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DECOMMISSIONING COST ANALYSIS

for the

MONTICELLO NUCLEAR GENERATING PLANT

prepared for

Xcel Energy Services, Inc.

prepared by

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REVISION LOG

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EXECUTIVE SUMMARY

This report presents estimates of the cost to promptly decommission the Monticello Nuclear Generating Plant (Monticello) following expiration of the current license and cessation of plant operations. The prompt decommissioning, or DECON method, as described below, was selected as it is the most cost-effective of the alternatives (in current dollars) to achieve the objectives of decommissioning. The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2008,[1] updated to reflect current assumptions pertaining to the disposition of the nuclear unit and relevant industry experience in undertaking such projects. The current estimates are designed to provide Xcel Energy with sufficient information to assess their financial obligations, as they pertain to the eventual decommissioning of the nuclear unit.

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

The Monticello site consists of a single boiling water reactor nominally rated to produce approximately 653 megawatts of electricity (MW). The currently projected cost to decommission the station (Scenario 1) is estimated at $1,146 million, as reported in 2011 dollars. Two additional estimates are provided for extended spent fuel storage scenarios (Scenarios 2 and 3). The estimates are based on numerous fundamental assumptions, including regulatory requirements, low-level radioactive waste disposal practices, high-level radioactive waste management options, site restoration requirements, and project contingencies. The estimates incorporate a minimum cooling period for the spent fuel that resides in the storage pool when operations cease. Any residual fuel remaining in the pool after the cooling period is relocated to the ISFSI to await transfer to a DOE facility. The estimates also include the dismantling of site structures and non-essential facilities and the limited restoration of the site.

An ISFSI is currently operating on the Monticello site. The facility is expected to contain 30 NUHOMS® dry shielded canisters (DSCs) and horizontal storage

[1] "Decommissioning Cost Analysis for the Monticello Nuclear Generating Plant," Document No. X01-1586-003, TLG Services, Inc., October 2008

modules (HSMs) after 60 years of operation. The casks are single-purpose and the stored assemblies will be relicensed to meet transport regulations in support of final transfer to a DOE facility. An additional 37 DSCs and HSMs will be purchased to accommodate the residual fuel remaining in the pool after final shutdown. Transfer of spent fuel from the pool will require approximately 15 years to allow for radioactive decay to decrease heat loading. Spent fuel is expected to be completely removed from the site by 2090 (Scenario 1) or 2230 (Scenarios 2 and 3).

Alternatives and Regulations

The ultimate objective of the decommissioning process is to reduce the inventory of contaminated and activated material so that the license(s) can be terminated. The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule adopted on June 27, 1988.[2] In this rule, 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

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

3 Ibid. Page FR24022, Column 3

4 Ibid.

> 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 pending the completion of additional research studies, for example, on engineered barriers.

In 1996, the NRC published revisions to the general requirements for decommissioning nuclear power plants to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process.[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 revised rule 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 the amended regulations. The format and content of the estimate is also consistent with the recommendations of Regulatory Guide 1.202, issued in February 2005.[7]

Decommissioning Scenarios

The following scenarios were evaluated and are intended to bound the liability associated with the removal of spent fuel from the site. The current operating license expires in 2030. In all three scenarios, decommissioning activities commence shortly after the cessation of plant operations. The spent fuel in the plant's spent fuel storage pool is transferred to the ISFSI within the first fifteen years. The equipment, structures, and portions of the plant containing radioactive contaminants are removed or decontaminated to a level that permits the facility to be released for unrestricted use. Non-essential structures are then demolished. Spent fuel storage operations continue at the site (at the ISFSI) until the transfer of the fuel to the DOE is completed (2090 in Scenario 1 and 2230 in Scenarios 2 and 3).

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5 Ibid. Page FR24023, Column 2

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

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

The difference between Scenarios 2 and 3 is in the need (in Scenario 3) to replace the DSCs after the first 100 years of operation. Canister replacement begins in 2109 and ends in 2145; a second round of canister replacement for the oldest Monticello fuel begins in 2209 and ends in 2214.

Scenario	1st Spent Fuel Canister Replacement	1st Spent Fuel Assembly Removed from Morris	1st Spent Fuel Assembly Removed from Monticello	Last Spent Fuel Assembly Removed from Monticello
1	n/a	2050	2077	2090
2	n/a	2190	2217	2230
3	2109	2190	2217	2230

Methodology

The methodology used to develop the estimate described within this document follows the basic approach originally presented in the cost estimating guidelines [8] 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 cost estimating practice, contingencies are applied to the decontamination and dismantling costs developed as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."[9] The cost elements in this estimate are based on ideal conditions; therefore, the types of unforeseeable

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

9 Project and Cost Engineers' Handbook, Second Edition, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, p. 239

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 projected operating life of the station or duration of the decommissioning program and dry fuel storage period.

Contingency funds are expected to be fully expended throughout the program. As such, inclusion of contingency is necessary to provide assurance that sufficient funding will be available to accomplish the intended tasks.

Low-Level Radioactive Waste Disposal

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is 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,[10] and its Amendments of 1985,[11] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. With the exception of Texas (where Waste Control Specialists is currently in the process of constructing a new facility), no new compact facilities have been successfully sited, licensed, and constructed.

The disposal facility in Barnwell, South Carolina is currently closed to generators outside the Atlantic Compact (comprising the states of Connecticut, New Jersey and South Carolina). This leaves Energy*Solutions*' disposal facility in Clive, Utah as the only available option for the disposal of the majority of the low-level radioactive waste generated from decommissioning.

For the purpose of this analysis, Xcel Energy's "Utilities Service Alliance" agreement with Energy*Solutions* for offsite processing and disposal is used as the basis for estimating the cost for disposition of the majority of the radioactive waste (Class A,[12]). Energy*Solutions* does not have a license to dispose of the more highly radioactive waste (Classes B and C), for example, generated in the dismantling of the reactor vessel. As a proxy, the disposal cost for this material is based upon the last published rate schedule for non-compact waste for the Barnwell facility.

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10 "Low-Level Radioactive Waste Policy Act of 1980," Public Law 96-573, 1980

11 "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, 1986

12 U.S. Code of Federal Regulations, Title 10, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste"

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

For purposes of this analysis, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as the spent fuel and at a cost equivalent to that envisioned for the spent fuel. The GTCC material is stored on site with the spent fuel and shipped once the spent fuel has been removed from the site.

A significant portion of the waste material generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be analyzed 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 for Monticello reflect the savings from waste recovery/volume reduction.

<u>High-Level Radioactive Waste Management</u>

Congress passed the "Nuclear Waste Policy Act"[13] (NWPA) in 1982, assigning the federal government's long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. The NWPA provided that DOE would enter into contracts with utilities in which DOE would promise to take the utilities' spent fuel and high-level radioactive waste and utilities would pay the cost of the disposition services for that material. The NWPA, along with the individual contracts with the utilities, specified that the DOE was to begin accepting spent fuel by January 31, 1998.

Since the original legislation, the DOE has announced several delays in the program schedule. By January 1998, the DOE had failed to accept any spent fuel or high level waste, as required by the NWPA and utility contracts. Delays continue and, as a

[13] "Nuclear Waste Policy Act of 1982 and Amendments," DOE's Office of Civilian Radioactive Management, 1982

result, generators have initiated legal action against the DOE in an attempt to obtain compensation for DOE's breach of contract.

Completion of the entire decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. Politically, the country is at an impasse on high-level waste disposal. The current administration has cut the budget for the geological repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle and recommend a new plan." Towards this goal, the administration appointed a Blue Ribbon Commission on America's Nuclear Future (Commission) to make recommendations for a new plan for nuclear waste disposal.

Recommendations by the Commission have included:

- "The United States should proceed expeditiously to establish one or more consolidated interim storage facilities as part of an integrated, comprehensive plan for managing the back end of the nuclear fuel cycle."
- "The United States should proceed expeditiously to develop one or more permanent deep geological facilities for the safe disposal of high-level nuclear waste."

The Commission also recognized that it would take some time to establish away-from-reactor storage and disposal sites, stating that "… it will take years to more a decade to open one of more consolidated storage facilities and even longer to open one or more permanent disposal facilities." [14]

With all this uncertainty, the state of Minnesota directed the Public Utilities Commission, "when considering approval of a plan for the accrual of funds for the decommissioning of nuclear facilities" …to "include an evaluation of the costs, if any, arising from storage of used nuclear fuel that may be incurred by the state of Minnesota, and any tribal community, county, city, or township where used nuclear fuel is located following the cessation of operations at a nuclear plant."[15]

The state of Minnesota statute also prescribed the parameters to be used in evaluating spent fuel management costs. "To assist the commission in making the determination … the filing shall provide cost estimates, including ratepayer impacts, assuming used

14 "Blue Ribbon Commission on America's Nuclear Future, Draft Report to the Secretary of Energy," July 2011, p. 49

15 Minnesota Statute 216B.1614, "Nuclear Power Plant Decommissioning and Storage of Used Nuclear Fuel"

nuclear fuel will be stored in the state for 60 years, 100 years, and 200 years following the cessation of operation of the nuclear plant." [16]

Xcel Energy's current spent fuel management plan for the Monticello spent fuel is based in general upon: 1) fuel transferred from the pool to the ISFSI within 15 years, 2) exchange of Monticello and Prairie Island spent fuel acceptance rights to best manage the overall cost of spent fuel storage for both plants, 3) fuel will be shipped in the existing DSCs (Scenarios 1 and 2), and 4) availability of a DOE interim or permanent storage repository by 2049 (Scenario 1) or 2189 (Scenarios 2 and 3).

The NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy, pursuant to 10 CFR Part 50.54(bb).[17] This requirement is prepared for 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 the ISFSI.

The spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core at shutdown. Over the following fifteen years, the assemblies are packaged into multipurpose canisters for transfer to the ISFSI for interim storage. It is assumed that this period provides the necessary cooling for the final core to meet the storage requirements for decay heat.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[18]), has been constructed to support continued plant operations. The facility is assumed to be expanded to support decommissioning. This will allow decommissioning activities to proceed within the reactor building.

Xcel Energy's position is that the DOE has a contractual obligation to accept Monticello' fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, 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 earlier.

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16 Ibid.

17 U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses"

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

Monticello also has 1,058 spent fuel assemblies stored at the General Electric facility in Morris, Illinois, that must be transferred to DOE. The decommissioning estimates assume that this fuel will be transferred prior to the spent fuel at Monticello.

Site Restoration

Prompt dismantling of site structures (once the facilities are decontaminated) 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 is deferred. Site facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public and the demolition work force. Consequently, this study assumes that site structures are removed to a nominal depth of three feet below the local grade level wherever possible. The site is then to be graded and stabilized.

Summary

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

The decommissioning scenarios 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 through E. The major cost components are also identified in the cost summary provided at the end of this section.

The cost elements in this estimate are assigned to one of three subcategories: NRC License Termination, Spent Fuel Management, and Site Restoration. The subcategory "NRC License Termination" is used to accumulate costs that are consistent with "decommissioning" as defined by the NRC in its financial assurance regulations (i.e., 10 CFR Part 50.75). The cost reported for this subcategory is generally sufficient to terminate the unit's operating license, recognizing that there may be some additional cost impact from spent fuel management.

The "Spent Fuel Management" subcategory contains costs associated with the containerization and transfer of spent fuel to the ISFSI, and the management of the ISFSI until such time that the transfer of all fuel from this facility to an off-site location (e.g., geologic repository) is complete. The estimate also includes spent fuel management expenses for the final loading and packaging of 1,058 spent fuel assemblies currently in storage at the General Electric facility in Morris, Illinois.

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

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

The estimate presented in this document reflects the total cost to decontaminate the nuclear unit, manage the spent fuel until the DOE is able to complete the transfer to a federal facility, dismantle the plant and restore the site for alternative use.

As noted within this document, the estimates were developed and costs are presented in 2011 dollars. As such, the estimates do not reflect the escalation of costs (due to inflationary and market forces) over the remaining operating life of the reactor or during the decommissioning period.

SCENARIO 1
COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2011 dollars)

Cost Element	Value
Decontamination	18,901
Removal	89,428
Packaging	25,983
Transportation	8,681
Waste Disposal	64,149
Off-site Waste Processing	27,111
Program Management [1]	509,525
Spent Fuel Pool Isolation	11,822
Spent Fuel Management (direct costs) [2]	248,045
Insurance and Regulatory Fees	44,335
Energy	27,520
Characterization and Licensing Surveys	14,940
Property Taxes	45,109
Miscellaneous Equipment	7,029
Railroad Track Maintenance	3,448
Total [3]	1,146,026

Cost Element	Value
License Termination	652,481
Spent Fuel Management	460,695
Site Restoration	32,850
Total [3]	1,146,026

[1] Includes engineering and security costs
[2] Excludes program management costs (staffing) but includes capital expenditures for ISFSI construction, costs for spent fuel loading/packaging/spent fuel pool O&M and EP fees
[3] Columns may not add due to rounding

SCENARIO 2
COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2011 dollars)

Cost Element	Value
Decontamination	18,901
Removal	89,428
Packaging	25,983
Transportation	8,681
Waste Disposal	64,149
Off-site Waste Processing	27,111
Program Management [1]	1,014,344
Spent Fuel Pool Isolation	11,822
Spent Fuel Management (direct costs) [2]	1,081,266
Insurance and Regulatory Fees	127,265
Energy	27,520
Characterization and Licensing Surveys	14,940
Property Taxes	127,022
Miscellaneous Equipment	7,029
Railroad Track Maintenance	3,448
Total [3]	

Cost Element	Value
License Termination	652,481
Spent Fuel Management	1,963,576
Site Restoration	32,850
Total [3]	2,648,907

[1] Includes engineering and security costs
[2] Excludes program management costs (staffing) but includes capital expenditures for ISFSI construction, costs for spent fuel loading/packaging/spent fuel pool O&M and EP fees
[3] Columns may not add due to rounding

SCENARIO 3
COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2011 dollars)

Cost Element	Value
Decontamination	18,935
Removal	89,738
Packaging	25,983
Transportation	9,442
Waste Disposal	76,657
Off-site Waste Processing	27,111
Program Management [1]	1,014,344
Spent Fuel Pool Isolation	11,822
Spent Fuel Management (direct costs) [2]	1,333,051
Insurance and Regulatory Fees	127,265
Energy	27,520
Characterization and Licensing Surveys	14,940
Property Taxes	127,022
Miscellaneous Equipment	7,029
Railroad Track Maintenance	3,448
Total [3]	2,914,305

Cost Element	Value
License Termination	652,481
Spent Fuel Management	2,228,974
Site Restoration	32,850
Total [3]	2,914,305

[1] Includes engineering and security costs
[2] Excludes program management costs (staffing) but includes capital expenditures for ISFSI construction, costs for spent fuel loading/packaging/spent fuel pool O&M and EP fees
[3] Columns may not add due to rounding

1. INTRODUCTION

This report presents estimates of the cost to promptly decommission the Monticello Nuclear Generating Plant (Monticello) following the scheduled cessation of plant operations. The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2008,[1] updated to reflect current assumptions pertaining to the disposition of the nuclear unit and relevant industry experience in undertaking such projects. The current estimates are designed to provide Xcel Energy with sufficient information to assess its 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 a comprehensive estimate of the cost to decommission the Monticello nuclear unit, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities.

The operating license was originally issued for the plant on September 8, 1970 and was valid for a period of 40 years. In early 2005, Nuclear Management Company submitted an application (as agent for the owner), for a renewed license (i.e., a 20 year extension). The application was approved by the NRC in November 2006. Therefore, for the purposes of this study, the shutdown date used for scheduling the decommissioning activities is September 8, 2030, assuming a 60-year operating life (the current operating license's expiration date).

1.2 SITE DESCRIPTION

Monticello is located on the Mississippi River within the city limits of Monticello, in Wright County, Minnesota. The plant is located approximately 30 miles northwest of the Minneapolis-St. Paul area.

The Nuclear Steam Supply System (NSSS) consists of a single cycle, forced circulation, low power density boiling water reactor. This system was supplied by the General Electric Company and after completion of an extended uprate in 2011 has a reference core design of 2004 MWt (thermal), with a corresponding (net dependable capability) electrical rating of 653 MWe (electric), with the reactor at rated power.

The reactor recirculation system is comprised of the reactor vessel; the two loop reactor recirculation system with its pumps, pipes, and valves; the main steam piping up to the main steam isolation valves; and the reactor auxiliary systems piping. The system is housed within a "containment system," consisting of a steel light bulb-shaped drywell, a steel doughnut-shaped pressure suppression chamber, and interconnecting vent pipes. This system provides the first containment barrier surrounding the reactor vessel and reactor primary system. The reactor building provides secondary containment and is designed as a controlled leakage structure.

The saturated steam leaving the reactor vessel flows through the four main steam lines to the main turbine located in the turbine building. After passing through the main turbine, low-pressure steam is condensed, the non-condensable gases are removed, and the condensate is demineralized before being returned to the reactor vessel through the reactor feedwater system heaters. The turbine-generator system converts the thermodynamic energy of the steam into electrical energy. The unit's turbine-generator consists of one single-flow, high-pressure, and two double-flow, low-pressure turbines driving a direct-coupled generator at 1800 rpm. Heat rejected in the main condenser is removed by the circulating water system.

The circulating water system has been designed for open cycle once-through cooling towers, closed cycle with cooling towers, or for variations of these modes, i.e., partial recirculation. The system for open cycle operation consists of an intake structure with two half-capacity circulating water pumps, piping river water through the condenser to a discharge structure where the water enters a 1000-foot long canal that returns the water to the river downstream from the intake. Two induced-draft cooling towers are used during the open and closed cycle operations. Cooled effluent returns by gravity to the intake structure from the cooling tower basins.

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 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 this deferred option is 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. With rulemaking permitting the controlled release of a site,[4] the NRC has re-evaluated this alternative. The resulting feasibility study, based upon an assessment by Pacific Northwest National Laboratory, concluded that the method did have conditional merit for some, if not most reactors. However, the staff also found that additional rulemaking would be needed before this option could be treated as a generic alternative. The NRC considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.[5] At this time, however, the NRC's staff has recommended that rulemaking be deferred, based upon several factors including that no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities, at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation.

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

Under the revised regulations, licensees will submit written certification to the NRC within 30 days after the decision to cease operations. Certification will also be required once the fuel is permanently removed from the reactor vessel. Submittal of these notices 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 an application 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 federal government's long-standing responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. The NWPA provided that DOE would enter into contracts with utilities in which DOE would promise to take the utilities' spent fuel and high-level radioactive waste and utilities would pay the cost of the disposition services for that material. The NWPA, along with the individual contracts with the utilities, specified that the DOE was to begin accepting spent fuel by January 31, 1998.

Since the original legislation, the DOE has announced several delays in the program schedule. By January 1998, the DOE had failed to accept any spent fuel or high level waste, as required by the NWPA and utility

contracts. Delays continue and, as a result, generators have initiated legal action against the DOE in an attempt to obtain compensation for DOE's breach of contract.

Completion of the entire decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. Politically, the country is at an impasse on high-level waste disposal. The current administration has cut the budget for the geological repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle and recommend a new plan." Towards this goal, the administration appointed a Blue Ribbon Commission on America's Nuclear Future (Commission) to make recommendations for a new plan for nuclear waste disposal.

Recommendations by the Commission have included:

- "The United States should proceed expeditiously to establish one or more consolidated interim storage facilities as part of an integrated, comprehensive plan for managing the back end of the nuclear fuel cycle."
- "The United States should proceed expeditiously to develop one or more permanent deep geological facilities for the safe disposal of high-level nuclear waste."

The Commission also recognized that it would take some time to establish away-from-reactor storage and disposal sites, stating that "… it will take years to more a decade to open one of more consolidated storage facilities and even longer to open one or more permanent disposal facilities." [8]

With all this uncertainty, the state of Minnesota directed the Public Utilities Commission, "when considering approval of a plan for the accrual of funds for the decommissioning of nuclear facilities" …to "include an evaluation of the costs, if any, arising from storage of used nuclear fuel that may be incurred by the state of Minnesota, and any tribal community, county, city, or township where used nuclear fuel is located following the cessation of operations at a nuclear plant."[9]

The State of Minnesota statute also prescribed the parameters to be used in evaluating spent fuel management costs. "To assist the commission in making the determination … the filing shall provide cost estimates, including ratepayer impacts, assuming used nuclear fuel will be stored in

the state for 60 years, 100 years, and 200 years following the cessation of operation of the nuclear plant." [9]

Xcel Energy's current spent fuel management plan for the Monticello spent fuel is based in general upon: 1) fuel transferred from the pool to the ISFSI within 15 years, 2) exchange of Monticello and Prairie Island spent fuel acceptance rights to best manage the overall cost of spent fuel storage for both plants, 3) fuel will be shipped in the existing DSCs (Scenarios 1 and 2), and 4) availability of a DOE interim or permanent storage repository by 2049 (Scenario 1) or 2189 (Scenario 2 and 3).

The NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy, pursuant to 10 CFR Part 50.54(bb).[10] This requirement is prepared for 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 the ISFSI.

The spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core at shutdown. Over the following fifteen years, the assemblies are packaged into multipurpose canisters for transfer to the ISFSI for interim storage. It is assumed that this period provides the necessary cooling for the final core to meet the storage requirements for decay heat.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[11]), has been constructed to support continued plant operations. The facility is assumed to be expanded to support decommissioning. This will allow decommissioning activities to proceed within the reactor building.

Xcel Energy's position is that the DOE has a contractual obligation to accept Monticello's fuel earlier than the projections set out above consistent with its contract commitments. No assumption made in this study should be interpreted to be inconsistent with this claim. However, 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 earlier.

Monticello also has 1,058 spent fuel assemblies stored at the General Electric facility in Morris, Illinois, that must be transferred to DOE. The decommissioning estimates assume that this fuel will be transferred prior to the spent fuel at Monticello.

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. With the passage of the "Low-Level Radioactive Waste Policy Act" in 1980,[12] and its Amendments of 1985,[13] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. With the exception of Texas (where Waste Control Specialists is currently in the process of constructing a new facility), no new compact facilities have been successfully sited, licensed, and constructed.

The disposal facility in Barnwell, South Carolina is currently closed to generators outside the Atlantic Compact (comprising the states of Connecticut, New Jersey and South Carolina). This leaves Energy*Solutions*' disposal facility in Clive, Utah as the only available option for the disposal of the majority of the low-level radioactive waste generated from decommissioning.

For the purpose of this analysis, Xcel Energy's "Utilities Service Alliance" agreement with Energy*Solutions* for offsite processing and disposal is used as the basis for estimating the disposal cost for the majority of the radioactive waste (Class A,[14]). Energy*Solutions* does not have a license to dispose of the more highly radioactive waste (Classes B and C), for example, generated in the dismantling of the reactor vessel. As a proxy, the disposal cost for this material is based upon the last published rate schedule for non-compact waste for the Barnwell facility.

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

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

For purposes of this analysis, the GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner as the spent fuel and at a cost equivalent to that envisioned for the spent fuel. The GTCC material is stored on site with the spent fuel and shipped once the spent fuel has been removed from the site.

A significant portion of the waste material generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be analyzed 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 for Monticello 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,"[15] amending 10 CFR Part 20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimate for the Monticello site assumed that it 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).[16]

An additional and separate limit of 4 millirem per year, as defined in 40 CFR Part 141.16, is applied to drinking water.[17]

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)[18] provides that EPA will defer exercise of authority under CERCLA for the majority of facilities decommissioned under NRC authority. The MOU also includes provisions for NRC and EPA consultation for certain sites when, at the time of license termination, (1) groundwater contamination exceeds EPA-permitted levels; (2) NRC contemplates restricted release of the site; and/or (3) residual radioactive soil concentrations exceed levels defined in the MOU.

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

2. DECOMMISSIONING ALTERNATIVE DESCRIPTION

Detailed cost estimates were developed to promptly decommission the Monticello nuclear unit, (i.e., the DECON decommissioning alternative). The DECON alternative, as defined by the NRC, is "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."

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

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

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimate developed for Monticello is 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 rate of expenditure.

2.1 PERIOD 1 - PREPARATIONS

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

2.1.1 Engineering and Planning

The PSDAR, required within two years of the notice to cease operations, provides a description of the licensee's planned decommissioning activities, a timetable, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local hearing to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR Part 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 Part 61. Major components are further defined as comprising the reactor vessel and internals, steam generators, large bore reactor coolant system piping, and other large components that are radioactive. The NRC includes the following additional criteria for use of the Part 50.59 process in decommissioning. The proposed activity must not:

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

Existing operational technical specifications are reviewed and modified to reflect plant conditions and the safety concerns associated with permanent cessation of operations. The environmental impact associated with the planned decommissioning activities is also considered. Typically, a licensee is not allowed to proceed if the consequences of a particular decommissioning activity are greater than that bounded by previously evaluated environmental assessments or impact statements. In this instance, the licensee must submit a license amendment for the specific activity and update the environmental report.

The decommissioning program outlined in the PSDAR is designed to accomplish the required tasks within the ALARA guidelines (as defined in 10 CFR Part 20) for protection of personnel from exposure to radiation hazards. It also addresses 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, work packages, and procedures are assembled to support the proposed decontamination and dismantling activities.

2.1.2 Site Preparations

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

- Characterize the site and surrounding environs. This includes radiation surveys and sampling of the work areas, major components (including the reactor vessel and its internals), internal piping, and sacrificial shield.
- Isolate 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 area to optimize the overall project schedule. The fuel is transferred from the pool once it decays to the point that it meets the heat load criteria of the storage/transport containers. Consequently, it is assumed that the fuel pool will remain operational for approximately fifteen years following the cessation of plant operations while the residual inventory is transferred to the ISFSI.
- Specify of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Develop 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.

2.2 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 Part 50 operating license. Significant decommissioning activities in this phase include:

- Construct 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.

- Reconfigure and modify 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 building to support the segmentation of the reactor vessel internals and component extraction.
- Design and fabricate temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.
- Procure (lease or purchase) of shipping canisters, cask liners, and industrial packages.
- Decontaminate components and piping systems as required to control (minimize) worker exposure.
- Remove 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.
- Disassembly and segmentation of the remaining reactor 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. The water level is 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 and the internal contaminants are stabilized, e.g., with grout. Steel shielding will be added, as necessary, to those external areas of the package to meet transportation limits and regulations.
- Segment the reactor vessel. A shielded platform is installed for segmentation as cutting operations are performed in air using remotely operated equipment within a contamination control envelope. The water level is maintained just below the cut to minimize the working area dose rates. Segments are transferred in-air to containers that are stored under water, for example, in an isolated area of the dryer-separator pool or the spent fuel pool.
- Demolition of the sacrificial shield activated concrete by controlled demolition.
- Expansion of the ISFSI and 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 to DOE is expected to be completed by the end of the year 2090 (Scenario 1).

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

- Remove 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).

- Remove steel liners from the drywell, disposing of the activated and contaminated sections as radioactive waste. Remove any remaining activated/ contaminated concrete.
- Removal of the steel liners from the steam separator and dryer pool, reactor well, and spent fuel storage pool.
- Survey decontaminated areas of the containment structure.
- Remediate and remove the contaminated equipment and material from the turbine and radwaste buildings and any other contaminated facility. Radiation and contamination controls are utilized until residual levels indicate that the structures and equipment can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity facilitates surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.
- Remove the remaining components, equipment, and plant services in support of the area release survey(s).
- Route 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)."[19] 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 the requested change to the operating license (that would release the property, exclusive of the ISFSI, for unrestricted use).

The NRC will amend 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.

2.3 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 may 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, radwaste and turbine buildings. Verifying that subsurface radionuclide concentrations meet NRC site release requirements may require removal of grade slabs and lower floors, potentially weakening footings and structural supports. This removal activity is 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 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, with any excess assumed to be removed from the site as recycled material at no cost or credit to the decommissioning program.

2.4 ISFSI OPERATIONS AND DECOMMISSIONING

The ISFSI will continue to operate under a general license (10 CFR §50) following the amendment of the operating license to release the adjacent (power block) property. Assuming the DOE starts accepting Monticello fuel in 2050 (Scenario 1), transfer of spent fuel from Monticello and from the General Electric facility in Morris, Illinois is anticipated to continue through the year 2090. Any delay in the transfer process, for example, due to a delay in the scheduled opening of the geologic repository, a slower acceptance rate, or a combination of both, can result in a longer on-site residence time for the fuel discharge from the reactor, as well as additional caretaking expenses. Scenarios 2 and 3 address an extended delay, as shown in the table below. The only difference in Scenarios 2 and 3 is the assumption that the DSCs will have to be replaced (in Scenario 3) after 100 years of operation (starting in 2109).

Scenario	1st Spent Fuel Canister Replacement	1st Spent Fuel Assembly Removed from Morris	1st Spent Fuel Assembly Removed from Monticello	Last Spent Fuel Assembly Removed from Monticello
1	n/a	2050	2077	2090
2	n/a	2190	2217	2230
3	2109	2190	2217	2230

At the conclusion of the spent fuel transfer process, the ISFSI will be decommissioned. The Commission will terminate the license when it determines that the remediation of the ISFSI has been performed in accordance with an ISFSI license termination plan and that the final radiation survey and associated documentation demonstrate that the facility is suitable for release.

The assumed design for the ISFSI is based upon the use of a NUHOMS® dry shielded canisters (DSCs) and horizontal storage modules (HSMs) for pad storage. For purposes of this cost analysis, it is assumed that once the DSCs containing the spent fuel assemblies have been removed, any required decontamination performed, and the license for the facility terminated, the HSMs 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.

In Scenario 3, once the spent fuel has been removed from the original casks by Xcel Energy in the cask replacement operation, the now-empty DSCs will be disposed of as low-level waste.

3. COST ESTIMATE

The cost estimates prepared for decommissioning the Monticello unit consider the unique features of the plant, including the nuclear steam supply system, power generation systems, support services, plant structures, 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 COST ESTIMATE

The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2008,[1] updated to reflect current assumptions pertaining to the disposition of the nuclear unit and relevant industry experience in undertaking such projects. This information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluations 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,"[20] and the DOE "Decommissioning Handbook."[21] 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) are developed using local labor rates. The activity-dependent costs are estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures rely upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means. [22]

The unit factor method provides a demonstrable basis for establishing a reliable cost estimate. 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.

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.

Work Difficulty Factors

The estimate 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.

Work difficulty adjustment factors (WDFs) account for the inefficiencies in working in a power plant environment. The factors are assigned to each unique set of unit cost factors, commensurate with the inefficiencies associated with working in confined, hazardous environments. The ranges used for the WDFs are as follows:

- Access Factor 10% to 20%
- Respiratory Protection Factor 10% to 50%
- Radiation/ALARA Factor 10% to 37%
- Protective Clothing Factor 0% to 30%
- Work Break Factor 8.33%

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

Scheduling Program Durations

The unit factors, adjusted by the WDFs as described above, are applied against the inventory of materials to be removed in the radiological controlled areas. The resulting man-hours, or crew-hours, are used in the development of the decommissioning program schedule, using resource loading and event sequencing considerations. The scheduling of conventional removal and dismantling activities is based upon productivity information available from the "Building Construction Cost Data" publication.

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 result.

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 (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"[23] 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, contingency is included. 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 anticipated operating life of the station.

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 0% 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 consistent with those developed in the AIF/NESP-036 study and 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%
- Nuclear Steam Supply System Component Removal 25%
- Reactor Waste Packaging 25%

- Reactor Waste Transport 25%
- Reactor Vessel Component Disposal 50%
- Greater-than-Class C 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%
- Property Taxes 0%
- Fees 10%
- Insurance 10%
- Staffing 15%

The contingency values are applied to the appropriate components of the estimate on a line item basis. A composite value can then be estimated. The composite contingency values for the three scenarios are reported at the end of each detailed estimate as provided in Appendices C, 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:

- 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 plant drawings.
- Regulatory changes, for example, 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, the start and rate of acceptance of spent fuel by the DOE.

- Pricing changes for basic inputs such as labor, energy, materials, and disposal. Items subject to widespread price competition (such as materials) may not show significant variation; however, others such as waste disposal could exhibit large pricing uncertainties, particularly in markets where limited access to services is available.

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 is mostly due to the pricing uncertainty for low-level radioactive waste disposal, and to a lesser extent due to schedule increases from changes in plant conditions and to pricing variations in the cost of labor (both craft and staff). This cost study, however, does not add any additional costs to the estimate for financial risk, since there is insufficient historical data from which to project future liabilities. Consequently, the areas of uncertainty or risk should be 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 the spent fuel generated from plant operations is not reflected within the estimate to decommission the Monticello unit. Ultimate disposition of the spent fuel is within the province of the DOE's Waste Management System, as defined by the Nuclear Waste Policy Act (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 reactor 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.

Spent Fuel Management Model

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program assumes that spent fuel allocations will be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor. Xcel Energy's current spent fuel management plan for the Monticello spent fuel is based in general upon: 1) fuel transferred from the pool to the ISFSI within 15 years, 2) exchange of Monticello and Prairie Island spent fuel acceptance rights to best manage the overall cost of spent fuel storage for both plants, 3) fuel will be shipped in the existing DSCs (Scenarios 1 and 2), and 4) availability of a DOE interim or permanent storage repository by 2049 (Scenario 1) or 2189 (Scenarios 2 and 3).

ISFSI

This analysis assumes that the existing ISFSI will need to be expanded to accommodate the fuel present in the storage pool at shutdown.

Operation and maintenance costs for the ISFSI are included within the estimates and address the costs for staffing the facility, as well as security, insurance, and licensing fees. The estimates also include the costs to purchase, load, and transfer the Transnuclear NUHOMS® dry shielded canisters (DSCs) spent fuel storage canisters from the pool to the ISFSI horizontal storage modules (HSMs). Costs are also provided for the final disposition of the ISFSI once the transfer is complete.

Storage Canister Design

The design and capacity of the ISFSI is based upon the NUHOMS® storage system. The dry storage modules have a capacity of 61 fuel assemblies.

Canister Loading and Transfer

An average cost of $1.3 million is used for the labor to load/transport the spent fuel from the pools (at Monticello and/or Morris) to the ISFSI pad or to DOE. A unit cost of $274,000 is used to estimate the cost to transfer the fuel from the Monticello ISFSI to the DOE.

Operations and Maintenance

An annual cost (excluding labor) of approximately $764,000 and $90,000 are used for operation and maintenance of the Monticello spent fuel pool and the ISFSI, respectively.

At shutdown, the spent fuel pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles). Over the next fifteen years, the assemblies are packaged into DSCs for transfer to the ISFSI to await transfer to the DOE. It is assumed that the fifteen years provides the necessary cooling period for the final core to meet the decay heat requirements for dry storage. Once the pool is emptied, the spent fuel storage and handling facilities are available for decommissioning.

ISFSI Design Considerations

An ISFSI is currently operating on the Monticello site. The facility is projected to contain 30 NUHOMS® dry shielded canisters (DSCs) and horizontal storage modules (HSMs) after 60 years of operation. The casks are single-purpose and the stored assemblies will be relicensed to meet transport regulations in support of final transfer to a DOE repository. An additional 37 NUHOMS® casks will be purchased to accommodate the residual fuel remaining in the pool after final shutdown. Transfer of all post-shutdown spent fuel will require fifteen years to allow for radioactive decay to decrease heat loading. Spent fuel is expected to be completely removed from the site by 2090 (Scenario 1).

While it is expected that surface contamination within the HSM concrete shields for the DSCs could be removed to levels that meet the site release criteria, it is also expected that the HSMs will 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).

For Scenario 3, all of the DSCs will be replaced once (and some of them twice) during the ISFSI spent fuel storage period. While it is expected that surface contamination within the DSCs could be removed to levels that meet the site release criteria, it is also expected that the DSCs will 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). The cost of the disposal of these DSCs is reflected within the Scenario 3 estimate.

The demolition of the ISFSI for all three scenarios is reflected within the estimate.

GTCC

The dismantling of the reactor internals generates radioactive waste considered unsuitable for shallow land disposal (i.e., low-level radioactive waste with concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste (GTCC)). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the Federal Government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs of disposing of such waste. To date, the Federal Government has not identified a cost for disposing of GTCC or a schedule for acceptance. As such, the estimate to decommission the Monticello unit includes an allowance for the disposition of GTCC material.

For purposes of this study, GTCC is packaged in the same canisters used to store 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 remains in storage with the spent fuel at the ISFSI.

3.4.2 Reactor Vessel and Internal Components

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.

As stated previously, the dismantling of 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 by the NRC, DOE at one time indicated it would accept title to this waste for disposal at the future high-level waste repository.[24] However, the current DOE position is unclear, and 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 radioactive waste has been packaged and disposed of as spent fuel, at a cost equivalent to that envisioned for the spent fuel.

Intact disposal of reactor vessel shells has been successfully demonstrated at several of the sites recently decommissioned. Access to navigable waterways has allowed these large packages to be transported to the Barnwell disposal site with minimal overland travel. 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 (including the internals). 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 the Monticello unit 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 that the reactor vessel will require segmentation, as a bounding condition. With lower levels of activation, the vessel shell can be packaged more efficiently than the curie-limited

internal components. This will allow the use of more conventional waste packages rather than shielded casks for transport.

3.4.3 Primary System Large Components

The reactor recirculation system components will be decontaminated using chemical agents prior to the start of cutting operations. This type of decontamination can be expected to have a significant ALARA impact in the DECON scenario, since in this scenario the removal work is done within the first few years of shutdown. It should be noted that if the decommissioning work is significantly delayed, chemical decontamination might not be necessary. A decontamination factor (average reduction) of 10 is assumed for the process.

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.[25] 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 Part 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.

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

Transport of the highly activated metal, produced in the segmentation of the reactor vessel and internal components, 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.

Transportation costs for Classes A, B and C material requiring controlled disposal are based upon the mileage to the Energy*Solutions*' facility in Clive, Utah. Transportation costs for off-site waste processing are based upon the mileage to Memphis, Tennessee. Truck transport costs are estimated using published tariffs from Tri-State Motor Transit.[26]

3.4.6 Low-Level Radioactive Waste Disposal

To the greatest extent practical, metallic material generated in the decontamination and dismantling processes is processed to reduce the total cost of controlled disposal. Material meeting the regulatory and/or site release criterion, is released as scrap, requiring no further cost consideration. Conditioning (preparing the material to meet the waste acceptance criteria of the disposal site) and recovery of the waste stream

is performed off site at a licensed processing center. Any material leaving the site is subject to a survey and release charge, at a minimum. Based on TLG's experience, rates were assumed for off-site processing as well as survey and release.

The mass of radioactive waste generated during the various decommissioning activities at the site is shown on a line-item basis in the detailed Appendices C, D and E, and summarized in Tables 5.1 through 5.3. The quantified waste summaries shown in these tables are consistent with 10 CFR Part 61 classifications. Commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations. The volumes are calculated based on the exterior package dimensions for containerized material or a specific calculation for components serving as their own waste containers.

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

Disposal fees are based upon estimated charges, 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 is based upon Xcel Energy's current cost for disposal at Energy*Solutions*' facility in Clive, Utah. Disposal costs for the higher activity waste (Class B and C) were estimated using the last available Barnwell rate structure for non-Atlantic Compact members.

3.4.7 Site Conditions Following Decommissioning

The NRC will terminate (or amend) the site license(s) 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 typically ends at this point. Building codes and state environmental regulations dictate the

next step in the decommissioning process, as well as the owner's future plans for the site.

There are varying degrees to which the Monticello site can be restored following the decommissioning of the nuclear unit. The estimates presented herein include the dismantling of the major structures to just below ground level, backfilling and the collapsing of below grade voids, and general regrading such that the site upon which the power block and supplemental structures are located is transformed into a "grassy plain." Xcel Energy has identified certain structures and site features that are candidates for reuse by a potential follow-on generating plant at the Monticello site. These structures are excluded from the scope of the estimate for decommissioning or site restoration.

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 estimate for decommissioning Monticello.

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 Monticello will be acquired through standard site contracting practices. Craft labor costs were based upon information from Xcel Energy. Craft labor costs include applicable overheads and profit.

Xcel Energy, as the operator, will continue to provide site operations support, including decommissioning program management, licensing, radiological protection, and site security. A Decommissioning Operations Contractor (DOC) will provide the supervisory staff needed to oversee the labor subcontractors, consultants, and specialty contractors needed to perform the work required for the decontamination and dismantling effort. The DOC will also provide the engineering services needed to develop activity specifications, detailed procedures, detailed activation analyses, and support field activities such as structural modifications.

Utility labor costs were provided by Xcel Energy. Average costs were provided by department or work group and included payroll overheads. Decommissioning Operations Contractor (DOC) labor costs were based on utility labor costs with modified markups to account for employee benefits, and DOC overhead and profit.

Based upon site overhead information provided by Xcel Energy, an administrative and general cost (A&G) is included. This cost is based on the average annual A&G per person applied to each of the utility staffing positions (number of utility personnel assigned to the project). The A&G cost includes: site overhead costs directly required to support the site decommissioning staff.

Security, while reduced from operating levels, is maintained throughout the decommissioning for access control, material control, and to safeguard the spent fuel.

3.5.3 Design Conditions

Activation levels in the vessel and internal components are modeled using NUREG/CR-3474.[27] Estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Monticello components, projected operating life(s), and different periods of decay. Additional short-lived isotopes were derived from CR-0130 [28] and CR-0672 [29] 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 is confined to the area around the sacrificial shield. More extensive activation (at very low levels) of the interior structures within containment has been detected at several reactors and the owners have elected to dispose of the affected material at a controlled facility rather than reuse the material as fill on site or sending it to a landfill. The ultimate disposition of the material removed from the reactor building will depend upon the site release criteria applied, as well as the designated end use for the site.

3.5.4 General

Transition Activities

Existing warehouses are cleared of non-essential material and remain for use by the plant operator and its subcontractors. The plant's operating staff performs 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.
- Process operating waste inventories. This estimate does not address the disposition of any legacy wastes and 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. Xcel Energy will make economically reasonable efforts to salvage equipment following final plant shutdown. However, dismantling techniques assumed 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 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 estimate do not include the additional cost for size reduction and preparation to meet "furnace ready" conditions. With a volatile market, the potential profit margin in scrap recovery is highly speculative, regardless of the ability to free release this material. An allowance has been included for the survey and release of all metallic material released from the site.

Furniture, tools, mobile equipment such as forklifts, trucks, bulldozers, and other property is removed at no cost or credit to the decommissioning project. Disposition may include relocation to other facilities. Spare parts are also made available for alternative use.

The concrete debris resulting from building demolition activities is crushed on site to reduce the size of the debris. The resulting crushed concrete is used to backfill below grade voids, with the excess assumed to be removed from the site as recycled material at no cost or credit to the decommissioning program. The rebar removed from the concrete crushing process is disposed of as scrap steel in a similar fashion as other scrap metal as discussed previously.

Energy

For estimating purposes, the plant is assumed to be de-energized; with the exception of those facilities associated with spent fuel storage (temporary power is run throughout the plant, as needed). Replacement power costs are used to calculate the cost of energy consumed 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."[30] The NRC's financial protection requirements are based on various reactor (and spent fuel) configurations.

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

Schedules of expenditures are provided in Tables 3.1 through 3.3. The tables delineate the cost contributors by year of expenditures as well as cost contributor (e.g., labor, materials, and waste disposal).

The cost elements in Table 3.1 (Scenario 1) are also assigned to one of three subcategories: "License Termination," "Spent Fuel Management," and "Site Restoration." The subcategory "License Termination" is used to accumulate costs that are consistent with "decommissioning" as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). In situations where the long-term management of spent fuel is not an issue, the cost reported for this subcategory is generally sufficient to terminate the unit's operating license. Table 3.1a lists the License Termination subcategory schedule of expenditures.

The "Spent Fuel Management" subcategory contains costs associated with the containerization and transfer of spent fuel to the ISFSI, and the management of the ISFSI until such time that the transfer of all fuel from this facility to an off-site location (e.g., geologic repository) is complete. Table 3.1b lists the Spent Fuel Management subcategory schedule of expenditures.

"Site Restoration" is used to capture costs associated with the dismantling and demolition of buildings and facilities demonstrated to be free from contamination. This includes structures never exposed to radioactive materials, as well as those facilities that have been decontaminated to appropriate levels. Structures are removed to a depth of three feet and backfilled to conform to local grade. Table 3.1c lists the Site Restoration subcategory schedule of expenditures.

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

Schedules of expenditures for the 200 year ISFSI operations scenarios are provided in Tables 3.2 and 3.3. Table 3.2 presents Scenario 2 (200 years without DSC replacement); Table 3.3 presents Scenario 3 (200 years with DSC replacement). The tables delineate the cost contributors by year of expenditures as well as cost contributor (e.g., labor, materials, and waste disposal).

Decommissioning costs are reported in 2011 dollars. Costs are not inflated, escalated, or discounted over the period of expenditure (or projected lifetime of the plant). The schedules are based upon the detailed activity costs reported in Appendices C through E, along with the timelines presented in Section 4.

TABLE 3.1
SCENARIO 1
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2030	21,564	21,215	1,157	18	2,497	46,451
2031	51,116	5,970	4,830	809	14,773	77,498
2032	56,768	27,117	4,217	37,458	13,386	138,946
2033	49,483	16,192	3,074	23,881	7,351	99,981
2034	46,084	9,734	2,754	7,332	5,593	71,498
2035	42,161	30,883	2,068	4,854	4,955	84,922
2036	10,792	667	737	38	3,724	15,958
2037	10,763	665	735	38	3,714	15,914
2038	10,763	665	735	38	3,714	15,914
2039	10,763	665	735	38	3,714	15,914
2040	10,792	667	737	38	3,724	15,958
2041	10,763	665	735	38	3,714	15,914
2042	10,763	665	735	38	3,714	15,914
2043	10,763	665	735	38	3,714	15,914
2044	10,792	667	737	38	3,724	15,958
2045	27,299	31,081	964	3,073	3,971	66,388
2046	30,949	3,182	1,059	4,327	3,543	43,060
2047	18,749	4,744	439	8	2,114	26,055
2048	15,854	6,884	341	0	1,956	25,035
2049	3,618	43	0	0	1,846	5,507
2050	5,653	6,150	0	0	1,846	13,649
2051	6,766	9,488	0	0	1,846	18,100
2052	4,922	3,924	0	0	1,851	10,697
2053	6,395	8,375	0	0	1,846	16,616
2054	7,508	11,713	0	0	1,846	21,067
2055	3,604	0	0	0	1,846	5,450
2056	3,613	0	0	0	1,851	5,464
2057	3,604	0	0	0	1,846	5,450
2058	3,604	0	0	0	1,846	5,450
2059	3,604	0	0	0	1,846	5,450
2060	3,613	0	0	0	1,851	5,464
2061	3,604	0	0	0	1,846	5,450
2062	3,604	0	0	0	1,846	5,450

TABLE 3.1 (continued)
SCENARIO 1
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2063	3,604	0	0	0	1,846	5,450
2064	3,613	0	0	0	1,851	5,464
2065	3,604	0	0	0	1,846	5,450
2066	3,604	0	0	0	1,846	5,450
2067	3,604	0	0	0	1,846	5,450
2068	3,613	0	0	0	1,851	5,464
2069	3,604	0	0	0	1,846	5,450
2070	3,604	0	0	0	1,846	5,450
2071	3,604	0	0	0	1,846	5,450
2072	3,613	0	0	0	1,851	5,464
2073	3,604	0	0	0	1,846	5,450
2074	3,604	0	0	0	1,846	5,450
2075	3,604	0	0	0	1,846	5,450
2076	3,613	0	0	0	1,853	5,467
2077	3,761	580	0	0	2,690	7,032
2078	4,076	1,526	0	0	2,690	8,292
2079	3,997	1,289	0	0	2,690	7,977
2080	4,007	1,289	0	0	2,698	7,994
2081	3,997	1,289	0	0	2,690	7,977
2082	4,076	1,526	0	0	2,690	8,292
2083	3,997	1,289	0	0	2,690	7,977
2084	4,007	1,289	0	0	2,698	7,994
2085	3,997	1,289	0	0	2,690	7,977
2086	4,076	1,526	0	0	2,690	8,292
2087	3,997	1,289	0	0	2,690	7,977
2088	4,582	3,014	0	0	2,698	10,294
2089	3,997	1,289	0	0	2,690	7,977
2090	3,758	581	0	1	2,698	7,037
2091	1,523	699	0	87	1,815	4,124
Total	629,031	222,455	27,520	82,192	184,828	1,146,026

TABLE 3.1a
SCENARIO 1
SCHEDULE OF LICENSE TERMINATION EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2030	14,521	511	1,157	18	1,751	17,958
2031	50,554	5,927	4,830	809	12,403	74,522
2032	56,600	27,056	4,217	37,458	11,366	136,697
2033	49,459	16,139	3,074	23,881	5,494	98,048
2034	44,739	5,710	2,754	7,332	3,795	64,331
2035	33,192	3,982	2,068	4,854	3,157	47,253
2036	10,778	624	737	38	1,921	14,098
2037	10,748	622	735	38	1,916	14,059
2038	10,748	622	735	38	1,916	14,059
2039	10,748	622	735	38	1,916	14,059
2040	10,778	624	737	38	1,921	14,098
2041	10,748	622	735	38	1,916	14,059
2042	10,748	622	735	38	1,916	14,059
2043	10,748	622	735	38	1,916	14,059
2044	10,778	624	737	38	1,921	14,098
2045	17,643	2,114	964	3,073	2,448	26,241
2046	30,934	3,139	1,059	4,327	2,896	42,355
2047	6,225	264	143	8	538	7,178
2048	574	0	0	0	99	673
2049	0	0	0	0	0	0
2050	0	0	0	0	0	0
2051	0	0	0	0	0	0
2052	0	0	0	0	0	0
2053	0	0	0	0	0	0
2054	0	0	0	0	0	0
2055	0	0	0	0	0	0
2056	0	0	0	0	0	0
2057	0	0	0	0	0	0
2058	0	0	0	0	0	0
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	0	0	0	0	0
2062	0	0	0	0	0	0

TABLE 3.1a (continued)
SCENARIO 1
SCHEDULE OF LICENSE TERMINATION EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0
2076	0	0	0	0	2	2
2077	0	108	0	0	647	755
2078	0	108	0	0	647	755
2079	0	108	0	0	647	755
2080	0	108	0	0	649	757
2081	0	108	0	0	647	755
2082	0	108	0	0	647	755
2083	0	108	0	0	647	755
2084	0	108	0	0	649	757
2085	0	108	0	0	647	755
2086	0	108	0	0	647	755
2087	0	108	0	0	647	755
2088	0	108	0	0	649	757
2089	0	108	0	0	647	755
2090	0	107	0	0	646	753
2091	0	0	0	0	0	0
Total	401,264	71,954	26,883	82,104	70,277	652,481

TABLE 3.1b
SCENARIO 1
SCHEDULE OF SPENT FUEL MANAGEMENT EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2030	6,901	20,703	0	0	747	28,351
2031	14	43	0	0	2,370	2,428
2032	14	43	0	0	1,909	1,967
2033	14	43	0	0	1,798	1,855
2034	1,341	4,024	0	0	1,798	7,163
2035	8,967	26,902	0	0	1,798	37,666
2036	14	43	0	0	1,803	1,860
2037	14	43	0	0	1,798	1,855
2038	14	43	0	0	1,798	1,855
2039	14	43	0	0	1,798	1,855
2040	14	43	0	0	1,803	1,860
2041	14	43	0	0	1,798	1,855
2042	14	43	0	0	1,798	1,855
2043	14	43	0	0	1,798	1,855
2044	14	43	0	0	1,803	1,860
2045	9,656	28,968	0	0	1,523	40,147
2046	14	43	0	0	648	705
2047	2,495	43	0	0	1,571	4,109
2048	3,716	1,768	0	0	1,851	7,336
2049	3,618	43	0	0	1,846	5,507
2050	5,653	6,150	0	0	1,846	13,649
2051	6,766	9,488	0	0	1,846	18,100
2052	4,922	3,924	0	0	1,851	10,697
2053	6,395	8,375	0	0	1,846	16,616
2054	7,508	11,713	0	0	1,846	21,067
2055	3,604	0	0	0	1,846	5,450
2056	3,613	0	0	0	1,851	5,464
2057	3,604	0	0	0	1,846	5,450
2058	3,604	0	0	0	1,846	5,450
2059	3,604	0	0	0	1,846	5,450
2060	3,613	0	0	0	1,851	5,464
2061	3,604	0	0	0	1,846	5,450
2062	3,604	0	0	0	1,846	5,450

TABLE 3.1b (continued)
SCENARIO 1
SCHEDULE OF SPENT FUEL MANAGEMENT EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2063	3,604	0	0	0	1,846	5,450
2064	3,613	0	0	0	1,851	5,464
2065	3,604	0	0	0	1,846	5,450
2066	3,604	0	0	0	1,846	5,450
2067	3,604	0	0	0	1,846	5,450
2068	3,613	0	0	0	1,851	5,464
2069	3,604	0	0	0	1,846	5,450
2070	3,604	0	0	0	1,846	5,450
2071	3,604	0	0	0	1,846	5,450
2072	3,613	0	0	0	1,851	5,464
2073	3,604	0	0	0	1,846	5,450
2074	3,604	0	0	0	1,846	5,450
2075	3,604	0	0	0	1,846	5,450
2076	3,613	0	0	0	1,852	5,465
2077	3,761	473	0	0	2,043	6,277
2078	4,076	1,418	0	0	2,043	7,537
2079	3,997	1,182	0	0	2,043	7,222
2080	4,007	1,182	0	0	2,049	7,237
2081	3,997	1,182	0	0	2,043	7,222
2082	4,076	1,418	0	0	2,043	7,537
2083	3,997	1,182	0	0	2,043	7,222
2084	4,007	1,182	0	0	2,049	7,237
2085	3,997	1,182	0	0	2,043	7,222
2086	4,076	1,418	0	0	2,043	7,537
2087	3,997	1,182	0	0	2,043	7,222
2088	4,582	2,907	0	0	2,049	9,537
2089	3,997	1,182	0	0	2,043	7,222
2090	3,758	474	0	1	2,052	6,284
2091	1,523	699	0	87	1,815	4,124
Total	205,314	140,920	0	88	114,373	460,695

TABLE 3.1c
SCENARIO 1
SCHEDULE OF SITE RESTORATION EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2030	142	0	0	0	0	142
2031	548	0	0	0	0	548
2032	154	18	0	0	110	282
2033	9	10	0	0	59	77
2034	4	0	0	0	0	4
2035	3	0	0	0	0	3
2036	0	0	0	0	0	0
2037	0	0	0	0	0	0
2038	0	0	0	0	0	0
2039	0	0	0	0	0	0
2040	0	0	0	0	0	0
2041	0	0	0	0	0	0
2042	0	0	0	0	0	0
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
2045	0	0	0	0	0	0
2046	0	0	0	0	0	0
2047	10,029	4,437	296	0	4	14,767
2048	11,564	5,116	341	0	5	17,027
2049-91	0	0	0	0	0	0
Total	22,453	9,582	637	0	179	32,850

TABLE 3.2
SCENARIO 2
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2030	21,564	21,215	1,157	18	2,497	46,451
2031	51,116	5,970	4,830	809	14,773	77,498
2032	56,768	27,117	4,217	37,458	13,386	138,946
2033	49,483	16,192	3,074	23,881	7,351	99,981
2034	46,084	9,734	2,754	7,332	5,593	71,498
2035	42,161	30,883	2,068	4,854	4,955	84,922
2036	10,792	667	737	38	3,724	15,958
2037	10,763	665	735	38	3,714	15,914
2038	10,763	665	735	38	3,714	15,914
2039	10,763	665	735	38	3,714	15,914
2040	10,792	667	737	38	3,724	15,958
2041	10,763	665	735	38	3,714	15,914
2042	10,763	665	735	38	3,714	15,914
2043	10,763	665	735	38	3,714	15,914
2044	10,792	667	737	38	3,724	15,958
2045	27,299	31,081	964	3,073	3,971	66,388
2046	30,949	3,182	1,059	4,327	3,543	43,060
2047	18,749	4,744	439	8	2,114	26,055
2048	15,854	6,884	341	0	1,956	25,035
2049	3,618	43	0	0	1,846	5,507
2050	4,912	3,924	0	0	1,846	10,682
2051	4,912	3,924	0	0	1,846	10,682
2052	4,922	3,924	0	0	1,851	10,697
2053	4,912	3,924	0	0	1,846	10,682
2054	4,912	3,924	0	0	1,846	10,682
2055	4,912	3,924	0	0	1,846	10,682
2056	4,922	3,924	0	0	1,851	10,697
2057	4,912	3,924	0	0	1,846	10,682
2058	4,912	3,924	0	0	1,846	10,682
2059	4,912	3,924	0	0	1,846	10,682
2060	4,922	3,924	0	0	1,851	10,697
2061	4,912	3,924	0	0	1,846	10,682
2062	4,912	3,924	0	0	1,846	10,682

TABLE 3.2 (continued)
SCENARIO 2
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2063	4,912	3,924	0	0	1,846	10,682
2064	4,922	3,924	0	0	1,851	10,697
2065	4,912	3,924	0	0	1,846	10,682
2066	4,912	3,924	0	0	1,846	10,682
2067	4,912	3,924	0	0	1,846	10,682
2068	4,922	3,924	0	0	1,851	10,697
2069	4,912	3,924	0	0	1,846	10,682
2070	4,912	3,924	0	0	1,846	10,682
2071	4,912	3,924	0	0	1,846	10,682
2072	4,922	3,924	0	0	1,851	10,697
2073	4,912	3,924	0	0	1,846	10,682
2074	4,912	3,924	0	0	1,846	10,682
2075	4,912	3,924	0	0	1,846	10,682
2076	4,922	3,924	0	0	1,851	10,697
2077	4,912	3,924	0	0	1,846	10,682
2078	4,912	3,924	0	0	1,846	10,682
2079	4,912	3,924	0	0	1,846	10,682
2080	4,922	3,924	0	0	1,851	10,697
2081	4,912	3,924	0	0	1,846	10,682
2082	4,912	3,924	0	0	1,846	10,682
2083	4,912	3,924	0	0	1,846	10,682
2084	4,922	3,924	0	0	1,851	10,697
2085	4,912	3,924	0	0	1,846	10,682
2086	4,912	3,924	0	0	1,846	10,682
2087	4,912	3,924	0	0	1,846	10,682
2088	5,497	5,649	0	0	1,851	12,997
2089	4,912	3,924	0	0	1,846	10,682
2090	4,912	3,924	0	0	1,846	10,682
2091	4,912	3,924	0	0	1,846	10,682
2092	4,922	3,924	0	0	1,851	10,697
2093	4,912	3,924	0	0	1,846	10,682
2094	4,912	3,924	0	0	1,846	10,682
2095	4,912	3,924	0	0	1,846	10,682

TABLE 3.2 (continued)
SCENARIO 2
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2096	4,922	3,924	0	0	1,851	10,697
2097	4,912	3,924	0	0	1,846	10,682
2098	4,912	3,924	0	0	1,846	10,682
2099	4,912	3,924	0	0	1,846	10,682
2100	4,912	3,924	0	0	1,846	10,682
2101	4,912	3,924	0	0	1,846	10,682
2102	4,912	3,924	0	0	1,846	10,682
2103	4,912	3,924	0	0	1,846	10,682
2104	4,922	3,924	0	0	1,851	10,697
2105	4,912	3,924	0	0	1,846	10,682
2106	4,912	3,924	0	0	1,846	10,682
2107	4,912	3,924	0	0	1,846	10,682
2108	4,922	3,924	0	0	1,851	10,697
2109	4,912	3,924	0	0	1,846	10,682
2110	4,912	3,924	0	0	1,846	10,682
2111	4,912	3,924	0	0	1,846	10,682
2112	4,922	3,924	0	0	1,851	10,697
2113	4,912	3,924	0	0	1,846	10,682
2114	4,912	3,924	0	0	1,846	10,682
2115	4,912	3,924	0	0	1,846	10,682
2116	4,922	3,924	0	0	1,851	10,697
2117	4,912	3,924	0	0	1,846	10,682
2118	4,912	3,924	0	0	1,846	10,682
2119	4,912	3,924	0	0	1,846	10,682
2120	4,922	3,924	0	0	1,851	10,697
2121	4,912	3,924	0	0	1,846	10,682
2122	4,912	3,924	0	0	1,846	10,682
2123	4,912	3,924	0	0	1,846	10,682
2124	4,922	3,924	0	0	1,851	10,697
2125	4,912	3,924	0	0	1,846	10,682
2126	4,912	3,924	0	0	1,846	10,682
2127	4,912	3,924	0	0	1,846	10,682
2128	5,497	5,649	0	0	1,851	12,997

TABLE 3.2 (continued)
SCENARIO 2
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2129	4,912	3,924	0	0	1,846	10,682
2130	4,912	3,924	0	0	1,846	10,682
2131	4,912	3,924	0	0	1,846	10,682
2132	4,922	3,924	0	0	1,851	10,697
2133	4,912	3,924	0	0	1,846	10,682
2134	4,912	3,924	0	0	1,846	10,682
2135	4,912	3,924	0	0	1,846	10,682
2136	4,922	3,924	0	0	1,851	10,697
2137	4,912	3,924	0	0	1,846	10,682
2138	4,912	3,924	0	0	1,846	10,682
2139	4,912	3,924	0	0	1,846	10,682
2140	4,922	3,924	0	0	1,851	10,697
2141	4,912	3,924	0	0	1,846	10,682
2142	4,912	3,924	0	0	1,846	10,682
2143	4,912	3,924	0	0	1,846	10,682
2144	4,922	3,924	0	0	1,851	10,697
2145	4,912	3,924	0	0	1,846	10,682
2146	4,912	3,924	0	0	1,846	10,682
2147	4,912	3,924	0	0	1,846	10,682
2148	4,922	3,924	0	0	1,851	10,697
2149	4,912	3,924	0	0	1,846	10,682
2150	4,912	3,924	0	0	1,846	10,682
2151	4,912	3,924	0	0	1,846	10,682
2152	4,922	3,924	0	0	1,851	10,697
2153	4,912	3,924	0	0	1,846	10,682
2154	4,912	3,924	0	0	1,846	10,682
2155	4,912	3,924	0	0	1,846	10,682
2156	4,922	3,924	0	0	1,851	10,697
2157	4,912	3,924	0	0	1,846	10,682
2158	4,912	3,924	0	0	1,846	10,682
2159	4,912	3,924	0	0	1,846	10,682
2160	4,922	3,924	0	0	1,851	10,697
2161	4,912	3,924	0	0	1,846	10,682

TABLE 3.2 (continued)
SCENARIO 2
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2162	4,912	3,924	0	0	1,846	10,682
2163	4,912	3,924	0	0	1,846	10,682
2164	4,922	3,924	0	0	1,851	10,697
2165	4,912	3,924	0	0	1,846	10,682
2166	4,912	3,924	0	0	1,846	10,682
2167	4,912	3,924	0	0	1,846	10,682
2168	5,497	5,649	0	0	1,851	12,997
2169	4,912	3,924	0	0	1,846	10,682
2170	4,912	3,924	0	0	1,846	10,682
2171	4,912	3,924	0	0	1,846	10,682
2172	4,922	3,924	0	0	1,851	10,697
2173	4,912	3,924	0	0	1,846	10,682
2174	4,912	3,924	0	0	1,846	10,682
2175	4,912	3,924	0	0	1,846	10,682
2176	4,922	3,924	0	0	1,851	10,697
2177	4,912	3,924	0	0	1,846	10,682
2178	4,912	3,924	0	0	1,846	10,682
2179	4,912	3,924	0	0	1,846	10,682
2180	4,922	3,924	0	0	1,851	10,697
2181	4,912	3,924	0	0	1,846	10,682
2182	4,912	3,924	0	0	1,846	10,682
2183	4,912	3,924	0	0	1,846	10,682
2184	4,922	3,924	0	0	1,851	10,697
2185	4,912	3,924	0	0	1,846	10,682
2186	4,912	3,924	0	0	1,846	10,682
2187	4,912	3,924	0	0	1,846	10,682
2188	4,922	3,924	0	0	1,851	10,697
2189	4,912	3,924	0	0	1,846	10,682
2190	5,653	6,150	0	0	1,846	13,649
2191	6,766	9,487	0	0	1,846	18,100
2192	4,922	3,924	0	0	1,851	10,697
2193	6,395	8,375	0	0	1,846	16,616
2194	7,508	11,713	0	0	1,846	21,067

TABLE 3.2 (continued)
SCENARIO 2
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2195	3,604	0	0	0	1,846	5,450
2196	3,613	0	0	0	1,851	5,464
2197	3,604	0	0	0	1,846	5,450
2198	3,604	0	0	0	1,846	5,450
2199	3,604	0	0	0	1,846	5,450
2200	3,604	0	0	0	1,846	5,450
2201	3,604	0	0	0	1,846	5,450
2202	3,604	0	0	0	1,846	5,450
2203	3,604	0	0	0	1,846	5,450
2204	3,613	0	0	0	1,851	5,464
2205	3,604	0	0	0	1,846	5,450
2206	3,604	0	0	0	1,846	5,450
2207	3,604	0	0	0	1,846	5,450
2208	4,188	1,725	0	0	1,851	7,764
2209	3,604	0	0	0	1,846	5,450
2210	3,604	0	0	0	1,846	5,450
2211	3,604	0	0	0	1,846	5,450
2212	3,613	0	0	0	1,851	5,464
2213	3,604	0	0	0	1,846	5,450
2214	3,604	0	0	0	1,846	5,450
2215	3,604	0	0	0	1,846	5,450
2216	3,613	0	0	0	1,852	5,465
2217	3,761	473	0	0	2,043	6,277
2218	4,076	1,418	0	0	2,043	7,537
2219	3,997	1,182	0	0	2,043	7,222
2220	4,007	1,182	0	0	2,049	7,237
2221	3,997	1,182	0	0	2,043	7,222
2222	4,076	1,418	0	0	2,043	7,537
2223	3,997	1,182	0	0	2,043	7,222
2224	4,007	1,182	0	0	2,049	7,237
2225	3,997	1,182	0	0	2,043	7,222
2226	4,076	1,418	0	0	2,043	7,537
2227	3,997	1,182	0	0	2,043	7,222

TABLE 3.2 (continued)
SCENARIO 2
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2228	4,007	1,182	0	0	2,049	7,237
2229	3,997	1,182	0	0	2,043	7,222
2230	3,758	1,981	0	1	11,120	16,859
2231	1,523	699	0	87	1,815	4,124
Total	1,318,713	777,042	27,520	82,192	443,441	2,648,907

TABLE 3.3
SCENARIO 3
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2030	21,564	21,215	1,157	18	2,497	46,451
2031	51,116	5,970	4,830	809	14,773	77,498
2032	56,768	27,117	4,217	37,458	13,386	138,946
2033	49,483	16,192	3,074	23,881	7,351	99,981
2034	46,084	9,734	2,754	7,332	5,593	71,498
2035	42,161	30,883	2,068	4,854	4,955	84,922
2036	10,792	667	737	38	3,724	15,958
2037	10,763	665	735	38	3,714	15,914
2038	10,763	665	735	38	3,714	15,914
2039	10,763	665	735	38	3,714	15,914
2040	10,792	667	737	38	3,724	15,958
2041	10,763	665	735	38	3,714	15,914
2042	10,763	665	735	38	3,714	15,914
2043	10,763	665	735	38	3,714	15,914
2044	10,792	667	737	38	3,724	15,958
2045	27,299	31,081	964	3,073	3,971	66,388
2046	30,949	3,182	1,059	4,327	3,543	43,060
2047	18,749	4,744	439	8	2,114	26,055
2048	15,854	6,884	341	0	1,956	25,035
2049	3,618	43	0	0	1,846	5,507
2050	4,912	3,924	0	0	1,846	10,682
2051	4,912	3,924	0	0	1,846	10,682
2052	4,922	3,924	0	0	1,851	10,697
2053	4,912	3,924	0	0	1,846	10,682
2054	4,912	3,924	0	0	1,846	10,682
2055	4,912	3,924	0	0	1,846	10,682
2056	4,922	3,924	0	0	1,851	10,697
2057	4,912	3,924	0	0	1,846	10,682
2058	4,912	3,924	0	0	1,846	10,682
2059	4,912	3,924	0	0	1,846	10,682
2060	4,922	3,924	0	0	1,851	10,697
2061	4,912	3,924	0	0	1,846	10,682
2062	4,912	3,924	0	0	1,846	10,682

TABLE 3.3 (continued)
SCENARIO 3
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2063	4,912	3,924	0	0	1,846	10,682
2064	4,922	3,924	0	0	1,851	10,697
2065	4,912	3,924	0	0	1,846	10,682
2066	4,912	3,924	0	0	1,846	10,682
2067	4,912	3,924	0	0	1,846	10,682
2068	4,922	3,924	0	0	1,851	10,697
2069	4,912	3,924	0	0	1,846	10,682
2070	4,912	3,924	0	0	1,846	10,682
2071	4,912	3,924	0	0	1,846	10,682
2072	4,922	3,924	0	0	1,851	10,697
2073	4,912	3,924	0	0	1,846	10,682
2074	4,912	3,924	0	0	1,846	10,682
2075	4,912	3,924	0	0	1,846	10,682
2076	4,922	3,924	0	0	1,851	10,697
2077	4,912	3,924	0	0	1,846	10,682
2078	4,912	3,924	0	0	1,846	10,682
2079	4,912	3,924	0	0	1,846	10,682
2080	4,922	3,924	0	0	1,851	10,697
2081	4,912	3,924	0	0	1,846	10,682
2082	4,912	3,924	0	0	1,846	10,682
2083	4,912	3,924	0	0	1,846	10,682
2084	4,922	3,924	0	0	1,851	10,697
2085	4,912	3,924	0	0	1,846	10,682
2086	4,912	3,924	0	0	1,846	10,682
2087	4,912	3,924	0	0	1,846	10,682
2088	5,497	5,649	0	0	1,851	12,997
2089	4,912	3,924	0	0	1,846	10,682
2090	4,912	3,924	0	0	1,846	10,682
2091	4,912	3,924	0	0	1,846	10,682
2092	4,922	3,924	0	0	1,851	10,697
2093	4,912	3,924	0	0	1,846	10,682
2094	4,912	3,924	0	0	1,846	10,682
2095	4,912	3,924	0	0	1,846	10,682

TABLE 3.3 (continued)
SCENARIO 3
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2096	4,922	3,924	0	0	1,851	10,697
2097	4,912	3,924	0	0	1,846	10,682
2098	4,912	3,924	0	0	1,846	10,682
2099	4,912	3,924	0	0	1,846	10,682
2100	4,912	3,924	0	0	1,846	10,682
2101	4,912	3,924	0	0	1,846	10,682
2102	4,912	3,924	0	0	1,846	10,682
2103	4,912	3,924	0	0	1,846	10,682
2104	4,922	3,924	0	0	1,851	10,697
2105	4,912	3,924	0	0	1,846	10,682
2106	7,853	12,749	0	0	1,846	22,448
2107	4,912	3,924	0	0	1,846	10,682
2108	11,819	24,616	0	1,438	1,942	39,814
2109	4,912	3,924	0	0	1,846	10,682
2110	4,912	3,924	0	0	1,846	10,682
2111	4,912	3,924	0	0	1,846	10,682
2112	4,922	3,924	0	0	1,851	10,697
2113	11,809	24,616	0	1,438	1,937	39,799
2114	4,912	3,924	0	0	1,846	10,682
2115	4,912	3,924	0	0	1,846	10,682
2116	11,819	24,616	0	1,438	1,942	39,814
2117	4,912	3,924	0	0	1,846	10,682
2118	4,912	3,924	0	0	1,846	10,682
2119	4,912	3,924	0	0	1,846	10,682
2120	4,922	3,924	0	0	1,851	10,697
2121	4,912	3,924	0	0	1,846	10,682
2122	4,912	3,924	0	0	1,846	10,682
2123	4,912	3,924	0	0	1,846	10,682
2124	4,922	3,924	0	0	1,851	10,697
2125	4,912	3,924	0	0	1,846	10,682
2126	4,912	3,924	0	0	1,846	10,682
2127	4,912	3,924	0	0	1,846	10,682
2128	5,497	5,649	0	0	1,851	12,997

TABLE 3.3 (continued)
SCENARIO 3
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2129	4,912	3,924	0	0	1,846	10,682
2130	11,809	24,616	0	1,438	1,937	39,799
2131	4,912	3,924	0	0	1,846	10,682
2132	4,922	3,924	0	0	1,851	10,697
2133	4,912	3,924	0	0	1,846	10,682
2134	4,912	3,924	0	0	1,846	10,682
2135	13,878	30,823	0	1,869	1,965	48,535
2136	4,922	3,924	0	0	1,851	10,697
2137	4,912	3,924	0	0	1,846	10,682
2138	4,912	3,924	0	0	1,846	10,682
2139	4,912	3,924	0	0	1,846	10,682
2140	4,922	3,924	0	0	1,851	10,697
2141	4,912	3,924	0	0	1,846	10,682
2142	4,912	3,924	0	0	1,846	10,682
2143	4,912	3,924	0	0	1,846	10,682
2144	4,922	3,924	0	0	1,851	10,697
2145	14,568	32,892	0	2,013	1,974	51,446
2146	4,912	3,924	0	0	1,846	10,682
2147	4,912	3,924	0	0	1,846	10,682
2148	4,922	3,924	0	0	1,851	10,697
2149	4,912	3,924	0	0	1,846	10,682
2150	4,912	3,924	0	0	1,846	10,682
2151	4,912	3,924	0	0	1,846	10,682
2152	4,922	3,924	0	0	1,851	10,697
2153	4,912	3,924	0	0	1,846	10,682
2154	4,912	3,924	0	0	1,846	10,682
2155	4,912	3,924	0	0	1,846	10,682
2156	4,922	3,924	0	0	1,851	10,697
2157	4,912	3,924	0	0	1,846	10,682
2158	4,912	3,924	0	0	1,846	10,682
2159	4,912	3,924	0	0	1,846	10,682
2160	4,922	3,924	0	0	1,851	10,697
2161	4,912	3,924	0	0	1,846	10,682

TABLE 3.3 (continued)
SCENARIO 3
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2162	4,912	3,924	0	0	1,846	10,682
2163	4,912	3,924	0	0	1,846	10,682
2164	4,922	3,924	0	0	1,851	10,697
2165	4,912	3,924	0	0	1,846	10,682
2166	4,912	3,924	0	0	1,846	10,682
2167	4,912	3,924	0	0	1,846	10,682
2168	5,497	5,649	0	0	1,851	12,997
2169	4,912	3,924	0	0	1,846	10,682
2170	4,912	3,924	0	0	1,846	10,682
2171	4,912	3,924	0	0	1,846	10,682
2172	4,922	3,924	0	0	1,851	10,697
2173	4,912	3,924	0	0	1,846	10,682
2174	4,912	3,924	0	0	1,846	10,682
2175	4,912	3,924	0	0	1,846	10,682
2176	4,922	3,924	0	0	1,851	10,697
2177	4,912	3,924	0	0	1,846	10,682
2178	4,912	3,924	0	0	1,846	10,682
2179	4,912	3,924	0	0	1,846	10,682
2180	4,922	3,924	0	0	1,851	10,697
2181	4,912	3,924	0	0	1,846	10,682
2182	4,912	3,924	0	0	1,846	10,682
2183	4,912	3,924	0	0	1,846	10,682
2184	4,922	3,924	0	0	1,851	10,697
2185	4,912	3,924	0	0	1,846	10,682
2186	4,912	3,924	0	0	1,846	10,682
2187	4,912	3,924	0	0	1,846	10,682
2188	4,922	3,924	0	0	1,851	10,697
2189	4,912	3,924	0	0	1,846	10,682
2190	5,653	6,150	0	0	1,846	13,649
2191	6,766	9,487	0	0	1,846	18,099
2192	4,922	3,924	0	0	1,851	10,697
2193	6,395	8,375	0	0	1,846	16,616
2194	7,508	11,713	0	0	1,846	21,066

TABLE 3.3 (continued)
SCENARIO 3
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2195	3,604	0	0	0	1,846	5,449
2196	3,613	0	0	0	1,851	5,464
2197	3,604	0	0	0	1,846	5,449
2198	3,604	0	0	0	1,846	5,449
2199	3,604	0	0	0	1,846	5,449
2200	3,604	0	0	0	1,846	5,449
2201	3,604	0	0	0	1,846	5,449
2202	3,604	0	0	0	1,846	5,449
2203	3,604	0	0	0	1,846	5,449
2204	3,613	0	0	0	1,851	5,464
2205	3,604	0	0	0	1,846	5,449
2206	3,604	0	0	0	1,846	5,449
2207	3,604	0	0	0	1,846	5,449
2208	11,086	22,416	0	1,438	1,942	36,882
2209	3,604	0	0	0	1,846	5,449
2210	3,604	0	0	0	1,846	5,449
2211	3,604	0	0	0	1,846	5,449
2212	3,613	0	0	0	1,851	5,464
2213	10,501	20,691	0	1,438	1,937	34,567
2214	3,604	0	0	0	1,846	5,449
2215	3,604	0	0	0	1,846	5,449
2216	3,613	0	0	0	1,851	5,465
2217	3,761	473	0	0	2,043	6,277
2218	4,076	1,418	0	0	2,043	7,537
2219	3,997	1,182	0	0	2,043	7,222
2220	4,007	1,182	0	0	2,049	7,237
2221	3,997	1,182	0	0	2,043	7,222
2222	4,076	1,418	0	0	2,043	7,537
2223	3,997	1,182	0	0	2,043	7,222
2224	4,007	1,182	0	0	2,049	7,237
2225	3,997	1,182	0	0	2,043	7,222
2226	4,076	1,418	0	0	2,043	7,537
2227	3,997	1,182	0	0	2,043	7,222

TABLE 3.3 (continued)
SCENARIO 3
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2011 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2228	4,007	1,182	0	0	2,049	7,237
2229	3,997	1,182	0	0	2,043	7,222
2230	3,758	1,981	0	1	11,120	16,860
2231	1,767	799	0	87	1,815	4,468
Total	1,381,903	965,981	27,520	94,700	444,201	2,914,305

4. SCHEDULE ESTIMATE

The schedule for the decommissioning scenario considered in this study follows 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 plan described in Section 3.5.1.

A schedule or sequence of activities for the Scenario 1 alternative (without the post-decommissioning ISFSI operating period) is presented in Figure 4.1. The scheduling sequence assumes that fuel is removed from the spent fuel pool approximately fifteen years following the permanent cessation of plant operations. The key activities listed in the schedule do not reflect a one-to-one correspondence with those activities in the cost table, but reflect dividing some activities for clarity and combining others for convenience. The schedule was prepared using the "Microsoft Project Professional 2010" computer software.[30]

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 table, 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 decommissioning schedule:

- The fuel pool area of the Reactor Building is isolated until such time that all spent fuel has been discharged from the spent fuel pool to the ISFSI. Decontamination and dismantling of the storage pool is initiated once the transfer of spent fuel 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.

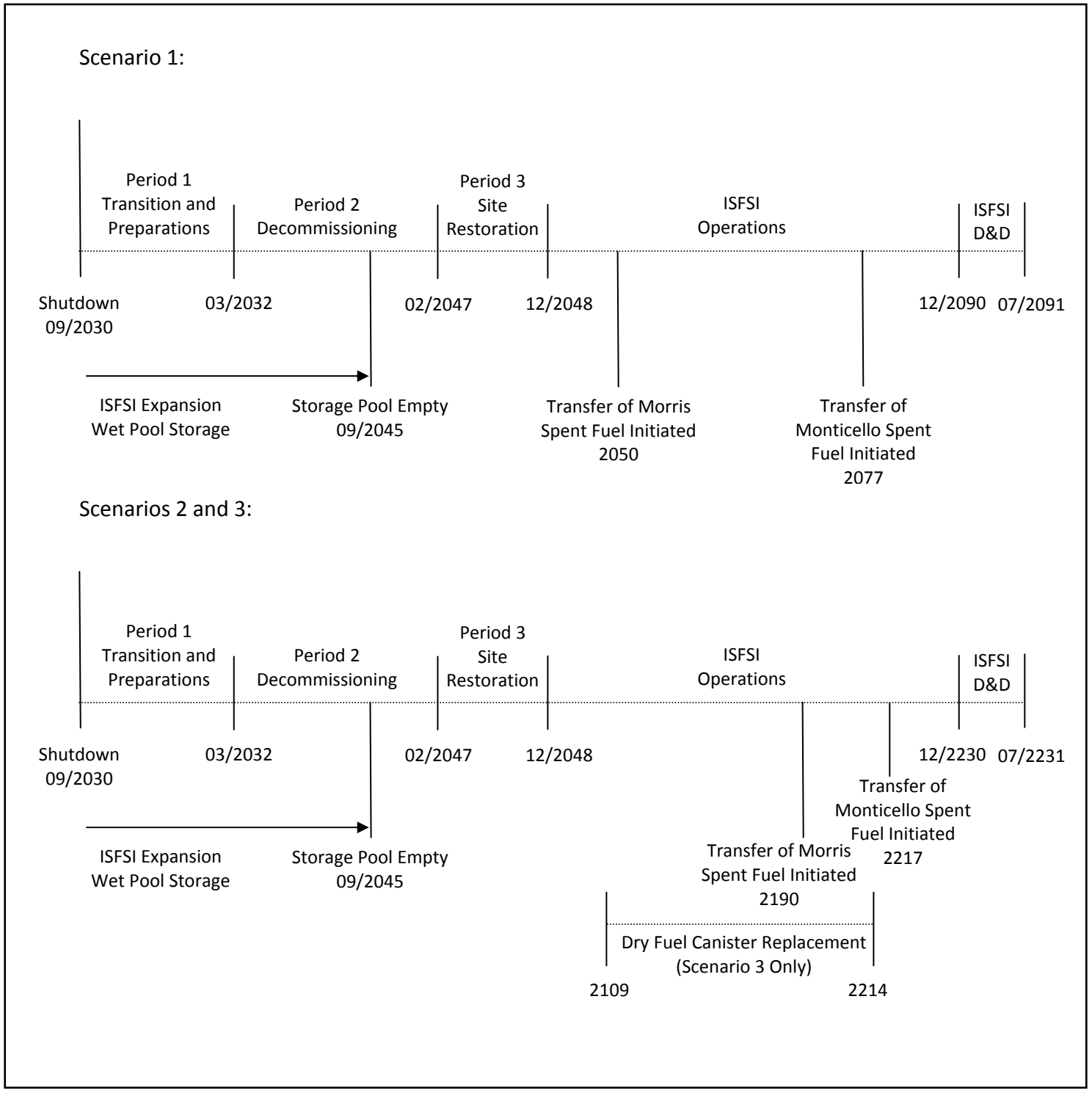
- For plant systems removal, the systems with the longest removal durations in areas on the critical path are considered to determine the duration of the activity.

4.2 PROJECT SCHEDULE

The period-dependent costs presented in Appendices C through E are based upon the durations developed in the schedules for decommissioning. 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 shown for the spent fuel storage period, which determines the release of the Reactor Building for final decontamination. Project timelines are provided in Figure 4.2.

FIGURE 4.1
ACTIVITY SCHEDULE

FIGURE 4.2
DECOMMISSIONING TIMELINES
(not to scale)



5. RADIOACTIVE WASTES

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license. This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act,[31] 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, Part 71 defines radioactive material as it pertains to transportation and Part 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 Parts 173-178. Shipping containers are required to be Industrial Packages (IP-1, IP-2 or IP-3, as defined in 10 CFR §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 are shown on a line-item basis in Appendices C through E, and summarized in Tables 5.1 through 5.3. The quantified waste volume summaries shown in these tables are consistent with Part 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 produced in the decontamination and dismantling of the nuclear unit is primarily generated during Period 2. Material that is considered potentially contaminated when removed from the radiological 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.

For purposes of constructing the estimate, the cost for disposal at the Energy*Solutions* facility was used as a proxy for future disposal facilities. Separate rates were used for containerized waste and large components, such as the reactor recirculation pumps and motors. Demolition debris including miscellaneous steel, scaffolding, and concrete was disposed of at a bulk rate. The decommissioning waste stream also included resins and dry active waste.

Since Energy*Solutions* is not currently able to receive the more highly radioactive components generated in the decontamination and dismantling of the reactor, disposal costs for the Class B and C material were based upon the last available published disposal rates for Barnwell for non-Atlantic Compact members. Additional surcharges were included for activity, dose rate, and/or handling added as appropriate for the particular package.

A small quantity of material will be generated during the Monticello decommissioning that is not considered suitable for near-surface disposal, and is assumed to be disposed of in a geologic repository, in a manner similar to that envisioned for spent fuel disposal. Such material, known as Greater-Than-Class-C or GTCC material, is estimated to require five spent fuel storage canisters (or the equivalent) to dispose of the most radioactive portions of the reactor vessel internals. The volume and weight reported in Tables 5.1 through 5.3 represent the packaged weight and volume of the spent fuel storage canisters.

TABLE 5.1
SCENARIOS 1 and 2
DECOMMISSIONING WASTE SUMMARY

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions*	A	105,504	7,656,437
	Barnwell	B	1,660	183,689
	Barnwell	C	1,033	80,000
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,785	346,570
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	293,218	12,214,210
Total [2]			403,201	20,480,906

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
[2] Columns may not add due to rounding.

TABLE 5.2
SCENARIO 3
DECOMMISSIONING WASTE SUMMARY

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions*	A	140,188	11,124,879
	Barnwell	B	1,660	183,689
	Barnwell	C	1,033	80,000
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,785	346,570
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	293,218	12,214,210
Total [2]			437,885	23,949,348

[1] Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55
[2] Columns may not add due to rounding.

6. RESULTS

The cost projected to promptly decommission the Monticello nuclear unit is estimated to be $1,146 million (Scenario 1). The estimates are based on numerous fundamental assumptions, including regulatory requirements, low-level radioactive waste disposal practices, high-level waste management considerations, and project contingencies.

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 Xcel Energy 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.

As described in this report, the spent fuel pool will remain operational for fifteen years following the cessation of operations. The pool will be isolated to allow decommissioning operations to proceed in and around the pool area. Over the fifteen year period, the spent fuel will be packaged for transfer to the ISFSI.

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, disposition of the low-level radioactive material requiring controlled disposal is at the Energy*Solutions* facility in Clive, Utah. Highly activated components, requiring additional isolation from the environment, are packaged for geologic disposal. The cost of geologic disposal 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 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 (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 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
SCENARIO 1
COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2011 dollars)

Cost Element	Cost	Percentage
Decontamination	18,901	1.6
Removal	89,428	7.8
Packaging	25,983	2.3
Transportation	8,681	0.8
Waste Disposal	64,149	5.6
Off-site Waste Processing	27,111	2.4
Program Management [1]	509,525	44.5
Spent Fuel Pool Isolation	11,822	1.0
Spent Fuel Management (direct costs) [2]	248,045	21.6
Insurance and Regulatory Fees	44,335	3.9
Energy	27,520	2.4
Characterization and Licensing Surveys	14,940	1.3
Property Taxes	45,109	3.9
Miscellaneous Equipment	7,029	0.6
Railroad Track Maintenance	3,448	0.3
Total [3]	1,146,026	100.0

Cost Element	Cost	Percentage
License Termination	652,481	56.9
Spent Fuel Management	460,695	40.2
Site Restoration	32,850	2.9
Total [3]	1,146,026	100.0

[1] Includes engineering and security costs
[2] Excludes program management costs (staffing) but includes capital expenditures for ISFSI construction, costs for spent fuel loading/packaging costs/spent fuel pool O&M and EP fees
[3] Columns may not add due to rounding

TABLE 6.2
SCENARIO 2
COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2011 dollars)

Cost Element	Cost	Percentage
Decontamination	18,901	0.7
Removal	89,428	3.4
Packaging	25,983	1.0
Transportation	8,681	0.3
Waste Disposal	64,149	2.4
Off-site Waste Processing	27,111	1.0
Program Management [1]	1,014,344	38.3
Spent Fuel Pool Isolation	11,822	0.4
Spent Fuel Management (direct costs) [2]	1,081,266	40.8
Insurance and Regulatory Fees	127,265	4.8
Energy	27,520	1.0
Characterization and Licensing Surveys	14,940	0.6
Property Taxes	127,022	4.8
Miscellaneous Equipment	7,029	0.3
Railroad Track Maintenance	3,448	0.1
Total [3]	2,648,907	100.0

Cost Element	Cost	Percentage
License Termination	652,481	24.6
Spent Fuel Management	1,963,576	74.1
Site Restoration	32,850	1.2
Total [3]	2,648,907	100.0

[1] Includes engineering and security costs
[2] Excludes program management costs (staffing) but includes capital expenditures for ISFSI construction, costs for spent fuel loading/packaging costs/spent fuel pool O&M and EP fees
[3] Columns may not add due to rounding

TABLE 6.3
SCENARIO 3
COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2011 dollars)

Cost Element	Cost	Percentage
Decontamination	18,935	0.6
Removal	89,738	3.1
Packaging	25,983	0.9
Transportation	9,442	0.3
Waste Disposal	76,657	2.6
Off-site Waste Processing	27,111	0.9
Program Management [1]	1,014,344	34.8
Spent Fuel Pool Isolation	11,822	0.4
Spent Fuel Management (direct costs) [2]	1,333,051	45.7
Insurance and Regulatory Fees	127,265	4.4
Energy	27,520	0.9
Characterization and Licensing Surveys	14,940	0.5
Property Taxes	127,022	4.4
Miscellaneous Equipment	7,029	0.2
Railroad Track Maintenance	3,448	0.1
Total [3]	2,914,305	100.0

Cost Element	Cost	Percentage
License Termination	652,481	22.4
Spent Fuel Management	2,228,974	76.5
Site Restoration	32,850	1.1
Total [3]	2,914,305	100.0

[1] Includes engineering and security costs
[2] Excludes program management costs (staffing) but includes capital expenditures for ISFSI construction, costs for spent fuel loading/packaging costs/spent fuel pool O&M and EP fees
[3] Columns may not add due to rounding

7. REFERENCES

1. "Decommissioning Cost Analysis for the Monticello Nuclear Generating Plant," Document No. X01-1586-003, TLG Services, Inc., October 2008

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

3. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," October 2003

4. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Radiological Criteria for License Termination"

5. U.S. Code of Federal Regulations, Title 10, Parts 20 and 50, "Entombment Options for Power Reactors," Advanced Notice of Proposed Rulemaking, Federal Register Volume 66, Number 200, October 16, 2001

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

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

8. "Blue Ribbon Commission on America's Nuclear Future, Draft Report to the Secretary of Energy," July 2011, p. 49

9. Minnesota Statute 216B.1614, "Nuclear Power Plant Decommissioning and Storage of Used Nuclear Fuel"

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

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

12. "Low Level Radioactive Waste Policy Act of 1980," Public Law 96-573, 1980

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(continued)

13. "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, 1986

14. U.S. Code of Federal Regulations, Title 10, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste"

15. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Radiological Criteria for License Termination," Federal Register, Volume 62, Number 139 (p 39058 et seq.), July 21, 1997

16. "Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination," EPA Memorandum OSWER No. 9200.4-18, August 22, 1997

17. U.S. Code of Federal Regulations, Title 40, Part 141.16, "Maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides in community water systems"

18. "Memorandum of Understanding between the Environmental Protection Agency and the Nuclear Regulatory Commission: Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites," OSWER 9295.8-06a, October 9, 2002

19. "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)," NUREG/CR-1575, Rev. 1, EPA 402-R-97-016, Rev. 1, August 2000

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

21. W.J. Manion and T.S. LaGuardia, "Decommissioning Handbook," U.S. Department of Energy, DOE/EV/10128-1, November 1980

22. "Building Construction Cost Data 2011," Robert Snow Means Company, Inc., Kingston, Massachusetts

23. Project and Cost Engineers' Handbook, Second Edition, p. 239, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, 1984

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25. U.S. Department of Transportation, Section 49 of the Code of Federal Regulations, "Transportation," Parts 173 through 178

26. Tri-State Motor Transit Company, published tariffs, Interstate Commerce Commission (ICC), Docket No. MC-427719 Rules Tariff, March 2004, Radioactive Materials Tariff, February 2011

27. 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

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29. 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

30. "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

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32. "Atomic Energy Act of 1954," 42 U.S.C 2001 et seq.

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 in plastic, 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 (37.08% 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 hours

APPENDIX A
(continued)

3. LABOR REQUIRED

Crew	Number	Duration (hr)	Rate ($/hr)	Cost
Laborers	3.00	11.217	$47.90	$1,611.88
Craftsmen	2.00	11.217	$61.56	$1,381.04
Foreman	1.00	11.217	$63.33	$710.37
General Foreman	0.25	11.217	$64.33	$180.40
Fire Watch	0.05	11.217	$47.90	$26.86
Health Physics Technician	1.00	11.217	$44.00	$493.55
Total labor cost				$4,404.10

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
Gas torch consumables 1 @ $10.26/hour x 1 hour [1]	$10.26
Tarpaulin, oil resistant, fire retardant 50 @ $0.40 square foot [2]	$20.00
Polypropylene sorbent rolls 50 @ $0.54/square foot [3]	$27.00
Subtotal cost of equipment and materials	$57.26
Overhead & sales tax on equipment and materials @ 16.88 %	$9.67
Total costs, equipment & material	$66.93

TOTAL COST: Removal of contaminated heat exchanger <3000 pounds: $4,471.03

Total labor cost:	$4,404.10
Total equipment/material costs:	$66.93
Total craft labor man-hours required per unit:	81.88

APPENDIX A
(continued)

5. NOTES AND REFERENCES

Work difficulty factors were developed in conjunction with the Atomic Industrial Forum (AIF) (now Nuclear Energy Institute) program to standardize nuclear decommissioning cost estimates and are delineated in Volume 1, Chapter 5 of the "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.

References for equipment & consumables costs:

1. R.S. Means (2011) Division 01 54 33, Section 40-6360, page 664
2. R.S. Means (2011) Division 01 56, Section 13.60-0600, page 20
3. www.mcmaster.com online catalog, McMaster Carr Spill Control (7193T88)

Material and consumable costs were adjusted using the regional indices for Minneapolis, Minnesota.

APPENDIX B

UNIT COST FACTOR LISTING

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of clean instrument and sampling tubing, $/linear foot	0.52
Removal of clean pipe 0.25 to 2 inches diameter, $/linear foot	5.55
Removal of clean pipe >2 to 4 inches diameter, $/linear foot	7.88
Removal of clean pipe >4 to 8 inches diameter, $/linear foot	15.38
Removal of clean pipe >8 to 14 inches diameter, $/linear foot	29.78
Removal of clean pipe >14 to 20 inches diameter, $/linear foot	38.64
Removal of clean pipe >20 to 36 inches diameter, $/linear foot	56.87
Removal of clean pipe >36 inches diameter, $/linear foot	67.61
Removal of clean valve >2 to 4 inches	101.31
Removal of clean valve >4 to 8 inches	153.81
Removal of clean valve >8 to 14 inches	297.82
Removal of clean valve >14 to 20 inches	386.41
Removal of clean valve >20 to 36 inches	568.73
Removal of clean valve >36 inches	676.08
Removal of clean pipe hanger for small bore piping	33.38
Removal of clean pipe hanger for large bore piping	122.03
Removal of clean pump, <300 pound	257.72
Removal of clean pump, 300-1000 pound	717.19
Removal of clean pump, 1000-10,000 pound	2,844.35
Removal of clean pump, >10,000 pound	5,495.01
Removal of clean pump motor, 300-1000 pound	301.81
Removal of clean pump motor, 1000-10,000 pound	1,184.80
Removal of clean pump motor, >10,000 pound	2,665.80
Removal of clean heat exchanger <3000 pound	1,522.60
Removal of clean heat exchanger >3000 pound	3,824.65
Removal of clean feedwater heater/deaerator	10,815.18
Removal of clean moisture separator/reheater	22,278.26
Removal of clean tank, <300 gallons	331.72
Removal of clean tank, 300-3000 gallon	1,049.18
Removal of clean tank, >3000 gallons, $/square foot surface area	8.77

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of clean electrical equipment, <300 pound	141.30
Removal of clean electrical equipment, 300-1000 pound	491.39
Removal of clean electrical equipment, 1000-10,000 pound	982.79
Removal of clean electrical equipment, >10,000 pound	2,326.99
Removal of clean electrical transformer < 30 tons	1,616.07
Removal of clean electrical transformer > 30 tons	4,653.99
Removal of clean standby diesel generator, <100 kW	1,650.66
Removal of clean standby diesel generator, 100 kW to 1 MW	3,684.41
Removal of clean standby diesel generator, >1 MW	7,627.47
Removal of clean electrical cable tray, $/linear foot	13.16
Removal of clean electrical conduit, $/linear foot	5.74
Removal of clean mechanical equipment, <300 pound	141.30
Removal of clean mechanical equipment, 300-1000 pound	491.39
Removal of clean mechanical equipment, 1000-10,000 pound	982.79
Removal of clean mechanical equipment, >10,000 pound	2,326.99
Removal of clean HVAC equipment, <300 pound	170.85
Removal of clean HVAC equipment, 300-1000 pound	590.44
Removal of clean HVAC equipment, 1000-10,000 pound	1,176.76
Removal of clean HVAC equipment, >10,000 pound	2,326.99
Removal of clean HVAC ductwork, $/pound	0.55
Removal of contaminated instrument and sampling tubing, $/linear foot	1.54
Removal of contaminated pipe 0.25 to 2 inches diameter, $/linear foot	22.34
Removal of contaminated pipe >2 to 4 inches diameter, $/linear foot	38.06
Removal of contaminated pipe >4 to 8 inches diameter, $/linear foot	59.89
Removal of contaminated pipe >8 to 14 inches diameter, $/linear foot	117.93
Removal of contaminated pipe >14 to 20 inches diameter, $/linear foot	141.44
Removal of contaminated pipe >20 to 36 inches diameter, $/linear foot	195.44
Removal of contaminated pipe >36 inches diameter, $/linear foot	230.87
Removal of contaminated valve >2 to 4 inches	449.12
Removal of contaminated valve >4 to 8 inches	543.67

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of contaminated valve >8 to 14 inches	1,124.36
Removal of contaminated valve >14 to 20 inches	1,427.34
Removal of contaminated valve >20 to 36 inches	1,899.46
Removal of contaminated valve >36 inches	2,253.74
Removal of contaminated pipe hanger for small bore piping	145.66
Removal of contaminated pipe hanger for large bore piping	493.89
Removal of contaminated pump, <300 pound	968.78
Removal of contaminated pump, 300-1000 pound	2,258.20
Removal of contaminated pump, 1000-10,000 pound	7,435.77
Removal of contaminated pump, >10,000 pound	18,107.29
Removal of contaminated pump motor, 300-1000 pound	967.21
Removal of contaminated pump motor, 1000-10,000 pound	3,033.07
Removal of contaminated pump motor, >10,000 pound	6,809.65
Removal of contaminated heat exchanger <3000 pound	4,471.03
Removal of contaminated heat exchanger >3000 pound	12,967.96
Removal of contaminated feedwater heater/deaerator	31,970.23
Removal of contaminated moisture separator/reheater	70,128.70
Removal of contaminated tank, <300 gallons	1,613.14
Removal of contaminated tank, >300 gallons, $/square foot	31.56
Removal of contaminated electrical equipment, <300 pound	751.04
Removal of contaminated electrical equipment, 300-1000 pound	1,842.23
Removal of contaminated electrical equipment, 1000-10,000 pound	3,548.59
Removal of contaminated electrical equipment, >10,000 pound	6,966.41
Removal of contaminated electrical cable tray, $/linear foot	36.21
Removal of contaminated electrical conduit, $/linear foot	17.85
Removal of contaminated mechanical equipment, <300 pound	835.42
Removal of contaminated mechanical equipment, 300-1000 pound	2,034.10
Removal of contaminated mechanical equipment, 1000-10,000 pound	3,911.75
Removal of contaminated mechanical equipment, >10,000 pound	6,966.41
Removal of contaminated HVAC equipment, <300 pound	835.42

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of contaminated HVAC equipment, 300-1000 pound	2,034.10
Removal of contaminated HVAC equipment, 1000-10,000 pound	3,911.75
Removal of contaminated HVAC equipment, >10,000 pound	6,966.41
Removal of contaminated HVAC ductwork, $/pound	2.15
Removal/plasma arc cut of contaminated thin metal components, $/linear in.	4.06
Additional decontamination of surface by washing, $/square foot	8.40
Additional decontamination of surfaces by hydrolasing, $/square foot	36.02
Decontamination rig hook up and flush, $/ 250 foot length	7,035.04
Chemical flush of components/systems, $/gallon	17.05
Removal of clean standard reinforced concrete, $/cubic yard	143.66
Removal of grade slab concrete, $/cubic yard	191.28
Removal of clean concrete floors, $/cubic yard	366.00
Removal of sections of clean concrete floors, $/cubic yard	1,108.30
Removal of clean heavily rein concrete w/#9 rebar, $/cubic yard	240.03
Removal of contaminated heavily rein concrete w/#9 rebar, $/cubic yard	2,154.89
Removal of clean heavily rein concrete w/#18 rebar, $/cubic yard	303.40
Removal of contaminated heavily rein concrete w/#18 rebar, $/cubic yard	2,849.60
Removal heavily rein concrete w/#18 rebar & steel embedments, $/cubic yard	470.87
Removal of below-grade suspended floors, $/cubic yard	366.00
Removal of clean monolithic concrete structures, $/cubic yard	921.72
Removal of contaminated monolithic concrete structures, $/cubic yard	2,144.64
Removal of clean foundation concrete, $/cubic yard	722.93
Removal of contaminated foundation concrete, $/cubic yard	1,997.83
Explosive demolition of bulk concrete, $/cubic yard	31.38
Removal of clean hollow masonry block wall, $/cubic yard	101.36
Removal of contaminated hollow masonry block wall, $/cubic yard	323.40
Removal of clean solid masonry block wall, $/cubic yard	101.36
Removal of contaminated solid masonry block wall, $/cubic yard	323.40
Backfill of below-grade voids, $/cubic yard	30.99
Removal of subterranean tunnels/voids, $/linear foot	118.73

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Placement of concrete for below-grade voids, $/cubic yard	126.84
Excavation of clean material, $/cubic yard	3.27
Excavation of contaminated material, $/cubic yard	41.66
Removal of clean concrete rubble (tipping fee included), $/cubic yard	23.41
Removal of contaminated concrete rubble, $/cubic yard	25.38
Removal of building by volume, $/cubic foot	0.30
Removal of clean building metal siding, $/square foot	1.25
Removal of contaminated building metal siding, $/square foot	4.10
Removal of standard asphalt roofing, $/square foot	2.44
Removal of transite panels, $/square foot	2.24
Scarifying contaminated concrete surfaces (drill & spall), $/square foot	12.82
Scabbling contaminated concrete floors, $/square foot	7.91
Scabbling contaminated concrete walls, $/square foot	20.95
Scabbling contaminated ceilings, $/square foot	71.93
Scabbling structural steel, $/square foot	6.45
Removal of clean overhead crane/monorail < 10 ton capacity	684.86
Removal of contaminated overhead crane/monorail < 10 ton capacity	1,859.50
Removal of clean overhead crane/monorail >10-50 ton capacity	1,643.67
Removal of contaminated overhead crane/monorail >10-50 ton capacity	4,462.04
Removal of polar crane > 50 ton capacity	6,836.81
Removal of gantry crane > 50 ton capacity	29,087.42
Removal of structural steel, $/pound	0.22
Removal of clean steel floor grating, $/square foot	4.80
Removal of contaminated steel floor grating, $/square foot	13.53
Removal of clean free standing steel liner, $/square foot	13.16
Removal of contaminated free standing steel liner, $/square foot	36.93
Removal of clean concrete-anchored steel liner, $/square foot	6.58
Removal of contaminated concrete-anchored steel liner, $/square foot	43.02
Placement of scaffolding in clean areas, $/square foot	17.27
Placement of scaffolding in contaminated areas, $/square foot	27.50

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Landscaping with topsoil, $/acre	28,090.38
Cost of CPC B-88 LSA box & preparation for use	2,095.49
Cost of CPC B-25 LSA box & preparation for use	1,919.43
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,562.47
Cost of CPC B-144 LSA box & preparation for use	10,592.31
Cost of LSA drum & preparation for use	201.53
Cost of cask liner for CNSI 8 120A cask (resins)	7,778.01
Cost of cask liner for CNSI 8 120A cask (filters)	8,129.94
Decontamination of surfaces with vacuuming, $/square foot	0.82

APPENDIX C

DETAILED COST TABLE

SCENARIO 1

DECON DECOMMISSIONING COST ESTIMATE –

60 YEAR SPENT FUEL MANAGEMENT

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	137	21	158	158	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	485	73	558	558	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	137	21	158	158	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	792	119	910	910	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	327	49	376	376	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	528	79	607	607	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	432	65	497	497	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	519	78	597	537	-	60	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	440	66	506	455	-	51	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	749	112	862	862	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	686	103	789	789	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	169	25	194	97	-	97	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	329	49	379	189	-	189	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	485	73	558	558	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	95	14	109	55	-	55	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	4,505	676	5,180	4,729	-	451	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	253	38	291	291	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	2,800	420	3,220	3,220	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	148	22	170	170	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,200	330	2,530	2,530	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	130	19	149	149	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	13,296	1,994	15,291	14,839	-	451	-	-	-	-	-	-	-	78,609
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	24,038	3,606	27,644	-	27,644	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	24,038	3,606	27,644	-	27,644	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,301	130	1,431	1,431	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	2,880	288	3,168	3,168	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	434	-	-	-	-	-	109	543	543	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	427	-	-	-	-	-	64	491	491	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	4	-	45	-	13	75	75	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	3,194	479	3,673	3,673	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	769	77	846	846	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,263	126	1,390	-	1,390	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,138	321	2,458	2,458	-	-	-	-	-	-	-	-	-	-

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 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 (continued)																					
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	763	114	878	-	878	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	89	13	103	-	103	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	93	14	107	107	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	4,968	745	5,713	5,713	-	-	-	-	-	-	-	-	-	157,471
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	20,566	3,085	23,651	23,651	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	862	13	4	-	45	38,024	5,579	44,526	42,156	2,370	-	-	610	-	-	-	12,190	20	580,871
1a.0	TOTAL PERIOD 1a COST	-	862	13	4	-	45	75,359	11,179	87,461	56,996	30,014	451	-	610	-	-	-	12,190	20	659,480
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	500	75	574	517	-	57	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	422	63	485	485	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	142	21	164	41	-	123	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	383	57	441	441	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	127	19	146	73	-	73	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	106	16	121	61	-	61	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	220	33	252	252	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	288	43	331	298	-	33	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	288	43	331	298	-	33	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	3,561	534	4,095	3,715	-	380	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	238	-	-	-	-	-	-	119	357	357	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	238	-	-	-	-	-	3,561	653	4,452	4,072	-	380	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent fuel pool isolation	-	-	-	-	-	-	10,280	1,542	11,822	11,822	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	4,786	1,436	6,222	6,222	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	26	12	11	-	-	6	55	55	-	-	43	-	-	-	-	5,253	163	-
1b.2	Subtotal Period 1b Additional Costs	-	-	26	12	11	-	15,066	2,984	18,099	18,099	-	-	43	-	-	-	-	5,253	30,663	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	835	-	-	-	-	-	-	125	961	961	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,599	240	1,839	1,839	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	37	-	15	53	-	88	-	50	243	243	-	-	-	233	-	-	-	13,986	45	-
1b.3.4	Process decommissioning chemical flush waste	0	-	14	67	-	856	-	226	1,163	1,163	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,500	-	-	-	-	-	-	225	1,725	1,725	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	25	4	29	-	29	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,373	1,102	29	119	-	944	1,624	1,035	7,226	7,197	29	-	-	233	231	-	-	38,585	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	26	-	-	-	-	-	-	6	32	32	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	281	28	309	309	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	835	84	919	919	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	245	-	-	-	-	-	61	306	306	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	214	-	-	-	-	-	32	246	246	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	2	-	26	-	8	44	44	-	-	-	358	-	-	-	7,159	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	3,202	480	3,683	3,683	-	-	-	-	-	-	-	-	-	-

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1b Period-Dependent Costs (continued)																					
1b.4.8	NRC Fees	-	-	-	-	-	-	386	39	424	424	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	633	63	697	-	697	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	1,072	161	1,233	1,233	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	383	57	440	-	440	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	45	7	52	-	52	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	47	7	54	54	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	2,491	374	2,864	2,864	-	-	-	-	-	-	-	-	-	78,951
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	4,405	661	5,066	5,066	-	-	-	-	-	-	-	-	-	63,789
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	10,364	1,555	11,919	11,919	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	26	459	8	2	-	26	24,143	3,622	28,286	27,098	1,188	-	-	358	-	-	-	7,159	12	356,066
1b.0	TOTAL PERIOD 1b COST	2,636	1,560	63	133	11	971	44,394	8,294	58,063	56,466	1,217	380	43	591	231	-	-	50,997	31,830	400,659
PERIOD 1 TOTALS		2,636	2,422	76	137	11	1,016	119,753	19,473	145,525	113,462	31,231	831	43	1,201	231	-	-	63,188	31,850	1,060,139
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Recirculation System Piping & Valves	89	75	17	19	-	291	-	140	632	632	-	-	-	858	-	-	-	98,047	2,888	-
2a.1.1.2	Recirculation Pumps & Motors	32	50	15	33	20	300	-	113	561	561	-	-	96	945	-	-	-	111,100	1,563	-
2a.1.1.3	CRDMs & NIs Removal	155	116	407	86	-	277	-	229	1,270	1,270	-	-	-	3,741	-	-	-	93,194	4,779	-
2a.1.1.4	Reactor Vessel Internals	173	3,070	14,185	2,146	-	17,131	249	15,075	52,030	52,030	-	-	-	1,002	1,430	1,033	-	312,690	25,925	1,169
2a.1.1.5	Reactor Vessel	65	6,759	1,934	692	-	2,736	249	7,164	19,600	19,600	-	-	-	10,110	-	-	-	1,073,269	25,925	1,169
2a.1.1	Totals	514	10,070	16,559	2,976	20	20,735	499	22,721	74,092	74,092	-	-	96	16,656	1,430	1,033	-	1,688,300	61,080	2,338
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	312	916	295	3,614	329	-	838	6,305	6,305	-	-	41,610	1,303	-	-	-	1,983,244	5,557	-
2a.1.3	Main Condensers	-	1,069	383	123	1,511	138	-	585	3,809	3,809	-	-	17,396	545	-	-	-	829,117	18,831	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor Building	-	577	-	-	-	-	-	86	663	663	-	-	-	-	-	-	-	-	6,356	-
2a.1.4.2	Radwaste	-	49	-	-	-	-	-	7	56	56	-	-	-	-	-	-	-	-	569	-
2a.1.4.3	Turbine	-	150	-	-	-	-	-	22	172	172	-	-	-	-	-	-	-	-	1,884	-
2a.1.4	Totals	-	775	-	-	-	-	-	116	891	891	-	-	-	-	-	-	-	-	8,809	-
Disposal of Plant Systems																					
2a.1.5.1	Automatic Press Relief	-	94	5	7	63	39	-	44	252	252	-	-	803	154	-	-	-	45,723	1,654	-
2a.1.5.2	Chemistry Sampling	-	22	1	1	12	7	-	9	52	52	-	-	156	28	-	-	-	8,686	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	1	0	0	-	0	-	0	2	2	-	-	-	1	-	-	-	70	28	-
2a.1.5.4	Circulating Water - RCA	-	165	10	39	522	-	-	126	862	862	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	24	0	1	17	-	-	9	50	50	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	14	0	2	22	-	-	7	46	46	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	784	143	211	1,563	1,386	-	823	4,910	4,910	-	-	19,947	5,490	-	-	-	1,276,657	14,137	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	391	26	40	327	228	-	213	1,226	1,226	-	-	4,176	905	-	-	-	246,501	6,953	-
2a.1.5.9	Condensate Demin	-	434	22	32	262	189	-	202	1,143	1,143	-	-	3,346	755	-	-	-	199,605	7,608	-
2a.1.5.10	Condensate Storage	-	577	25	52	559	150	-	276	1,640	1,640	-	-	7,131	641	-	-	-	340,215	10,339	-
2a.1.5.11	Control Rod Drive	-	2	0	0	1	1	-	1	6	6	-	-	19	3	-	-	-	1,005	41	-
2a.1.5.12	Control Rod Drive Hydraulic	-	331	12	17	130	106	-	133	729	729	-	-	1,658	422	-	-	-	103,181	5,893	-
2a.1.5.13	Core Spray	-	63	15	33	344	99	-	98	651	651	-	-	4,384	391	-	-	-	211,254	1,158	-
2a.1.5.14	Core Spray - Insulated	-	115	6	8	64	50	-	53	296	296	-	-	818	198	-	-	-	50,030	2,030	-
2a.1.5.15	Demin Water - Insulated - RCA	-	12	0	1	7	-	-	4	23	23	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	33	0	1	20	-	-	12	67	67	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	2	-	-	1	4	4	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	30	1	3	43	-	-	14	91	91	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	17	0	1	11	-	-	6	35	35	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	1	0	0	1	-	-	1	3	3	-	-	13	-	-	-	-	512	22	-

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2a.1.5.23	GEZIP - RCA	-	3	0	1	8	-	-	2	14	14	-	-	103	-	-	-	-	4,184	48	-
2a.1.5.24	Generator Physical Design - RCA	-	4	0	0	2	-	-	1	8	8	-	-	31	-	-	-	-	1,250	67	-
2a.1.5.25	H2-O2 Control Analyzing	-	5	0	0	0	2	-	2	10	10	-	-	6	10	-	-	-	1,054	80	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	5	0	0	0	2	-	2	10	10	-	-	6	10	-	-	-	1,054	80	-
2a.1.5.27	High Pressure Coolant Injection	-	53	5	8	76	39	-	36	219	219	-	-	972	156	-	-	-	52,764	964	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	175	11	16	125	91	-	89	506	506	-	-	1,598	361	-	-	-	95,554	3,074	-
2a.1.5.29	Hydrogen Cooling	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	6	0	0	3	-	-	2	11	11	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	14	0	1	15	-	-	6	36	36	-	-	189	-	-	-	-	7,669	212	-
2a.1.5.32	Hydrogen Water Chemistry - RCA	-	19	0	1	11	-	-	7	38	38	-	-	140	-	-	-	-	5,672	304	-
2a.1.5.33	Instrument & Service Air - RCA	-	181	3	10	139	-	-	68	400	400	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	156	9	13	104	78	-	77	438	438	-	-	1,333	308	-	-	-	80,308	2,742	-
2a.1.5.35	Main Steam	-	198	13	20	168	112	-	107	619	619	-	-	2,148	447	-	-	-	125,079	3,507	-
2a.1.5.36	Main Turbine	-	803	162	227	1,549	1,645	-	894	5,280	5,280	-	-	19,760	6,524	-	-	-	1,356,213	14,665	-
2a.1.5.37	Main Turbine - Insulated	-	170	14	23	198	126	-	109	641	641	-	-	2,530	500	-	-	-	145,256	3,064	-
2a.1.5.38	Miscellaneous	-	34	0	2	24	-	-	12	72	72	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	150	15	20	141	145	-	99	570	570	-	-	1,795	573	-	-	-	121,626	2,702	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	308	15	17	107	134	-	131	712	712	-	-	1,366	532	-	-	-	100,657	5,378	-
2a.1.5.41	Post Accident Sampling	-	20	1	1	4	6	-	7	39	39	-	-	53	25	-	-	-	4,267	344	-
2a.1.5.42	Post Accident Sampling - Insulated	-	13	1	1	1	7	-	5	29	29	-	-	17	28	-	-	-	3,042	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	66	2	9	116	-	-	36	229	229	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	3	0	0	3	-	-	1	7	7	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	44	2	2	15	18	-	18	100	100	-	-	193	73	-	-	-	13,992	772	-
2a.1.5.46	Residual Heat Removal	288	200	126	114	502	1,138	-	583	2,951	2,951	-	-	6,406	4,509	-	-	-	643,278	4,068	-
2a.1.5.47	Residual Heat Removal - Insulated	494	441	48	53	264	494	-	533	2,326	2,326	-	-	3,367	1,955	-	-	-	302,913	10,318	-
2a.1.5.48	Rx Core Isolation Cooling	-	39	2	2	20	14	-	17	94	94	-	-	259	57	-	-	-	15,348	690	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	85	4	4	23	37	-	35	189	189	-	-	288	148	-	-	-	24,314	1,477	-
2a.1.5.50	Rx Recirculation	45	47	4	3	3	36	-	44	182	182	-	-	43	142	-	-	-	13,860	1,578	-
2a.1.5.51	Snubbers	-	135	2	3	30	17	-	43	229	229	-	-	377	67	-	-	-	21,029	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	3	0	0	2	-	-	1	6	6	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	21	0	1	19	-	-	8	50	50	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	6	0	1	10	-	-	3	20	20	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	3	0	0	0	1	-	1	5	5	-	-	1	4	-	-	-	375	51	-
2a.1.5	Totals	826	6,539	707	1,006	7,654	6,400	-	5,016	28,148	28,129	-	19	97,654	25,419	-	-	-	6,120,628	119,641	-
2a.1.6	Scaffolding in support of decommissioning	-	1,950	23	8	89	17	-	509	2,596	2,596	-	-	1,030	68	-	-	-	52,131	22,564	-
2a.1	Subtotal Period 2a Activity Costs	1,340	20,714	18,588	4,408	12,888	27,618	499	29,785	115,841	115,822	-	19	157,785	43,991	1,430	1,033	-	10,673,420	236,482	2,338
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	83	-	35	120	-	202	-	114	554	554	-	-	-	533	-	-	-	31,987	104	-
2a.3.2	Process decommissioning chemical flush waste	4	-	130	605	-	1,407	-	458	2,605	2,605	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	242	-	-	-	-	-	36	278	250	-	28	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	62	9	72	-	72	-	-	-	-	-	-	-	-	-
2a.3.5	On-site survey and release of 0.0 tons clean metallic waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	88	242	165	725	-	1,609	62	617	3,508	3,408	72	28	-	2,626	-	-	-	254,995	496	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	64	-	-	-	-	-	-	16	80	80	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	701	70	771	771	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	1,537	154	1,690	1,521	-	169	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	1,510	-	-	-	-	-	377	1,887	1,887	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	2,328	-	-	-	-	-	349	2,677	2,677	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	97	30	-	338	-	99	564	564	-	-	-	4,573	-	-	-	91,465	149	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	3,799	570	4,368	4,368	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	898	90	988	988	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	930	93	1,023	-	1,023	-	-	-	-	-	-	-	-	-
2a.4.10	Fixed Overhead	-	-	-	-	-	-	2,043	306	2,350	2,350	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	956	143	1,099	-	1,099	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 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.4.13	Railroad Track Maintenance	-	-	-	-	-	-	116	17	134	134	-	-	-	-	-	-	-	-	-	-
2a.4.14	Security Staff Cost	-	-	-	-	-	-	5,275	791	6,066	6,066	-	-	-	-	-	-	-	-	-	165,173
2a.4.15	DOC Staff Cost	-	-	-	-	-	-	13,347	2,002	15,349	15,349	-	-	-	-	-	-	-	-	-	198,469
2a.4.16	Utility Staff Cost	-	-	-	-	-	-	18,669	2,800	21,470	21,470	-	-	-	-	-	-	-	-	-	369,517
2a.4	Subtotal Period 2a Period-Dependent Costs	64	3,838	97	30	-	338	48,383	7,895	60,645	58,226	2,251	169	-	4,573	-	-	-	91,465	149	733,159
2a.0	TOTAL PERIOD 2a COST	1,491	24,794	18,851	5,163	12,888	29,565	48,945	38,297	179,994	177,456	2,323	216	157,785	51,190	1,430	1,033	-	11,019,880	237,127	735,497
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	14	0	0	3	2	-	5	24	24	-	-	35	7	-	-	-	2,059	277	-
2b.1.1.2	Alternate N2 - RCA	-	13	0	1	7	-	-	4	26	26	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	128	17	-
2b.1.1.4	Electrical - Contaminated	-	354	5	15	187	17	-	124	702	702	-	-	2,389	68	-	-	-	102,746	6,324	-
2b.1.1.5	Electrical - Decontaminated	-	2,149	35	138	1,830	-	-	836	4,987	4,987	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	81	1	4	48	-	-	28	162	162	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	245	5	17	209	19	-	100	596	596	-	-	2,665	75	-	-	-	114,620	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	260	4	16	216	-	-	100	596	596	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	384	12	38	472	43	-	185	1,134	1,134	-	-	6,018	170	-	-	-	258,840	7,099	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	2	0	0	2	-	-	1	5	5	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	468	546	38	40	241	326	-	498	2,157	2,157	-	-	3,073	1,426	-	-	-	234,622	17,182	-
2b.1.1.12	Makeup Demin - RCA	-	82	2	9	115	-	-	39	248	248	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	22	2	8	112	-	-	24	168	168	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	272	16	24	216	119	-	135	783	783	-	-	2,755	484	-	-	-	151,977	4,763	-
2b.1.1.15	Primary Containment	-	362	33	56	486	285	-	246	1,468	1,468	-	-	6,201	1,132	-	-	-	347,847	6,442	-
2b.1.1.16	Process Radiation Monitors	-	37	1	1	11	10	-	14	74	74	-	-	142	39	-	-	-	9,063	648	-
2b.1.1.17	Rx Bldg Closed Clng Water - Insul - RCA	-	91	1	6	77	-	-	35	210	210	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	146	11	42	556	-	-	127	882	882	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	22	113	14	17	91	157	-	96	510	510	-	-	1,158	622	-	-	-	99,915	2,456	-
2b.1.1.20	Rx Pressure Vessel	22	38	4	3	6	44	-	33	150	150	-	-	75	172	-	-	-	17,716	1,049	-
2b.1.1.21	Rx Water Cleanup	136	211	14	10	10	139	-	160	680	680	-	-	130	555	-	-	-	52,246	5,729	-
2b.1.1.22	Secondary Containment	-	99	6	9	80	48	-	51	292	292	-	-	1,017	191	-	-	-	57,539	1,761	-
2b.1.1.23	Service & Seal Water - Insulated - RCA	-	96	2	7	92	-	-	39	236	236	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	127	3	11	142	-	-	55	337	337	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	12	0	1	16	-	-	6	36	36	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	269	393	29	32	187	261	-	333	1,503	1,503	-	-	2,387	1,108	-	-	-	184,752	10,809	-
2b.1.1.27	Structures & Buildings	-	62	2	3	28	16	-	24	135	135	-	-	357	64	-	-	-	19,952	1,127	-
2b.1.1.28	Wells & Domestic Water	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	42	1	2	27	-	-	15	86	86	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	917	6,261	240	512	5,466	1,486	-	3,316	18,199	18,190	-	9	69,735	6,115	-	-	-	3,332,448	122,771	-
2b.1.2	Scaffolding in support of decommissioning	-	2,437	29	10	112	21	-	636	3,245	3,245	-	-	1,287	85	-	-	-	65,164	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	4,157	2,305	122	324	3,768	789	-	3,478	14,943	14,943	-	-	48,077	4,214	-	-	-	2,314,063	112,479	-
2b.1.3.2	Admin	86	5	0	2	-	12	-	47	152	152	-	-	-	79	-	-	-	6,840	1,599	-
2b.1.3.3	HPCI Room	23	22	0	2	9	11	-	22	90	90	-	-	118	70	-	-	-	10,755	789	-
2b.1.3.4	Hot Shop	13	3	0	1	-	9	-	10	37	37	-	-	-	56	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	47	20	1	5	2	37	-	39	149	149	-	-	31	237	-	-	-	21,707	1,126	-
2b.1.3.6	Offgas Stack	299	212	4	14	105	62	-	236	933	933	-	-	1,343	376	-	-	-	86,945	8,858	-
2b.1.3.7	Offgas Storage & Compressor	33	14	0	3	2	27	-	27	107	107	-	-	25	173	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	97	49	2	10	13	78	-	84	334	334	-	-	172	501	-	-	-	49,943	2,501	-
2b.1.3.9	Radwaste Material Storage Warehouse	51	20	1	5	-	42	-	42	161	161	-	-	-	270	-	-	-	23,400	1,196	-
2b.1.3.10	Recombiner	22	20	1	3	16	19	-	23	103	103	-	-	199	121	-	-	-	18,403	695	-
2b.1.3.11	Turbine	567	284	10	63	101	455	-	494	1,973	1,973	-	-	1,283	2,910	-	-	-	303,139	14,432	-
2b.1.3.12	Turbine Building Addition	47	17	1	5	-	37	-	38	144	144	-	-	-	236	-	-	-	20,478	1,086	-
2b.1.3	Totals	5,442	2,970	141	436	4,017	1,578	-	4,540	19,126	19,126	-	-	51,247	9,242	-	-	-	2,876,482	145,831	-

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 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			
2b.1	Subtotal Period 2b Activity Costs	6,360	11,669	411	958	9,594	3,086	-	8,492	40,570	40,561	-	9	122,269	15,442	-	-	-	6,274,094	296,806	-
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	173	-	74	257	-	430	-	240	1,173	1,173	-	-	-	1,135	-	-	-	68,127	221	-
2b.3.2	Process decommissioning chemical flush waste	1	-	26	119	-	278	-	90	514	514	-	-	-	413	-	-	-	43,978	77	-
2b.3.3	Small tool allowance	-	275	-	-	-	-	-	41	316	316	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	25,288	3,793	29,081	-	29,081	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	174	275	99	376	-	707	25,288	4,165	31,084	2,003	29,081	-	-	1,548	-	-	-	112,106	299	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,008	-	-	-	-	-	-	252	1,260	1,260	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,246	125	1,371	1,371	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,733	273	3,006	3,006	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,170	-	-	-	-	-	542	2,712	2,712	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,103	-	-	-	-	-	615	4,718	4,718	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	124	38	-	429	-	125	715	715	-	-	-	5,805	-	-	-	116,095	189	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	5,328	799	6,128	6,128	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,596	160	1,755	1,755	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,653	165	1,818	-	1,818	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	3,630	545	4,175	4,175	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,698	255	1,952	-	1,952	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	431	65	496	496	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	199	30	229	-	229	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	207	31	238	238	-	-	-	-	-	-	-	-	-	-
2b.4.15	Security Staff Cost	-	-	-	-	-	-	9,373	1,406	10,779	10,779	-	-	-	-	-	-	-	-	-	293,480
2b.4.16	DOC Staff Cost	-	-	-	-	-	-	22,933	3,440	26,373	26,373	-	-	-	-	-	-	-	-	-	338,720
2b.4.17	Utility Staff Cost	-	-	-	-	-	-	32,021	4,803	36,824	36,824	-	-	-	-	-	-	-	-	-	628,720
2b.4	Subtotal Period 2b Period-Dependent Costs	1,008	6,273	124	38	-	429	83,048	13,631	104,550	100,551	3,999	-	-	5,805	-	-	-	116,095	189	1,260,920
2b.0	TOTAL PERIOD 2b COST	7,541	18,217	634	1,372	9,594	4,223	108,336	26,287	176,204	143,115	33,080	9	122,269	22,795	-	-	-	6,502,294	297,294	1,260,920
PERIOD 2c - Spent fuel delay prior to SFP decon																					
Period 2c Direct Decommissioning Activities																					
Period 2c Collateral Costs																					
2c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	34,142	5,121	39,263	-	39,263	-	-	-	-	-	-	-	-	-
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	34,142	5,121	39,263	-	39,263	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	5,621	562	6,183	6,183	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	8,659	866	9,525	9,525	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	3,222	-	-	-	-	-	806	4,028	4,028	-	-	-	-	-	-	-	-	-	-
2c.4.4	Heavy equipment rental	-	1,851	-	-	-	-	-	278	2,129	2,129	-	-	-	-	-	-	-	-	-	-
2c.4.5	Disposal of DAW generated	-	-	88	27	-	306	-	89	510	510	-	-	-	4,140	-	-	-	82,809	135	-
2c.4.6	Plant energy budget	-	-	-	-	-	-	6,410	961	7,371	7,371	-	-	-	-	-	-	-	-	-	-
2c.4.7	NRC Fees	-	-	-	-	-	-	1,792	179	1,971	1,971	-	-	-	-	-	-	-	-	-	-
2c.4.8	Emergency Planning Fees	-	-	-	-	-	-	7,455	745	8,200	-	8,200	-	-	-	-	-	-	-	-	-
2c.4.9	Fixed Overhead	-	-	-	-	-	-	16,377	2,457	18,833	18,833	-	-	-	-	-	-	-	-	-	-
2c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	7,659	1,149	8,807	-	8,807	-	-	-	-	-	-	-	-	-
2c.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	389	58	447	447	-	-	-	-	-	-	-	-	-	-
2c.4.12	ISFSI Operating Costs	-	-	-	-	-	-	898	135	1,032	-	1,032	-	-	-	-	-	-	-	-	-
2c.4.13	Railroad Track Maintenance	-	-	-	-	-	-	933	140	1,073	1,073	-	-	-	-	-	-	-	-	-	-
2c.4.14	Security Staff Cost	-	-	-	-	-	-	36,102	5,415	41,517	41,517	-	-	-	-	-	-	-	-	-	1,114,599
2c.4.15	Utility Staff Cost	-	-	-	-	-	-	41,311	6,197	47,508	47,508	-	-	-	-	-	-	-	-	-	826,791
2c.4	Subtotal Period 2c Period-Dependent Costs	-	5,073	88	27	-	306	133,604	20,037	159,135	141,095	18,040	-	-	4,140	-	-	-	82,809	135	1,941,390
2c.0	TOTAL PERIOD 2c COST	-	5,073	88	27	-	306	167,746	25,158	198,398	141,095	57,303	-	-	4,140	-	-	-	82,809	135	1,941,390

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	526	46	111	97	-	1,449	-	663	2,892	2,892	-	-	-	5,740	-	-	-	487,876	906	-
Disposal of Plant Systems																					
2d.1.2.1	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	8	-	-	2	14	14	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	37	0	2	19	2	-	13	73	73	-	-	240	7	-	-	-	10,336	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	237	4	15	193	-	-	91	538	538	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	9	0	0	5	-	-	3	17	17	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	195	340	26	24	92	254	-	266	1,198	1,198	-	-	1,179	1,021	-	-	-	133,352	8,367	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	21	33	2	2	5	22	-	26	111	111	-	-	67	88	-	-	-	10,157	847	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	27	1	2	23	2	-	11	66	66	-	-	296	8	-	-	-	12,736	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	26	0	1	18	-	-	9	55	55	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	23	0	2	21	-	-	9	55	55	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	217	735	34	48	384	280	-	430	2,127	2,127	-	-	4,894	1,124	-	-	-	292,960	15,371	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	756	1,359	35	247	154	2,668	-	1,449	6,669	6,669	-	-	1,969	15,685	-	-	-	1,203,773	35,501	-
2d.1.3	Totals	756	1,359	35	247	154	2,668	-	1,449	6,669	6,669	-	-	1,969	15,685	-	-	-	1,203,773	35,501	-
2d.1.4	Scaffolding in support of decommissioning	-	487	6	2	22	4	-	127	649	649	-	-	257	17	-	-	-	13,033	5,641	-
2d.1	Subtotal Period 2d Activity Costs	1,499	2,628	186	394	560	4,401	-	2,669	12,337	12,337	-	-	7,120	22,566	-	-	-	1,997,641	57,419	-
Period 2d Additional Costs																					
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,034	310	1,344	1,344	-	-	-	-	-	-	-	-	-	12,480
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,034	310	1,344	1,344	-	-	-	-	-	-	-	-	-	12,480
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	25	-	13	46	-	77	-	40	201	201	-	-	-	202	-	-	-	12,142	39	-
2d.3.2	Process decommissioning chemical flush waste	1	-	16	72	-	168	-	55	310	310	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	62	-	-	-	-	-	9	71	71	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	137	55	521	100	-	125	938	938	-	-	6,000	397	-	-	-	303,726	88	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,512	1,577	12,089	-	12,089	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	26	62	165	172	521	344	10,512	1,806	13,609	1,520	12,089	-	6,000	848	-	-	-	342,421	174	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	161	-	-	-	-	-	-	40	201	201	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	422	42	464	464	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	532	53	586	586	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	529	-	-	-	-	-	132	661	661	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,390	-	-	-	-	-	208	1,598	1,598	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	12	-	140	-	41	233	233	-	-	-	1,890	-	-	-	37,793	62	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	962	144	1,107	1,107	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	540	54	594	594	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	560	56	616	-	616	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,230	184	1,414	1,414	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	292	44	336	336	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	67	10	78	-	78	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	70	11	81	81	-	-	-	-	-	-	-	-	-	-
2d.4.14	Security Staff Cost	-	-	-	-	-	-	1,782	267	2,050	2,050	-	-	-	-	-	-	-	-	-	52,250
2d.4.15	DOC Staff Cost	-	-	-	-	-	-	5,375	806	6,182	6,182	-	-	-	-	-	-	-	-	-	78,571
2d.4.16	Utility Staff Cost	-	-	-	-	-	-	8,063	1,209	9,272	9,272	-	-	-	-	-	-	-	-	-	150,071
2d.4	Subtotal Period 2d Period-Dependent Costs	161	1,918	40	12	-	140	19,896	3,303	25,471	24,778	693	-	-	1,890	-	-	-	37,793	62	280,893
2d.0	TOTAL PERIOD 2d COST	1,686	4,608	391	579	1,081	4,885	31,442	8,088	52,760	39,979	12,782	-	13,120	25,303	-	-	-	2,377,855	57,655	293,373

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 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 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	154	46	200	200	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	154	46	200	200	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	5,518	1,656	7,174	7,174	-	-	-	-	-	-	-	-	96,186	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	5,518	1,656	7,174	7,174	-	-	-	-	-	-	-	-	96,186	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,599	240	1,839	1,839	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	38	6	43	-	43	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,636	245	1,882	1,839	43	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	405	41	446	446	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	532	53	586	586	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	503	-	-	-	-	-	126	629	629	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	8	2	-	26	-	8	44	44	-	-	-	355	-	-	-	7,097	12	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	481	72	553	553	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	579	58	637	637	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	226	23	248	-	248	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,230	184	1,414	1,414	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	67	10	78	-	78	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	70	11	81	81	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	1,748	262	2,010	2,010	-	-	-	-	-	-	-	-	-	51,071
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	4,071	611	4,682	4,682	-	-	-	-	-	-	-	-	-	57,357
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	4,566	685	5,250	5,250	-	-	-	-	-	-	-	-	-	80,929
2f.4	Subtotal Period 2f Period-Dependent Costs	-	503	8	2	-	26	13,976	2,143	16,658	16,332	326	-	-	355	-	-	-	7,097	12	189,357
2f.0	TOTAL PERIOD 2f COST	-	503	8	2	-	26	21,284	4,090	25,913	25,544	369	-	-	355	-	-	-	7,097	96,197	195,597
PERIOD 2 TOTALS		10,719	53,195	19,972	7,142	23,563	39,005	377,753	101,920	633,270	527,188	105,857	225	293,175	103,784	1,430	1,033	-	19,989,940	688,408	4,426,777
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	3,342	-	-	-	-	-	501	3,844	-	-	3,844	-	-	-	-	-	-	37,418	-
3b.1.1.2	Condensate Tanks Foundation	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	219	-
3b.1.1.3	Discharge Retention Basin	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	110	-
3b.1.1.4	HPCI Room	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	401	-
3b.1.1.5	Hot Shop	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	298	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	21	-
3b.1.1.7	LLRW Storage & Shipping	-	129	-	-	-	-	-	19	148	-	-	148	-	-	-	-	-	-	1,794	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	59	-
3b.1.1.9	Offgas Stack	-	214	-	-	-	-	-	32	246	-	-	246	-	-	-	-	-	-	2,668	-
3b.1.1.10	Offgas Storage & Compressor	-	80	-	-	-	-	-	12	92	-	-	92	-	-	-	-	-	-	963	-
3b.1.1.11	Radwaste	-	444	-	-	-	-	-	67	511	-	-	511	-	-	-	-	-	-	5,196	-
3b.1.1.12	Recombiner	-	236	-	-	-	-	-	35	272	-	-	272	-	-	-	-	-	-	2,490	-
3b.1.1.13	Security Barrier	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	4,083	-
3b.1.1.14	Tank Farm	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	121	-
3b.1.1.15	Turbine	-	1,443	-	-	-	-	-	216	1,659	-	-	1,659	-	-	-	-	-	-	18,764	-
3b.1.1.16	Turbine Building Addition	-	61	-	-	-	-	-	9	70	-	-	70	-	-	-	-	-	-	971	-
3b.1.1.17	Turbine Pedestal	-	379	-	-	-	-	-	57	436	-	-	436	-	-	-	-	-	-	3,762	-
3b.1.1	Totals	-	6,764	-	-	-	-	-	1,015	7,778	-	-	7,778	-	-	-	-	-	-	79,340	-

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 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			
Site Closeout Activities																					
3b.1.2	BackFill Site	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	517	-
3b.1.3	Grade & landscape site	-	983	-	-	-	-	-	147	1,131	-	-	1,131	-	-	-	-	-	-	1,841	-
3b.1.4	Final report to NRC	-	-	-	-	-	-	165	25	189	189	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	8,014	-	-	-	-	165	1,227	9,405	189	-	9,216	-	-	-	-	-	-	81,698	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	299	-	-	-	-	8	46	353	-	-	353	-	-	-	-	-	-	1,402	-
3b.2	Subtotal Period 3b Additional Costs	-	299	-	-	-	-	8	46	353	-	-	353	-	-	-	-	-	-	1,402	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	81	-	-	-	-	-	12	93	-	-	93	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,939	291	2,230	-	2,230	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	81	-	-	-	-	1,939	303	2,323	-	2,230	93	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	933	93	1,027	-	1,027	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	922	92	1,014	-	1,014	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	4,584	-	-	-	-	-	688	5,272	-	-	5,272	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	554	83	637	-	-	637	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	373	37	411	-	411	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	520	52	572	-	572	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	767	115	882	882	-	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	155	23	178	-	178	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	4,023	603	4,626	(0)	3,932	694	-	-	-	-	-	-	-	117,557
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	8,894	1,334	10,228	-	-	10,228	-	-	-	-	-	-	-	122,983
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	5,834	875	6,710	(0)	1,409	5,301	-	-	-	-	-	-	-	98,567
3b.4	Subtotal Period 3b Period-Dependent Costs	-	4,584	-	-	-	-	23,136	4,021	31,741	1,067	8,543	22,131	-	-	-	-	-	-	-	339,107
3b.0	TOTAL PERIOD 3b COST	-	12,978	-	-	-	-	25,248	5,597	43,823	1,256	10,772	31,794	-	-	-	-	-	-	83,100	340,667
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	46,171	6,926	53,097	-	53,097	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	46,171	6,926	53,097	-	53,097	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	15,117	1,512	16,629	-	16,629	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	14,932	1,493	16,425	-	16,425	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	6,045	604	6,649	-	6,649	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	8,421	842	9,264	-	9,264	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	12,418	1,863	14,281	-	14,281	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	2,513	377	2,890	-	2,890	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	55,641	8,346	63,987	-	63,987	-	-	-	-	-	-	-	-	1,581,891
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	19,963	2,994	22,957	-	22,957	-	-	-	-	-	-	-	-	395,473
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	135,049	18,032	153,080	-	153,080	-	-	-	-	-	-	-	-	1,977,364
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	181,220	24,957	206,177	-	206,177	-	-	-	-	-	-	-	-	1,977,364
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,370	-	-	7,885	-	1,320	10,575	10,575	-	-	-	-	-	-	1,785	346,570	-	-
3d.1.1	Totals	-	-	1,370	-	-	7,885	-	1,320	10,575	10,575	-	-	-	-	-	-	1,785	346,570	-	-

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 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			
3d.1	Subtotal Period 3d Activity Costs	-	-	1,370	-	-	7,885	-	1,320	10,575	10,575	-	-	-	-	-	-	1,785	346,570	-	-
Period 3d Additional Costs																					
3d.2.1	ISFSI Railroad Track Refurbishment	-	-	-	-	-	-	265	40	304	-	304	-	-	-	-	-	-	-	-	-
3d.2	Subtotal Period 3d Additional Costs	-	-	-	-	-	-	265	40	304	-	304	-	-	-	-	-	-	-	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	20,358	3,054	23,412	-	23,412	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	20,358	3,054	23,412	-	23,412	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	7,539	754	8,292	-	8,292	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	7,446	745	8,191	-	8,191	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	3,885	388	4,273	-	4,273	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	4,200	420	4,620	-	4,620	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	6,193	929	7,122	-	7,122	-	-	-	-	-	-	-	-	-
3d.4.7	ISFSI Operating Costs	-	-	-	-	-	-	1,253	188	1,441	-	1,441	-	-	-	-	-	-	-	-	-
3d.4.8	Railroad Track Maintenance	-	-	-	-	-	-	1,302	195	1,497	-	1,497	-	-	-	-	-	-	-	-	-
3d.4.9	Security Staff Cost	-	-	-	-	-	-	27,747	4,162	31,909	-	31,909	-	-	-	-	-	-	-	-	788,863
3d.4.10	Utility Staff Cost	-	-	-	-	-	-	9,955	1,493	11,448	-	11,448	-	-	-	-	-	-	-	-	197,216
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	69,519	9,274	78,793	-	78,793	-	-	-	-	-	-	-	-	986,079
3d.0	TOTAL PERIOD 3d COST	-	-	1,370	-	-	7,885	90,141	13,688	113,084	10,575	102,509	-	-	-	-	-	1,785	346,570	-	986,079
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	ISFSI License Termination	-	273	5	14	-	70	1,291	282	1,935	-	1,935	-	-	520	-	-	-	81,210	6,483	2,560
3e.2	Subtotal Period 3e Additional Costs	-	273	5	14	-	70	1,291	282	1,935	-	1,935	-	-	520	-	-	-	81,210	6,483	2,560
Period 3e Collateral Costs																					
3e.3.1	Small tool allowance	-	3	-	-	-	-	-	0	4	-	4	-	-	-	-	-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	3	-	-	-	-	-	0	4	-	4	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	178	18	196	-	196	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	NRC ISFSI Fees	-	-	-	-	-	-	71	7	78	-	78	-	-	-	-	-	-	-	-	-
3e.4.5	Fixed Overhead	-	-	-	-	-	-	147	22	169	-	169	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	178	27	205	-	205	-	-	-	-	-	-	-	-	5,013
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	197	30	227	-	227	-	-	-	-	-	-	-	-	3,803
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	772	103	875	-	875	-	-	-	-	-	-	-	-	8,816
3e.0	TOTAL PERIOD 3e COST	-	276	5	14	-	70	2,063	386	2,814	-	2,814	-	-	520	-	-	-	81,210	6,483	11,376
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	ISFSI Demolition and Site Restoration	-	866	-	-	-	-	47	137	1,049	-	1,049	-	-	-	-	-	-	-	6,504	160
3f.2	Subtotal Period 3f Additional Costs	-	866	-	-	-	-	47	137	1,049	-	1,049	-	-	-	-	-	-	-	6,504	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	6	-	-	-	-	-	1	7	-	7	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	6	-	-	-	-	-	1	7	-	7	-	-	-	-	-	-	-	-	-

Table C
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 60 Year Spent Fuel Management
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.4	Fixed Overhead	-	-	-	-	-	-	74	11	85	-	85	-	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	90	13	103	-	103	-	-	-	-	-	-	-	-	2,527
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	78	12	89	-	89	-	-	-	-	-	-	-	-	1,569
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	241	36	277	-	277	-	-	-	-	-	-	-	-	4,096
3f.0	TOTAL PERIOD 3f COST	-	872	-	-	-	-	288	174	1,334	-	1,334	-	-	-	-	-	-	-	6,504	4,256
PERIOD 3 TOTALS		-	14,126	1,375	14	-	7,955	298,960	44,801	367,232	11,831	323,606	31,794	-	520	-	-	1,785	427,780	96,088	3,319,742
TOTAL COST TO DECOMMISSION		**13,355**	**69,743**	**21,422**	**7,294**	**23,575**	**47,976**	**796,467**	**166,194**	**1,146,026**	**652,481**	**460,695**	**32,850**	**293,218**	**105,504**	**1,660**	**1,033**	**1,785**	**20,480,900**	**816,345**	**8,806,656**

TOTAL COST TO DECOMMISSION WITH 16.96% CONTINGENCY:	**$1,146,026**	**thousands of 2011 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 56.93% OR:	**$652,481**	**thousands of 2011 dollars**
SPENT FUEL MANAGEMENT COST IS 40.2% OR:	**$460,695**	**thousands of 2011 dollars**
NON-NUCLEAR DEMOLITION COST IS 2.87% OR:	**$32,850**	**thousands of 2011 dollars**
TOTAL LOW-LEVEL RADWASTE VOLUME BURIED (EXCLUDING GTCC):	**108,198**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**1,785**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**15,668**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**816,345**	**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 TABLE

SCENARIO 2

DECON DECOMMISSIONING COST ESTIMATE –

200 YEAR SPENT FUEL MANAGEMENT

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	137	21	158	158	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	485	73	558	558	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	137	21	158	158	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	792	119	910	910	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	327	49	376	376	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	528	79	607	607	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	432	65	497	497	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	519	78	597	537	-	60	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	440	66	506	455	-	51	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	749	112	862	862	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	686	103	789	789	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	169	25	194	97	-	97	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	329	49	379	189	-	189	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	485	73	558	558	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	95	14	109	55	-	55	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	4,505	676	5,180	4,729	-	451	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	253	38	291	291	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	2,800	420	3,220	3,220	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	148	22	170	170	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,200	330	2,530	2,530	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	130	19	149	149	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	13,296	1,994	15,291	14,839	-	451	-	-	-	-	-	-	-	78,609
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	24,038	3,606	27,644	-	27,644	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	24,038	3,606	27,644	-	27,644	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,301	130	1,431	1,431	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	2,880	288	3,168	3,168	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	434	-	-	-	-	-	109	543	543	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	427	-	-	-	-	-	64	491	491	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	4	-	45	-	13	75	75	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	3,194	479	3,673	3,673	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	769	77	846	846	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,263	126	1,390	-	1,390	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,138	321	2,458	2,458	-	-	-	-	-	-	-	-	-	-

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 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 (continued)																					
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	763	114	878	-	878	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	89	13	103	-	103	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	93	14	107	107	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	4,968	745	5,713	5,713	-	-	-	-	-	-	-	-	-	157,471
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	20,566	3,085	23,651	23,651	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	862	13	4	-	45	38,024	5,579	44,526	42,156	2,370	-	-	610	-	-	-	12,190	20	580,871
1a.0	TOTAL PERIOD 1a COST	-	862	13	4	-	45	75,359	11,179	87,461	56,996	30,014	451	-	610	-	-	-	12,190	20	659,480
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	500	75	574	517	-	57	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	422	63	485	485	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	142	21	164	41	-	123	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	383	57	441	441	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	127	19	146	73	-	73	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	106	16	121	61	-	61	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	220	33	252	252	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	288	43	331	298	-	33	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	288	43	331	298	-	33	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	3,561	534	4,095	3,715	-	380	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	238	-	-	-	-	-	-	119	357	357	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	238	-	-	-	-	-	3,561	653	4,452	4,072	-	380	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent fuel pool isolation	-	-	-	-	-	-	10,280	1,542	11,822	11,822	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	4,786	1,436	6,222	6,222	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	26	12	11	-	-	6	55	55	-	-	43	-	-	-	-	5,253	163	-
1b.2	Subtotal Period 1b Additional Costs	-	-	26	12	11	-	15,066	2,984	18,099	18,099	-	-	43	-	-	-	-	5,253	30,663	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	835	-	-	-	-	-	-	125	961	961	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,599	240	1,839	1,839	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	37	-	15	53	-	88	-	50	243	243	-	-	-	233	-	-	-	13,986	45	-
1b.3.4	Process decommissioning chemical flush waste	0	-	14	67	-	856	-	226	1,163	1,163	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,500	-	-	-	-	-	-	225	1,725	1,725	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	25	4	29	-	29	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,373	1,102	29	119	-	944	1,624	1,035	7,226	7,197	29	-	-	233	231	-	-	38,585	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	26	-	-	-	-	-	-	6	32	32	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	281	28	309	309	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	835	84	919	919	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	245	-	-	-	-	-	61	306	306	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	214	-	-	-	-	-	32	246	246	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	2	-	26	-	8	44	44	-	-	-	358	-	-	-	7,159	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	3,202	480	3,683	3,683	-	-	-	-	-	-	-	-	-	-

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1b Period-Dependent Costs (continued)																					
1b.4.8	NRC Fees	-	-	-	-	-	-	386	39	424	424	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	633	63	697	-	697	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	1,072	161	1,233	1,233	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	383	57	440	-	440	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	45	7	52	-	52	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	47	7	54	54	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	2,491	374	2,864	2,864	-	-	-	-	-	-	-	-	-	78,951
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	4,405	661	5,066	5,066	-	-	-	-	-	-	-	-	-	63,789
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	10,364	1,555	11,919	11,919	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	26	459	8	2	-	26	24,143	3,622	28,286	27,098	1,188	-	-	358	-	-	-	7,159	12	356,066
1b.0	TOTAL PERIOD 1b COST	2,636	1,560	63	133	11	971	44,394	8,294	58,063	56,466	1,217	380	43	591	231	-	-	50,997	31,830	400,659
PERIOD 1 TOTALS		2,636	2,422	76	137	11	1,016	119,753	19,473	145,525	113,462	31,231	831	43	1,201	231	-	-	63,188	31,850	1,060,139
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Recirculation System Piping & Valves	89	75	17	19	-	291	-	140	632	632	-	-	-	858	-	-	-	98,047	2,888	-
2a.1.1.2	Recirculation Pumps & Motors	32	50	15	33	20	300	-	113	561	561	-	-	96	945	-	-	-	111,100	1,563	-
2a.1.1.3	CRDMs & NIs Removal	155	116	407	86	-	277	-	229	1,270	1,270	-	-	-	3,741	-	-	-	93,194	4,779	-
2a.1.1.4	Reactor Vessel Internals	173	3,070	14,185	2,146	-	17,131	249	15,075	52,030	52,030	-	-	-	1,002	1,430	1,033	-	312,690	25,925	1,169
2a.1.1.5	Reactor Vessel	65	6,759	1,934	692	-	2,736	249	7,164	19,600	19,600	-	-	-	10,110	-	-	-	1,073,269	25,925	1,169
2a.1.1	Totals	514	10,070	16,559	2,976	20	20,735	499	22,721	74,092	74,092	-	-	96	16,656	1,430	1,033	-	1,688,300	61,080	2,338
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	312	916	295	3,614	329	-	838	6,305	6,305	-	-	41,610	1,303	-	-	-	1,983,244	5,557	-
2a.1.3	Main Condensers	-	1,069	383	123	1,511	138	-	585	3,809	3,809	-	-	17,396	545	-	-	-	829,117	18,831	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor Building	-	577	-	-	-	-	-	86	663	663	-	-	-	-	-	-	-	-	6,356	-
2a.1.4.2	Radwaste	-	49	-	-	-	-	-	7	56	56	-	-	-	-	-	-	-	-	569	-
2a.1.4.3	Turbine	-	150	-	-	-	-	-	22	172	172	-	-	-	-	-	-	-	-	1,884	-
2a.1.4	Totals	-	775	-	-	-	-	-	116	891	891	-	-	-	-	-	-	-	-	8,809	-
Disposal of Plant Systems																					
2a.1.5.1	Automatic Press Relief	-	94	5	7	63	39	-	44	252	252	-	-	803	154	-	-	-	45,723	1,654	-
2a.1.5.2	Chemistry Sampling	-	22	1	1	12	7	-	9	52	52	-	-	156	28	-	-	-	8,686	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	1	0	0	-	0	-	0	2	2	-	-	-	1	-	-	-	70	28	-
2a.1.5.4	Circulating Water - RCA	-	165	10	39	522	-	-	126	862	862	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	24	0	1	17	-	-	9	50	50	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	14	0	2	22	-	-	7	46	46	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	784	143	211	1,563	1,386	-	823	4,910	4,910	-	-	19,947	5,490	-	-	-	1,276,657	14,137	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	391	26	40	327	228	-	213	1,226	1,226	-	-	4,176	905	-	-	-	246,501	6,953	-
2a.1.5.9	Condensate Demin	-	434	22	32	262	189	-	202	1,143	1,143	-	-	3,346	755	-	-	-	199,605	7,608	-
2a.1.5.10	Condensate Storage	-	577	25	52	559	150	-	276	1,640	1,640	-	-	7,131	641	-	-	-	340,215	10,339	-
2a.1.5.11	Control Rod Drive	-	2	0	0	1	1	-	1	6	6	-	-	19	3	-	-	-	1,005	41	-
2a.1.5.12	Control Rod Drive Hydraulic	-	331	12	17	130	106	-	133	729	729	-	-	1,658	422	-	-	-	103,181	5,893	-
2a.1.5.13	Core Spray	-	63	15	33	344	99	-	98	651	651	-	-	4,384	391	-	-	-	211,254	1,158	-
2a.1.5.14	Core Spray - Insulated	-	115	6	8	64	50	-	53	296	296	-	-	818	198	-	-	-	50,030	2,030	-
2a.1.5.15	Demin Water - Insulated - RCA	-	12	0	1	7	-	-	4	23	23	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	33	0	1	20	-	-	12	67	67	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	2	-	-	1	4	4	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	30	1	3	43	-	-	14	91	91	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	17	0	1	11	-	-	6	35	35	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	1	0	0	1	-	-	1	3	3	-	-	13	-	-	-	-	512	22	-

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 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)																					
2a.1.5.23	GEZIP - RCA	-	3	0	1	8	-	-	2	14	14	-	-	103	-	-	-	-	4,184	48	-
2a.1.5.24	Generator Physical Design - RCA	-	4	0	0	2	-	-	1	8	8	-	-	31	-	-	-	-	1,250	67	-
2a.1.5.25	H2-O2 Control Analyzing	-	5	0	0	0	2	-	2	10	10	-	-	6	10	-	-	-	1,054	80	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	5	0	0	0	2	-	2	10	10	-	-	6	10	-	-	-	1,054	80	-
2a.1.5.27	High Pressure Coolant Injection	-	53	5	8	76	39	-	36	219	219	-	-	972	156	-	-	-	52,764	964	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	175	11	16	125	91	-	89	506	506	-	-	1,598	361	-	-	-	95,554	3,074	-
2a.1.5.29	Hydrogen Cooling	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	6	0	0	3	-	-	2	11	11	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	14	0	1	15	-	-	6	36	36	-	-	189	-	-	-	-	7,669	212	-
2a.1.5.32	Hydrogen Water Chemistry - RCA	-	19	0	1	11	-	-	7	38	38	-	-	140	-	-	-	-	5,672	304	-
2a.1.5.33	Instrument & Service Air - RCA	-	181	3	10	139	-	-	68	400	400	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	156	9	13	104	78	-	77	438	438	-	-	1,333	308	-	-	-	80,308	2,742	-
2a.1.5.35	Main Steam	-	198	13	20	168	112	-	107	619	619	-	-	2,148	447	-	-	-	125,079	3,507	-
2a.1.5.36	Main Turbine	-	803	162	227	1,549	1,645	-	894	5,280	5,280	-	-	19,760	6,524	-	-	-	1,356,213	14,665	-
2a.1.5.37	Main Turbine - Insulated	-	170	14	23	198	126	-	109	641	641	-	-	2,530	500	-	-	-	145,256	3,064	-
2a.1.5.38	Miscellaneous	-	34	0	2	24	-	-	12	72	72	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	150	15	20	141	145	-	99	570	570	-	-	1,795	573	-	-	-	121,626	2,702	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	308	15	17	107	134	-	131	712	712	-	-	1,366	532	-	-	-	100,657	5,378	-
2a.1.5.41	Post Accident Sampling	-	20	1	1	4	6	-	7	39	39	-	-	53	25	-	-	-	4,267	344	-
2a.1.5.42	Post Accident Sampling - Insulated	-	13	1	1	1	7	-	5	29	29	-	-	17	28	-	-	-	3,042	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	66	2	9	116	-	-	36	229	229	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	3	0	0	3	-	-	1	7	7	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	44	2	2	15	18	-	18	100	100	-	-	193	73	-	-	-	13,992	772	-
2a.1.5.46	Residual Heat Removal	288	200	126	114	502	1,138	-	583	2,951	2,951	-	-	6,406	4,509	-	-	-	643,278	4,068	-
2a.1.5.47	Residual Heat Removal - Insulated	494	441	48	53	264	494	-	533	2,326	2,326	-	-	3,367	1,955	-	-	-	302,913	10,318	-
2a.1.5.48	Rx Core Isolation Cooling	-	39	2	2	20	14	-	17	94	94	-	-	259	57	-	-	-	15,348	690	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	85	4	4	23	37	-	35	189	189	-	-	288	148	-	-	-	24,314	1,477	-
2a.1.5.50	Rx Recirculation	45	47	4	3	3	36	-	44	182	182	-	-	43	142	-	-	-	13,860	1,578	-
2a.1.5.51	Snubbers	-	135	2	3	30	17	-	43	229	229	-	-	377	67	-	-	-	21,029	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	3	0	0	2	-	-	1	6	6	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	21	0	1	19	-	-	8	50	50	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	6	0	1	10	-	-	3	20	20	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	3	0	0	0	1	-	1	5	5	-	-	1	4	-	-	-	375	51	-
2a.1.5	Totals	826	6,539	707	1,006	7,654	6,400	-	5,016	28,148	28,129	-	19	97,654	25,419	-	-	-	6,120,628	119,641	-
2a.1.6	Scaffolding in support of decommissioning	-	1,950	23	8	89	17	-	509	2,596	2,596	-	-	1,030	68	-	-	-	52,131	22,564	-
2a.1	Subtotal Period 2a Activity Costs	1,340	20,714	18,588	4,408	12,888	27,618	499	29,785	115,841	115,822	-	19	157,785	43,991	1,430	1,033	-	10,673,420	236,482	2,338
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	83	-	35	120	-	202	-	114	554	554	-	-	-	533	-	-	-	31,987	104	-
2a.3.2	Process decommissioning chemical flush waste	4	-	130	605	-	1,407	-	458	2,605	2,605	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	242	-	-	-	-	-	36	278	250	-	28	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	62	9	72	-	72	-	-	-	-	-	-	-	-	-
2a.3.5	On-site survey and release of 0.0 tons clean metallic waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	88	242	165	725	-	1,609	62	617	3,508	3,408	72	28	-	2,626	-	-	-	254,995	496	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	64	-	-	-	-	-	-	16	80	80	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	701	70	771	771	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	1,537	154	1,690	1,521	-	169	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	1,510	-	-	-	-	-	377	1,887	1,887	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	2,328	-	-	-	-	-	349	2,677	2,677	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	97	30	-	338	-	99	564	564	-	-	-	4,573	-	-	-	91,465	149	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	3,799	570	4,368	4,368	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	898	90	988	988	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	930	93	1,023	-	1,023	-	-	-	-	-	-	-	-	-
2a.4.10	Fixed Overhead	-	-	-	-	-	-	2,043	306	2,350	2,350	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	956	143	1,099	-	1,099	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 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.4.13	Railroad Track Maintenance	-	-	-	-	-	-	116	17	134	134	-	-	-	-	-	-	-	-	-	-
2a.4.14	Security Staff Cost	-	-	-	-	-	-	5,275	791	6,066	6,066	-	-	-	-	-	-	-	-	-	165,173
2a.4.15	DOC Staff Cost	-	-	-	-	-	-	13,347	2,002	15,349	15,349	-	-	-	-	-	-	-	-	-	198,469
2a.4.16	Utility Staff Cost	-	-	-	-	-	-	18,669	2,800	21,470	21,470	-	-	-	-	-	-	-	-	-	369,517
2a.4	Subtotal Period 2a Period-Dependent Costs	64	3,838	97	30	-	338	48,383	7,895	60,645	58,226	2,251	169	-	4,573	-	-	-	91,465	149	733,159
2a.0	TOTAL PERIOD 2a COST	1,491	24,794	18,851	5,163	12,888	29,565	48,945	38,297	179,994	177,456	2,323	216	157,785	51,190	1,430	1,033	-	11,019,880	237,127	735,497
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	14	0	0	3	2	-	5	24	24	-	-	35	7	-	-	-	2,059	277	-
2b.1.1.2	Alternate N2 - RCA	-	13	0	1	7	-	-	4	26	26	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	128	17	-
2b.1.1.4	Electrical - Contaminated	-	354	5	15	187	17	-	124	702	702	-	-	2,389	68	-	-	-	102,746	6,324	-
2b.1.1.5	Electrical - Decontaminated	-	2,149	35	138	1,830	-	-	836	4,987	4,987	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	81	1	4	48	-	-	28	162	162	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	245	5	17	209	19	-	100	596	596	-	-	2,665	75	-	-	-	114,620	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	260	4	16	216	-	-	100	596	596	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	384	12	38	472	43	-	185	1,134	1,134	-	-	6,018	170	-	-	-	258,840	7,099	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	2	0	0	2	-	-	1	5	5	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	468	546	38	40	241	326	-	498	2,157	2,157	-	-	3,073	1,426	-	-	-	234,622	17,182	-
2b.1.1.12	Makeup Demin - RCA	-	82	2	9	115	-	-	39	248	248	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	22	2	8	112	-	-	24	168	168	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	272	16	24	216	119	-	135	783	783	-	-	2,755	484	-	-	-	151,977	4,763	-
2b.1.1.15	Primary Containment	-	362	33	56	486	285	-	246	1,468	1,468	-	-	6,201	1,132	-	-	-	347,847	6,442	-
2b.1.1.16	Process Radiation Monitors	-	37	1	1	11	10	-	14	74	74	-	-	142	39	-	-	-	9,063	648	-
2b.1.1.17	Rx Bldg Closed Clng Water - Insul - RCA	-	91	1	6	77	-	-	35	210	210	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	146	11	42	556	-	-	127	882	882	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	22	113	14	17	91	157	-	96	510	510	-	-	1,158	622	-	-	-	99,915	2,456	-
2b.1.1.20	Rx Pressure Vessel	22	38	4	3	6	44	-	33	150	150	-	-	75	172	-	-	-	17,716	1,049	-
2b.1.1.21	Rx Water Cleanup	136	211	14	10	10	139	-	160	680	680	-	-	130	555	-	-	-	52,246	5,729	-
2b.1.1.22	Secondary Containment	-	99	6	9	80	48	-	51	292	292	-	-	1,017	191	-	-	-	57,539	1,761	-
2b.1.1.23	Service & Seal Water - Insulated - RCA	-	96	2	7	92	-	-	39	236	236	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	127	3	11	142	-	-	55	337	337	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	12	0	1	16	-	-	6	36	36	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	269	393	29	32	187	261	-	333	1,503	1,503	-	-	2,387	1,108	-	-	-	184,752	10,809	-
2b.1.1.27	Structures & Buildings	-	62	2	3	28	16	-	24	135	135	-	-	357	64	-	-	-	19,952	1,127	-
2b.1.1.28	Wells & Domestic Water	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	42	1	2	27	-	-	15	86	86	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	917	6,261	240	512	5,466	1,486	-	3,316	18,199	18,190	-	9	69,735	6,115	-	-	-	3,332,448	122,771	-
2b.1.2	Scaffolding in support of decommissioning	-	2,437	29	10	112	21	-	636	3,245	3,245	-	-	1,287	85	-	-	-	65,164	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	4,157	2,305	122	324	3,768	789	-	3,478	14,943	14,943	-	-	48,077	4,214	-	-	-	2,314,063	112,479	-
2b.1.3.2	Admin	86	5	0	2	-	12	-	47	152	152	-	-	-	79	-	-	-	6,840	1,599	-
2b.1.3.3	HPCI Room	23	22	0	2	9	11	-	22	90	90	-	-	118	70	-	-	-	10,755	789	-
2b.1.3.4	Hot Shop	13	3	0	1	-	9	-	10	37	37	-	-	-	56	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	47	20	1	5	2	37	-	39	149	149	-	-	31	237	-	-	-	21,707	1,126	-
2b.1.3.6	Offgas Stack	299	212	4	14	105	62	-	236	933	933	-	-	1,343	376	-	-	-	86,945	8,858	-
2b.1.3.7	Offgas Storage & Compressor	33	14	0	3	2	27	-	27	107	107	-	-	25	173	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	97	49	2	10	13	78	-	84	334	334	-	-	172	501	-	-	-	49,943	2,501	-
2b.1.3.9	Radwaste Material Storage Warehouse	51	20	1	5	-	42	-	42	161	161	-	-	-	270	-	-	-	23,400	1,196	-
2b.1.3.10	Recombiner	22	20	1	3	16	19	-	23	103	103	-	-	199	121	-	-	-	18,403	695	-
2b.1.3.11	Turbine	567	284	10	63	101	455	-	494	1,973	1,973	-	-	1,283	2,910	-	-	-	303,139	14,432	-
2b.1.3.12	Turbine Building Addition	47	17	1	5	-	37	-	38	144	144	-	-	-	236	-	-	-	20,478	1,086	-
2b.1.3	Totals	5,442	2,970	141	436	4,017	1,578	-	4,540	19,126	19,126	-	-	51,247	9,242	-	-	-	2,876,482	145,831	-

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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			
2b.1	Subtotal Period 2b Activity Costs	6,360	11,669	411	958	9,594	3,086	-	8,492	40,570	40,561	-	9	122,269	15,442	-	-	-	6,274,094	296,806	-
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	173	-	74	257	-	430	-	240	1,173	1,173	-	-	-	1,135	-	-	-	68,127	221	-
2b.3.2	Process decommissioning chemical flush waste	1	-	26	119	-	278	-	90	514	514	-	-	-	413	-	-	-	43,978	77	-
2b.3.3	Small tool allowance	-	275	-	-	-	-	-	41	316	316	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	25,288	3,793	29,081	-	29,081	-	-	-	-	-	-	-	-	-
2b.3.5	On-site survey and release of 0.0 tons clean metallic waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	174	275	99	376	-	707	25,288	4,165	31,084	2,003	29,081	-	-	1,548	-	-	-	112,106	299	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,008	-	-	-	-	-	-	252	1,260	1,260	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,246	125	1,371	1,371	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,733	273	3,006	3,006	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,170	-	-	-	-	-	542	2,712	2,712	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,103	-	-	-	-	-	615	4,718	4,718	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	124	38	-	429	-	125	715	715	-	-	-	5,805	-	-	-	116,095	189	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	5,328	799	6,128	6,128	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,596	160	1,755	1,755	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,653	165	1,818	-	1,818	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	3,630	545	4,175	4,175	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,698	255	1,952	-	1,952	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	431	65	496	496	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	199	30	229	-	229	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	207	31	238	238	-	-	-	-	-	-	-	-	-	-
2b.4.15	Security Staff Cost	-	-	-	-	-	-	9,373	1,406	10,779	10,779	-	-	-	-	-	-	-	-	-	293,480
2b.4.16	DOC Staff Cost	-	-	-	-	-	-	22,933	3,440	26,373	26,373	-	-	-	-	-	-	-	-	-	338,720
2b.4.17	Utility Staff Cost	-	-	-	-	-	-	32,021	4,803	36,824	36,824	-	-	-	-	-	-	-	-	-	628,720
2b.4	Subtotal Period 2b Period-Dependent Costs	1,008	6,273	124	38	-	429	83,048	13,631	104,550	100,551	3,999	-	-	5,805	-	-	-	116,095	189	1,260,920
2b.0	TOTAL PERIOD 2b COST	7,541	18,217	634	1,372	9,594	4,223	108,336	26,287	176,204	143,115	33,080	9	122,269	22,795	-	-	-	6,502,294	297,294	1,260,920
PERIOD 2c - Spent fuel delay prior to SFP decon																					
Period 2c Direct Decommissioning Activities																					
Period 2c Collateral Costs																					
2c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	34,142	5,121	39,263	-	39,263	-	-	-	-	-	-	-	-	-
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	34,142	5,121	39,263	-	39,263	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	5,621	562	6,183	6,183	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	8,659	866	9,525	9,525	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	3,222	-	-	-	-	-	806	4,028	4,028	-	-	-	-	-	-	-	-	-	-
2c.4.4	Heavy equipment rental	-	1,851	-	-	-	-	-	278	2,129	2,129	-	-	-	-	-	-	-	-	-	-
2c.4.5	Disposal of DAW generated	-	-	88	27	-	306	-	89	510	510	-	-	-	4,140	-	-	-	82,809	135	-
2c.4.6	Plant energy budget	-	-	-	-	-	-	6,410	961	7,371	7,371	-	-	-	-	-	-	-	-	-	-
2c.4.7	NRC Fees	-	-	-	-	-	-	1,792	179	1,971	1,971	-	-	-	-	-	-	-	-	-	-
2c.4.8	Emergency Planning Fees	-	-	-	-	-	-	7,455	745	8,200	-	8,200	-	-	-	-	-	-	-	-	-
2c.4.9	Fixed Overhead	-	-	-	-	-	-	16,377	2,457	18,833	18,833	-	-	-	-	-	-	-	-	-	-
2c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	7,659	1,149	8,807	-	8,807	-	-	-	-	-	-	-	-	-
2c.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	389	58	447	447	-	-	-	-	-	-	-	-	-	-
2c.4.12	ISFSI Operating Costs	-	-	-	-	-	-	898	135	1,032	-	1,032	-	-	-	-	-	-	-	-	-
2c.4.13	Railroad Track Maintenance	-	-	-	-	-	-	933	140	1,073	1,073	-	-	-	-	-	-	-	-	-	-
2c.4.14	Security Staff Cost	-	-	-	-	-	-	36,102	5,415	41,517	41,517	-	-	-	-	-	-	-	-	-	1,114,599
2c.4.15	Utility Staff Cost	-	-	-	-	-	-	41,311	6,197	47,508	47,508	-	-	-	-	-	-	-	-	-	826,791
2c.4	Subtotal Period 2c Period-Dependent Costs	-	5,073	88	27	-	306	133,604	20,037	159,135	141,095	18,040	-	-	4,140	-	-	-	82,809	135	1,941,390
2c.0	TOTAL PERIOD 2c COST	-	5,073	88	27	-	306	167,746	25,158	198,398	141,095	57,303	-	-	4,140	-	-	-	82,809	135	1,941,390

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 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 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	526	46	111	97	-	1,449	-	663	2,892	2,892	-	-	-	5,740	-	-	-	487,876	906	-
Disposal of Plant Systems																					
2d.1.2.1	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	8	-	-	2	14	14	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	37	0	2	19	2	-	13	73	73	-	-	240	7	-	-	-	10,336	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	237	4	15	193	-	-	91	538	538	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	9	0	0	5	-	-	3	17	17	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	195	340	26	24	92	254	-	266	1,198	1,198	-	-	1,179	1,021	-	-	-	133,352	8,367	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	21	33	2	2	5	22	-	26	111	111	-	-	67	88	-	-	-	10,157	847	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	27	1	2	23	2	-	11	66	66	-	-	296	8	-	-	-	12,736	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	26	0	1	18	-	-	9	55	55	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	23	0	2	21	-	-	9	55	55	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	217	735	34	48	384	280	-	430	2,127	2,127	-	-	4,894	1,124	-	-	-	292,960	15,371	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	756	1,359	35	247	154	2,668	-	1,449	6,669	6,669	-	-	1,969	15,685	-	-	-	1,203,773	35,501	-
2d.1.3	Totals	756	1,359	35	247	154	2,668	-	1,449	6,669	6,669	-	-	1,969	15,685	-	-	-	1,203,773	35,501	-
2d.1.4	Scaffolding in support of decommissioning	-	487	6	2	22	4	-	127	649	649	-	-	257	17	-	-	-	13,033	5,641	-
2d.1	Subtotal Period 2d Activity Costs	1,499	2,628	186	394	560	4,401	-	2,669	12,337	12,337	-	-	7,120	22,566	-	-	-	1,997,641	57,419	-
Period 2d Additional Costs																					
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,034	310	1,344	1,344	-	-	-	-	-	-	-	-	-	12,480
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,034	310	1,344	1,344	-	-	-	-	-	-	-	-	-	12,480
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	25	-	13	46	-	77	-	40	201	201	-	-	-	202	-	-	-	12,142	39	-
2d.3.2	Process decommissioning chemical flush waste	1	-	16	72	-	168	-	55	310	310	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	62	-	-	-	-	-	9	71	71	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	137	55	521	100	-	125	938	938	-	-	6,000	397	-	-	-	303,726	88	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,512	1,577	12,089	-	12,089	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	26	62	165	172	521	344	10,512	1,806	13,609	1,520	12,089	-	6,000	848	-	-	-	342,421	174	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	161	-	-	-	-	-	-	40	201	201	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	422	42	464	464	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	532	53	586	586	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	529	-	-	-	-	-	132	661	661	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,390	-	-	-	-	-	208	1,598	1,598	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	12	-	140	-	41	233	233	-	-	-	1,890	-	-	-	37,793	62	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	962	144	1,107	1,107	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	540	54	594	594	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	560	56	616	-	616	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,230	184	1,414	1,414	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	292	44	336	336	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	67	10	78	-	78	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	70	11	81	81	-	-	-	-	-	-	-	-	-	-
2d.4.14	Security Staff Cost	-	-	-	-	-	-	1,782	267	2,050	2,050	-	-	-	-	-	-	-	-	-	52,250
2d.4.15	DOC Staff Cost	-	-	-	-	-	-	5,375	806	6,182	6,182	-	-	-	-	-	-	-	-	-	78,571
2d.4.16	Utility Staff Cost	-	-	-	-	-	-	8,063	1,209	9,272	9,272	-	-	-	-	-	-	-	-	-	150,071
2d.4	Subtotal Period 2d Period-Dependent Costs	161	1,918	40	12	-	140	19,896	3,303	25,471	24,778	693	-	-	1,890	-	-	-	37,793	62	280,893
2d.0	TOTAL PERIOD 2d COST	1,686	4,608	391	579	1,081	4,885	31,442	8,088	52,760	39,979	12,782	-	13,120	25,303	-	-	-	2,377,855	57,655	293,373

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 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 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	154	46	200	200	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	154	46	200	200	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	5,518	1,656	7,174	7,174	-	-	-	-	-	-	-	-	96,186	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	5,518	1,656	7,174	7,174	-	-	-	-	-	-	-	-	96,186	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,599	240	1,839	1,839	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	38	6	43	-	43	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,636	245	1,882	1,839	43	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	405	41	446	446	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	532	53	586	586	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	503	-	-	-	-	-	126	629	629	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	8	2	-	26	-	8	44	44	-	-	-	355	-	-	-	7,097	12	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	481	72	553	553	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	579	58	637	637	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	226	23	248	-	248	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,230	184	1,414	1,414	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	67	10	78	-	78	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	70	11	81	81	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	1,748	262	2,010	2,010	-	-	-	-	-	-	-	-	-	51,071
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	4,071	611	4,682	4,682	-	-	-	-	-	-	-	-	-	57,357
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	4,566	685	5,250	5,250	-	-	-	-	-	-	-	-	-	80,929
2f.4	Subtotal Period 2f Period-Dependent Costs	-	503	8	2	-	26	13,976	2,143	16,658	16,332	326	-	-	355	-	-	-	7,097	12	189,357
2f.0	TOTAL PERIOD 2f COST	-	503	8	2	-	26	21,284	4,090	25,913	25,544	369	-	-	355	-	-	-	7,097	96,197	195,597
PERIOD 2 TOTALS		10,719	53,195	19,972	7,142	23,563	39,005	377,753	101,920	633,270	527,188	105,857	225	293,175	103,784	1,430	1,033	-	19,989,940	688,408	4,426,777
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	3,342	-	-	-	-	-	501	3,844	-	-	3,844	-	-	-	-	-	-	37,418	-
3b.1.1.2	Condensate Tanks Foundation	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	219	-
3b.1.1.3	Discharge Retention Basin	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	110	-
3b.1.1.4	HPCI Room	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	401	-
3b.1.1.5	Hot Shop	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	298	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	21	-
3b.1.1.7	LLRW Storage & Shipping	-	129	-	-	-	-	-	19	148	-	-	148	-	-	-	-	-	-	1,794	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	59	-
3b.1.1.9	Offgas Stack	-	214	-	-	-	-	-	32	246	-	-	246	-	-	-	-	-	-	2,668	-
3b.1.1.10	Offgas Storage & Compressor	-	80	-	-	-	-	-	12	92	-	-	92	-	-	-	-	-	-	963	-
3b.1.1.11	Radwaste	-	444	-	-	-	-	-	67	511	-	-	511	-	-	-	-	-	-	5,196	-
3b.1.1.12	Recombiner	-	236	-	-	-	-	-	35	272	-	-	272	-	-	-	-	-	-	2,490	-
3b.1.1.13	Security Barrier	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	4,083	-
3b.1.1.14	Tank Farm	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	121	-
3b.1.1.15	Turbine	-	1,443	-	-	-	-	-	216	1,659	-	-	1,659	-	-	-	-	-	-	18,764	-
3b.1.1.16	Turbine Building Addition	-	61	-	-	-	-	-	9	70	-	-	70	-	-	-	-	-	-	971	-
3b.1.1.17	Turbine Pedestal	-	379	-	-	-	-	-	57	436	-	-	436	-	-	-	-	-	-	3,762	-
3b.1.1	Totals	-	6,764	-	-	-	-	-	1,015	7,778	-	-	7,778	-	-	-	-	-	-	79,340	-

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 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			
Site Closeout Activities																					
3b.1.2	BackFill Site	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	517	-
3b.1.3	Grade & landscape site	-	983	-	-	-	-	-	147	1,131	-	-	1,131	-	-	-	-	-	-	1,841	-
3b.1.4	Final report to NRC	-	-	-	-	-	-	165	25	189	189	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	8,014	-	-	-	-	165	1,227	9,405	189	-	9,216	-	-	-	-	-	-	81,698	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	299	-	-	-	-	8	46	353	-	-	353	-	-	-	-	-	-	1,402	-
3b.2	Subtotal Period 3b Additional Costs	-	299	-	-	-	-	8	46	353	-	-	353	-	-	-	-	-	-	1,402	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	81	-	-	-	-	-	12	93	-	-	93	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,939	291	2,230	-	2,230	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	81	-	-	-	-	1,939	303	2,323	-	2,230	93	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	933	93	1,027	-	1,027	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	922	92	1,014	-	1,014	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	4,584	-	-	-	-	-	688	5,272	-	-	5,272	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	554	83	637	-	-	637	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	373	37	411	-	411	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	520	52	572	-	572	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	767	115	882	882	-	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	155	23	178	-	178	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	4,023	603	4,626	(0)	3,932	694	-	-	-	-	-	-	-	117,557
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	8,894	1,334	10,228	-	-	10,228	-	-	-	-	-	-	-	122,983
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	5,834	875	6,710	(0)	1,409	5,301	-	-	-	-	-	-	-	98,567
3b.4	Subtotal Period 3b Period-Dependent Costs	-	4,584	-	-	-	-	23,136	4,021	31,741	1,067	8,543	22,131	-	-	-	-	-	-	-	339,107
3b.0	TOTAL PERIOD 3b COST	-	12,978	-	-	-	-	25,248	5,597	43,823	1,256	10,772	31,794	-	-	-	-	-	-	83,100	340,667
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	691,171	103,676	794,847	-	794,847	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	691,171	103,676	794,847	-	794,847	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	90,508	9,051	99,558	-	99,558	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	89,398	8,940	98,337	-	98,337	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	36,191	3,619	39,810	-	39,810	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	50,420	5,042	55,462	-	55,462	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	74,348	11,152	85,501	-	85,501	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	15,044	2,257	17,300	-	17,300	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	333,127	49,969	383,096	-	383,096	-	-	-	-	-	-	-	-	9,470,982
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	119,519	17,928	137,446	-	137,446	-	-	-	-	-	-	-	-	2,367,746
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	808,554	107,957	916,512	-	916,512	-	-	-	-	-	-	-	-	11,838,730
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	1,499,725	211,633	1,711,359	-	1,711,359	-	-	-	-	-	-	-	-	11,838,730
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,370	-	-	7,885	-	1,320	10,575	10,575	-	-	-	-	-	-	1,785	346,570	-	-
3d.1.1	Totals	-	-	1,370	-	-	7,885	-	1,320	10,575	10,575	-	-	-	-	-	-	1,785	346,570	-	-

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 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			
3d.1	Subtotal Period 3d Activity Costs	-	-	1,370	-	-	7,885	-	1,320	10,575	10,575	-	-	-	-	-	-	1,785	346,570	-	-
Period 3d Additional Costs																					
3d.2.1	ISFSI Railroad Track Refurbishment	-	-	-	-	-	-	265	40	304	-	304	-	-	-	-	-	-	-	-	-
3d.2	Subtotal Period 3d Additional Costs	-	-	-	-	-	-	265	40	304	-	304	-	-	-	-	-	-	-	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	18,358	2,754	21,112	-	21,112	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	18,358	2,754	21,112	-	21,112	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	7,539	754	8,292	-	8,292	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	7,446	745	8,191	-	8,191	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	3,885	388	4,273	-	4,273	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	4,200	420	4,620	-	4,620	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	6,193	929	7,122	-	7,122	-	-	-	-	-	-	-	-	-
3d.4.7	ISFSI Operating Costs	-	-	-	-	-	-	1,253	188	1,441	-	1,441	-	-	-	-	-	-	-	-	-
3d.4.8	Railroad Track Maintenance	-	-	-	-	-	-	1,302	195	1,497	-	1,497	-	-	-	-	-	-	-	-	-
3d.4.9	Security Staff Cost	-	-	-	-	-	-	27,747	4,162	31,909	-	31,909	-	-	-	-	-	-	-	-	788,863
3d.4.10	Utility Staff Cost	-	-	-	-	-	-	9,955	1,493	11,448	-	11,448	-	-	-	-	-	-	-	-	197,216
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	69,519	9,274	78,793	-	78,793	-	-	-	-	-	-	-	-	986,079
3d.0	TOTAL PERIOD 3d COST	-	-	1,370	-	-	7,885	88,141	13,388	110,784	10,575	100,209	-	-	-	-	-	1,785	346,570	-	986,079
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	ISFSI License Termination	-	273	5	14	-	70	1,291	282	1,935	-	1,935	-	-	520	-	-	-	81,210	6,483	2,560
3e.2	Subtotal Period 3e Additional Costs	-	273	5	14	-	70	1,291	282	1,935	-	1,935	-	-	520	-	-	-	81,210	6,483	2,560
Period 3e Collateral Costs																					
3e.3.1	Small tool allowance	-	3	-	-	-	-	-	0	4	-	4	-	-	-	-	-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	3	-	-	-	-	-	0	4	-	4	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	178	18	196	-	196	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	NRC ISFSI Fees	-	-	-	-	-	-	71	7	78	-	78	-	-	-	-	-	-	-	-	-
3e.4.5	Fixed Overhead	-	-	-	-	-	-	147	22	169	-	169	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	178	27	205	-	205	-	-	-	-	-	-	-	-	5,013
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	197	30	227	-	227	-	-	-	-	-	-	-	-	3,803
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	772	103	875	-	875	-	-	-	-	-	-	-	-	8,816
3e.0	TOTAL PERIOD 3e COST	-	276	5	14	-	70	2,063	386	2,814	-	2,814	-	-	520	-	-	-	81,210	6,483	11,376
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	ISFSI Demolition and Site Restoration	-	866	-	-	-	-	47	137	1,049	-	1,049	-	-	-	-	-	-	-	6,504	160
3f.2	Subtotal Period 3f Additional Costs	-	866	-	-	-	-	47	137	1,049	-	1,049	-	-	-	-	-	-	-	6,504	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	6	-	-	-	-	-	1	7	-	7	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	6	-	-	-	-	-	1	7	-	7	-	-	-	-	-	-	-	-	-

Table D
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.4	Fixed Overhead	-	-	-	-	-	-	74	11	85	-	85	-	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	90	13	103	-	103	-	-	-	-	-	-	-	-	2,527
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	78	12	89	-	89	-	-	-	-	-	-	-	-	1,569
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	241	36	277	-	277	-	-	-	-	-	-	-	-	4,096
3f.0	TOTAL PERIOD 3f COST	-	872	-	-	-	-	288	174	1,334	-	1,334	-	-	-	-	-	-	-	6,504	4,256
PERIOD 3 TOTALS		-	14,126	1,375	14	-	7,955	1,615,466	231,177	1,870,113	11,831	1,826,488	31,794	-	520	-	-	1,785	427,780	96,088	13,181,110
TOTAL COST TO DECOMMISSION		**13,355**	**69,743**	**21,422**	**7,294**	**23,575**	**47,976**	**2,112,972**	**352,570**	**2,648,907**	**652,481**	**1,963,576**	**32,850**	**293,218**	**105,504**	**1,660**	**1,033**	**1,785**	**20,480,900**	**816,345**	**18,668,020**

TOTAL COST TO DECOMMISSION WITH 15.35% CONTINGENCY:	**$2,648,907**	**thousands of 2011 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 24.63% OR:	**$652,481**	**thousands of 2011 dollars**
SPENT FUEL MANAGEMENT COST IS 74.13% OR:	**$1,963,576**	**thousands of 2011 dollars**
NON-NUCLEAR DEMOLITION COST IS 1.24% OR:	**$32,850**	**thousands of 2011 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**108,198**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**1,785**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**15,668**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**816,345**	**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 TABLE

SCENARIO 3

DECON DECOMMISSIONING COST ESTIMATE –

200 YEAR SPENT FUEL MANAGEMENT –

PERIODIC RE-CASKING OF SPENT FUEL

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	137	21	158	158	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	485	73	558	558	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	137	21	158	158	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	792	119	910	910	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	327	49	376	376	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	528	79	607	607	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	432	65	497	497	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	519	78	597	537	-	60	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	440	66	506	455	-	51	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	749	112	862	862	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	686	103	789	789	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	169	25	194	97	-	97	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	329	49	379	189	-	189	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	485	73	558	558	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	95	14	109	55	-	55	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	4,505	676	5,180	4,729	-	451	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	253	38	291	291	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	2,800	420	3,220	3,220	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	148	22	170	170	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,200	330	2,530	2,530	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	130	19	149	149	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	13,296	1,994	15,291	14,839	-	451	-	-	-	-	-	-	-	78,609
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	24,038	3,606	27,644	-	27,644	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	24,038	3,606	27,644	-	27,644	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,301	130	1,431	1,431	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	2,880	288	3,168	3,168	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	434	-	-	-	-	-	109	543	543	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	427	-	-	-	-	-	64	491	491	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	4	-	45	-	13	75	75	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	3,194	479	3,673	3,673	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	769	77	846	846	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	1,263	126	1,390	-	1,390	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Overhead	-	-	-	-	-	-	2,138	321	2,458	2,458	-	-	-	-	-	-	-	-	-	-

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 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 (continued)																					
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	763	114	878	-	878	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	89	13	103	-	103	-	-	-	-	-	-	-	-	-
1a.4.12	Railroad Track Maintenance	-	-	-	-	-	-	93	14	107	107	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	4,968	745	5,713	5,713	-	-	-	-	-	-	-	-	-	157,471
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	20,566	3,085	23,651	23,651	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	862	13	4	-	45	38,024	5,579	44,526	42,156	2,370	-	-	610	-	-	-	12,190	20	580,871
1a.0	TOTAL PERIOD 1a COST	-	862	13	4	-	45	75,359	11,179	87,461	56,996	30,014	451	-	610	-	-	-	12,190	20	659,480
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	500	75	574	517	-	57	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	422	63	485	485	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	142	21	164	41	-	123	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	383	57	441	441	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	127	19	146	73	-	73	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	106	16	121	61	-	61	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	220	33	252	252	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	288	43	331	298	-	33	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	288	43	331	298	-	33	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	3,561	534	4,095	3,715	-	380	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	238	-	-	-	-	-	-	119	357	357	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	238	-	-	-	-	-	3,561	653	4,452	4,072	-	380	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Spent fuel pool isolation	-	-	-	-	-	-	10,280	1,542	11,822	11,822	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	4,786	1,436	6,222	6,222	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.3	Mixed & RCRA Waste	-	-	26	12	11	-	-	6	55	55	-	-	43	-	-	-	-	5,253	163	-
1b.2	Subtotal Period 1b Additional Costs	-	-	26	12	11	-	15,066	2,984	18,099	18,099	-	-	43	-	-	-	-	5,253	30,663	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	835	-	-	-	-	-	-	125	961	961	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,599	240	1,839	1,839	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	37	-	15	53	-	88	-	50	243	243	-	-	-	233	-	-	-	13,986	45	-
1b.3.4	Process decommissioning chemical flush waste	0	-	14	67	-	856	-	226	1,163	1,163	-	-	-	-	231	-	-	24,599	43	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,500	-	-	-	-	-	-	225	1,725	1,725	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	25	4	29	-	29	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,373	1,102	29	119	-	944	1,624	1,035	7,226	7,197	29	-	-	233	231	-	-	38,585	89	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	26	-	-	-	-	-	-	6	32	32	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	281	28	309	309	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	835	84	919	919	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	245	-	-	-	-	-	61	306	306	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	214	-	-	-	-	-	32	246	246	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	2	-	26	-	8	44	44	-	-	-	358	-	-	-	7,159	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	3,202	480	3,683	3,683	-	-	-	-	-	-	-	-	-	-

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1b Period-Dependent Costs (continued)																					
1b.4.8	NRC Fees	-	-	-	-	-	-	386	39	424	424	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	633	63	697	-	697	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Overhead	-	-	-	-	-	-	1,072	161	1,233	1,233	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	383	57	440	-	440	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	45	7	52	-	52	-	-	-	-	-	-	-	-	-
1b.4.13	Railroad Track Maintenance	-	-	-	-	-	-	47	7	54	54	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	2,491	374	2,864	2,864	-	-	-	-	-	-	-	-	-	78,951
1b.4.15	DOC Staff Cost	-	-	-	-	-	-	4,405	661	5,066	5,066	-	-	-	-	-	-	-	-	-	63,789
1b.4.16	Utility Staff Cost	-	-	-	-	-	-	10,364	1,555	11,919	11,919	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	26	459	8	2	-	26	24,143	3,622	28,286	27,098	1,188	-	-	358	-	-	-	7,159	12	356,066
1b.0	TOTAL PERIOD 1b COST	2,636	1,560	63	133	11	971	44,394	8,294	58,063	56,466	1,217	380	43	591	231	-	-	50,997	31,830	400,659
PERIOD 1 TOTALS		2,636	2,422	76	137	11	1,016	119,753	19,473	145,525	113,462	31,231	831	43	1,201	231	-	-	63,188	31,850	1,060,139
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Recirculation System Piping & Valves	89	75	17	19	-	291	-	140	632	632	-	-	-	858	-	-	-	98,047	2,888	-
2a.1.1.2	Recirculation Pumps & Motors	32	50	15	33	20	300	-	113	561	561	-	-	96	945	-	-	-	111,100	1,563	-
2a.1.1.3	CRDMs & NIs Removal	155	116	407	86	-	277	-	229	1,270	1,270	-	-	-	3,741	-	-	-	93,194	4,779	-
2a.1.1.4	Reactor Vessel Internals	173	3,070	14,185	2,146	-	17,131	249	15,075	52,030	52,030	-	-	-	1,002	1,430	1,033	-	312,690	25,925	1,169
2a.1.1.5	Reactor Vessel	65	6,759	1,934	692	-	2,736	249	7,164	19,600	19,600	-	-	-	10,110	-	-	-	1,073,269	25,925	1,169
2a.1.1	Totals	514	10,070	16,559	2,976	20	20,735	499	22,721	74,092	74,092	-	-	96	16,656	1,430	1,033	-	1,688,300	61,080	2,338
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	312	916	295	3,614	329	-	838	6,305	6,305	-	-	41,610	1,303	-	-	-	1,983,244	5,557	-
2a.1.3	Main Condensers	-	1,069	383	123	1,511	138	-	585	3,809	3,809	-	-	17,396	545	-	-	-	829,117	18,831	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor Building	-	577	-	-	-	-	-	86	663	663	-	-	-	-	-	-	-	-	6,356	-
2a.1.4.2	Radwaste	-	49	-	-	-	-	-	7	56	56	-	-	-	-	-	-	-	-	569	-
2a.1.4.3	Turbine	-	150	-	-	-	-	-	22	172	172	-	-	-	-	-	-	-	-	1,884	-
2a.1.4	Totals	-	775	-	-	-	-	-	116	891	891	-	-	-	-	-	-	-	-	8,809	-
Disposal of Plant Systems																					
2a.1.5.1	Automatic Press Relief	-	94	5	7	63	39	-	44	252	252	-	-	803	154	-	-	-	45,723	1,654	-
2a.1.5.2	Chemistry Sampling	-	22	1	1	12	7	-	9	52	52	-	-	156	28	-	-	-	8,686	400	-
2a.1.5.3	Chemistry Sampling - Insulated	-	1	0	0	-	0	-	0	2	2	-	-	-	1	-	-	-	70	28	-
2a.1.5.4	Circulating Water - RCA	-	165	10	39	522	-	-	126	862	862	-	-	6,656	-	-	-	-	270,307	2,860	-
2a.1.5.5	Combustible Gas Control - Insul - RCA	-	24	0	1	17	-	-	9	50	50	-	-	212	-	-	-	-	8,617	378	-
2a.1.5.6	Combustible Gas Control - RCA	-	14	0	2	22	-	-	7	46	46	-	-	285	-	-	-	-	11,577	245	-
2a.1.5.7	Condensate & Feedwater	-	784	143	211	1,563	1,386	-	823	4,910	4,910	-	-	19,947	5,490	-	-	-	1,276,657	14,137	-
2a.1.5.8	Condensate & Feedwater - Insulated	-	391	26	40	327	228	-	213	1,226	1,226	-	-	4,176	905	-	-	-	246,501	6,953	-
2a.1.5.9	Condensate Demin	-	434	22	32	262	189	-	202	1,143	1,143	-	-	3,346	755	-	-	-	199,605	7,608	-
2a.1.5.10	Condensate Storage	-	577	25	52	559	150	-	276	1,640	1,640	-	-	7,131	641	-	-	-	340,215	10,339	-
2a.1.5.11	Control Rod Drive	-	2	0	0	1	1	-	1	6	6	-	-	19	3	-	-	-	1,005	41	-
2a.1.5.12	Control Rod Drive Hydraulic	-	331	12	17	130	106	-	133	729	729	-	-	1,658	422	-	-	-	103,181	5,893	-
2a.1.5.13	Core Spray	-	63	15	33	344	99	-	98	651	651	-	-	4,384	391	-	-	-	211,254	1,158	-
2a.1.5.14	Core Spray - Insulated	-	115	6	8	64	50	-	53	296	296	-	-	818	198	-	-	-	50,030	2,030	-
2a.1.5.15	Demin Water - Insulated - RCA	-	12	0	1	7	-	-	4	23	23	-	-	85	-	-	-	-	3,445	181	-
2a.1.5.16	Demin Water - RCA	-	33	0	1	20	-	-	12	67	67	-	-	253	-	-	-	-	10,278	508	-
2a.1.5.17	Diesel Oil - RCA	-	2	0	0	2	-	-	1	4	4	-	-	23	-	-	-	-	931	25	-
2a.1.5.18	Drywell Atmosphere Cooling - RCA	-	30	1	3	43	-	-	14	91	91	-	-	548	-	-	-	-	22,244	550	-
2a.1.5.19	EDG Emerg Service Water - Insul - RCA	-	0	0	0	0	-	-	0	1	1	-	-	2	-	-	-	-	84	4	-
2a.1.5.20	Electrical - Clean	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	182	-
2a.1.5.21	Emergency Service Water - Insul - RCA	-	17	0	1	11	-	-	6	35	35	-	-	137	-	-	-	-	5,544	281	-
2a.1.5.22	Emergency Service Water - RCA	-	1	0	0	1	-	-	1	3	3	-	-	13	-	-	-	-	512	22	-

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 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)																					
2a.1.5.23	GEZIP - RCA	-	3	0	1	8	-	-	2	14	14	-	-	103	-	-	-	-	4,184	48	-
2a.1.5.24	Generator Physical Design - RCA	-	4	0	0	2	-	-	1	8	8	-	-	31	-	-	-	-	1,250	67	-
2a.1.5.25	H2-O2 Control Analyzing	-	5	0	0	0	2	-	2	10	10	-	-	6	10	-	-	-	1,054	80	-
2a.1.5.26	H2-O2 Control Analyzing - Insulated	-	5	0	0	0	2	-	2	10	10	-	-	6	10	-	-	-	1,054	80	-
2a.1.5.27	High Pressure Coolant Injection	-	53	5	8	76	39	-	36	219	219	-	-	972	156	-	-	-	52,764	964	-
2a.1.5.28	High Pressure Coolant Injection - Insula	-	175	11	16	125	91	-	89	506	506	-	-	1,598	361	-	-	-	95,554	3,074	-
2a.1.5.29	Hydrogen Cooling	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	118	-
2a.1.5.30	Hydrogen Cooling - RCA	-	6	0	0	3	-	-	2	11	11	-	-	39	-	-	-	-	1,600	79	-
2a.1.5.31	Hydrogen Seal Oil - RCA	-	14	0	1	15	-	-	6	36	36	-	-	189	-	-	-	-	7,669	212	-
2a.1.5.32	Hydrogen Water Chemistry - RCA	-	19	0	1	11	-	-	7	38	38	-	-	140	-	-	-	-	5,672	304	-
2a.1.5.33	Instrument & Service Air - RCA	-	181	3	10	139	-	-	68	400	400	-	-	1,768	-	-	-	-	71,810	2,733	-
2a.1.5.34	Main Condenser	-	156	9	13	104	78	-	77	438	438	-	-	1,333	308	-	-	-	80,308	2,742	-
2a.1.5.35	Main Steam	-	198	13	20	168	112	-	107	619	619	-	-	2,148	447	-	-	-	125,079	3,507	-
2a.1.5.36	Main Turbine	-	803	162	227	1,549	1,645	-	894	5,280	5,280	-	-	19,760	6,524	-	-	-	1,356,213	14,665	-
2a.1.5.37	Main Turbine - Insulated	-	170	14	23	198	126	-	109	641	641	-	-	2,530	500	-	-	-	145,256	3,064	-
2a.1.5.38	Miscellaneous	-	34	0	2	24	-	-	12	72	72	-	-	302	-	-	-	-	12,283	622	-
2a.1.5.39	Off Gas Recombiner	-	150	15	20	141	145	-	99	570	570	-	-	1,795	573	-	-	-	121,626	2,702	-
2a.1.5.40	Off Gas Recombiner - Insulated	-	308	15	17	107	134	-	131	712	712	-	-	1,366	532	-	-	-	100,657	5,378	-
2a.1.5.41	Post Accident Sampling	-	20	1	1	4	6	-	7	39	39	-	-	53	25	-	-	-	4,267	344	-
2a.1.5.42	Post Accident Sampling - Insulated	-	13	1	1	1	7	-	5	29	29	-	-	17	28	-	-	-	3,042	212	-
2a.1.5.43	RHR Service Water - Insulated - RCA	-	66	2	9	116	-	-	36	229	229	-	-	1,485	-	-	-	-	60,293	1,125	-
2a.1.5.44	RHR Service Water - RCA	-	3	0	0	3	-	-	1	7	7	-	-	35	-	-	-	-	1,410	57	-
2a.1.5.45	Reactor Feedwater Pump Seal	-	44	2	2	15	18	-	18	100	100	-	-	193	73	-	-	-	13,992	772	-
2a.1.5.46	Residual Heat Removal	288	200	126	114	502	1,138	-	583	2,951	2,951	-	-	6,406	4,509	-	-	-	643,278	4,068	-
2a.1.5.47	Residual Heat Removal - Insulated	494	441	48	53	264	494	-	533	2,326	2,326	-	-	3,367	1,955	-	-	-	302,913	10,318	-
2a.1.5.48	Rx Core Isolation Cooling	-	39	2	2	20	14	-	17	94	94	-	-	259	57	-	-	-	15,348	690	-
2a.1.5.49	Rx Core Isolation Cooling - Insulated	-	85	4	4	23	37	-	35	189	189	-	-	288	148	-	-	-	24,314	1,477	-
2a.1.5.50	Rx Recirculation	45	47	4	3	3	36	-	44	182	182	-	-	43	142	-	-	-	13,860	1,578	-
2a.1.5.51	Snubbers	-	135	2	3	30	17	-	43	229	229	-	-	377	67	-	-	-	21,029	2,548	-
2a.1.5.52	Standby Liquid Control - Insul - RCA	-	3	0	0	2	-	-	1	6	6	-	-	22	-	-	-	-	904	48	-
2a.1.5.53	Standby Liquid Control - RCA	-	21	0	1	19	-	-	8	50	50	-	-	245	-	-	-	-	9,969	341	-
2a.1.5.54	Stator Cooling - RCA	-	6	0	1	10	-	-	3	20	20	-	-	126	-	-	-	-	5,135	98	-
2a.1.5.55	Traversing Incore Probe	0	3	0	0	0	1	-	1	5	5	-	-	1	4	-	-	-	375	51	-
2a.1.5	Totals	826	6,539	707	1,006	7,654	6,400	-	5,016	28,148	28,129	-	19	97,654	25,419	-	-	-	6,120,628	119,641	-
2a.1.6	Scaffolding in support of decommissioning	-	1,950	23	8	89	17	-	509	2,596	2,596	-	-	1,030	68	-	-	-	52,131	22,564	-
2a.1	Subtotal Period 2a Activity Costs	1,340	20,714	18,588	4,408	12,888	27,618	499	29,785	115,841	115,822	-	19	157,785	43,991	1,430	1,033	-	10,673,420	236,482	2,338
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	83	-	35	120	-	202	-	114	554	554	-	-	-	533	-	-	-	31,987	104	-
2a.3.2	Process decommissioning chemical flush waste	4	-	130	605	-	1,407	-	458	2,605	2,605	-	-	-	2,093	-	-	-	223,008	392	-
2a.3.3	Small tool allowance	-	242	-	-	-	-	-	36	278	250	-	28	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	62	9	72	-	72	-	-	-	-	-	-	-	-	-
2a.3.5	On-site survey and release of 0.0 tons clean metallic waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	88	242	165	725	-	1,609	62	617	3,508	3,408	72	28	-	2,626	-	-	-	254,995	496	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	64	-	-	-	-	-	-	16	80	80	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	701	70	771	771	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	1,537	154	1,690	1,521	-	169	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	1,510	-	-	-	-	-	377	1,887	1,887	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	2,328	-	-	-	-	-	349	2,677	2,677	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	97	30	-	338	-	99	564	564	-	-	-	4,573	-	-	-	91,465	149	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	3,799	570	4,368	4,368	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	898	90	988	988	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	930	93	1,023	-	1,023	-	-	-	-	-	-	-	-	-
2a.4.10	Fixed Overhead	-	-	-	-	-	-	2,043	306	2,350	2,350	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	956	143	1,099	-	1,099	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 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.4.13	Railroad Track Maintenance	-	-	-	-	-	-	116	17	134	134	-	-	-	-	-	-	-	-	-	-
2a.4.14	Security Staff Cost	-	-	-	-	-	-	5,275	791	6,066	6,066	-	-	-	-	-	-	-	-	-	165,173
2a.4.15	DOC Staff Cost	-	-	-	-	-	-	13,347	2,002	15,349	15,349	-	-	-	-	-	-	-	-	-	198,469
2a.4.16	Utility Staff Cost	-	-	-	-	-	-	18,669	2,800	21,470	21,470	-	-	-	-	-	-	-	-	-	369,517
2a.4	Subtotal Period 2a Period-Dependent Costs	64	3,838	97	30	-	338	48,383	7,895	60,645	58,226	2,251	169	-	4,573	-	-	-	91,465	149	733,159
2a.0	TOTAL PERIOD 2a COST	1,491	24,794	18,851	5,163	12,888	29,565	48,945	38,297	179,994	177,456	2,323	216	157,785	51,190	1,430	1,033	-	11,019,880	237,127	735,497
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	ALARA/Radiological	-	14	0	0	3	2	-	5	24	24	-	-	35	7	-	-	-	2,059	277	-
2b.1.1.2	Alternate N2 - RCA	-	13	0	1	7	-	-	4	26	26	-	-	93	-	-	-	-	3,765	185	-
2b.1.1.3	Decontamination Projects	-	1	0	0	0	0	-	0	2	2	-	-	2	0	-	-	-	128	17	-
2b.1.1.4	Electrical - Contaminated	-	354	5	15	187	17	-	124	702	702	-	-	2,389	68	-	-	-	102,746	6,324	-
2b.1.1.5	Electrical - Decontaminated	-	2,149	35	138	1,830	-	-	836	4,987	4,987	-	-	23,344	-	-	-	-	948,013	37,107	-
2b.1.1.6	Fire - RCA	-	81	1	4	48	-	-	28	162	162	-	-	614	-	-	-	-	24,917	1,324	-
2b.1.1.7	HVAC Ductwork	-	245	5	17	209	19	-	100	596	596	-	-	2,665	75	-	-	-	114,620	4,111	-
2b.1.1.8	HVAC/Chilled Water - RCA	-	260	4	16	216	-	-	100	596	596	-	-	2,752	-	-	-	-	111,779	3,985	-
2b.1.1.9	Heating & Ventilation	-	384	12	38	472	43	-	185	1,134	1,134	-	-	6,018	170	-	-	-	258,840	7,099	-
2b.1.1.10	Heating Boiler - Insulated - RCA	-	2	0	0	2	-	-	1	5	5	-	-	26	-	-	-	-	1,058	35	-
2b.1.1.11	Liquid Radwaste	468	546	38	40	241	326	-	498	2,157	2,157	-	-	3,073	1,426	-	-	-	234,622	17,182	-
2b.1.1.12	Makeup Demin - RCA	-	82	2	9	115	-	-	39	248	248	-	-	1,471	-	-	-	-	59,747	1,412	-
2b.1.1.13	Non-Essential Diesel Generator - RCA	-	22	2	8	112	-	-	24	168	168	-	-	1,424	-	-	-	-	57,832	395	-
2b.1.1.14	Off Gas Holdup	-	272	16	24	216	119	-	135	783	783	-	-	2,755	484	-	-	-	151,977	4,763	-
2b.1.1.15	Primary Containment	-	362	33	56	486	285	-	246	1,468	1,468	-	-	6,201	1,132	-	-	-	347,847	6,442	-
2b.1.1.16	Process Radiation Monitors	-	37	1	1	11	10	-	14	74	74	-	-	142	39	-	-	-	9,063	648	-
2b.1.1.17	Rx Bldg Closed Clng Water - Insul - RCA	-	91	1	6	77	-	-	35	210	210	-	-	977	-	-	-	-	39,675	1,484	-
2b.1.1.18	Rx Bldg Closed Clng Water - RCA	-	146	11	42	556	-	-	127	882	882	-	-	7,093	-	-	-	-	288,031	2,489	-
2b.1.1.19	Rx Component Handling Equip	22	113	14	17	91	157	-	96	510	510	-	-	1,158	622	-	-	-	99,915	2,456	-
2b.1.1.20	Rx Pressure Vessel	22	38	4	3	6	44	-	33	150	150	-	-	75	172	-	-	-	17,716	1,049	-
2b.1.1.21	Rx Water Cleanup	136	211	14	10	10	139	-	160	680	680	-	-	130	555	-	-	-	52,246	5,729	-
2b.1.1.22	Secondary Containment	-	99	6	9	80	48	-	51	292	292	-	-	1,017	191	-	-	-	57,539	1,761	-
2b.1.1.23	Service & Seal Water - Insulated - RCA	-	96	2	7	92	-	-	39	236	236	-	-	1,180	-	-	-	-	47,917	1,565	-
2b.1.1.24	Service & Seal Water - RCA	-	127	3	11	142	-	-	55	337	337	-	-	1,809	-	-	-	-	73,453	2,016	-
2b.1.1.25	Service Air Blower - RCA	-	12	0	1	16	-	-	6	36	36	-	-	206	-	-	-	-	8,364	206	-
2b.1.1.26	Solid Radwaste	269	393	29	32	187	261	-	333	1,503	1,503	-	-	2,387	1,108	-	-	-	184,752	10,809	-
2b.1.1.27	Structures & Buildings	-	62	2	3	28	16	-	24	135	135	-	-	357	64	-	-	-	19,952	1,127	-
2b.1.1.28	Wells & Domestic Water	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	144	-
2b.1.1.29	Wells & Domestic Water - RCA	-	42	1	2	27	-	-	15	86	86	-	-	342	-	-	-	-	13,874	633	-
2b.1.1	Totals	917	6,261	240	512	5,466	1,486	-	3,316	18,199	18,190	-	9	69,735	6,115	-	-	-	3,332,448	122,771	-
2b.1.2	Scaffolding in support of decommissioning	-	2,437	29	10	112	21	-	636	3,245	3,245	-	-	1,287	85	-	-	-	65,164	28,205	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	4,157	2,305	122	324	3,768	789	-	3,478	14,943	14,943	-	-	48,077	4,214	-	-	-	2,314,063	112,479	-
2b.1.3.2	Admin	86	5	0	2	-	12	-	47	152	152	-	-	-	79	-	-	-	6,840	1,599	-
2b.1.3.3	HPCI Room	23	22	0	2	9	11	-	22	90	90	-	-	118	70	-	-	-	10,755	789	-
2b.1.3.4	Hot Shop	13	3	0	1	-	9	-	10	37	37	-	-	-	56	-	-	-	4,860	286	-
2b.1.3.5	LLRW Storage & Shipping	47	20	1	5	2	37	-	39	149	149	-	-	31	237	-	-	-	21,707	1,126	-
2b.1.3.6	Offgas Stack	299	212	4	14	105	62	-	236	933	933	-	-	1,343	376	-	-	-	86,945	8,858	-
2b.1.3.7	Offgas Storage & Compressor	33	14	0	3	2	27	-	27	107	107	-	-	25	173	-	-	-	15,948	785	-
2b.1.3.8	Radwaste	97	49	2	10	13	78	-	84	334	334	-	-	172	501	-	-	-	49,943	2,501	-
2b.1.3.9	Radwaste Material Storage Warehouse	51	20	1	5	-	42	-	42	161	161	-	-	-	270	-	-	-	23,400	1,196	-
2b.1.3.10	Recombiner	22	20	1	3	16	19	-	23	103	103	-	-	199	121	-	-	-	18,403	695	-
2b.1.3.11	Turbine	567	284	10	63	101	455	-	494	1,973	1,973	-	-	1,283	2,910	-	-	-	303,139	14,432	-
2b.1.3.12	Turbine Building Addition	47	17	1	5	-	37	-	38	144	144	-	-	-	236	-	-	-	20,478	1,086	-
2b.1.3	Totals	5,442	2,970	141	436	4,017	1,578	-	4,540	19,126	19,126	-	-	51,247	9,242	-	-	-	2,876,482	145,831	-

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 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			
2b.1	Subtotal Period 2b Activity Costs	6,360	11,669	411	958	9,594	3,086	-	8,492	40,570	40,561	-	9	122,269	15,442	-	-	-	6,274,094	296,806	-
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	173	-	74	257	-	430	-	240	1,173	1,173	-	-	-	1,135	-	-	-	68,127	221	-
2b.3.2	Process decommissioning chemical flush waste	1	-	26	119	-	278	-	90	514	514	-	-	-	413	-	-	-	43,978	77	-
2b.3.3	Small tool allowance	-	275	-	-	-	-	-	41	316	316	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	25,288	3,793	29,081	-	29,081	-	-	-	-	-	-	-	-	-
2b.3.5	On-site survey and release of 0.0 tons clean metallic waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	174	275	99	376	-	707	25,288	4,165	31,084	2,003	29,081	-	-	1,548	-	-	-	112,106	299	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,008	-	-	-	-	-	-	252	1,260	1,260	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,246	125	1,371	1,371	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,733	273	3,006	3,006	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,170	-	-	-	-	-	542	2,712	2,712	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,103	-	-	-	-	-	615	4,718	4,718	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	124	38	-	429	-	125	715	715	-	-	-	5,805	-	-	-	116,095	189	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	5,328	799	6,128	6,128	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,596	160	1,755	1,755	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,653	165	1,818	-	1,818	-	-	-	-	-	-	-	-	-
2b.4.10	Fixed Overhead	-	-	-	-	-	-	3,630	545	4,175	4,175	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,698	255	1,952	-	1,952	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	431	65	496	496	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	199	30	229	-	229	-	-	-	-	-	-	-	-	-
2b.4.14	Railroad Track Maintenance	-	-	-	-	-	-	207	31	238	238	-	-	-	-	-	-	-	-	-	-
2b.4.15	Security Staff Cost	-	-	-	-	-	-	9,373	1,406	10,779	10,779	-	-	-	-	-	-	-	-	-	293,480
2b.4.16	DOC Staff Cost	-	-	-	-	-	-	22,933	3,440	26,373	26,373	-	-	-	-	-	-	-	-	-	338,720
2b.4.17	Utility Staff Cost	-	-	-	-	-	-	32,021	4,803	36,824	36,824	-	-	-	-	-	-	-	-	-	628,720
2b.4	Subtotal Period 2b Period-Dependent Costs	1,008	6,273	124	38	-	429	83,048	13,631	104,550	100,551	3,999	-	-	5,805	-	-	-	116,095	189	1,260,920
2b.0	TOTAL PERIOD 2b COST	7,541	18,217	634	1,372	9,594	4,223	108,336	26,287	176,204	143,115	33,080	9	122,269	22,795	-	-	-	6,502,294	297,294	1,260,920
PERIOD 2c - Spent fuel delay prior to SFP decon																					
Period 2c Direct Decommissioning Activities																					
Period 2c Collateral Costs																					
2c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	34,142	5,121	39,263	-	39,263	-	-	-	-	-	-	-	-	-
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	34,142	5,121	39,263	-	39,263	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	5,621	562	6,183	6,183	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	8,659	866	9,525	9,525	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	3,222	-	-	-	-	-	806	4,028	4,028	-	-	-	-	-	-	-	-	-	-
2c.4.4	Heavy equipment rental	-	1,851	-	-	-	-	-	278	2,129	2,129	-	-	-	-	-	-	-	-	-	-
2c.4.5	Disposal of DAW generated	-	-	88	27	-	306	-	89	510	510	-	-	-	4,140	-	-	-	82,809	135	-
2c.4.6	Plant energy budget	-	-	-	-	-	-	6,410	961	7,371	7,371	-	-	-	-	-	-	-	-	-	-
2c.4.7	NRC Fees	-	-	-	-	-	-	1,792	179	1,971	1,971	-	-	-	-	-	-	-	-	-	-
2c.4.8	Emergency Planning Fees	-	-	-	-	-	-	7,455	745	8,200	-	8,200	-	-	-	-	-	-	-	-	-
2c.4.9	Fixed Overhead	-	-	-	-	-	-	16,377	2,457	18,833	18,833	-	-	-	-	-	-	-	-	-	-
2c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	7,659	1,149	8,807	-	8,807	-	-	-	-	-	-	-	-	-
2c.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	389	58	447	447	-	-	-	-	-	-	-	-	-	-
2c.4.12	ISFSI Operating Costs	-	-	-	-	-	-	898	135	1,032	-	1,032	-	-	-	-	-	-	-	-	-
2c.4.13	Railroad Track Maintenance	-	-	-	-	-	-	933	140	1,073	1,073	-	-	-	-	-	-	-	-	-	-
2c.4.14	Security Staff Cost	-	-	-	-	-	-	36,102	5,415	41,517	41,517	-	-	-	-	-	-	-	-	-	1,114,599
2c.4.15	Utility Staff Cost	-	-	-	-	-	-	41,311	6,197	47,508	47,508	-	-	-	-	-	-	-	-	-	826,791
2c.4	Subtotal Period 2c Period-Dependent Costs	-	5,073	88	27	-	306	133,604	20,037	159,135	141,095	18,040	-	-	4,140	-	-	-	82,809	135	1,941,390
2c.0	TOTAL PERIOD 2c COST	-	5,073	88	27	-	306	167,746	25,158	198,398	141,095	57,303	-	-	4,140	-	-	-	82,809	135	1,941,390

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 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 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	526	46	111	97	-	1,449	-	663	2,892	2,892	-	-	-	5,740	-	-	-	487,876	906	-
Disposal of Plant Systems																					
2d.1.2.1	Cranes/Heavy Loads/Rigging - RCA	-	3	0	1	8	-	-	2	14	14	-	-	103	-	-	-	-	4,184	48	-
2d.1.2.2	Electrical - Contaminated Fuel Pool	-	37	0	2	19	2	-	13	73	73	-	-	240	7	-	-	-	10,336	665	-
2d.1.2.3	Electrical - Decontam. Fuel Pool Area	-	237	4	15	193	-	-	91	538	538	-	-	2,457	-	-	-	-	99,783	4,090	-
2d.1.2.4	Fire - RCA - Fuel Pool Area	-	9	0	0	5	-	-	3	17	17	-	-	62	-	-	-	-	2,499	143	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	195	340	26	24	92	254	-	266	1,198	1,198	-	-	1,179	1,021	-	-	-	133,352	8,367	-
2d.1.2.6	Fuel Pool Cooling & Cleanup - Insulated	21	33	2	2	5	22	-	26	111	111	-	-	67	88	-	-	-	10,157	847	-
2d.1.2.7	HVAC Ductwork - Fuel Pool Area	-	27	1	2	23	2	-	11	66	66	-	-	296	8	-	-	-	12,736	457	-
2d.1.2.8	HVAC/Chilled Water - RCA Fuel Pool Area	-	26	0	1	18	-	-	9	55	55	-	-	223	-	-	-	-	9,072	397	-
2d.1.2.9	Instrument & Service Air-RCA-Fuel Pool	-	23	0	2	21	-	-	9	55	55	-	-	267	-	-	-	-	10,841	357	-
2d.1.2	Totals	217	735	34	48	384	280	-	430	2,127	2,127	-	-	4,894	1,124	-	-	-	292,960	15,371	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor (Post Fuel)	756	1,359	35	247	154	2,668	-	1,449	6,669	6,669	-	-	1,969	15,685	-	-	-	1,203,773	35,501	-
2d.1.3	Totals	756	1,359	35	247	154	2,668	-	1,449	6,669	6,669	-	-	1,969	15,685	-	-	-	1,203,773	35,501	-
2d.1.4	Scaffolding in support of decommissioning	-	487	6	2	22	4	-	127	649	649	-	-	257	17	-	-	-	13,033	5,641	-
2d.1	Subtotal Period 2d Activity Costs	1,499	2,628	186	394	560	4,401	-	2,669	12,337	12,337	-	-	7,120	22,566	-	-	-	1,997,641	57,419	-
Period 2d Additional Costs																					
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	1,034	310	1,344	1,344	-	-	-	-	-	-	-	-	-	12,480
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	1,034	310	1,344	1,344	-	-	-	-	-	-	-	-	-	12,480
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	25	-	13	46	-	77	-	40	201	201	-	-	-	202	-	-	-	12,142	39	-
2d.3.2	Process decommissioning chemical flush waste	1	-	16	72	-	168	-	55	310	310	-	-	-	249	-	-	-	26,553	47	-
2d.3.3	Small tool allowance	-	62	-	-	-	-	-	9	71	71	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	137	55	521	100	-	125	938	938	-	-	6,000	397	-	-	-	303,726	88	-
2d.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,512	1,577	12,089	-	12,089	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	26	62	165	172	521	344	10,512	1,806	13,609	1,520	12,089	-	6,000	848	-	-	-	342,421	174	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	161	-	-	-	-	-	-	40	201	201	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	422	42	464	464	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	532	53	586	586	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	529	-	-	-	-	-	132	661	661	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,390	-	-	-	-	-	208	1,598	1,598	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	40	12	-	140	-	41	233	233	-	-	-	1,890	-	-	-	37,793	62	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	962	144	1,107	1,107	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	540	54	594	594	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	560	56	616	-	616	-	-	-	-	-	-	-	-	-
2d.4.10	Fixed Overhead	-	-	-	-	-	-	1,230	184	1,414	1,414	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	292	44	336	336	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	67	10	78	-	78	-	-	-	-	-	-	-	-	-
2d.4.13	Railroad Track Maintenance	-	-	-	-	-	-	70	11	81	81	-	-	-	-	-	-	-	-	-	-
2d.4.14	Security Staff Cost	-	-	-	-	-	-	1,782	267	2,050	2,050	-	-	-	-	-	-	-	-	-	52,250
2d.4.15	DOC Staff Cost	-	-	-	-	-	-	5,375	806	6,182	6,182	-	-	-	-	-	-	-	-	-	78,571
2d.4.16	Utility Staff Cost	-	-	-	-	-	-	8,063	1,209	9,272	9,272	-	-	-	-	-	-	-	-	-	150,071
2d.4	Subtotal Period 2d Period-Dependent Costs	161	1,918	40	12	-	140	19,896	3,303	25,471	24,778	693	-	-	1,890	-	-	-	37,793	62	280,893
2d.0	TOTAL PERIOD 2d COST	1,686	4,608	391	579	1,081	4,885	31,442	8,088	52,760	39,979	12,782	-	13,120	25,303	-	-	-	2,377,855	57,655	293,373

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	154	46	200	200	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	154	46	200	200	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	5,518	1,656	7,174	7,174	-	-	-	-	-	-	-	-	96,186	6,240
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	5,518	1,656	7,174	7,174	-	-	-	-	-	-	-	-	96,186	6,240
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,599	240	1,839	1,839	-	-	-	-	-	-	-	-	-	-
2f.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	38	6	43	-	43	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,636	245	1,882	1,839	43	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	405	41	446	446	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	532	53	586	586	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	503	-	-	-	-	-	126	629	629	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	8	2	-	26	-	8	44	44	-	-	-	355	-	-	-	7,097	12	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	481	72	553	553	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	579	58	637	637	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	226	23	248	-	248	-	-	-	-	-	-	-	-	-
2f.4.8	Fixed Overhead	-	-	-	-	-	-	1,230	184	1,414	1,414	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	67	10	78	-	78	-	-	-	-	-	-	-	-	-
2f.4.10	Railroad Track Maintenance	-	-	-	-	-	-	70	11	81	81	-	-	-	-	-	-	-	-	-	-
2f.4.11	Security Staff Cost	-	-	-	-	-	-	1,748	262	2,010	2,010	-	-	-	-	-	-	-	-	-	51,071
2f.4.12	DOC Staff Cost	-	-	-	-	-	-	4,071	611	4,682	4,682	-	-	-	-	-	-	-	-	-	57,357
2f.4.13	Utility Staff Cost	-	-	-	-	-	-	4,566	685	5,250	5,250	-	-	-	-	-	-	-	-	-	80,929
2f.4	Subtotal Period 2f Period-Dependent Costs	-	503	8	2	-	26	13,976	2,143	16,658	16,332	326	-	-	355	-	-	-	7,097	12	189,357
2f.0	TOTAL PERIOD 2f COST	-	503	8	2	-	26	21,284	4,090	25,913	25,544	369	-	-	355	-	-	-	7,097	96,197	195,597
PERIOD 2 TOTALS		10,719	53,195	19,972	7,142	23,563	39,005	377,753	101,920	633,270	527,188	105,857	225	293,175	103,784	1,430	1,033	-	19,989,940	688,408	4,426,777
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	3,342	-	-	-	-	-	501	3,844	-	-	3,844	-	-	-	-	-	-	37,418	-
3b.1.1.2	Condensate Tanks Foundation	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	219	-
3b.1.1.3	Discharge Retention Basin	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	110	-
3b.1.1.4	HPCI Room	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	401	-
3b.1.1.5	Hot Shop	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	298	-
3b.1.1.6	Hydrogen & Oxygen Storage	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	21	-
3b.1.1.7	LLRW Storage & Shipping	-	129	-	-	-	-	-	19	148	-	-	148	-	-	-	-	-	-	1,794	-
3b.1.1.8	MSIV	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	59	-
3b.1.1.9	Offgas Stack	-	214	-	-	-	-	-	32	246	-	-	246	-	-	-	-	-	-	2,668	-
3b.1.1.10	Offgas Storage & Compressor	-	80	-	-	-	-	-	12	92	-	-	92	-	-	-	-	-	-	963	-
3b.1.1.11	Radwaste	-	444	-	-	-	-	-	67	511	-	-	511	-	-	-	-	-	-	5,196	-
3b.1.1.12	Recombiner	-	236	-	-	-	-	-	35	272	-	-	272	-	-	-	-	-	-	2,490	-
3b.1.1.13	Security Barrier	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	4,083	-
3b.1.1.14	Tank Farm	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	121	-
3b.1.1.15	Turbine	-	1,443	-	-	-	-	-	216	1,659	-	-	1,659	-	-	-	-	-	-	18,764	-
3b.1.1.16	Turbine Building Addition	-	61	-	-	-	-	-	9	70	-	-	70	-	-	-	-	-	-	971	-
3b.1.1.17	Turbine Pedestal	-	379	-	-	-	-	-	57	436	-	-	436	-	-	-	-	-	-	3,762	-
3b.1.1	Totals	-	6,764	-	-	-	-	-	1,015	7,778	-	-	7,778	-	-	-	-	-	-	79,340	-

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 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			
Site Closeout Activities																					
3b.1.2	BackFill Site	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	517	-
3b.1.3	Grade & landscape site	-	983	-	-	-	-	-	147	1,131	-	-	1,131	-	-	-	-	-	-	1,841	-
3b.1.4	Final report to NRC	-	-	-	-	-	-	165	25	189	189	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	8,014	-	-	-	-	165	1,227	9,405	189	-	9,216	-	-	-	-	-	-	81,698	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	299	-	-	-	-	8	46	353	-	-	353	-	-	-	-	-	-	1,402	-
3b.2	Subtotal Period 3b Additional Costs	-	299	-	-	-	-	8	46	353	-	-	353	-	-	-	-	-	-	1,402	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	81	-	-	-	-	-	12	93	-	-	93	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,939	291	2,230	-	2,230	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	81	-	-	-	-	1,939	303	2,323	-	2,230	93	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	933	93	1,027	-	1,027	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	922	92	1,014	-	1,014	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	4,584	-	-	-	-	-	688	5,272	-	-	5,272	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	554	83	637	-	-	637	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	373	37	411	-	411	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	520	52	572	-	572	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Overhead	-	-	-	-	-	-	767	115	882	882	-	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	155	23	178	-	178	-	-	-	-	-	-	-	-	-
3b.4.9	Railroad Track Maintenance	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	4,023	603	4,626	(0)	3,932	694	-	-	-	-	-	-	-	117,557
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	8,894	1,334	10,228	-	-	10,228	-	-	-	-	-	-	-	122,983
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	5,834	875	6,710	(0)	1,409	5,301	-	-	-	-	-	-	-	98,567
3b.4	Subtotal Period 3b Period-Dependent Costs	-	4,584	-	-	-	-	23,136	4,021	31,741	1,067	8,543	22,131	-	-	-	-	-	-	-	339,107
3b.0	TOTAL PERIOD 3b COST	-	12,978	-	-	-	-	25,248	5,597	43,823	1,256	10,772	31,794	-	-	-	-	-	-	83,100	340,667
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Additional Costs																					
3c.2.1	ISFSI Disposition of Original Casks	-	-	-	691	-	10,007	-	2,571	13,269	-	13,269	-	-	34,684	-	-	-	3,468,443	-	-
3c.2	Subtotal Period 3c Additional Costs	-	-	-	691	-	10,007	-	2,571	13,269	-	13,269	-	-	34,684	-	-	-	3,468,443	-	-
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	910,115	136,517	1,046,633	-	1,046,633	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	910,115	136,517	1,046,633	-	1,046,633	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	90,508	9,051	99,558	-	99,558	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	89,398	8,940	98,337	-	98,337	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	36,191	3,619	39,810	-	39,810	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	50,420	5,042	55,462	-	55,462	-	-	-	-	-	-	-	-	-
3c.4.6	Fixed Overhead	-	-	-	-	-	-	74,348	11,152	85,501	-	85,501	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	15,044	2,257	17,300	-	17,300	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	333,127	49,969	383,096	-	383,096	-	-	-	-	-	-	-	-	9,470,982
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	119,519	17,928	137,446	-	137,446	-	-	-	-	-	-	-	-	2,367,746
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	808,554	107,957	916,512	-	916,512	-	-	-	-	-	-	-	-	11,838,730
3c.0	TOTAL PERIOD 3c COST	-	-	-	691	-	10,007	1,718,669	247,045	1,976,413	-	1,976,413	-	-	34,684	-	-	-	3,468,443	-	11,838,730

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 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 - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	1,370	-	-	7,885	-	1,320	10,575	10,575	-	-	-	-	-	-	1,785	346,570	-	-
3d.1.1	Totals	-	-	1,370	-	-	7,885	-	1,320	10,575	10,575	-	-	-	-	-	-	1,785	346,570	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	1,370	-	-	7,885	-	1,320	10,575	10,575	-	-	-	-	-	-	1,785	346,570	-	-
Period 3d Additional Costs																					
3d.2.1	ISFSI Railroad Track Refurbishment	-	-	-	-	-	-	265	40	304	-	304	-	-	-	-	-	-	-	-	-
3d.2	Subtotal Period 3d Additional Costs	-	-	-	-	-	-	265	40	304	-	304	-	-	-	-	-	-	-	-	-
Period 3d Collateral Costs																					
3d.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	18,358	2,754	21,112	-	21,112	-	-	-	-	-	-	-	-	-
3d.3	Subtotal Period 3d Collateral Costs	-	-	-	-	-	-	18,358	2,754	21,112	-	21,112	-	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	7,539	754	8,292	-	8,292	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	7,446	745	8,191	-	8,191	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	3,885	388	4,273	-	4,273	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	4,200	420	4,620	-	4,620	-	-	-	-	-	-	-	-	-
3d.4.6	Fixed Overhead	-	-	-	-	-	-	6,193	929	7,122	-	7,122	-	-	-	-	-	-	-	-	-
3d.4.7	ISFSI Operating Costs	-	-	-	-	-	-	1,253	188	1,441	-	1,441	-	-	-	-	-	-	-	-	-
3d.4.8	Railroad Track Maintenance	-	-	-	-	-	-	1,302	195	1,497	-	1,497	-	-	-	-	-	-	-	-	-
3d.4.9	Security Staff Cost	-	-	-	-	-	-	27,747	4,162	31,909	-	31,909	-	-	-	-	-	-	-	-	788,863
3d.4.10	Utility Staff Cost	-	-	-	-	-	-	9,955	1,493	11,448	-	11,448	-	-	-	-	-	-	-	-	197,216
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	69,519	9,274	78,793	-	78,793	-	-	-	-	-	-	-	-	986,079
3d.0	TOTAL PERIOD 3d COST	-	-	1,370	-	-	7,885	88,141	13,388	110,784	10,575	100,209	-	-	-	-	-	1,785	346,570	-	986,079
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	ISFSI License Termination	23	273	5	14	-	70	1,291	293	1,969	-	1,969	-	-	520	-	-	-	81,210	6,483	2,560
3e.2	Subtotal Period 3e Additional Costs	23	273	5	14	-	70	1,291	293	1,969	-	1,969	-	-	520	-	-	-	81,210	6,483	2,560
Period 3e Collateral Costs																					
3e.3.1	Small tool allowance	-	4	-	-	-	-	-	1	4	-	4	-	-	-	-	-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	4	-	-	-	-	-	1	4	-	4	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	178	18	196	-	196	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	NRC ISFSI Fees	-	-	-	-	-	-	71	7	78	-	78	-	-	-	-	-	-	-	-	-
3e.4.5	Fixed Overhead	-	-	-	-	-	-	147	22	169	-	169	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	178	27	205	-	205	-	-	-	-	-	-	-	-	5,013
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	197	30	227	-	227	-	-	-	-	-	-	-	-	3,803
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	772	103	875	-	875	-	-	-	-	-	-	-	-	8,816
3e.0	TOTAL PERIOD 3e COST	23	276	5	14	-	70	2,063	397	2,848	-	2,848	-	-	520	-	-	-	81,210	6,483	11,376

Table E
Monticello Nuclear Generating Plant
DECON Decommissioning Cost Estimate - 200 Year Spent Fuel Management - Periodic Re-casking of Spent Fuel
(Thousands of 2011 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	ISFSI Demolition and Site Restoration	-	1,132	-	-	-	-	47	177	1,355	-	1,355	-	-	-	-	-	-	-	9,822	160
3f.2	Subtotal Period 3f Additional Costs	-	1,132	-	-	-	-	47	177	1,355	-	1,355	-	-	-	-	-	-	-	9,822	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	9	-	-	-	-	-	1	11	-	11	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	9	-	-	-	-	-	1	11	-	11	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.4	Fixed Overhead	-	-	-	-	-	-	74	11	85	-	85	-	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	90	13	103	-	103	-	-	-	-	-	-	-	-	2,527
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	78	12	89	-	89	-	-	-	-	-	-	-	-	1,569
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	241	36	277	-	277	-	-	-	-	-	-	-	-	4,096
3f.0	TOTAL PERIOD 3f COST	-	1,141	-	-	-	-	288	214	1,643	-	1,643	-	-	-	-	-	-	-	9,822	4,256
PERIOD 3 TOTALS		23	14,395	1,375	705	-	17,962	1,834,410	266,641	2,135,511	11,831	2,091,886	31,794	-	35,204	-	-	1,785	3,896,223	99,406	13,181,110
TOTAL COST TO DECOMMISSION		**13,378**	**70,012**	**21,422**	**7,985**	**23,575**	**57,983**	**2,331,916**	**388,034**	**2,914,305**	**652,481**	**2,228,974**	**32,850**	**293,218**	**140,188**	**1,660**	**1,033**	**1,785**	**23,949,350**	**819,664**	**18,668,020**

TOTAL COST TO DECOMMISSION WITH 15.36% CONTINGENCY:	**$2,914,305**	**thousands of 2011 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 22.39% OR:	**$652,481**	**thousands of 2011 dollars**
SPENT FUEL MANAGEMENT COST IS 76.48% OR:	**$2,228,974**	**thousands of 2011 dollars**
NON-NUCLEAR DEMOLITION COST IS 1.13% OR:	**$32,850**	**thousands of 2011 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**142,882**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**1,785**	**cubic Feet**
TOTAL SCRAP METAL REMOVED:	**15,668**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**819,664**	**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