	GTCC Cu. Feet			
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	2,028	203	2,230	-	2,230	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	5,603	560	6,163	-	6,163	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	344	-	-	-	-	-	86	430	-	430	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	39	16	-	101	-	32	187	-	187	-	-	1,815	-	-	-	36,370	55	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	771	116	887	-	887	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	863	86	949	-	949	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	799	80	879	-	879	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	999	150	1,149	-	1,149	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	2,952	443	3,394	-	3,394	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	328	49	378	-	378	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	16,801	2,520	19,321	-	19,321	-	-	-	-	-	-	-	-	444,257
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	20,888	3,133	24,021	-	24,021	-	-	-	-	-	-	-	-	308,686
2a.4	Subtotal Period 2a Period-Dependent Costs	-	344	39	16	-	101	52,031	7,458	59,989	-	59,989	-	-	1,815	-	-	-	36,370	55	752,943
2a.0	TOTAL PERIOD 2a COST	-	344	39	16	-	101	98,034	14,408	112,942	-	112,942	-	-	1,815	-	-	-	36,370	55	752,943
PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection									a											
2b.1.2	Semi-annual environmental survey									a											
2b.1.3	Prepare reports									a											
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	845	127	972	-	972	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	850	212	1,062	-	1,062	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	1,695	339	2,034	-	2,034	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,000	1,200	9,200	-	9,200	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	8,000	1,200	9,200	-	9,200	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	3,172	317	3,489	-	3,489	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	6,757	676	7,433	-	7,433	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	496	-	-	-	-	-	124	620	-	620	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	61	25	-	161	-	50	297	-	297	-	-	2,878	-	-	-	57,682	88	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	652	98	749	-	749	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	1,458	146	1,604	-	1,604	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,351	135	1,487	-	1,487	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	1,689	253	1,943	-	1,943	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	555	83	638	-	638	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	14,400	2,160	16,560	-	16,560	-	-	-	-	-	-	-	-	380,777
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	13,994	2,099	16,093	-	16,093	-	-	-	-	-	-	-	-	225,646
2b.4	Subtotal Period 2b Period-Dependent Costs	-	496	61	25	-	161	44,028	6,141	50,913	-	50,913	-	-	2,878	-	-	-	57,682	88	606,423
2b.0	TOTAL PERIOD 2b COST	-	496	61	25	-	161	53,723	7,681	62,147	-	62,147	-	-	2,878	-	-	-	57,682	88	606,423
PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Quarterly Inspection									a											
2c.1.2	Semi-annual environmental survey									a											
2c.1.3	Prepare reports									a											
2c.1.4	Bituminous roof replacement	-	-	-	-	-	-	5,333	800	6,133	6,133	-	-	-	-	-	-	-	-	-	-

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				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
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	-	2,946	-	-	-	-	-	736	3,682	3,682	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	378	156	-	991	-	309	1,833	1,833	-	-	-	17,755	-	-	-	355,795	542	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	4,112	617	4,729	4,729	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	9,203	920	10,124	10,124	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	10,662	1,599	12,261	12,261	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	50,493	7,574	58,066	58,066	-	-	-	-	-	-	-	-	-	1,335,171
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	48,756	7,313	56,069	56,069	-	-	-	-	-	-	-	-	-	778,850
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,946	378	156	-	991	185,412	25,288	215,169	215,169	-	-	-	17,755	-	-	-	355,795	542	2,114,021
2c.0	TOTAL PERIOD 2c COST	-	2,946	378	156	-	991	196,109	27,429	228,008	228,008	-	-	-	17,755	-	-	-	355,795	542	2,114,021
PERIOD 2 TOTALS		-	3,786	478	197	-	1,253	347,866	49,518	403,097	228,008	175,089	-	-	22,448	-	-	-	449,847	685	3,473,387
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									a											
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 major work sequence	-	-	-	-	-	-	680	102	782	782	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	454	68	522	522	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	372	56	427	427	-	-	-	-	-	-	-	-	-	4,096
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	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
3a.1.11.11	Drywell	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	283	42	325	163	-	163	-	-	-	-	-	-	-	3,120
3a.1.11.13	Waste management	-	-	-	-	-	-	417	63	480	480	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.14	Facility & site closeout	-	-	-	-	-	-	82	12	94	47	-	47	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	4,048	607	4,655	4,242	-	413	-	-	-	-	-	-	-	44,633
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	218	33	250	250	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-

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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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
3a.1.14	Design water clean-up system	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & 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 Collateral Costs																					
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	323,807
3a.0	TOTAL PERIOD 3a COST	-	678	12	5	-	32	33,040	5,015	38,782	38,369	-	413	-	570	-	-	-	11,419	17	401,366
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	429	64	494	444	-	49	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	363	54	417	417	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	122	18	141	35	-	106	-	-	-	-	-	-	-	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 containment	-	-	-	-	-	-	181	27	209	209	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	329	49	379	379	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	109	16	125	63	-	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	-	52	-	-	-	-	-	-	-	1,000
3b.1.1.11	Main Turbine	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12	Main Condensers	-	-	-	-	-	-	189	28	218	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	-	28	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	248	37	285	256	-	28	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	2,970	445	3,415	3,088	-	327	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	2,970	445	3,415	3,088	-	327	-	-	-	-	-	-	-	32,741
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	897	269	1,167	1,167	-	-	-	-	-	-	-	-	-	-
3b.2.2	hazardous liquid disposal	-	-	-	7	-	411	-	104	523	523	-	-	-	1,571	-	-	-	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	-	-

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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	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
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	-	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	-	-	-	323	-	-	-	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	-	-	-	-	-	-	-	-	-	58,560
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	8,094	1,214	9,309	9,309	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	22	357	7	3	-	18	14,622	2,232	17,261	17,261	-	-	-	323	-	-	-	6,476	10	220,907
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		748	1,992	19	23	-	466	52,360	8,445	64,053	63,313	-	740	-	2,524	-	-	-	109,241	27	655,014
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	6	31	50	-	34	179	179	-	-	265	265	-	-	-	61,459	1,078	-
4a.1.1.2	Recirculation Pumps & Motors	10	38	13	20	107	132	-	68	389	389	-	-	1,487	1,237	-	-	-	187,000	1,145	-
4a.1.1.3	CRDMs & NIs Removal	42	158	321	82	-	203	-	156	962	962	-	-	-	6,985	-	-	-	131,119	4,212	-
4a.1.1.4	Reactor Vessel Internals	63	2,203	3,456	667	-	3,966	197	4,727	15,279	15,279	-	-	-	2,413	1,502	287	-	347,905	26,617	1,197
4a.1.1.5	Vessel & Internals GTCC Disposal	-	-	-	-	-	8,152	-	1,223	9,374	9,374	-	-	-	-	-	-	482	86,500	-	-
4a.1.1.6	Reactor Vessel	-	5,228	1,242	375	-	2,056	197	5,383	14,481	14,481	-	-	-	13,057	-	-	-	1,326,615	26,617	1,197
4a.1.1	Totals	125	7,667	5,041	1,150	138	14,559	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	-	-	-	-	2,787,524	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	Radwaste Building	-	500	-	-	-	-	-	75	575	575	-	-	-	-	-	-	-	-	6,493	-
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	-

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Disposal of Plant Systems (continued)																					
4a.1.5.4	CO2 & Generator Purge	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	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	29	29	143	114	-	145	810	810	-	-	3,354	1,375	-	-	-	244,454	7,319	-
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	-	-	-	-	-	-	3,682	-
4a.1.5.9	Chlorination	-	44	-	-	-	-	-	7	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	-	-	-	-	-	-	1,090	-
4a.1.5.12	Cntnmnt Aux & Fuel Bldg Equip Drains	-	81	4	4	14	17	-	27	146	146	-	-	325	180	-	-	-	29,340	1,625	-
4a.1.5.13	Cntnmnt Aux & Fuel Bldg Floor Drains	-	139	5	6	49	15	-	47	262	262	-	-	1,145	168	-	-	-	61,146	2,845	-
4a.1.5.14	Component Cooling Water Non-RCA	-	119	-	-	-	-	-	18	137	-	-	137	-	-	-	-	-	-	2,622	-
4a.1.5.15	Condensate	-	810	93	118	977	330	-	459	2,787	2,787	-	-	22,921	3,507	-	-	-	1,245,444	17,225	-
4a.1.5.16	Condensate Booster	-	766	100	126	906	398	-	456	2,750	2,750	-	-	21,259	4,224	-	-	-	1,242,066	16,349	-
4a.1.5.17	Condensate Polishing	-	619	31	34	265	100	-	228	1,277	1,277	-	-	6,222	1,088	-	-	-	348,255	12,807	-
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	2	3	46	-	-	24	141	141	-	-	1,069	-	-	-	-	43,421	1,391	-
4a.1.5.20	Cycled Condensate	-	555	26	30	254	82	-	204	1,150	1,150	-	-	5,945	910	-	-	-	319,550	11,453	-
4a.1.5.21	Drywell Cooling	-	437	11	18	297	-	-	157	919	919	-	-	6,955	-	-	-	-	282,437	8,549	-
4a.1.5.22	Drywell Purge	-	124	6	9	156	-	-	56	351	351	-	-	3,655	-	-	-	-	148,412	2,612	-
4a.1.5.23	ECCS Equipment Cooling	-	65	2	3	53	-	-	25	148	148	-	-	1,252	-	-	-	-	50,856	1,311	-
4a.1.5.24	Extraction Steam	-	424	37	46	353	140	-	205	1,205	1,205	-	-	8,276	1,486	-	-	-	469,355	8,998	-
4a.1.5.25	Feedwater	-	464	55	70	544	206	-	265	1,605	1,605	-	-	12,765	2,191	-	-	-	714,912	9,918	-
4a.1.5.26	Feedwater Heater Drains Turbine Cycle	-	1,109	74	91	744	262	-	476	2,757	2,757	-	-	17,456	2,804	-	-	-	958,507	23,310	-
4a.1.5.27	Feedwater Heater Misc.	-	172	9	10	52	37	-	62	342	342	-	-	1,223	389	-	-	-	84,542	3,542	-
4a.1.5.28	Filtered Water	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	86	-
4a.1.5.29	Generator Hydrogen Seal Oil	-	25	0	1	10	-	-	8	44	44	-	-	243	-	-	-	-	9,883	469	-
4a.1.5.30	Generator Stator Cooling	-	16	0	1	9	-	-	6	32	32	-	-	207	-	-	-	-	8,423	339	-
4a.1.5.31	High Pressure Core Spray	-	225	20	25	224	66	-	112	672	672	-	-	5,250	702	-	-	-	276,214	4,755	-
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	8	10	117	19	-	72	416	416	-	-	2,742	231	-	-	-	129,825	3,930	-
4a.1.5.34	Leak Detection	-	37	0	0	4	-	-	10	51	51	-	-	86	-	-	-	-	3,512	836	-
4a.1.5.35	Local Instrument Panels	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	116	-
4a.1.5.36	Low Pressure Core Spray	-	86	10	13	124	31	-	51	316	316	-	-	2,907	329	-	-	-	147,560	1,828	-
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	7	120	-	-	70	401	401	-	-	2,806	-	-	-	-	113,939	3,669	-
4a.1.5.39	Main Steam	-	746	50	60	442	185	-	313	1,797	1,797	-	-	10,374	1,966	-	-	-	597,645	15,622	-
4a.1.5.40	Main Steam Isolation Valve	-	19	1	1	2	3	-	6	32	32	-	-	44	36	-	-	-	5,045	380	-
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	-	-	-	-	-	-	4,416	-
4a.1.5.43	Makeup Condensate Storage	-	216	11	11	42	45	-	74	399	399	-	-	991	474	-	-	-	82,690	4,349	-
4a.1.5.44	Misc. Building Drains	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	357	-
4a.1.5.45	Miscellaneous Ventilation	-	30	-	-	-	-	-	4	34	-	-	34	-	-	-	-	-	-	643	-
4a.1.5.46	Nuclear Boiler	-	15	0	0	1	2	-	5	24	24	-	-	34	21	-	-	-	3,277	323	-
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	9	11	106	24	-	73	417	417	-	-	2,491	275	-	-	-	124,231	4,063	-
4a.1.5.49	Refrigeration Piping	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	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	-	-	9	55	55	-	-	413	-	-	-	-	16,763	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	-	-	-	-	85,531	2,948	-
4a.1.5.55	Turbine Electrohydraulic Control	-	9	0	0	4	-	-	3	16	16	-	-	84	-	-	-	-	3,405	185	-
4a.1.5.56	Turbine Gen Misc Drains & Vents	-	45	1	1	14	-	-	14	74	74	-	-	323	-	-	-	-	13,132	895	-

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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
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	22,355	-	-	-	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	-	457	-	143	846	846	-	-	-	8,196	-	-	-	164,251	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	Radwaste Processing Equipment/Services	-	-	-	-	-	-	476	71	547	547	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	3,154	473	3,627	3,627	-	-	-	-	-	-	-	-	-	83,393
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	11,904	1,786	13,689	13,689	-	-	-	-	-	-	-	-	-	184,131
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	20,861	3,129	23,990	23,990	-	-	-	-	-	-	-	-	-	333,571
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	601,096
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
PERIOD 4b - Site Decontamination																					
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	-	-	-	-	-	-	1,256	-
4b.1.2.5	Diesel General	-	52	-	-	-	-	-	8	60	-	-	60	-	-	-	-	-	-	1,133	-
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	-	-	-	-	-	-	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	-

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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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4b.1.2.12	Fire Protection - RCA	-	616	15	23	385	-	-	217	1,255	1,255	-	-	9,018	-	-	-	-	366,214	12,406	-
4b.1.2.13	Fire Protection Non-RCA	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	3,416	-
4b.1.2.14	Floor Drain Radwaste Reprocessing	-	634	37	42	323	128	-	249	1,413	1,413	-	-	7,582	1,406	-	-	-	429,512	13,094	-
4b.1.2.15	Fuel Handling & Transfer	-	22	1	2	11	5	-	9	50	50	-	-	262	54	-	-	-	15,494	464	-
4b.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	-
4b.1.2.17	Fuel Support	-	88	7	9	70	26	-	41	242	242	-	-	1,649	278	-	-	-	91,923	1,898	-
4b.1.2.18	HVAC - Auxiliary Building	-	28	1	2	26	-	-	11	68	68	-	-	612	-	-	-	-	24,859	592	-
4b.1.2.19	HVAC - Containment Building	-	661	21	33	560	-	-	256	1,532	1,532	-	-	13,132	-	-	-	-	533,296	12,643	-
4b.1.2.20	HVAC - Control Room	-	242	-	-	-	-	-	36	279	-	-	279	-	-	-	-	-	-	5,686	-
4b.1.2.21	HVAC - Fuel Building	-	283	6	10	170	-	-	99	569	569	-	-	3,993	-	-	-	-	162,145	5,153	-
4b.1.2.22	HVAC - Laboratory	-	456	10	16	273	-	-	158	913	913	-	-	6,392	-	-	-	-	259,566	8,385	-
4b.1.2.23	HVAC - Off Gas Building	-	115	3	5	80	-	-	42	245	245	-	-	1,876	-	-	-	-	76,166	2,292	-
4b.1.2.24	HVAC - Radwaste Building	-	644	16	25	428	-	-	231	1,345	1,345	-	-	10,038	-	-	-	-	407,637	11,910	-
4b.1.2.25	HVAC - Service Building	-	52	-	-	-	-	-	8	60	-	-	60	-	-	-	-	-	-	1,145	-
4b.1.2.26	HVAC - Turbine Building	-	532	13	20	334	-	-	187	1,087	1,087	-	-	7,839	-	-	-	-	318,337	9,704	-
4b.1.2.27	Hoists Cranes & Elevators	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	123	-
4b.1.2.28	Instrument Air - RCA	-	374	5	7	115	-	-	112	613	613	-	-	2,708	-	-	-	-	109,971	7,089	-
4b.1.2.29	Instrument Air Non-RCA	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	389	-
4b.1.2.30	Off Gas	-	154	4	5	93	-	-	54	309	309	-	-	2,172	-	-	-	-	88,201	3,139	-
4b.1.2.31	Plant Service Water - RCA	-	176	5	8	130	-	-	65	384	384	-	-	3,043	-	-	-	-	123,583	3,532	-
4b.1.2.32	Plant Service Water Non-RCA	-	156	-	-	-	-	-	23	180	-	-	180	-	-	-	-	-	-	3,494	-
4b.1.2.33	Potable Water	-	11	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	231	-
4b.1.2.34	Process Radiation Monitoring	-	84	1	1	23	-	-	25	134	134	-	-	529	-	-	-	-	21,497	1,687	-
4b.1.2.35	Process Sampling	-	414	3	5	92	-	-	119	634	634	-	-	2,157	-	-	-	-	87,602	8,330	-
4b.1.2.36	Reactor Recirculation	-	42	3	3	11	15	-	17	91	91	-	-	266	159	-	-	-	25,061	874	-
4b.1.2.37	Reactor Water Clean-up	-	257	15	17	74	72	-	97	533	533	-	-	1,738	766	-	-	-	139,001	5,284	-
4b.1.2.38	Residual Heat Removal	-	481	47	58	496	157	-	247	1,487	1,487	-	-	11,630	1,672	-	-	-	622,251	10,146	-
4b.1.2.39	Screen Wash	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	132	-
4b.1.2.40	Service Air - RCA	-	230	4	6	106	-	-	75	421	421	-	-	2,476	-	-	-	-	100,556	4,507	-
4b.1.2.41	Service Air Non-RCA	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	309	-
4b.1.2.42	Shutdown Service Water - RCA	-	92	2	4	63	-	-	33	195	195	-	-	1,481	-	-	-	-	60,155	1,829	-
4b.1.2.43	Shutdown Service Water Non-RCA	-	99	-	-	-	-	-	15	114	-	-	114	-	-	-	-	-	-	2,196	-
4b.1.2.44	Solid Radwaste Reprocessing & Disposal	-	509	22	25	214	68	-	182	1,020	1,020	-	-	5,026	756	-	-	-	268,960	10,504	-
4b.1.2.45	Standby Gas Treatment	-	60	1	1	25	-	-	19	107	107	-	-	589	-	-	-	-	23,913	1,224	-
4b.1.2.46	Suppression Pool Cleanup & Transfer	-	96	6	6	46	20	-	38	212	212	-	-	1,086	213	-	-	-	63,215	1,997	-
4b.1.2.47	Suppression Pool Make-up	-	44	5	6	48	18	-	24	145	145	-	-	1,117	193	-	-	-	62,702	942	-
4b.1.2.48	Turb OG RW Cntrl & DG Bldg Equip Drains	-	181	8	8	33	31	-	60	321	321	-	-	764	334	-	-	-	60,852	3,642	-
4b.1.2.49	Turb OG RW Cntrl & DG Bldg Floor Drains	-	295	12	13	128	33	-	104	585	585	-	-	3,005	366	-	-	-	153,049	6,062	-
4b.1.2	Totals	-	19,502	529	705	9,002	959	-	6,375	37,073	34,210	-	2,862	211,112	10,382	-	-	-	9,487,092	399,374	-
4b.1.3	Scaffolding in support of decommissioning	-	4,118	74	17	210	26	-	1,078	5,523	5,523	-	-	4,453	277	-	-	-	225,261	94,887	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	2,497	3,066	404	454	330	1,817	-	2,627	11,196	11,196	-	-	7,734	24,125	-	-	-	2,519,185	112,645	-
4b.1.4.2	Auxiliary Building	285	113	16	21	50	45	-	194	723	723	-	-	1,171	895	-	-	-	134,128	7,994	-
4b.1.4.3	Control Building	329	67	14	19	2	46	-	197	675	675	-	-	56	915	-	-	-	93,484	7,972	-
4b.1.4.4	Diesel Generator Building	95	17	4	5	-	12	-	56	191	191	-	-	-	250	-	-	-	24,981	2,272	-
4b.1.4.5	Fuel Building	729	632	20	25	110	50	-	557	2,122	2,122	-	-	2,574	959	-	-	-	197,780	27,889	-
4b.1.4.6	Radwaste Building	1,114	288	54	71	45	167	-	693	2,432	2,432	-	-	1,067	3,336	-	-	-	373,533	28,179	-
4b.1.4.7	Turbine Building	997	339	52	68	117	152	-	654	2,379	2,379	-	-	2,735	3,035	-	-	-	408,574	26,826	-
4b.1.4	Totals	6,046	4,522	564	663	654	2,289	-	4,980	19,718	19,718	-	-	15,337	33,515	-	-	-	3,751,664	213,778	-
4b.1	Subtotal Period 4b Activity Costs	6,498	28,186	1,259	1,489	9,866	3,846	-	12,837	63,982	61,119	-	2,862	230,902	50,241	-	-	-	14,008,310	709,055	-

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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 4b Additional Costs																					
4b.2.1	ISFSI License Termination	-	723	2	85	-	214	1,162	421	2,607	-	2,607	-	-	4,255	-	-	-	510,082	11,114	2,560
4b.2	Subtotal Period 4b Additional Costs	-	723	2	85	-	214	1,162	421	2,607	-	2,607	-	-	4,255	-	-	-	510,082	11,114	2,560
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	83	-	35	193	-	62	-	90	463	463	-	-	-	669	-	-	-	40,127	130	-
4b.3.2	Small tool allowance	-	537	-	-	-	-	-	81	618	618	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	100	27	284	35	-	65	511	511	-	-	6,000	373	-	-	-	303,507	88	-
4b.3	Subtotal Period 4b Collateral Costs	83	537	135	219	284	97	-	235	1,591	1,591	-	-	6,000	1,042	-	-	-	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	-	2,663	-	-	-	-	-	399	3,063	3,063	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	253	104	-	664	-	207	1,228	1,228	-	-	-	11,898	-	-	-	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	-	-	-	-	-	-	-	-	-	102,679
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	14,266	2,140	16,406	16,406	-	-	-	-	-	-	-	-	-	220,143
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	24,393	3,659	28,052	28,052	-	-	-	-	-	-	-	-	-	387,714
4b.4	Subtotal Period 4b Period-Dependent Costs	1,958	5,757	253	104	-	664	47,574	8,860	65,171	65,171	-	-	-	11,898	-	-	-	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	127,881	2,607	2,862	236,902	67,436	-	-	-	15,100,450	720,751	713,096
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	141	42	183	183	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	Final Site Survey	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	230,140	-
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	11,020	3,306	14,326	14,326	-	-	-	-	-	-	-	-	230,140	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	829	124	953	953	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	74	7	82	82	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	745	74	819	819	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	1,032	-	-	-	-	-	258	1,290	1,290	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	8	3	-	21	-	7	40	40	-	-	-	385	-	-	-	7,712	12	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	144	22	165	165	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	256	26	282	282	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	705	106	811	811	-	-	-	-	-	-	-	-	-	18,651
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,905	586	4,490	4,490	-	-	-	-	-	-	-	-	-	56,731
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	5,167	775	5,942	5,942	-	-	-	-	-	-	-	-	-	73,829

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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
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	2,607	4,088	597,250	122,679	1,502	287	482	34,587,500	1,383,740	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	-	-	-	-	-	-	63,415	-
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	-	-	-	-	-	-	443,422	-
Site Closeout Activities																					
5b.1.2	BackFill 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	-	-	-	-	-	-	141	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	193	1,482	-	-	1,482	-	-	-	-	-	-	7,355	-
5b.2.2	ISFSI Site Restoration	-	1,158	-	-	-	-	42	180	1,380	-	1,380	-	-	-	-	-	-	-	3,069	160
5b.2.3	Screenhouse Cofferdam	-	934	-	-	-	-	-	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	-	1,380	8,269	-	-	-	-	-	-	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	-	-	-	-	-	-	-	56,709
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,330	1,699	13,029	-	-	13,029	-	-	-	-	-	-	-	160,674
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	6,331	950	7,280	-	-	7,280	-	-	-	-	-	-	-	92,151

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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
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	80,537	-	-	-	-	-	-	505,713	311,254
PERIOD 5 TOTALS		-	49,167	-	-	-	-	22,271	10,641	82,079	163	1,380	80,537	-	-	-	-	-	-	505,713	311,254
TOTAL COST TO DECOMMISSION		19,021	124,062	10,292	5,338	26,216	24,017	656,899	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 VOLUME 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 0.5 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)

Year	Radiological Decommissioning Cost (July 31, 2009 dollars)	Radiological Decommissioning Cost less Decommissioning Period Credit
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
Total	**$798,737**	**$409,492**
	Total Decommissioning Period Credit:	**$389,245**

ATTACHMENT 3

Clinton Power Station
NRC Funding Assurance Calculations
July 31, 2009
(dollars, thousands)

	NRC Generic Formula	CPS Site-Specific SAFSTOR Decommissioning Cost Estimate
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
Prepayment Difference – Surplus/(Shortfall) (J) = (H) / (1 + 2%) ^ (C)	**($65,795)**	**$29,269**