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DECOMMISSIONING COST ANALYSIS

for the

CATAWBA NUCLEAR STATION

prepared for

Duke Energy Corporation

prepared by

TLG Services, Inc.
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REVISION LOG

No.	CRA No.	Date	Item Revised	Reason for Revision
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EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the Catawba Nuclear Station (Catawba) for the selected decommissioning scenarios following the scheduled cessation of plant operations. The analysis relies upon site-specific, technical information from an evaluation prepared in 2003,[1] updated to reflect current assumptions pertaining to the disposition of the nuclear plant and relevant industry experience in undertaking such projects. The current estimates are designed to provide Duke Energy Corporation, (Duke Energy) with sufficient information to assess the plant owners' financial obligations, as they pertain to the eventual decommissioning of the nuclear plant.

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

The currently projected cost to decommission the station, assuming the DECON alternative, is estimated at $1,230.1 million, as reported in 2008 dollars. An estimate for the SAFSTOR alternative is also provided.

The estimates are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The estimates incorporate a minimum cooling period for the spent fuel that resides in the storage pools when operations cease. Once sufficiently cooled, the spent fuel is transferred to the DOE, along with the spent fuel stored at the ISFSI during plant operations. The estimates also include the dismantling of site structures and non-essential facilities and the limited restoration of the site.

Alternatives and Regulations

The ultimate objective of the decommissioning process is to reduce the inventory of contaminated and activated material so that the license 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

1 "Decommissioning Cost Analysis for the Catawba Nuclear Station," Document No. D03-1478-002, Rev. 0, TLG Services, Inc., November 2003

2 U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72 "General Requirements for

NRC set forth financial criteria for decommissioning licensed nuclear power facilities. The regulations addressed planning needs, timing, funding methods, and environmental review requirements for decommissioning. The rule also defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB.

> DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."[3]
>
> SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."[4] Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.
>
> ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."[5] As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.
>
> The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred pending the completion of additional research studies, for example, on engineered barriers.

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.

5 Ibid. Page FR24023, Column 2

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 estimates is also consistent with the recommendations of Regulatory Guide 1.202, issued in February 2005.[7]

Methodology

The methodology used to develop the estimates 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.

The estimates also reflect lessons learned from TLG's involvement in the Shippingport Station decommissioning, completed in 1989, and the decommissioning of the Cintichem reactor, hot cells and associated facilities, completed in 1997. In addition, the planning and engineering for the Pathfinder, Shoreham, Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Connecticut Yankee and San Onofre-1 nuclear units have provided additional insight into the process, the regulatory aspects, and technical challenges of decommissioning commercial nuclear units.

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.

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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

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

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 the estimates are based on ideal conditions; therefore, the types of unforeseeable events that are almost certain to occur in decommissioning, based on industry experience, are addressed through a percentage contingency applied on a line-item basis. This contingency factor is a nearly universal element in all large-scale construction and demolition projects. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

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.

South Carolina is a member of the three-state Atlantic Interstate Low-Level Radioactive Waste Management Compact, formed after South Carolina formally joined the Northeast Regional Compact. The Barnwell Low-Level Radioactive Waste Management Facility, located in South Carolina, is expected to be available to support the decommissioning of Catawba. It is also assumed that Duke Energy can access other disposal sites should it prove cost-effective. As such, rate schedules for both the Barnwell and EnergySolutions's facility in Clive, Utah are used to generate disposal costs.

For the purpose of this analysis, the EnergySolutions' facility is used as the basis for estimating the disposal cost for the lowest level and majority of the radioactive waste

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

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.

(Class A [12]). EnergySolutions 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. The disposal cost for this material is based upon the rate schedule for the Barnwell facility.

The dismantling of the components residing closest to the reactor core 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. However, to date, the federal government has not identified a cost for disposing of GTCC or a schedule for acceptance. As such, the GTCC radioactive waste has been packaged and disposed of as high-level waste, at a cost equivalent to that envisioned for the spent fuel.

For purposes of this study, GTCC is packaged in the same canisters used for spent fuel. The GTCC material is either stored with the spent fuel at the ISFSI or shipped directly to a DOE facility as it is generated (depending upon the timing of the decommissioning and whether the spent fuel has been removed from the site prior to the start of decommissioning).

A significant portion of the 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 Catawba reflect the savings from waste recovery/volume reduction.

High-Level Radioactive Waste Management

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

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

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

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.

Operation of DOE's yet-to-be constructed repository is contingent upon the review and approval of the facility's license application by the NRC and the successful resolution of pending litigation. The DOE submitted its license application to the NRC on June 3, 2008, seeking authorization to construct the repository at Yucca Mountain, Nevada. Assuming a timely review and adequate funding, the DOE expects that receipt of fuel could begin as early as 2017,[14] although 2020 may be more likely according to the director of the DOE's waste program.[15]

It is generally necessary that spent fuel be cooled and stored for a minimum period at the generating site prior to transfer. As such, the NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy, pursuant to 10 CFR Part 50.54(bb).[16] This funding requirement is fulfilled through inclusion of certain cost elements in the decommissioning estimates, for example, associated with the isolation and continued operation of the spent fuel pools and the ISFSI.

According to the spent fuel management plan, at shutdown the spent fuel pools are expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core. Over the following twelve years the assemblies are packaged into multipurpose canisters for transfer to the DOE. It is assumed that this period provides the necessary cooling for the final core to meet the transport requirements for decay heat.

DOE's contracts with utilities order the acceptance of spent fuel from utilities based upon the oldest fuel receiving the highest priority. For purposes of this analysis,

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

15 "Testimony of Edward Sproat", Director, Office of Civilian Radioactive Waste Management, before a U.S. House of Representatives subcommittee on the status of Yucca Mountain, July 15, 2008.

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

acceptance of commercial spent fuel by the DOE is expected to begin in 2017 (in accordance with DOE's latest published schedule). The first assemblies removed from the Catawba site are assumed to be in 2020. With an estimated, maximum rate of transfer of 3,000 metric tons of uranium (MTU)/year, completion of the removal of fuel from the site is projected to be in the year 2061. Consequently, costs are included within the estimates for the long-term caretaking of the spent fuel at the Catawba site until the year 2061.

An ISFSI, which can be operated under a separate and independent license, has been constructed to support continued plant operations. The facility is not required to support future decommissioning operations, however, there will be spent fuel located at the ISFSI (from plant operations) that will need to be transferred to the DOE during decommissioning. This fuel is assumed to be transferred after the pools are emptied.

Duke Energy's position is that the DOE has a contractual obligation to accept Catawba'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.

Site Restoration

The efficient removal of the contaminated materials at the site may result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities will substantially damage power block structures, potentially weakening the footings and structural supports. 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 costs to decommission Catawba 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 with no further requirements for an operating license. Low-level radioactive waste, other than GTCC waste, is sent to a commercial processor for treatment/conditioning or to a controlled disposal facility.

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

Both the DECON and SAFSTOR 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 and D. The major cost components are also identified in the cost summary provided at the end of this section.

The cost elements in the estimates are assigned to one of three subcategories: NRC License Termination, 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 from the wet storage pools to a DOE transport cask, as well as the transfer the fuel in storage at the ISFSl to the DOE. Costs are included for the operation of the storage pools and the management of the ISFSI until such time that the transfer is complete.

"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.

lt 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.

As noted within this document, the estimates were developed and costs are presented in 2008 dollars. As such, the estimates do not reflect the escalation of costs (due to inflationary and market forces) over the remaining operating life of the plant or during the decommissioning period.

DECON COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2008 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	14,130	14,787	28,917
Removal	87,810	122,652	210,461
Packaging	19,654	17,231	36,885
Transportation	6,830	6,189	13,019
Waste Disposal	81,039	70,454	151,493
Off-site Waste Processing	26,566	28,122	54,688
Program Management [1]	217,307	231,397	448,704
Utility Site Indirect	17,654	18,936	36,590
Spent Fuel Pool Isolation	10,819	7,212	18,031
Spent Fuel Management [2]	24,858	31,324	56,182
Insurance and Regulatory Fees	15,754	15,598	31,352
Energy	12,775	12,889	25,664
Characterization and Licensing Surveys	17,464	16,863	34,326
Property Taxes	34,237	34,425	68,663
Miscellaneous Equipment	6,503	6,438	12,940
Miscellaneous Site Services	0	2,211	2,211
Total [3]	593,400	636,727	1,230,127

Cost Element			
License Termination	477,834	477,846	955,680
Spent Fuel Management	87,173	109,208	196,902
Site Restoration	28,393	49,672	77,544
Total [3]	593,400	636,727	1,230,127

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

SAFSTOR COST SUMMARY
DECOMMISSIONING COST ELEMENTS
(thousands of 2008 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	12,159	12,560	24,719
Removal	85,473	118,932	204,405
Packaging	15,513	13,159	28,672
Transportation	5,497	4,802	10,299
Waste Disposal	66,154	57,105	123,258
Off-site Waste Processing	28,963	30,659	59,622
Program Management [1]	332,191	250,746	582,937
Utility Site Indirect	25,181	17,906	43,087
Spent Fuel Pool Isolation	10,819	7,212	18,031
Spent Fuel Management [2]	25,221	28,832	54,052
Insurance and Regulatory Fees	47,441	45,627	93,068
Energy	22,091	21,458	43,549
Characterization and Licensing Surveys	18,911	18,310	37,221
Property Taxes	35,602	35,602	71,205
Miscellaneous Equipment	17,078	20,602	37,680
Miscellaneous Site Services		2,211	2,211
Total [3]	748,292	685,723	1,434,015

Cost Element			
License Termination	590,482	533,475	1,123,957
Spent Fuel Management [4]	121,194	95,094	216,288
Site Restoration	36,616	57,155	93,770
Total [3]	748,292	685,723	1,434,015

[1] Includes engineering and security costs
[2] Direct costs only, excludes program management costs (staffing) but includes costs for spent fuel loading/transfer/spent fuel pool O&M and EP fees
[3] Columns may not add due to rounding
[4] Includes percentage of Period 2a (dormancy) plant operating costs until spent fuel pools are emptied, in addition to the direct costs

1. INTRODUCTION

This report presents estimates of the costs to decommission the Catawba Nuclear Station, (Catawba) following a scheduled cessation of plant operations. The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2003,[1]* updated to reflect current assumptions pertaining to the disposition of the nuclear plant and relevant industry experience in undertaking such projects. The current estimates are designed to provide Duke Energy Corporation (Duke Energy) with sufficient information to assess the plant owners' financial obligations, as they pertain to the eventual decommissioning of the nuclear station. It is not a detailed engineering document, but a financial analysis prepared in advance of the detailed engineering that will be required to carry out the decommissioning.

1.1 OBJECTIVES OF STUDY

The objectives of this study are to prepare comprehensive estimates of the costs to decommission Catawba, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities. For the purposes of this study, the shutdown date for the station is assumed to be December 12, 2043, based upon the current operating licenses.

1.2 SITE DESCRIPTION

Catawba is located in York County, South Carolina, approximately 17 miles southwest of Charlotte, North Carolina and 6 miles north-northwest of Rock Hill, South Carolina on the shore of Lake Wylie. The station is comprised of two nuclear units that are essentially identical except for certain auxiliary systems.

The Nuclear Steam Supply System (NSSS) consists of a pressurized water reactor and four-loop reactor coolant system. Each generating unit has a reference core design of 3,411 megawatts (thermal) with a corresponding net electrical rating of 1,129 megawatts (electric), with the reactor at rated power.

The reactor coolant system is comprised of the reactor vessel and four heat transfer loops, each containing a vertical U-tube type steam generator, and a single speed centrifugal reactor coolant pump. In addition, the system includes an electrically heated pressurizer, a pressurizer relief tank, and interconnected piping. The system is housed within a containment vessel, a free-standing

* References provided in Section 7 of the document

cylindrical steel structure enclosed by a separate reinforced concrete reactor building. The reactor building houses the containment vessel and is designed to provide biological shielding as well as missile protection for the steel containment vessel. A six-foot annulus space is provided between the containment vessel and reactor building for control of containment external temperatures and pressures and also provides a controlled air volume for filtering and access to penetrations for testing and inspection. The containment shell is anchored to the reactor building foundation with a steel liner plate encased in concrete forming the base of the containment.

Heat produced in the reactor is converted to electrical energy by the steam and power conversion system. A turbine-generator system converts the thermal energy of steam produced in the steam generators into mechanical shaft power and then into electrical energy. The turbine generators consist of a tandem (single shaft) arrangement of a double-flow high-pressure turbine and three identical double-flow, low-pressure turbines driving a direct-coupled generator at 1800 rpm. The turbines are operated in a closed feedwater cycle, which condenses the steam. The heated feedwater is returned to the steam generators.

The condenser circulating water system removes heat rejected in the main condensers. The heat is dissipated to the ambient surroundings in a closed-cycle system using three round, mechanical draft, cross-flow Marley cooling towers per unit. During normal operation, makeup cooling water for the nuclear service water and low pressure service water systems is pumped from the Beaver Dam Creek arm of Lake Wylie and returned to Big Allison Creek.

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 these deferred options are only used in situations where it is reasonable and consistent with the definition of decommissioning. At the conclusion of a 60-year dormancy period (or longer for ENTOMB if the NRC approves such a case), the site would still require significant remediation to meet the unrestricted release limits for license termination.

The ENTOMB alternative has not been viewed as a viable option for power reactors due to the significant time required to isolate the long-lived radionuclides for decay to permissible levels. However, with 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 had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.[5] However, the NRC's staff has recommended that rulemaking be deferred, based upon several factors, e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities, at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation.

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.

Operation of DOE's yet-to-be constructed repository is contingent upon the review and approval of the facility's license application by the NRC and the successful resolution of pending litigation. The DOE submitted

its license application to the NRC on June 3, 2008, seeking authorization to construct the repository at Yucca Mountain, Nevada. Assuming a timely review, and adequate funding, the DOE expects that receipt of fuel could begin as early as 2017.[8]

It is generally necessary that spent fuel be actively cooled and stored for a minimum period at the generating site prior to transfer. As such, the NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor site until title of the fuel is transferred to the Secretary of Energy, pursuant to 10 CFR Part 50.54(bb).[9] This funding requirement is fulfilled through inclusion of certain cost elements in the decommissioning estimate, for example, associated with the isolation and continued operation of the spent fuel pools and ISFSI.

According to the spent fuel management plan, at shutdown the spent fuel pools are expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core. Over the following twelve years the assemblies are packaged into multipurpose canisters for transfer to the DOE. It is assumed that this period provides the necessary cooling for the final core to meet the transport requirements for decay heat.

DOE's contracts with utilities order the acceptance of spent fuel from utilities based upon the oldest fuel receiving the highest priority. For purposes of this analysis, acceptance of commercial spent fuel by the DOE is expected to begin in 2017 (in accordance with DOE's latest published schedule). The first assemblies removed from the Catawba site are assumed to be in 2020. With an estimated maximum rate of transfer of 3,000 metric tons of uranium (MTU)/year from the commercial generators, completion of the removal of fuel from the Catawba site is projected to be in the year 2061. Consequently, costs are included within the estimates for the long-term caretaking of the spent fuel at the Catawba site until the year 2061.

An ISFSI, which can be operated under a separate and independent license, has been constructed to support continued plant operations. The facility is not required to support future decommissioning operations, however, there will be spent fuel located at the ISFSI (from plant operations) that will need to be transferred to the DOE during decommissioning. This fuel is assumed to be transferred after the pools are emptied.

Duke Energy's position is that the DOE has a contractual obligation to accept Catawba'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.

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,[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.

South Carolina is a member of the three-state Atlantic Interstate Low-Level Radioactive Waste Management Compact, formed after South Carolina formally joined the Northeast Regional Compact. The Barnwell Low-Level Radioactive Waste Management Facility, located in South Carolina, is expected to be available to support the decommissioning of Catawba. It is also assumed that Duke Energy can access other disposal sites should it prove cost-effective. As such, rate schedules for both the Barnwell and EnergySolutions's facility in Clive, Utah are used to generate disposal costs.

For the purpose of this analysis, the EnergySolutions' facility is used as the basis for estimating the disposal cost for the lowest level and majority of the radioactive waste (Class A [12]). EnergySolutions 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. The disposal cost for this material is based upon the rate schedule for the Barnwell facility.

The dismantling of the components residing closest to the reactor core 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. However, to date, the federal government has not identified a cost for disposing of GTCC or a schedule for acceptance. As such, the GTCC radioactive waste has been packaged and disposed of as high-level waste, at a cost equivalent to that envisioned for the spent fuel.

For purposes of this study, GTCC is packaged in the same canisters used for spent fuel. The GTCC material is either stored with the spent fuel or shipped directly to a DOE facility as it is generated (depending upon the timing of the decommissioning and whether the spent fuel has been removed from the site prior to the start of decommissioning).

A significant portion of the 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 Catawba 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,"[13] amending 10 CFR Part 20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates assume that the Catawba site will be remediated to a residual level consistent with the NRC-prescribed level. It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived

from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).[14] An additional and separate limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.[15]

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

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

2. DECOMMISSIONING ALTERNATIVES

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

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

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

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

2.1 DECON

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

2.1.1 Period 1 - Preparations

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

Engineering and Planning

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

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

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

Typically, a licensee will not be allowed to proceed if the consequences of a particular decommissioning activity are greater than that bounded by previously evaluated environmental assessments or impact statements. In this instance, the licensee would have to submit a license amendment for the specific activity and update the environmental report.

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

Site Preparations

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

- Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and primary shield cores.
- Isolation of the spent fuel storage pools and fuel handling systems, such that decommissioning operations can commence on the balance of the plant. The pools will remain operational for approximately twelve years following the cessation of operations before the inventory resident at shutdown can be transferred to the DOE.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic components generated in decommissioning), site security and emergency programs, and industrial safety.

2.1.2 Period 2 - Decommissioning Operations

This period includes the physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful termination of the 10 CFR §50 operating license. Significant decommissioning activities in this phase include:

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

- Disassembly and segmentation of the remaining reactor internals, including the core shroud and lower core support assembly. Some material is expected to exceed Class C disposal requirements. As such, the segments will be packaged in modified fuel storage canisters for geologic disposal.
- Segmentation of 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 refueling canal.
- Removal of the activated portions of the concrete biological shield and accessible contaminated concrete surfaces. If dictated by the steam generator and pressurizer removal scenarios, those portions of the associated cubicles necessary for access and component extraction are removed.
- Removal of the steam generators and pressurizer for material recovery and controlled disposal. The generators will be moved to an on-site processing center, the steam domes removed and the internal components segregated for recycling. The lower shell and tube bundle will be packaged for direct disposal. These 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. The retired units in storage at the site will be handled in a similar manner. The pressurizer is disposed of intact.

At least two years prior to the anticipated date of license termination, an LTP is required. Submitted as a supplement to the Final Safety Analysis Report (FSAR) or its equivalent, the plan must include: a site characterization, description of the remaining dismantling activities, plans for site remediation, procedures for the final radiation survey, designation of the end use of the site, an updated cost estimate to complete the decommissioning, and any associated environmental concerns. The NRC will notice the receipt of the plan, make the plan available for public comment, and schedule a local 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:

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).
- Removal of the steel liners from refueling canal, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/ contaminated concrete.
- Surveys of the decontaminated areas of the containment structure.
- Remediation and removal of the contaminated equipment and material from the auxiliary and fuel buildings and any other contaminated facility. Radiation and contamination controls will be 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.
- Routing of material removed in the decontamination and dismantling to a central processing area. Material certified to be free of contamination is released for unrestricted disposition, e.g., as scrap, recycle, or general disposal. Contaminated material is characterized and segregated for additional off-site processing (disassembly, chemical cleaning, volume reduction, and waste treatment), and/or packaged for controlled disposal at a low-level radioactive waste disposal facility.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)."[17] This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies state-of-the-art, commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on final termination of the license.

The NRC will terminate the operating licenses if it determines that site remediation has been performed in accordance with the LTP, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release.

2.1.3 Period 3 - Site Restoration

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

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

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

Non-contaminated concrete rubble produced by demolition activities is processed to remove reinforcing steel and miscellaneous embedments. The processed material is then used on site to backfill foundation voids. Excess non-contaminated materials are trucked to an off-site area for disposal as construction debris.

2.1.4 ISFSI Operations and Decommissioning

The ISFSI will continue to operate under a separate and independent license (10 CFR §72) following the termination of the §50 operating license. Assuming the DOE starts accepting fuel from Catawba in 2020, transfer of spent fuel from the ISFSI is anticipated to begin in 2055, and continue through the year 2061.

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

The assumed design for the ISFSI is based upon the use of a multi-purpose canister and a concrete overpack for pad storage. For purposes of this cost analysis, it is assumed that once the inner canisters containing the spent fuel assemblies have been removed, any required decontamination performed on the storage overpack (some minor activation is assumed), and the license for the facility terminated, the concrete overpacks can be dismantled using conventional techniques for the demolition of reinforced concrete. The concrete storage pad is then removed and the area regraded.

2.2 SAFSTOR

The NRC defines SAFSTOR as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use." The facility is left intact (during the dormancy period), with structures maintained in a sound condition. Systems that are not required to support the spent fuel pools or site surveillance and security are drained, de-energized, and secured. Minimal cleaning/removal of loose contamination and/or fixation and sealing of

remaining contamination is performed. Access to contaminated areas is secured to provide controlled access for inspection and maintenance.

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

2.2.1 Period 1 - Preparations

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

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

- Isolating of the spent fuel storage services and fuel handling systems so that safe-storage operations may commence on the balance of the plant. This activity may be carried out by plant personnel in accordance with existing operating technical specifications. Activities are scheduled around the fuel handling systems to the greatest extent possible.
- Transferring of the spent fuel from the storage pools to the DOE, following the minimum required cooling period in the spent fuel pools.
- Draining and de-energizing of the non-contaminated systems not required to support continued site operations or maintenance.
- Disposing of contaminated filter elements and resin beds not required for processing wastes from layup activities for future operations.
- Draining of the reactor vessel, with the internals left in place and the vessel head secured.
- Draining and de-energizing non-essential, contaminated systems with decontamination as required for future maintenance and inspection.

- Preparing lighting and alarm systems whose continued use is required; de-energizing portions of fire protection, electric power, and HVAC systems whose continued use is not required.
- Cleaning of the loose surface contamination from building access pathways.
- Performing an interim radiation survey of plant, posting warning signs where appropriate.
- Erecting physical barriers and/or securing all access to radioactive or contaminated areas, except as required for inspection and maintenance.
- Installing security and surveillance monitoring equipment and relocating security fence around secured structures, as required.

2.2.2 Period 2 - Dormancy

The second phase identified by the NRC in its rule addresses licensed activities during a storage period and is applicable to the dormancy phases of the deferred decommissioning alternatives. Dormancy activities include a 24-hour security force, preventive and corrective maintenance on security systems, area lighting, general building maintenance, heating and ventilation of buildings, routine radiological inspections of contaminated structures, maintenance of structural integrity, and a site environmental and radiation monitoring program. Resident maintenance personnel perform equipment maintenance, inspection activities, routine services to maintain safe conditions, adequate lighting, heating, and ventilation, and periodic preventive maintenance on essential site services.

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

Security during the dormancy period is conducted primarily to prevent unauthorized entry and to protect the public from the consequences of its own actions. The security fence, sensors, alarms, and other surveillance equipment provide security. Fire and radiation alarms are also monitored and maintained.

Consistent with the DECON scenario, the spent fuel storage pools are emptied within twelve years of the cessation of operations. The transfer of the spent fuel to the DOE continues throughout the dormancy period until completed in 2061. Once emptied, the ISFSI is secured for storage and decommissioned along with the power block structures in Period 4.

After an optional period of storage (such that license termination is accomplished within 60 years of final shutdown), it is required that the licensee submit an application to terminate the license, along with an LTP (described in Section 2.1.2), thereby initiating the third phase.

2.2.3 Periods 3 and 4 - Delayed Decommissioning

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

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

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

The delay in decommissioning also yields lower working area radiation levels. As such, the estimate for this delayed scenario incorporates

reduced ALARA controls for the SAFSTOR's lower occupational exposure potential.

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

2.2.4 Period 5 - Site Restoration

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

3. COST ESTIMATE

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

3.1 BASIS OF ESTIMATE

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

3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"[18] and the DOE "Decommissioning Handbook."[19] 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.[20]

The unit factor method provides a demonstrable basis for establishing reliable cost estimates. The detail provided in the unit factors, including activity duration, labor costs (by craft), and equipment and consumable costs, ensures that essential elements have not been omitted. Appendix A presents the detailed development of a typical unit factor. Appendix B provides the values contained within one set of factors developed for this analysis.

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

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

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

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

Scheduling Program Durations

The unit factors, adjusted by the WDFs as described above, are applied against the inventory of materials to be removed in the radiologically controlled areas. The resulting man-hours, or crew-hours, are used in the development of the decommissioning program schedule, using resource loading and event sequencing considerations. The scheduling of conventional removal and dismantling activities 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 resulting costs.

3.3 IMPACT OF DECOMMISSIONING MULTIPLE REACTOR UNITS

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

- The sequence of work generally follows the principal that the work is done at Unit 1 first, followed by similar work at Unit 2. This permits the experience gained at Unit 1 to be applied by the workforce at the second unit. It should be noted however, that the estimate does not consider productivity improvements at the second unit, since there is little documented experience with decommissioning two units simultaneously. The work associated with developing activity specifications and procedures can be considered essentially identical between the two units, therefore the second unit costs are assumed to be a fraction of the first unit (~ 43%).
- Segmenting the reactor vessel and internals will require the use of special equipment. The decommissioning project will be scheduled such that Unit 2's reactor internals and vessel are segmented immediately after the activities at Unit 1 have been completed.
- Some program management and support costs, particularly costs associated with the more senior positions, can be avoided with two reactors undergoing decommissioning simultaneously. As a result, the estimate is based on a "lead" unit that includes these senior positions, and a "second" unit that excludes these positions. The designation as lead is based on the unit undertaking the most complex tasks (for instance vessel segmentation) or performing tasks for the first time.
- The final radiological survey schedule is also affected by a two-unit decommissioning schedule. It would be considered impractical to try to complete the final status survey of Unit 1, while Unit 2 still has ongoing radiological remediation work and waste handling in process. As such, the transfer of the spent fuel from the storage pools and subsequent

decontamination of the fuel handling buildings is coordinated so as to synchronize the final status survey for the station.

- The final demolition of buildings at Units 1 and 2 are considered to take place concurrently. This is considered a reasonable assumption since access to the buildings is considered good at the station.
- Unit 1, as the first unit to enter decommissioning, incurs the majority of site characterization costs.
- Shared systems and common structures are generally assigned to Unit 2.
- Station costs such as emergency response fees, regulatory agency fees, corporate overhead, and insurance are generally allocated on an equal basis between the two units.

3.4 FINANCIAL COMPONENTS OF THE COST MODEL

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

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

3.4.1 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"[21] 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 remaining 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 10% to 75%, depending on the degree of difficulty judged to be appropriate from TLG's actual decommissioning experience. The contingency values used in this study are as follows:

• Decontamination	50%
• Contaminated Component Removal	25%
• Contaminated Component Packaging	10%
• Contaminated Component Transport	15%
• Low-Level Radioactive Waste Disposal	25%
• Reactor Segmentation	75%
• NSSS Component Removal	25%
• Reactor Waste Packaging	25%
• Reactor Waste Transport	25%
• Reactor Vessel Component Disposal	50%
• GTCC Disposal	15%
• Non-Radioactive Component Removal	15%
• Heavy Equipment and Tooling	15%
• Supplies	25%
• Engineering	15%
• Energy	15%
• Characterization and Termination Surveys	30%
• Construction	15%
• Taxes and Fees	10%
• Insurance	10%
• Staffing	15%

The contingency values are applied to the appropriate components of the estimates on a line item basis. A composite value is then reported at the end of each detailed estimate (as provided in Appendix C and D). For example, the composite contingency value reported for the DECON alternative in Appendix C is approximately 18.7% and for the SAFSTOR alternative in Appendix D is approximately 17.3%.

3.4.2 Financial Risk

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

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

3.5 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.

3.5.1 Spent Fuel Management

The cost to dispose the spent fuel generated from plant operations is not reflected within the estimates to decommission Catawba. Ultimate disposition of the spent fuel is within the province of the DOE's Waste Management System, as defined by the Nuclear Waste Policy Act. As such, the disposal cost is financed by a 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 site 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 estimates, as described below.

Completion of the decommissioning process is highly dependent upon the DOE's ability to remove spent fuel from the site. The timing for

removal of spent fuel from the site is based upon the DOE's most recently published annual acceptance rates of 400 MTU/year for year 1, 3,800 MTU total for years 2 through 4 and 3,000 MTU/year for year 5 and beyond.[22] The DOE contracts provide mechanisms for altering the oldest fuel first allocation scheme, including emergency deliveries, exchanges of allocations amongst utilities and the option of providing priority acceptance from permanently shutdown nuclear reactors. Because it is unclear how these mechanisms may operate once DOE begins accepting spent fuel from commercial reactors, this study assumes that DOE will accept spent fuel in an oldest fuel first order.

ISFSI

An ISFSI, which can be operated under a separate and independent license, has been constructed to support continued plant operations. The facility is not required to support future decommissioning operations; however, there will be spent fuel located at the ISFSI (from plant operations) that will need to be transferred to the DOE during decommissioning. This fuel is assumed to be transferred after the pools are emptied.

The ISFSI will continue to operate throughout decommissioning, and beyond the termination of the operating license in the DECON decommissioning scenario, until such time that the transfer of spent fuel to the DOE can be completed. Assuming that DOE commences repository operation in 2017, Catawba fuel is projected to be removed from the site beginning in 2020. The process is expected to be completed by the year 2061, based upon the current shutdown date, as delineated in Table 3.1. The scenario is similar for the SAFSTOR alternative; however, based upon the expected completion date for fuel transfer, the ISFSI will be emptied prior to the commencement of decommissioning operations.

Operation and maintenance costs for the spent fuel pools and the ISFSI are included within the estimates and address the cost for staffing the facility, as well as security, insurance, and licensing fees. Costs are also provided for the final disposition of the facilities once the transfer is complete.

Storage Canister Design

A multi-purpose storage canister, with a 24-fuel assembly capacity, is assumed to be used at the ISFSI and in the transfer of spent fuel to the DOE. For fuel transferred directly from the pools to the DOE, the DOE

was assumed to provide Transport, Aging and Disposal (TAD) canisters with a 21 assembly capacity at no additional cost to the owner.

Canister Loading and Transfer

An average cost of $1,800 per assembly is used for the labor and equipment to seal and load each spent fuel canister into the DOE transport cask from the wet storage pools. For estimating purposes, 50% of this cost is used to estimate the cost to transfer the fuel from the ISFSI into the transport cask. An additional cost of $100,000 is used for the labor and equipment to perform the closure and testing of the TAD cask for shipment to the DOE repository.

Operations and Maintenance

An annual cost (excluding labor) of approximately $745,000 and $109,000 are used for operation and maintenance of the spent fuel pools and the ISFSI, respectively. Pool operations are expected to continue approximately twelve years after the cessation of operations. ISFSI operating costs are based upon a 18 year period of operations following plant shutdown.

ISFSI Design Considerations

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

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. Although there are strong arguments

that GTCC waste is covered by the spent fuel contact with DOE and the fees being paid pursuant to that contract, DOE has taken the position that GTCC waste is not covered by that contract or its fees and that utilities, including Duke Energy, will have to pay an additional fee for the disposal of their GTCC waste. However, to date, the federal government has not identified a cost for disposing of GTCC or a schedule for acceptance. As such, the GTCC radioactive waste has been packaged and disposed of as high-level waste, at a cost equivalent to that envisioned for the spent fuel.

For purposes of this study, GTCC is packaged in the same canisters used to store spent fuel. Disposal costs are based upon a cost equivalent to that envisioned for the spent fuel. It is not anticipated that the DOE would accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage with the spent fuel in the ISFSI at the Catawba site (for the DECON alternative). In the SAFSTOR scenario, the GTCC material is shipped directly to a DOE facility as it is generated since the fuel has been removed from the site prior to the start of decommissioning and the ISFSI deactivated.

3.5.2 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 refueling canal, where a turntable and remote cutter are installed. The vessel is segmented in place, using a mast-mounted cutter supported off the lower head and directed from a shielded work platform installed overhead in the reactor cavity. Transportation cask specifications and transportation regulations dictate the segmentation and packaging methodology.

Intact disposal of reactor vessel shells has been successfully demonstrated at several of the sites currently being 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 Catawba plant 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. Consequently, the study assumes 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 (although some shielded casks are still required).

3.5.3 Primary System Components

In the DECON scenario, the reactor coolant system components are assumed to be decontaminated using chemical agents prior to the start of dismantling operations. This type of decontamination can be expected to have a significant ALARA impact, since in this scenario the removal work is done within the first few years of shutdown. A decontamination factor (average reduction) of 10 is assumed for the process. Disposal of the decontamination solution effluent is included within the estimate as a "process liquid waste" charge. In the SAFSTOR scenario, radionuclide decay is expected to provide the same benefit and, therefore, a chemical decontamination is not included.

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

A trolley crane is set up for the removal of the generators. It can also be used to move portions of the steam generator cubicle walls and floor slabs from the reactor building to a location where they can be decontaminated and transported to the material handling area. Interferences within the work area, such as grating, piping, and other components are removed to create sufficient laydown space for processing these large components.

The generators are rigged for removal, disconnected from the surrounding piping and supports, and maneuvered into the open area where they are lowered onto a dolly. Each generator is rotated into the horizontal position for extraction from the containment and placed onto a multi-wheeled vehicle for transport to an on-site processing and storage area.

The generators are disassembled on-site with the outer shell and lightly contaminated subassemblies designated for off-site recycling. The more highly contaminated tube sheet and tube bundle are packaged for direct disposal. The interior volume is filled with low-density cellular concrete for stabilization of the internal contamination.

Disposal costs are based upon the displaced volume and weight of the units. Each component is then loaded onto a rail car for transport to the disposal facility.

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

3.5.4 Retired Components

The estimate includes the cost to dispose of the four Unit 1 retired steam generators expected to be in storage at the site upon the cessation of

plant operations. The components are processed for disposal in the same manner as described for the installed units.

3.5.5 Main Turbine and Condenser

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

3.5.6 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.[23] 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 material requiring controlled disposal are based upon the mileage to the Barnwell facility and/or the EnergySolutions facility in Clive, Utah. Transportation costs for off-site waste processing are based upon the mileage to Oak Ridge, Tennessee. Truck transport costs are estimated using published tariffs from Tri-State Motor Transit.[24]

3.5.7 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 and D, and summarized in Section 5. The quantified waste summaries shown in these tables are consistent with 10 CFR Part 61 classifications. Commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations. The volumes are calculated based on the exterior package dimensions for containerized material or a specific calculation for components serving as their own waste containers.

The more highly activated reactor components will be shipped in reusable, shielded truck casks with disposable liners. In calculating disposal costs, the burial fees are applied against the liner volume, as well as the special handling requirements of the payload. Packaging

efficiencies are lower for the highly activated materials (greater than 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 lowest level and majority of the material generated from the decontamination and dismantling activities is based upon the current cost for disposal at EnergySolutions facility in Clive, Utah. Disposal costs for the higher activity waste (Class B and C) are based upon the rate schedule for the Barnwell facility.

3.5.8 Site Conditions Following Decommissioning

The NRC will terminate (or amend) the site license if it determines that site remediation has been performed in accordance with the license termination plan, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release. The NRC's involvement in the decommissioning process will end at this point. Local building codes and state environmental regulations will dictate the next step in the decommissioning process, as well as the owner's own future plans for the site.

All structures will be removed except for the switchyard. The switchyard is required for grid operations. Structures to be removed include but are not limited to the Reactor Buildings, Auxiliary Buildings, Service Building, Turbine Buildings, Intake and Discharge Structures, ponds, dams, and dikes. The landfill and shooting range will be remediated and closed.

The structures that may require decontamination or radiological remediation are the Reactor Buildings, Auxiliary Buildings, Containment Mechanical Equipment Building, Fuel Building, Retired Steam Generator Storage Facility, Monitor Tank Building, Contaminated Material Storage Warehouse and the asphalt pad under the RP Storage Tent.

The estimates presented herein include the dismantling of the major structures to a nominal depth of three feet below grade, backfilling and the collapsing of below grade voids, and general terra-forming such that the site upon which the power block and supplemental structures are located is transformed into a "grassy plain."

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.

Costs are included for the remediation and post-closure care and maintenance of the landfill and shooting range at the site. Since the care and maintenance of the landfill will extend beyond the active decommissioning period, a lump-sum perpetuity payment is included in the final year of decommissioning for the remaining duration.

Environmental Remediation

For purposes of this estimate, the sanitary and chemical treatment ponds are not projected to require remediation. The first sanitary pond has a synthetic liner and will not require remediation. The tertiary pond is not lined, but the liquid is releasable; therefore, no remediation will be required. As for the chemical treatment ponds, the initial hold-up pond is concrete and should not require remediation. The conventional waste basins are earthen and unlined. Current groundwater monitoring around these basins has not indicated any problems; therefore, no remediation will be required. The final hold-up pond has a synthetic liner and should not require remediation.

3.6 ASSUMPTIONS

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

3.6.1 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.

3.6.2 Labor Costs

The craft labor required to decontaminate and dismantle the nuclear plant is acquired through standard site contracting practices. The current cost of labor at the site is used as an estimating basis.

Duke Energy will continue to provide site operations support, including decommissioning program management, licensing, radiological protection, and site security. Duke Energy will serve as the Decommissioning Operations Contractor, providing the supervisory staff needed to oversee the labor subcontractors, consultants, and specialty contractors needed to perform the work envisioned in the decontamination and dismantling effort. Duke Energy will also provide the engineering services needed to develop activity specifications, detailed procedures, detailed activation analyses, and support field activities such as structural modifications. Severance and retention costs are not included in the estimate. Reduction in staff levels will be handled through normal staffing processes.

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

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

3.6.3 Design Conditions

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

The curie contents of the vessel and internals at final shutdown are derived from those listed in NUREG/CR-3474.[25] Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Catawba components, projected operating life, and different periods of decay. Additional short-lived isotopes were derived from CR-0130[26] and CR-0672,[27] and benchmarked to the long-lived values from CR-3474.

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

Activation of the containment building structure is confined to the biological 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 send it to a landfill. The ultimate disposition of the material removed from the containment building will depend upon the site release criteria selected, as well as the designated end use for the site.

3.6.4 General

Transition Activities

Existing warehouses are cleared of non-essential material and remain for use by Duke Energy 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, i.e., the estimates do not address the disposition of any legacy wastes; the disposal of operating wastes during this initial period is not considered a decommissioning expense.

Scrap and Salvage

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

equipment would be speculative, and the value would be small in comparison to the overall decommissioning expenses, this analysis does not attempt to quantify the value that an owner may realize based upon those efforts.

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

Furniture, tools, mobile equipment such as forklifts, trucks, bulldozers, and other property 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.

Energy

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

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."[28] The NRC's financial protection requirements are based on various reactor (and spent fuel) configurations.

Taxes

Property tax payments continue throughout the decommissioning process, although at a substantially reduced level. The rate of decrease in disbursements is consistent over the same time interval for both the DECON and SAFSTOR alternatives.

The value of plant structures and equipment decreases from 100% to 0% over an eight-year period. The property taxes are determined based on a 100% value of the plant structures and equipment for the first two years, 66.7% of the value for the next three years, 33.3% of the value for the next three years, and 0% for the remainder of the decommissioning period.

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.

Integrated earthworks created during the initial formation of the Lake Wylie area and integral with it will be left intact and maintained in accordance with the current dam maintenance and inspection program. The on-site dike and earthwork network forming water retention ponds and lagoons will be disabled to relieve ongoing inspection requirements.

3.7 COST ESTIMATE SUMMARY

Schedules of expenditures are provided in Tables 3.2 through 3.5. The tables delineate the cost contributors by year of expenditures as well as cost contributor (e.g., labor, materials, and waste disposal).

Additional tables in Appendices C and D provide detailed costs elements. The cost elements 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). The cost reported for this subcategory is generally sufficient to terminate the plant's operating license, recognizing that there may be some additional cost impact from spent fuel management.

The "Spent Fuel Management" subcategory contains costs associated with the containerization and transfer of spent fuel from the pool to the DOE and the transfer of casks from the ISFSI to the DOE. Costs are also included for the operations of the pools and 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.

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

As discussed in Section 3.4.1, it is 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 (for the DECON alternative). 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.

Decommissioning costs are reported in 2008 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 and D, along with the timeline presented in Section 4.

TABLE 3.1
SPENT FUEL MANAGEMENT SCHEDULE

	Fuel Assembly Inventory		
Year	Pool	ISFSI	DOE Acceptance
2017	2202	1146	0
2018	2202	1306	0
2019	2202	1386	0
2020	2202	1386	80
2021	2202	1386	160
2022	2202	1386	80
2023	2202	1386	80
2024	2202	1386	160
2025	2202	1386	80
2026	2202	1386	80
2027	2202	1386	160
2028	2202	1386	80
2029	2202	1386	80
2030	2202	1386	160
2031	2202	1386	80
2032	2202	1386	80
2033	2202	1386	160
2034	2202	1386	80
2035	2202	1386	80
2036	2202	1386	160
2037	2202	1386	80
2038	2202	1386	80
2039	2202	1386	160
2040	2202	1386	80
2041	2202	1386	80
2042	2202	1386	160
2043	2428	1386	160
2044	2256	1386	172
2045	2089	1386	167
2046	1917	1386	172
2047	1745	1386	172
2048	1573	1386	172
2049	1401	1386	172
2050	1229	1386	172

TABLE 3.1 (continued)
SPENT FUEL MANAGEMENT SCHEDULE

	Fuel Assembly Inventory		
Year	Pool	ISFSI	DOE Acceptance
2051	971	1386	258
2052	713	1386	258
2053	455	1386	258
2054	197	1386	258
2055	0	1325	258
2056	0	1067	258
2057	0	809	258
2058	0	551	258
2059	0	293	258
2060	0	35	258
2061	0	0	35
			6454

TABLE 3.2
CATAWBA NUCLEAR STATION, UNIT 1
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	2,285	114	100	2	810	3,312
2044	42,090	2,527	1,931	328	16,078	62,954
2045	45,092	15,335	2,630	22,892	25,546	111,495
2046	43,593	19,573	1,740	37,709	14,163	116,777
2047	33,987	7,819	1,407	13,132	10,544	66,889
2048	33,090	6,630	1,377	10,637	10,200	61,934
2049	13,481	2,351	639	2,882	5,098	24,451
2050	6,216	766	366	7	3,209	10,564
2051	6,216	766	366	7	3,209	10,564
2052	6,233	768	367	7	3,218	10,593
2053	6,216	766	366	7	3,209	10,564
2054	6,216	766	366	7	3,209	10,564
2055	10,479	2,387	460	2,099	4,267	19,692
2056	9,839	3,257	382	917	13,155	27,550
2057	9,855	7,444	183	0	957	18,438
2058	5,022	3,793	93	0	488	9,396
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	688	0	0	16,975	17,663
	279,912	75,748	12,775	90,630	134,335	593,400

TABLE 3.2a
CATAWBA NUCLEAR STATION, UNIT 1
DECON ALTERNATIVE
LICENSE TERMINATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	2,258	89	100	2	741	3,190
2044	41,556	2,068	1,931	328	14,798	60,682
2045	43,997	14,839	2,630	22,892	23,970	108,328
2046	42,502	19,057	1,740	37,709	12,328	113,335
2047	32,361	7,301	1,407	13,132	9,216	63,418
2048	31,405	6,111	1,377	10,637	8,921	58,450
2049	8,495	1,653	403	2,877	2,413	15,840
2050	0	0	41	0	0	41
2051	0	0	41	0	0	41
2052	0	0	41	0	0	41
2053	0	0	41	0	0	41
2054	0	0	41	0	0	41
2055	5,806	1,693	31	2,094	1,769	11,393
2056	8,430	2,090	276	917	12,982	24,695
2057	74	0	0	0	346	420
2058	37	0	0	0	177	214
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	688	0	0	16,975	17,663
	216,921	55,588	10,101	90,587	104,637	477,834

TABLE 3.2b
CATAWBA NUCLEAR STATION, UNIT 1
DECON ALTERNATIVE
SPENT FUEL MANAGEMENT EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	8	25	0	0	70	103
2044	153	459	0	0	1,280	1,891
2045	159	476	0	0	1,276	1,910
2046	160	479	0	0	1,276	1,915
2047	161	483	0	0	1,276	1,920
2048	162	485	0	0	1,280	1,926
2049	4,574	689	267	5	2,685	8,220
2050	6,216	766	366	7	3,209	10,564
2051	6,216	766	366	7	3,209	10,564
2052	6,233	768	367	7	3,218	10,593
2053	6,216	766	366	7	3,209	10,564
2054	6,216	766	366	7	3,209	10,564
2055	4,673	694	273	5	2,498	8,143
2056	613	140	23	0	161	938
2057	4,085	98	165	0	527	4,875
2058	2,082	50	84	0	268	2,484
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	0	0	0	0	0
	47,928	7,909	2,644	43	28,649	87,173

TABLE 3.2c
CATAWBA NUCLEAR STATION, UNIT 1
DECON ALTERNATIVE
SITE RESTORATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	19	0	0	0	0	19
2044	381	0	0	0	0	381
2045	937	20	0	0	300	1,257
2046	931	37	0	0	559	1,527
2047	1,465	34	0	0	52	1,551
2048	1,524	34	0	0	0	1,558
2049	412	9	0	0	0	421
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	796	1,026	3	0	12	1,837
2057	5,696	7,346	18	0	83	13,144
2058	2,903	3,743	9	0	43	6,698
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	0	0	0	0	0
	15,064	12,250	30	0	1,049	28,393

TABLE 3.3
CATAWBA NUCLEAR STATION, UNIT 2
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	922	80	60	1	622	1,685
2044	16,868	1,460	1,098	25	11,383	30,833
2045	17,469	1,784	1,186	234	11,934	32,607
2046	41,542	18,066	2,630	21,895	20,255	104,388
2047	46,310	21,131	1,660	30,756	13,143	113,001
2048	43,235	9,172	1,377	12,909	10,650	77,343
2049	41,701	8,826	1,335	12,380	10,333	74,576
2050	6,223	785	366	7	3,124	10,504
2051	6,223	785	366	7	3,124	10,504
2052	6,240	787	367	7	3,132	10,533
2053	6,223	785	366	7	3,124	10,504
2054	6,223	785	366	7	3,124	10,504
2055	12,384	2,950	460	2,107	4,344	22,244
2056	16,382	4,557	382	922	15,251	37,495
2057	18,747	13,771	183	0	1,970	34,671
2058	11,203	7,107	183	0	1,673	20,166
2059	3,364	182	183	0	1,365	5,094
2060	3,373	183	184	0	1,368	5,108
2061	2,308	2,501	137	336	19,685	24,967
	306,937	95,697	12,889	81,600	139,602	636,727

TABLE 3.3a
CATAWBA NUCLEAR STATION, UNIT 2
DECON ALTERNATIVE
LICENSE TERMINATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	909	54	60	1	545	1,570
2044	16,638	995	1,098	25	9,977	28,733
2045	17,227	1,320	1,186	234	10,532	30,499
2046	40,396	17,551	2,630	21,895	18,554	101,026
2047	44,526	20,590	1,660	30,756	11,174	108,707
2048	40,900	8,635	1,377	12,909	8,646	72,468
2049	39,223	8,281	1,321	12,380	8,292	69,498
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	7,706	2,241	187	2,102	1,866	14,102
2056	13,725	2,506	356	922	14,850	32,359
2057	32	0	0	0	778	809
2058	16	0	0	0	396	413
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	688	0	0	16,975	17,663
	221,297	62,862	9,875	81,226	102,587	477,846

TABLE 3.3b
CATAWBA NUCLEAR STATION, UNIT 2
DECON ALTERNATIVE
SPENT FUEL MANAGEMENT EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	8	25	0	0	77	111
2044	155	465	0	0	1,405	2,025
2045	155	464	0	0	1,401	2,020
2046	161	484	0	0	1,401	2,046
2047	161	484	0	0	1,401	2,047
2048	162	485	0	0	1,405	2,052
2049	394	495	14	0	1,466	2,369
2050	6,223	785	366	7	3,078	10,459
2051	6,223	785	366	7	3,078	10,459
2052	6,240	787	367	7	3,087	10,487
2053	6,223	785	366	7	3,078	10,459
2054	6,223	785	366	7	3,078	10,459
2055	4,678	708	273	5	2,433	8,097
2056	1,233	143	23	0	344	1,743
2057	8,525	113	165	0	1,062	9,866
2058	5,994	147	174	0	1,188	7,503
2059	3,364	182	183	0	1,319	5,048
2060	3,373	183	184	0	1,323	5,062
2061	2,308	1,813	137	336	2,302	6,896
	61,803	10,120	2,984	374	33,927	109,208

TABLE 3.3c
CATAWBA NUCLEAR STATION, UNIT 2
DECON ALTERNATIVE
SITE RESTORATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	4	0	0	0	0	4
2044	75	0	0	0	0	75
2045	87	0	0	0	0	87
2046	985	31	0	0	300	1,316
2047	1,623	57	0	0	567	2,247
2048	2,174	52	0	0	598	2,824
2049	2,084	50	0	0	575	2,710
2050	0	0	0	0	45	45
2051	0	0	0	0	45	45
2052	0	0	0	0	46	46
2053	0	0	0	0	45	45
2054	0	0	0	0	45	45
2055	0	0	0	0	45	45
2056	1,424	1,908	3	0	57	3,392
2057	10,190	13,657	18	0	130	23,996
2058	5,192	6,960	9	0	89	12,250
2059	0	0	0	0	45	45
2060	0	0	0	0	46	46
2061	0	0	0	0	408	408
	23,838	22,716	30	0	3,089	49,672

TABLE 3.4
CATAWBA NUCLEAR STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	1,877	90	100	2	810	2,879
2044	34,866	2,242	1,836	94	17,209	56,247
2045	21,682	4,061	1,020	645	16,857	44,266
2046	7,811	886	366	22	4,824	13,909
2047	7,811	886	366	22	4,824	13,909
2048	7,833	888	367	22	4,838	13,947
2049	7,811	886	366	22	4,824	13,909
2050	7,811	886	366	22	4,824	13,909
2051	7,811	886	366	22	4,824	13,909
2052	7,833	888	367	22	4,838	13,947
2053	7,811	886	366	22	4,824	13,909
2054	7,811	886	366	22	4,824	13,909
2055	6,677	762	320	21	3,864	11,644
2056	3,371	400	184	20	1,057	5,031
2057	3,361	398	183	20	1,054	5,017
2058	3,361	398	183	20	1,054	5,017
2059	3,361	398	183	20	1,054	5,017
2060	3,371	400	184	20	1,057	5,031
2061	2,289	303	183	20	912	3,706
2062	1,943	272	183	20	866	3,284
2063	1,943	272	183	20	866	3,284
2064	1,948	273	184	20	868	3,293
2065	1,943	272	183	20	866	3,284
2066	1,943	272	183	20	866	3,284
2067	1,943	272	183	20	866	3,284
2068	1,948	273	184	20	868	3,293
2069	1,943	272	183	20	866	3,284
2070	1,943	272	183	20	866	3,284
2071	1,943	272	183	20	866	3,284
2072	1,948	273	184	20	868	3,293
2073	1,943	272	183	20	866	3,284
2074	1,943	272	183	20	866	3,284
2075	1,943	272	183	20	866	3,284

TABLE 3.4 (continued)
CATAWBA NUCLEAR STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	1,948	273	184	20	868	3,293
2077	1,943	272	183	20	866	3,284
2078	1,943	272	183	20	866	3,284
2079	1,943	272	183	20	866	3,284
2080	1,948	273	184	20	868	3,293
2081	1,943	272	183	20	866	3,284
2082	1,943	272	183	20	866	3,284
2083	1,943	272	183	20	866	3,284
2084	1,948	273	184	20	868	3,293
2085	1,943	272	183	20	866	3,284
2086	1,943	272	183	20	866	3,284
2087	1,943	272	183	20	866	3,284
2088	1,948	273	184	20	868	3,293
2089	1,943	272	183	20	866	3,284
2090	1,943	272	183	20	866	3,284
2091	1,943	272	183	20	866	3,284
2092	1,948	273	184	20	868	3,293
2093	1,943	272	183	20	866	3,284
2094	1,943	272	183	20	866	3,284
2095	1,943	272	183	20	866	3,284
2096	1,948	273	184	20	868	3,293
2097	1,943	272	183	20	866	3,284
2098	24,826	1,315	1,520	26	4,030	31,716
2099	33,490	8,490	1,804	11,737	8,565	64,085
2100	38,853	18,204	1,740	38,879	20,000	117,676
2101	35,146	9,015	1,392	19,371	6,811	71,737
2102	12,601	3,004	714	6,321	2,314	24,953
2103	6,052	1,762	357	18	11,870	20,058
2104	11,040	7,339	184	0	549	19,112
2105	6,666	4,432	111	0	331	11,540
	393,220	80,803	22,091	78,141	174,036	748,292

TABLE 3.4a
CATAWBA NUCLEAR STATION, UNIT 1
SAFSTOR ALTERNATIVE
LICENSE TERMINATION EXPENSITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	1,868	65	100	2	741	2,776
2044	34,713	1,783	1,836	94	15,929	54,356
2045	18,364	3,527	919	645	14,108	37,563
2046	1,943	300	183	22	887	3,334
2047	1,943	300	183	22	887	3,334
2048	1,948	301	184	22	889	3,344
2049	1,943	300	183	22	887	3,334
2050	1,943	300	183	22	887	3,334
2051	1,943	300	183	22	887	3,334
2052	1,948	301	184	22	889	3,344
2053	1,943	300	183	22	887	3,334
2054	1,943	300	183	22	887	3,334
2055	1,943	295	183	21	887	3,329
2056	1,948	280	184	20	889	3,321
2057	1,943	279	183	20	887	3,312
2058	1,943	279	183	20	887	3,312
2059	1,943	279	183	20	887	3,312
2060	1,948	280	184	20	889	3,321
2061	1,943	274	183	20	871	3,291
2062	1,943	272	183	20	866	3,284
2063	1,943	272	183	20	866	3,284
2064	1,948	273	184	20	868	3,293
2065	1,943	272	183	20	866	3,284
2066	1,943	272	183	20	866	3,284
2067	1,943	272	183	20	866	3,284
2068	1,948	273	184	20	868	3,293
2069	1,943	272	183	20	866	3,284
2070	1,943	272	183	20	866	3,284
2071	1,943	272	183	20	866	3,284
2072	1,948	273	184	20	868	3,293
2073	1,943	272	183	20	866	3,284
2074	1,943	272	183	20	866	3,284
2075	1,943	272	183	20	866	3,284

TABLE 3.4a (continued)
CATAWBA NUCLEAR STATION, UNIT 1
SAFSTOR ALTERNATIVE
LICENSE TERMINATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	1,948	273	184	20	868	3,293
2077	1,943	272	183	20	866	3,284
2078	1,943	272	183	20	866	3,284
2079	1,943	272	183	20	866	3,284
2080	1,948	273	184	20	868	3,293
2081	1,943	272	183	20	866	3,284
2082	1,943	272	183	20	866	3,284
2083	1,943	272	183	20	866	3,284
2084	1,948	273	184	20	868	3,293
2085	1,943	272	183	20	866	3,284
2086	1,943	272	183	20	866	3,284
2087	1,943	272	183	20	866	3,284
2088	1,948	273	184	20	868	3,293
2089	1,943	272	183	20	866	3,284
2090	1,943	272	183	20	866	3,284
2091	1,943	272	183	20	866	3,284
2092	1,948	273	184	20	868	3,293
2093	1,943	272	183	20	866	3,284
2094	1,943	272	183	20	866	3,284
2095	1,943	272	183	20	866	3,284
2096	1,948	273	184	20	868	3,293
2097	1,943	272	183	20	866	3,284
2098	24,525	1,315	1,520	26	4,030	31,416
2099	32,426	8,477	1,804	11,737	8,564	63,009
2100	37,731	18,162	1,740	38,879	19,997	116,510
2101	32,659	8,959	1,392	19,371	6,811	69,192
2102	11,716	2,984	714	6,321	2,314	24,049
2103	5,484	1,381	347	18	11,868	19,097
2104	99	0	0	0	518	616
2105	60	0	0	0	313	372
	300,738	61,132	19,900	78,141	130,571	590,482

TABLE 3.4b
CATAWBA NUCLEAR STATION, UNIT 1
SAFSTOR ALTERNATIVE
SPENT FUEL MANAGEMENT EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	8	25	0	0	70	103
2044	153	459	0	0	1,280	1,891
2045	3,318	535	101	0	2,749	6,703
2046	5,868	586	183	0	3,938	10,575
2047	5,868	586	183	0	3,938	10,575
2048	5,885	587	184	0	3,948	10,604
2049	5,868	586	183	0	3,938	10,575
2050	5,868	586	183	0	3,938	10,575
2051	5,868	586	183	0	3,938	10,575
2052	5,885	587	184	0	3,948	10,604
2053	5,868	586	183	0	3,938	10,575
2054	5,868	586	183	0	3,938	10,575
2055	4,735	467	136	0	2,977	8,315
2056	1,422	120	0	0	167	1,710
2057	1,419	120	0	0	167	1,705
2058	1,419	120	0	0	167	1,705
2059	1,419	120	0	0	167	1,705
2060	1,422	120	0	0	167	1,710
2061	346	29	0	0	41	416
2062	0	0	0	0	0	0
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0

TABLE 3.4b (continued)
CATAWBA NUCLEAR STATION, UNIT 1
SAFSTOR ALTERNATIVE
SPENT FUEL MANAGEMENT EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	0	0	0	0	0	0
2077	0	0	0	0	0	0
2078	0	0	0	0	0	0
2079	0	0	0	0	0	0
2080	0	0	0	0	0	0
2081	0	0	0	0	0	0
2082	0	0	0	0	0	0
2083	0	0	0	0	0	0
2084	0	0	0	0	0	0
2085	0	0	0	0	0	0
2086	0	0	0	0	0	0
2087	0	0	0	0	0	0
2088	0	0	0	0	0	0
2089	0	0	0	0	0	0
2090	0	0	0	0	0	0
2091	0	0	0	0	0	0
2092	0	0	0	0	0	0
2093	0	0	0	0	0	0
2094	0	0	0	0	0	0
2095	0	0	0	0	0	0
2096	0	0	0	0	0	0
2097	0	0	0	0	0	0
2098	0	0	0	0	0	0
2099	0	0	0	0	0	0
2100	0	0	0	0	0	0
2101	0	0	0	0	0	0
2102	0	0	0	0	0	0
2103	0	0	0	0	0	0
2104	0	0	0	0	0	0
2105	0	0	0	0	0	0
	68,509	7,388	1,887	0	43,410	121,194

TABLE 3.4c
CATAWBA NUCLEAR STATION, UNIT 1
SAFSTOR ALTERNATIVE
SITE RESTORATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
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	0	0	0	0	0	0
2048	0	0	0	0	0	0
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
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

TABLE 3.4c (continued)
CATAWBA NUCLEAR STATION, UNIT 1
SAFSTOR ALTERNATIVE
SITE RESTORATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	0	0	0	0	0	0
2077	0	0	0	0	0	0
2078	0	0	0	0	0	0
2079	0	0	0	0	0	0
2080	0	0	0	0	0	0
2081	0	0	0	0	0	0
2082	0	0	0	0	0	0
2083	0	0	0	0	0	0
2084	0	0	0	0	0	0
2085	0	0	0	0	0	0
2086	0	0	0	0	0	0
2087	0	0	0	0	0	0
2088	0	0	0	0	0	0
2089	0	0	0	0	0	0
2090	0	0	0	0	0	0
2091	0	0	0	0	0	0
2092	0	0	0	0	0	0
2093	0	0	0	0	0	0
2094	0	0	0	0	0	0
2095	0	0	0	0	0	0
2096	0	0	0	0	0	0
2097	0	0	0	0	0	0
2098	300	0	0	0	0	300
2099	1,063	13	0	0	1	1,077
2100	1,122	42	0	0	3	1,166
2101	2,487	57	0	0	0	2,544
2102	885	20	0	0	0	904
2103	568	381	10	0	2	960
2104	10,941	7,339	184	0	31	18,495
2105	6,607	4,432	111	0	19	11,168
	23,973	12,283	304	0	55	36,616

TABLE 3.5
CATAWBA NUCLEAR STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	1,497	88	100	2	825	2,512
2044	28,021	2,237	1,836	95	16,604	48,793
2045	17,658	4,140	1,020	654	13,734	37,207
2046	4,851	881	366	20	4,674	10,793
2047	4,851	881	366	20	4,674	10,793
2048	4,864	883	367	20	4,687	10,822
2049	4,851	881	366	20	4,674	10,793
2050	4,851	881	366	20	4,674	10,793
2051	4,851	881	366	20	4,674	10,793
2052	4,864	883	367	20	4,687	10,822
2053	4,851	881	366	20	4,674	10,793
2054	4,851	881	366	20	4,674	10,793
2055	4,060	759	320	20	3,766	8,924
2056	1,750	403	184	20	1,113	3,469
2057	1,745	402	183	19	1,110	3,459
2058	1,745	402	183	19	1,110	3,459
2059	1,745	402	183	19	1,110	3,459
2060	1,750	403	184	20	1,113	3,469
2061	1,424	311	183	19	873	2,811
2062	1,321	282	183	19	797	2,602
2063	1,321	282	183	19	797	2,602
2064	1,325	283	184	20	799	2,609
2065	1,321	282	183	19	797	2,602
2066	1,321	282	183	19	797	2,602
2067	1,321	282	183	19	797	2,602
2068	1,325	283	184	20	799	2,609
2069	1,321	282	183	19	797	2,602
2070	1,321	282	183	19	797	2,602
2071	1,321	282	183	19	797	2,602
2072	1,325	283	184	20	799	2,609
2073	1,321	282	183	19	797	2,602
2074	1,321	282	183	19	797	2,602
2075	1,321	282	183	19	797	2,602

TABLE 3.5 (continued)
CATAWBA NUCLEAR STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	1,325	283	184	20	799	2,609
2077	1,321	282	183	19	797	2,602
2078	1,321	282	183	19	797	2,602
2079	1,321	282	183	19	797	2,602
2080	1,325	283	184	20	799	2,609
2081	1,321	282	183	19	797	2,602
2082	1,321	282	183	19	797	2,602
2083	1,321	282	183	19	797	2,602
2084	1,325	283	184	20	799	2,609
2085	1,321	282	183	19	797	2,602
2086	1,321	282	183	19	797	2,602
2087	1,321	282	183	19	797	2,602
2088	1,325	283	184	20	799	2,609
2089	1,321	282	183	19	797	2,602
2090	1,321	282	183	19	797	2,602
2091	1,321	282	183	19	797	2,602
2092	1,325	283	184	20	799	2,609
2093	1,321	282	183	19	797	2,602
2094	1,321	282	183	19	797	2,602
2095	1,321	282	183	19	797	2,602
2096	1,325	283	184	20	799	2,609
2097	1,321	282	183	19	797	2,602
2098	1,321	282	183	19	797	2,602
2099	14,724	1,101	1,262	23	2,273	19,384
2100	24,635	6,725	1,818	5,577	5,755	44,509
2101	42,496	23,093	1,703	36,681	21,729	125,703
2102	46,810	13,536	1,373	22,351	8,291	92,362
2103	19,293	4,911	553	4,366	15,146	44,268
2104	15,199	14,217	184	0	580	30,180
2105	9,178	8,585	111	0	350	18,223
	326,322	100,083	21,458	70,788	167,071	685,723

TABLE 3.5a
CATAWBA NUCLEAR STATION, UNIT 2
SAFSTOR ALTERNATIVE
LICENSE TERMINATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	1,489	63	100	2	699	2,353
2044	27,868	1,778	1,836	95	14,345	45,923
2045	15,634	3,606	919	654	10,947	31,760
2046	1,321	295	183	20	806	2,625
2047	1,321	295	183	20	806	2,625
2048	1,325	296	184	20	808	2,632
2049	1,321	295	183	20	806	2,625
2050	1,321	295	183	20	806	2,625
2051	1,321	295	183	20	806	2,625
2052	1,325	296	184	20	808	2,632
2053	1,321	295	183	20	806	2,625
2054	1,321	295	183	20	806	2,625
2055	1,321	292	183	20	806	2,621
2056	1,325	283	184	20	808	2,618
2057	1,321	282	183	19	806	2,611
2058	1,321	282	183	19	806	2,611
2059	1,321	282	183	19	806	2,611
2060	1,325	283	184	20	808	2,618
2061	1,321	282	183	19	799	2,604
2062	1,321	282	183	19	797	2,602
2063	1,321	282	183	19	797	2,602
2064	1,325	283	184	20	799	2,609
2065	1,321	282	183	19	797	2,602
2066	1,321	282	183	19	797	2,602
2067	1,321	282	183	19	797	2,602
2068	1,325	283	184	20	799	2,609
2069	1,321	282	183	19	797	2,602
2070	1,321	282	183	19	797	2,602
2071	1,321	282	183	19	797	2,602
2072	1,325	283	184	20	799	2,609
2073	1,321	282	183	19	797	2,602
2074	1,321	282	183	19	797	2,602
2075	1,321	282	183	19	797	2,602

TABLE 3.5a (continued)
CATAWBA NUCLEAR STATION, UNIT 2
SAFSTOR ALTERNATIVE
LICENSE TERMINATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	1,325	283	184	20	799	2,609
2077	1,321	282	183	19	797	2,602
2078	1,321	282	183	19	797	2,602
2079	1,321	282	183	19	797	2,602
2080	1,325	283	184	20	799	2,609
2081	1,321	282	183	19	797	2,602
2082	1,321	282	183	19	797	2,602
2083	1,321	282	183	19	797	2,602
2084	1,325	283	184	20	799	2,609
2085	1,321	282	183	19	797	2,602
2086	1,321	282	183	19	797	2,602
2087	1,321	282	183	19	797	2,602
2088	1,325	283	184	20	799	2,609
2089	1,321	282	183	19	797	2,602
2090	1,321	282	183	19	797	2,602
2091	1,321	282	183	19	797	2,602
2092	1,325	283	184	20	799	2,609
2093	1,321	282	183	19	797	2,602
2094	1,321	282	183	19	797	2,602
2095	1,321	282	183	19	797	2,602
2096	1,325	283	184	20	799	2,609
2097	1,321	282	183	19	797	2,602
2098	1,321	282	183	19	797	2,602
2099	14,620	1,101	1,262	23	2,273	19,279
2100	24,029	6,715	1,818	5,577	5,754	43,892
2101	40,430	22,995	1,703	36,655	21,572	123,355
2102	42,839	13,179	1,373	22,091	6,726	86,208
2103	17,734	4,103	543	4,315	14,838	41,533
2104	42	0	0	0	518	560
2105	26	0	0	0	313	338
	254,768	68,619	19,267	70,453	120,368	533,475

TABLE 3.5b
CATAWBA NUCLEAR STATION, UNIT 2
SAFSTOR ALTERNATIVE
SPENT FUEL MANAGEMENT EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	8	25	0	0	77	110
2044	153	459	0	0	1,405	2,017
2045	2,024	535	101	0	2,752	5,412
2046	3,530	586	183	0	3,842	8,141
2047	3,530	586	183	0	3,842	8,141
2048	3,540	587	184	0	3,853	8,163
2049	3,530	586	183	0	3,842	8,141
2050	3,530	586	183	0	3,842	8,141
2051	3,530	586	183	0	3,842	8,141
2052	3,540	587	184	0	3,853	8,163
2053	3,530	586	183	0	3,842	8,141
2054	3,530	586	183	0	3,842	8,141
2055	2,739	467	136	0	2,912	6,255
2056	425	120	0	0	194	739
2057	424	120	0	0	194	737
2058	424	120	0	0	194	737
2059	424	120	0	0	194	737
2060	425	120	0	0	194	739
2061	103	29	0	0	47	180
2062	0	0	0	0	0	0
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0

TABLE 3.5b (continued)
CATAWBA NUCLEAR STATION, UNIT 2
SAFSTOR ALTERNATIVE
SPENT FUEL MANAGEMENT EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	0	0	0	0	0	0
2077	0	0	0	0	0	0
2078	0	0	0	0	0	0
2079	0	0	0	0	0	0
2080	0	0	0	0	0	0
2081	0	0	0	0	0	0
2082	0	0	0	0	0	0
2083	0	0	0	0	0	0
2084	0	0	0	0	0	0
2085	0	0	0	0	0	0
2086	0	0	0	0	0	0
2087	0	0	0	0	0	0
2088	0	0	0	0	0	0
2089	0	0	0	0	0	0
2090	0	0	0	0	0	0
2091	0	0	0	0	0	0
2092	0	0	0	0	0	0
2093	0	0	0	0	0	0
2094	0	0	0	0	0	0
2095	0	0	0	0	0	0
2096	0	0	0	0	0	0
2097	0	0	0	0	0	0
2098	0	0	0	0	0	0
2099	0	0	0	0	0	0
2100	0	0	0	0	0	0
2101	31	27	0	26	124	207
2102	316	270	0	260	1,256	2,101
2103	73	83	0	51	246	453
2104	230	587	0	0	30	846
2105	139	354	0	0	18	511
	39,727	8,708	1,887	336	44,436	95,094

TABLE 3.5c
CATAWBA NUCLEAR STATION, UNIT 2
SAFSTOR ALTERNATIVE
SITE RESTORATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	0	0	0	0	49	49
2044	0	0	0	0	854	854
2045	0	0	0	0	35	35
2046	0	0	0	0	27	27
2047	0	0	0	0	27	27
2048	0	0	0	0	27	27
2049	0	0	0	0	27	27
2050	0	0	0	0	27	27
2051	0	0	0	0	27	27
2052	0	0	0	0	27	27
2053	0	0	0	0	27	27
2054	0	0	0	0	27	27
2055	0	0	0	0	48	48
2056	0	0	0	0	112	112
2057	0	0	0	0	111	111
2058	0	0	0	0	111	111
2059	0	0	0	0	111	111
2060	0	0	0	0	112	112
2061	0	0	0	0	27	27
2062	0	0	0	0	0	0
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	0	0	0	0	0	0
2075	0	0	0	0	0	0

TABLE 3.5c (continued)
CATAWBA NUCLEAR STATION, UNIT 2
SAFSTOR ALTERNATIVE
SITE RESTORATION EXPENDITURES
(thousands, 2008 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	0	0	0	0	0	0
2077	0	0	0	0	0	0
2078	0	0	0	0	0	0
2079	0	0	0	0	0	0
2080	0	0	0	0	0	0
2081	0	0	0	0	0	0
2082	0	0	0	0	0	0
2083	0	0	0	0	0	0
2084	0	0	0	0	0	0
2085	0	0	0	0	0	0
2086	0	0	0	0	0	0
2087	0	0	0	0	0	0
2088	0	0	0	0	0	0
2089	0	0	0	0	0	0
2090	0	0	0	0	0	0
2091	0	0	0	0	0	0
2092	0	0	0	0	0	0
2093	0	0	0	0	0	0
2094	0	0	0	0	0	0
2095	0	0	0	0	0	0
2096	0	0	0	0	0	0
2097	0	0	0	0	0	0
2098	0	0	0	0	0	0
2099	104	0	0	0	0	104
2100	606	10	0	0	0	617
2101	2,035	72	0	0	33	2,140
2102	3,656	87	0	0	309	4,052
2103	1,486	725	10	0	62	2,282
2104	14,927	13,631	184	0	32	28,773
2105	9,013	8,231	111	0	20	17,374
	31,827	22,756	304	0	2,268	57,155

4. SCHEDULE ESTIMATE

The schedules for the decommissioning scenarios considered in this study follow the sequences 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 DECON alternative from shutdown through ISFSI site restoration is presented in Figure 4.1. The scheduling sequence is based on the fuel being removed from the spent fuel pools within twelve years. The key activities listed in the schedule do not reflect a one-to-one correspondence with those activities in the cost tables, but reflect dividing some activities for clarity and combining others for convenience. The schedule was prepared using the "Microsoft Project Professional 2003" computer software.[29]

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 Building is isolated until such time that all spent fuel has been discharged from the spent fuel pools to the DOE. Decontamination and dismantling of the storage pools is initiated once the transfer of spent fuel is complete (DECON option).
- All work (except vessel and internals removal) is performed during an 8-hour workday, 5 days per week, with no overtime. There are eleven paid holidays per year.
- Reactor and internals removal activities are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.
- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal and laydown space, and with the stringent safety measures necessary during demolition of heavy components and structures.

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

4.2 PROJECT SCHEDULE

The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the 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 Fuel Building for final decontamination.

Project timelines are provided in Figures 4.2 and 4.3 with milestone dates based on a 2043 shutdown date. The fuel pools are emptied approximately twelve years after shutdown, while ISFSI operations continue until the DOE can complete the transfer of assemblies to its geologic repository. Deferred decommissioning in the SAFSTOR scenarios is assumed to commence so that the operating licenses are terminated within a 60-year period from the cessation of plant operations.

FIGURE 4.1
ACTIVITY SCHEDULE

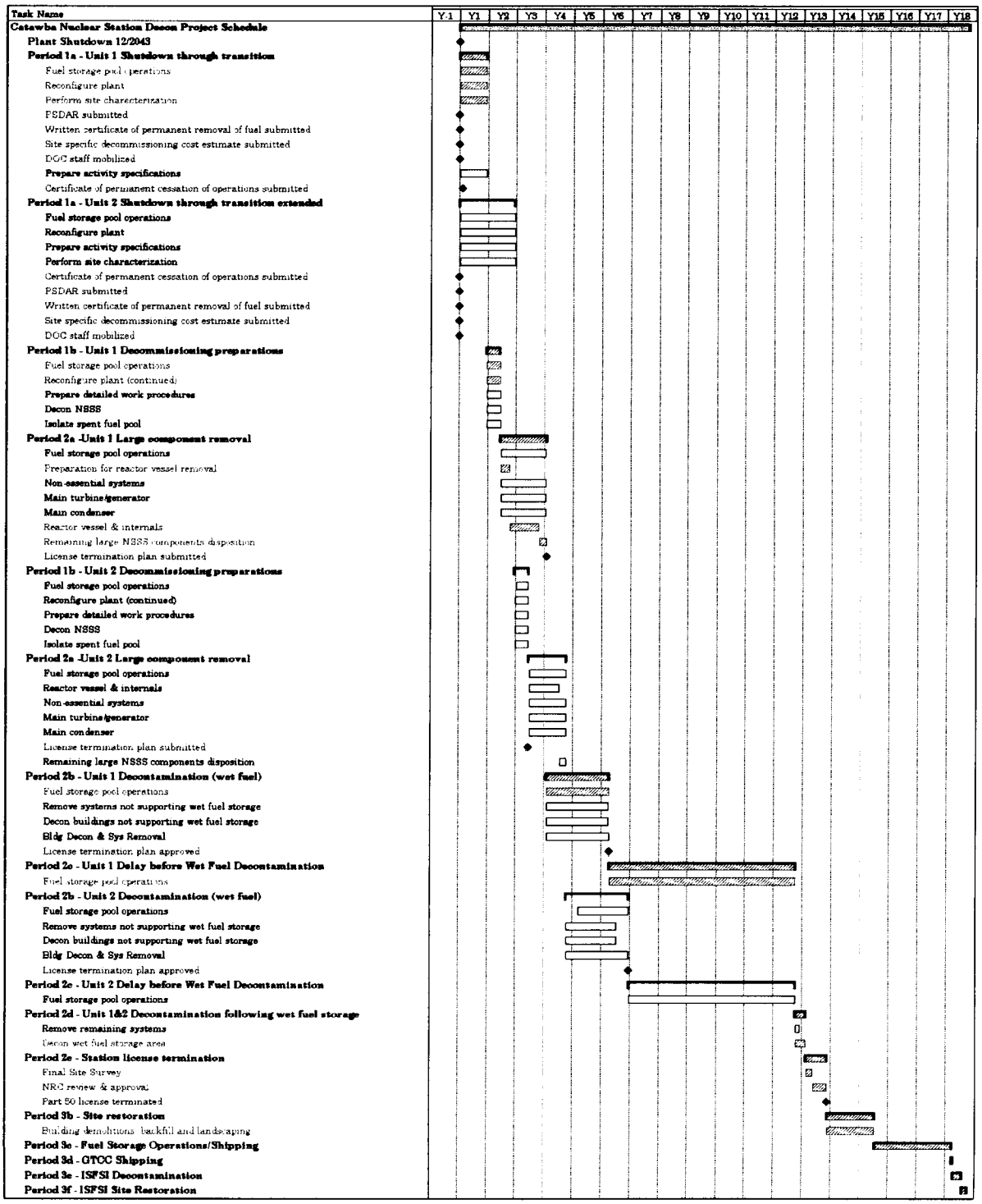

FIGURE 4.1 (continued)
ACTIVITY SCHEDULE

LEGEND

1. Red text and/or shaded scheduling bars indicate critical path activities

2. Shaded scheduling bars associated with major decommissioning periods, e.g., Period 1a, indicate overall duration of that period

3. Blue text and/or diamond symbols indicate major milestones

FIGURE 4.2
DECOMMISSIONING TIMELINE
DECON

CATAWBA NUCLEAR STATION
DECON

Shutdown and Decommisioning Preparation → Prompt Decommissioning DECON → Site Restoration → Post - Decommissioning ISFSI Operations → ISFSI Decon and Demolition

Unit 1													
Periods	1a	1b	2a	2b	2c	2d	2e	3b	3c	3d			End
Start Dates	12-Dec-43	13-Dec-44	19-Jun-45	04-Feb-47	10-Apr-49	30-Sep-55	10-Feb-56	11-Nov-56	06-Jul-58	17-Mar-61			31-Mar-61
Durations (Years)	1.0	0.5	1.6	2.2	6.5	0.4	0.8	1.6	2.7	0.04			
Elapsed Time (Years)		1.5	3.1	5.3	11.8	12.2	12.9	14.6	17.3	17.3			

Unit 2													
Periods	1a	1b	2a	2b	2c	2d	2e	3b	3c	3d	3e	3f	End
Start Dates	12-Dec-43	19-Dec-45	19-Jun-46	14-Oct-47	18-Dec-49	30-Sep-55	10-Feb-56	11-Nov-56	06-Jul-58	17-Mar-61	31-Mar-61	01-Aug-61	01-Oct-61
Durations (Years)	2.0	0.5	1.3	2.2	5.8	0.4	0.8	1.6	2.7	0.04	0.3	0.2	
Elapsed Time (Years)		2.5	3.8	6.0	11.8	12.2	12.9	14.6	17.3	17.3	17.6	17.8	

CNS Spent Fuel Schedule													
CNS Pool	8	8	8	16	76							116	Total
(DOE Cask Loaded)													
CNS ISFSI						2	11	22	23			58	Total
(Cask to DOE)													

Note: Cask distribution is provided as a general representation of inventory per period, totals per period are not actuals as used to calculate costs.

FIGURE 4.3
DECOMMISSIONING TIMELINE
SAFSTOR

CATAWBA NUCLEAR STATION
SAFSTOR

Shutdown and Decommisioning Preparation → Preparations for Safe-Storage → Wet & Dry & No Fuel Dormancy → Delayed Decommissioning SAFSTOR → Site Restoration

Unit 1

Periods	1a	1b	1c	2a	2b	2c	3a	3b	4a	4b	4d	4e	5b	End
Start Dates	12-Dec-43	11-Dec-44	13-Mar-45	13-Jun-45	30-Sep-55	31-Mar-61	11-Mar-98	11-Mar-99	13-Sep-99	20-Jan-01	07-May-02	13-Mar-03	13-Dec-03	10-Aug-05
Durations (Years)	1.0	0.3	0.3	10.3	5.5	36.9	1.0	0.5	1.4	1.3	0.8	0.8	1.7	
Elapsed Time (Years)		1.3	1.5	11.8	17.3	54.2	55.2	55.8	57.1	58.4	59.2	60.0	61.7	

Unit 2

Periods	1a	1b	1c	2a	2b	2c	3a	3b	4a	4b		4e	5b	End
Start Dates	12-Dec-43	11-Dec-44	13-Mar-45	13-Jun-45	30-Sep-55	31-Mar-61	07-May-99	07-May-00	09-Nov-00	26-Nov-01		13-Mar-03	13-Dec-03	10-Aug-05
Durations (Years)	1.0	0.3	0.3	10.3	5.5	38.1	1.0	0.5	1.0	1.3		0.8	1.7	
Elapsed Time (Years)		1.3	1.5	11.8	17.3	55.4	56.4	56.9	58.0	59.2		60.0	61.7	

CNS Spent Fuel Schedule

CNS Pool (DOE Cask Loaded)	8	4	4	100									116	Total
CNS ISFSI (Cask to DOE)					58								58	Total

Note: Cask distribution is provided as a general representation of inventory per period, totals per period are not actuals as used to calculate costs.

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,[30] 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 and D, and summarized in Tables 5.1 and 5.2. The quantified waste volume summaries shown in these tables are consistent with Part 61 classifications. The volumes 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 plants is primarily generated during Period 2 of DECON and Period 4 of SAFSTOR. 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 estimates, the cost for disposal at the EnergySolutions' and Barnwell facilities were used as a proxy for future disposal facilities. Separate rates were used for containerized waste and large components, including the steam generators and reactor coolant pump 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 EnergySolutions 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 rate schedule for the Barnwell facility. Additional surcharges were included for activity, dose rate, and/or handling added as appropriate for the particular package.

TABLE 5.1
UNIT 1 DECON ALTERNATIVE
DECOMMISSIONING WASTE SUMMARY

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	EnergySolutions	A	67,425	5,232,975
	Barnwell	A	47,061	3,805,531
	Barnwell	B	3,686	477,228
	Barnwell	C	459	48,192
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	666	129,800
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	239,465	10,528,640
Total [2]			358,763	20,222,360

[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
UNIT 2 DECON ALTERNATIVE
DECOMMISSIONING WASTE SUMMARY

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	EnergySolutions	A	80,096	6,573,254
	Barnwell	A	32,138	2,581,515
	Barnwell	B	3,686	477,228
	Barnwell	C	459	48,192
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	666	129,800
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	257,225	10,926,380
Total [2]			374,270	20,736,370

[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 5.3
UNIT 1 SAFSTOR ALTERNATIVE
DECOMMISSIONING WASTE SUMMARY

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	EnergySolutions	A	68,409	4,089,718
	Barnwell	A	45,472	3,642,274
	Barnwell	B	3,080	314,050
	Barnwell	C	470	47,502
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	666	129,800
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	260,802	11,458,920
Total [2]			378,899	19,682,270

[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 5.4
UNIT 2 SAFSTOR ALTERNATIVE
DECOMMISSIONING WASTE SUMMARY

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	EnergySolutions	A	81,875	5,571,837
	Barnwell	A	30,349	2,403,179
	Barnwell	B	3,080	314,050
	Barnwell	C	470	47,502
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	666	129,800
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	280,180	11,911,320
Total [2]			396,619	20,377,690

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

The estimates described in this report are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenarios assume continued operation of the station's spent fuel pools for a minimum of twelve years following the cessation of operations for continued cooling of the assemblies.

The cost projected to promptly decommission (DECON) Catawba is estimated to be $1,230.1million. The majority of this cost (approximately 77.7%) is associated with the physical decontamination and dismantling of the nuclear plant so that the operating license can be terminated. Another 16.0% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 6.3% is for the demolition of the designated structures and limited restoration of the site.

The cost projected for deferred decommissioning (SAFSTOR) is estimated to be $1,434.0 million. The majority of this cost (approximately 78.4%) is associated with placing the plant in storage, ongoing caretaking of the plant during dormancy, and the eventual physical decontamination and dismantling of the nuclear plant so that the operating license can be terminated. Another 15.1% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 6.5% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 thru 6.4, 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 Duke Energy will oversee the decommissioning program, acting as the DOC to manage the decommissioning labor force and the associated subcontractors. The size and composition of the management organization varies with the decommissioning phase and associated site activities. However, once the operating license is terminated, the staff is

substantially reduced for the conventional demolition and restoration of the site, and the long-term care of the spent fuel (for the DECON alternative).

As described in this report, the spent fuel pools will remain operational for a minimum of twelve years following the cessation of operations. The pools will be isolated and an independent spent fuel island created. This will allow decommissioning operations to proceed in and around the pool area. Over the twelve-year period, the spent fuel will be packaged into transportable canisters for loading into a DOE-provided transport cask. Spent fuel will also be in storage at the ISFSI (from operations). This inventory will be transferred to the DOE after the pools are emptied.

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 required controlled disposal is at the EnergySolutions' and Barnwell facilities. Highly activated components, requiring additional isolation from the environment (GTCC), 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 tables for processing is all-inclusive, incorporating the ultimate disposition of the material.

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

The reported cost for transport includes the tariffs and surcharges associated with moving large components and/or overweight shielded casks overland, as well as the general expense, e.g., labor and fuel, of transporting material to the destinations identified in this report. For purposes of this analysis, material is primarily moved overland by truck.

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

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

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

TABLE 6.1
UNIT 1 DECON ALTERNATIVE
DECOMMISSIONING COST ELEMENTS
(thousands of 2008 dollars)

Cost Element	Total	Percentage
Decontamination	14,130	2.4
Removal	87,810	14.8
Packaging	19,654	3.3
Transportation	6,830	1.2
Waste Disposal	81,039	13.7
Off-site Waste Processing	26,566	4.5
Program Management [1]	217,307	36.6
Utility Site Indirect	17,654	3.0
Spent Fuel Pool Isolation	10,819	1.8
Spent Fuel Management [2]	24,858	4.2
Insurance and Regulatory Fees	15,754	2.7
Energy	12,775	2.2
Characterization and Licensing Surveys	17,464	2.9
Property Taxes	34,237	5.8
Miscellaneous Equipment	6,503	1.1
Total [3]	593,400	100

Cost Element	Total	Percentage
License Termination	477,834	80.5
Spent Fuel Management	87,173	14.7
Site Restoration	28,393	4.8
Total [3]	593,400	100

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

TABLE 6.2
UNIT 2 DECON ALTERNATIVE
DECOMMISSIONING COST ELEMENTS
(thousands of 2008 dollars)

Cost Element	Total	Percentage
Decontamination	14,787	2.3
Removal	122,652	19.3
Packaging	17,231	2.7
Transportation	6,189	1.0
Waste Disposal	70,454	11.1
Off-site Waste Processing	28,122	4.4
Program Management [1]	231,397	36.3
Utility Site Indirect	18,936	3.0
Spent Fuel Pool Isolation	7,212	1.1
Spent Fuel Management [2]	31,324	4.9
Insurance and Regulatory Fees	15,598	2.4
Energy	12,889	2.0
Characterization and Licensing Surveys	16,863	2.6
Property Taxes	34,425	5.4
Miscellaneous Equipment	6,438	1.0
Miscellaneous Site Services	2,211	0.3
Total [3]	636,727	100

Cost Element	Total	Percentage
License Termination	477,846	75.0
Spent Fuel Management	109,208	17.2
Site Restoration	49,672	7.8
Total [3]	636,727	100

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

TABLE 6.3
UNIT 1 SAFSTOR ALTERNATIVE
DECOMMISSIONING COST ELEMENTS
(thousands of 2008 dollars)

Cost Element	Total	Percentage
Decontamination	12,159	1.6
Removal	85,473	11.4
Packaging	15,513	2.1
Transportation	5,497	0.7
Waste Disposal	66,154	8.8
Off-site Waste Processing	28,963	3.9
Program Management [1]	332,191	44.4
Utility Site Indirect	25,181	3.4
Spent Fuel Pool Isolation	10,819	1.4
Spent Fuel Management [2]	25,221	3.4
Insurance and Regulatory Fees	47,441	6.3
Energy	22,091	3.0
Characterization and Licensing Surveys	18,911	2.5
Property Taxes	35,602	4.8
Miscellaneous Equipment	17,078	2.3
Total [3]	748,292	100

Cost Element	Total	Percentage
License Termination	590,482	78.9
Spent Fuel Management	121,194	16.2
Site Restoration	36,616	4.9
Total [3]	748,292	100

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

TABLE 6.4
UNIT 2 SAFSTOR ALTERNATIVE
DECOMMISSIONING COST ELEMENTS
(thousands of 2008 dollars)

Cost Element	Total	Percentage
Decontamination	12,560	1.8
Removal	118,932	17.3
Packaging	13,159	1.9
Transportation	4,802	0.7
Waste Disposal	57,105	8.3
Off-site Waste Processing	30,659	4.5
Program Management [1]	250,746	36.6
Utility Site Indirect	17,906	2.6
Spent Fuel Pool Isolation	7,212	1.1
Spent Fuel Management [2]	28,832	4.2
Insurance and Regulatory Fees	45,627	6.7
Energy	21,458	3.1
Characterization and Licensing Surveys	18,310	2.7
Property Taxes	35,602	5.2
Miscellaneous Equipment	20,602	3.0
Miscellaneous Site Services	2,211	0.3
Total [3]	685,723	100

Cost Element	Total	Percentage
License Termination	533,475	77.8
Spent Fuel Management	95,094	13.9
Site Restoration	57,155	8.3
Total [3]	685,723	100

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

7. REFERENCES

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

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

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

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

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7. REFERENCES
(continued)

13. 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

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

15. 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"

16. "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

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

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

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

20. "Building Construction Cost Data 2008," Robert Snow Means Company, Inc., Kingston, Massachusetts

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

22. Civilian Radioactive Waste Management System Waste Acceptance System Requirements Document, Revision 5" (DOE/RW-0351) issued May 31, 2007

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7. REFERENCES
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24. Tri-State Motor Transit Company, published tariffs, Interstate Commerce Commission (ICC), Docket No. MC-427719 Rules Tariff, March 2004, Radioactive Materials Tariff, February 2006

25. 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

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

27. 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

28. "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

29. "Microsoft Project Professional 2003," Microsoft Corporation, Redmond, WA.

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

APPENDIX A

UNIT COST FACTOR DEVELOPMENT

APPENDIX A
UNIT COST FACTOR DEVELOPMENT

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

1. SCOPE

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

2. CALCULATIONS

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

Duration adjustment(s):	
+ Respiratory protection adjustment (50% of critical duration)	128
+ Radiation/ALARA adjustment (37% of critical duration)	95
Adjusted work duration	478
+ Protective clothing adjustment (30% of adjusted duration)	143
Productive work duration	621
+ Work break adjustment (8.33 % of productive duration)	52
Total work duration (minutes)	673

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

* alpha designators indicate activities that can be performed in parallel

APPENDIX A
(continued)

3. LABOR REQUIRED

Crew	Number	Duration (hours)	Rate ($/hr)	Cost
Laborers	3.00	11.217	$**.**	$***.**
Craftsmen	2.00	11.217	$**.**	$****.**
Foreman	1.00	11.217	$**.**	$***.**
General Foreman	0.25	11.217	$**.**	$***.**
Fire Watch	0.05	11.217	$**.**	$**.**
Health Physics Technician	1.00	11.217	$**.**	$***.**

Total Labor Cost $3,097.30

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
-Blotting paper 50 @ $0.54 sq ft [1]	$27.00
-Plastic sheets/bags 50 @ $0.16/sq ft [2]	$8.00
-Gas torch consumables 1 @ $9.69/hr x 1 hr [3]	$9.69
Subtotal cost of equipment and materials	$44.69
Overhead & profit on equipment and materials @ 17.00 %	$7.60
Total costs, equipment & material	$52.29

TOTAL COST:

Removal of contaminated **heat exchanger <3000 pounds:** **$3,149.59**

Total labor cost:	$3,097.30
Total equipment/material costs:	$52.29
Total craft labor man-hours required per unit:	81.88

** denotes business sensitive information

5. NOTES AND REFERENCES

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

- References for equipment & consumables costs:

  1. McMaster-Carr, Item 7193T88, Spill Control
  2. R.S. Means (2008) Division 01 56, Section 13.60-0200, page 20
  3. R.S. Means (2008) Division 01 54 33, Section 40-6360, Reference-10

- Material and consumable costs were adjusted using the regional indices for Rock Hill, South Carolina.

APPENDIX B

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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of clean instrument and sampling tubing, $/linear foot	0.31
Removal of clean pipe 0.25 to 2 inches diameter, $/linear foot	3.16
Removal of clean pipe >2 to 4 inches diameter, $/linear foot	4.69
Removal of clean pipe >4 to 8 inches diameter, $/linear foot	9.81
Removal of clean pipe >8 to 14 inches diameter, $/linear foot	18.36
Removal of clean pipe >14 to 20 inches diameter, $/linear foot	23.88
Removal of clean pipe >20 to 36 inches diameter, $/linear foot	35.13
Removal of clean pipe >36 inches diameter, $/linear foot	41.74
Removal of clean valve >2 to 4 inches	63.89
Removal of clean valve >4 to 8 inches	98.09
Removal of clean valve >8 to 14 inches	183.60
Removal of clean valve >14 to 20 inches	238.76
Removal of clean valve >20 to 36 inches	351.29
Removal of clean valve >36 inches	417.35
Removal of clean pipe hanger for small bore piping	20.82
Removal of clean pipe hanger for large bore piping	71.37
Removal of clean pump, <300 pound	165.50
Removal of clean pump, 300-1000 pound	474.87
Removal of clean pump, 1000-10,000 pound	1,851.56
Removal of clean pump, >10,000 pound	3,580.82
Removal of clean pump motor, 300-1000 pound	199.24
Removal of clean pump motor, 1000-10,000 pound	770.54
Removal of clean pump motor, >10,000 pound	1,733.71
Removal of clean heat exchanger <3000 pound	995.83
Removal of clean heat exchanger >3000 pound	2,506.66
Removal of clean feedwater heater/deaerator	7,055.14
Removal of clean moisture separator/reheater	14,489.84
Removal of clean tank, <300 gallons	212.89
Removal of clean tank, 300-3000 gallon	671.20
Removal of clean tank, >3000 gallons, $/square foot surface area	5.82

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of clean electrical equipment, <300 pound	90.08
Removal of clean electrical equipment, 300-1000 pound	324.39
Removal of clean electrical equipment, 1000-10,000 pound	648.77
Removal of clean electrical equipment, >10,000 pound	1,564.83
Removal of clean electrical transformer < 30 tons	1,086.75
Removal of clean electrical transformer > 30 tons	3,129.67
Removal of clean standby diesel generator, <100 kW	1,110.04
Removal of clean standby diesel generator, 100 kW to 1 MW	2,477.65
Removal of clean standby diesel generator, >1 MW	5,129.25
Removal of clean electrical cable tray, $/linear foot	8.44
Removal of clean electrical conduit, $/linear foot	3.68
Removal of clean mechanical equipment, <300 pound	90.08
Removal of clean mechanical equipment, 300-1000 pound	324.39
Removal of clean mechanical equipment, 1000-10,000 pound	648.77
Removal of clean mechanical equipment, >10,000 pound	1,564.83
Removal of clean HVAC equipment, <300 pound	90.08
Removal of clean HVAC equipment, 300-1000 pound	324.39
Removal of clean HVAC equipment, 1000-10,000 pound	648.77
Removal of clean HVAC equipment, >10,000 pound	1,564.83
Removal of clean HVAC ductwork, $/pound	0.33
Removal of contaminated instrument and sampling tubing, $/linear foot	1.11
Removal of contaminated pipe 0.25 to 2 inches diameter, $/linear foot	15.09
Removal of contaminated pipe >2 to 4 inches diameter, $/linear foot	25.75
Removal of contaminated pipe >4 to 8 inches diameter, $/linear foot	43.02
Removal of contaminated pipe >8 to 14 inches diameter, $/linear foot	82.04
Removal of contaminated pipe >14 to 20 inches diameter, $/linear foot	98.32
Removal of contaminated pipe >20 to 36 inches diameter, $/linear foot	135.63
Removal of contaminated pipe >36 inches diameter, $/linear foot	160.08
Removal of contaminated valve >2 to 4 inches	326.20
Removal of contaminated valve >4 to 8 inches	393.44

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of contaminated valve >8 to 14 inches	779.46
Removal of contaminated valve >14 to 20 inches	989.11
Removal of contaminated valve >20 to 36 inches	1,315.31
Removal of contaminated valve >36 inches	1,559.89
Removal of contaminated pipe hanger for small bore piping	78.42
Removal of contaminated pipe hanger for large bore piping	243.53
Removal of contaminated pump, <300 pound	702.01
Removal of contaminated pump, 300-1000 pound	1,639.62
Removal of contaminated pump, 1000-10,000 pound	5,141.39
Removal of contaminated pump, >10,000 pound	12,520.67
Removal of contaminated pump motor, 300-1000 pound	704.17
Removal of contaminated pump motor, 1000-10,000 pound	2,101.79
Removal of contaminated pump motor, >10,000 pound	4,718.84
Removal of contaminated heat exchanger <3000 pound	3,149.59
Removal of contaminated heat exchanger >3000 pound	9,145.58
Removal of contaminated tank, <300 gallons	1,168.83
Removal of contaminated tank, >300 gallons, $/square foot	22.90
Removal of contaminated electrical equipment, <300 pound	540.02
Removal of contaminated electrical equipment, 300-1000 pound	1,321.90
Removal of contaminated electrical equipment, 1000-10,000 pound	2,545.19
Removal of contaminated electrical equipment, >10,000 pound	5,001.30
Removal of contaminated electrical cable tray, $/linear foot	26.05
Removal of contaminated electrical conduit, $/linear foot	12.16
Removal of contaminated mechanical equipment, <300 pound	601.13
Removal of contaminated mechanical equipment, 300-1000 pound	1,461.15
Removal of contaminated mechanical equipment, 1000-10,000 pound	2,808.75
Removal of contaminated mechanical equipment, >10,000 pound	5,001.30
Removal of contaminated HVAC equipment, <300 pound	601.13
Removal of contaminated HVAC equipment, 300-1000 pound	1,461.15
Removal of contaminated HVAC equipment, 1000-10,000 pound	2,808.75

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of contaminated HVAC equipment, >10,000 pound	5,001.30
Removal of contaminated HVAC ductwork, $/pound	1.66
Removal/plasma arc cut of contaminated thin metal components, $/linear in.	2.84
Additional decontamination of surface by washing, $/square foot	5.68
Additional decontamination of surfaces by hydrolasing, $/square foot	28.17
Decontamination rig hook up and flush, $/ 250 foot length	5,093.89
Chemical flush of components/systems, $/gallon	15.40
Removal of clean standard reinforced concrete, $/cubic yard	109.54
Removal of grade slab concrete, $/cubic yard	139.74
Removal of clean concrete floors, $/cubic yard	292.19
Removal of sections of clean concrete floors, $/cubic yard	846.97
Removal of clean heavily rein concrete w/#9 rebar, $/cubic yard	200.34
Removal of contaminated heavily rein concrete w/#9 rebar, $/cubic yard	1,681.68
Removal of clean heavily rein concrete w/#18 rebar, $/cubic yard	253.37
Removal of contaminated heavily rein concrete w/#18 rebar, $/cubic yard	2,225.13
Removal heavily rein concrete w/#18 rebar & steel embedments, $/cubic yard	374.16
Removal of below-grade suspended floors, $/cubic yard	292.19
Removal of clean monolithic concrete structures, $/cubic yard	707.49
Removal of contaminated monolithic concrete structures, $/cubic yard	1,677.78
Removal of clean foundation concrete, $/cubic yard	557.04
Removal of contaminated foundation concrete, $/cubic yard	1,563.43
Explosive demolition of bulk concrete, $/cubic yard	25.36
Removal of clean hollow masonry block wall, $/cubic yard	71.58
Removal of contaminated hollow masonry block wall, $/cubic yard	259.60
Removal of clean solid masonry block wall, $/cubic yard	71.58
Removal of contaminated solid masonry block wall, $/cubic yard	259.60
Backfill of below-grade voids, $/cubic yard	16.05
Removal of subterranean tunnels/voids, $/linear foot	85.91
Placement of concrete for below-grade voids, $/cubic yard	136.74
Excavation of clean material, $/cubic yard	2.63

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Excavation of contaminated material, $/cubic yard	35.76
Removal of clean concrete rubble, $/cubic yard	20.82
Removal of contaminated concrete rubble, $/cubic yard	21.46
Removal of building by volume, $/cubic foot	0.26
Removal of clean building metal siding, $/square foot	0.76
Removal of contaminated building metal siding, $/square foot	3.03
Removal of standard asphalt roofing, $/square foot	1.45
Removal of transite panels, $/square foot	1.67
Scarifying contaminated concrete surfaces (drill & spall), $/square foot	11.83
Scabbling contaminated concrete floors, $/square foot	6.30
Scabbling contaminated concrete walls, $/square foot	15.89
Scabbling contaminated ceilings, $/square foot	53.82
Scabbling structural steel, $/square foot	5.48
Removal of clean overhead crane/monorail < 10 ton capacity	472.58
Removal of contaminated overhead crane/monorail < 10 ton capacity	1,418.62
Removal of clean overhead crane/monorail >10-50 ton capacity	1,134.20
Removal of contaminated overhead crane/monorail >10-50 ton capacity	3,404.07
Removal of polar crane > 50 ton capacity	4,785.69
Removal of gantry crane > 50 ton capacity	19,560.45
Removal of structural steel, $/pound	0.17
Removal of clean steel floor grating, $/square foot	3.59
Removal of contaminated steel floor grating, $/square foot	10.80
Removal of clean free standing steel liner, $/square foot	8.73
Removal of contaminated free standing steel liner, $/square foot	26.73
Removal of clean concrete-anchored steel liner, $/square foot	4.37
Removal of contaminated concrete-anchored steel liner, $/square foot	31.15
Placement of scaffolding in clean areas, $/square foot	14.61
Placement of scaffolding in contaminated areas, $/square foot	22.36
Landscaping with topsoil, $/acre	23,279.22
Cost of CPC B-88 LSA box & preparation for use	1,721.57

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Cost of CPC B-25 LSA box & preparation for use	1,511.13
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,479.08
Cost of CPC B-144 LSA box & preparation for use	9,284.26
Cost of LSA drum & preparation for use	124.25
Cost of cask liner for CNSI 8 120A cask (resins)	6,977.85
Decontamination of surfaces with vacuuming, $/square foot	0.49

APPENDIX C

DETAILED COST ANALYSIS

DECON

Table C-1
Catawba Nuclear Station - Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2008 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	135	20	156	156	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	311	47	358	358	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	507	76	583	583	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	210	31	241	241	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	338	51	389	389	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	277	42	319	319	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	333	50	383	344	-	38	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	282	42	324	292	-	32	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	34	5	39	39	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	480	72	552	552	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	440	66	506	506	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Biological shield	-	-	-	-	-	-	34	5	39	39	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Steam generators	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	3,120
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	108	16	124	62	-	62	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	27	4	31	-	-	31	-	-	-	-	-	-	-	400
1a.1.17.10	Main Condensers	-	-	-	-	-	-	27	4	31	-	-	31	-	-	-	-	-	-	-	400
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	211	32	243	121	-	121	-	-	-	-	-	-	-	3,120
1a.1.17.12	Waste management	-	-	-	-	-	-	311	47	358	358	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	61	9	70	35	-	35	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	2,558	384	2,942	2,591	-	351	-	-	-	-	-	-	-	37,827
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	162	24	187	187	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	2,700	405	3,105	3,105	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	95	14	109	109	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,100	315	2,415	2,415	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	83	12	96	96	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	9,788	1,468	11,256	10,905	-	351	-	-	-	-	-	-	-	73,753
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	532	80	612	-	612	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	532	80	612	-	612	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,191	119	1,310	1,310	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	7,648	765	8,413	8,413	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	446	-	-	-	-	-	111	557	557	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	453	-	-	-	-	-	68	521	521	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	9	2	-	26	-	8	45	45	-	-	-	619	-	-	-	12,378	21	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,601	240	1,841	1,841	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	710	71	781	781	-	-	-	-	-	-	-	-	-	-

Table C-1
Catawba Nuclear Station - Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2008 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 1a Period-Dependent Costs (continued)																					
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	383	38	421	-	421	-	-	-	-	-	-	-	-	-
1a.4.9	FEMA Fees	-	-	-	-	-	-	210	32	242	242	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	750	112	862	-	862	-	-	-	-	-	-	-	-	-
1a.4.11	Indirect Overhead	-	-	-	-	-	-	2,471	371	2,842	2,842	-	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	3,019	453	3,472	3,472	-	-	-	-	-	-	-	-	-	102,634
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	24,007	3,601	27,608	27,608	-	-	-	-	-	-	-	-	-	436,206
1a.4	Subtotal Period 1a Period-Dependent Costs	-	899	9	2	-	26	41,989	5,989	48,913	47,630	1,283	-	-	619	-	-	-	12,378	21	538,840
1a.0	TOTAL PERIOD 1a COST	-	899	9	2	-	26	52,309	7,537	60,782	58,535	1,895	351	-	619	-	-	-	12,378	21	612,593
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	320	48	368	331	-	37	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	2,500
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	91	14	105	26	-	79	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	245	37	282	282	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	81	12	93	47	-	47	-	-	-	-	-	-	-	1,200
1b.1.1.10	Missile shields	-	-	-	-	-	-	30	5	35	35	-	-	-	-	-	-	-	-	-	450
1b.1.1.11	Biological shield	-	-	-	-	-	-	81	12	93	93	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.12	Steam generators	-	-	-	-	-	-	311	47	358	358	-	-	-	-	-	-	-	-	-	4,600
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	68	10	78	39	-	39	-	-	-	-	-	-	-	1,000
1b.1.1.14	Main Turbine	-	-	-	-	-	-	106	16	121	-	-	121	-	-	-	-	-	-	-	1,560
1b.1.1.15	Main Condensers	-	-	-	-	-	-	106	16	121	-	-	121	-	-	-	-	-	-	-	1,560
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	185	28	212	191	-	21	-	-	-	-	-	-	-	2,730
1b.1.1.17	Reactor building	-	-	-	-	-	-	185	28	212	191	-	21	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	2,248	337	2,585	2,099	-	486	-	-	-	-	-	-	-	33,243
1b.1.2	Decon primary loop	501	-	-	-	-	-	-	250	751	751	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	501	-	-	-	-	-	2,248	588	3,337	2,850	-	486	-	-	-	-	-	-	1,067	33,243
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	9,407	1,411	10,819	10,819	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	2,927	878	3,805	3,805	-	-	-	-	-	-	-	-	19,100	7,852
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,334	2,289	14,624	14,624	-	-	-	-	-	-	-	-	19,100	7,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	862	-	-	-	-	-	-	129	991	991	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	30	-	55	160	-	2,337	-	629	3,210	3,210	-	-	-	193	749	-	-	94,773	184	-
1b.3.3	Small tool allowance	-	1	-	-	-	-	-	0	1	1	-	-	-	-	-	-	-	-	-	-
1b.3.4	Pipe cutting equipment	-	1,000	-	-	-	-	-	150	1,150	1,150	-	-	-	-	-	-	-	-	-	-
1b.3.5	Decon rig	1,400	-	-	-	-	-	-	210	1,610	1,610	-	-	-	-	-	-	-	-	-	-
1b.3.6	Spent Fuel Capital and Transfer	-	-	-	-	-	-	281	42	324	-	324	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,292	1,001	55	160	-	2,337	281	1,160	7,286	6,962	324	-	-	193	749	-	-	94,773	184	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	610	61	671	671	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,742	274	3,016	3,016	-	-	-	-	-	-	-	-	-	-

Table C-1
Catawba Nuclear Station - Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2008 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1b Period-Dependent Costs (continued)																					
1b.4.4	Health physics supplies	-	252	-	-	-	-	-	63	315	315	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	232	-	-	-	-	-	35	267	267	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	6	1	-	15	-	5	26	26	-	-	-	364	-	-	-	7,285	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,640	246	1,886	1,886	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	363	36	400	400	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	196	20	216	-	216	-	-	-	-	-	-	-	-	-
1b.4.10	FEMA Fees	-	-	-	-	-	-	108	16	124	124	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	384	58	442	-	442	-	-	-	-	-	-	-	-	-
1b.4.12	Indirect Overhead	-	-	-	-	-	-	1,582	237	1,820	1,820	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	1,546	232	1,778	1,778	-	-	-	-	-	-	-	-	-	52,576
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	15,680	2,352	18,032	18,032	-	-	-	-	-	-	-	-	-	279,314
1b.4	Subtotal Period 1b Period-Dependent Costs	27	484	6	1	-	15	24,852	3,641	29,027	28,369	657	-	-	364	-	-	-	7,285	12	331,890
1b.0	TOTAL PERIOD 1b COST	2,819	1,485	60	161	-	2,352	39,716	7,678	54,273	52,806	981	486	-	557	749	-	-	102,058	20,363	372,985
PERIOD 1 TOTALS		2,819	2,384	70	162	-	2,378	92,025	15,215	115,054	111,341	2,876	838	-	1,176	749	-	-	114,436	20,384	985,577
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	205	194	21	47	-	334	-	244	1,046	1,046	-	-	-	1,268	-	-	-	153,369	9,274	-
2a.1.1.2	Pressurizer Relief Tank	21	17	5	10	-	66	-	33	151	151	-	-	-	272	-	-	-	30,174	885	-
2a.1.1.3	Reactor Coolant Pumps & Motors	76	69	39	152	143	1,210	-	406	2,094	2,094	-	-	272	4,708	-	-	-	888,360	3,771	-
2a.1.1.4	Pressurizer	39	45	351	129	-	774	-	279	1,617	1,617	-	-	-	2,490	-	-	-	70,079	2,487	-
2a.1.1.5	Steam Generators	329	2,606	2,369	1,038	2,281	8,542	-	3,686	20,850	20,850	-	-	21,655	15,151	-	-	-	2,268,503	23,227	2,125
2a.1.1.6	Retired Steam Generator Units	-	-	2,369	1,038	2,281	8,542	-	2,870	17,100	17,100	-	-	22,105	15,151	-	-	-	2,465,378	13,520	1,500
2a.1.1.7	CRDMs/ICIs/Service Structure Removal	147	82	262	98	-	189	-	182	961	961	-	-	-	3,923	-	-	-	86,603	5,001	-
2a.1.1.8	Reactor Vessel Internals	129	2,647	6,857	412	-	6,454	243	7,130	23,873	23,873	-	-	-	2,754	683	459	-	341,105	30,783	1,363
2a.1.1.9	Reactor Vessel	74	5,439	1,619	243	-	10,026	243	9,632	27,277	27,277	-	-	-	6,320	2,254	-	-	937,367	30,783	1,363
2a.1.1	Totals	1,021	11,098	13,892	3,167	4,706	36,137	487	24,462	94,970	94,970	-	-	44,032	52,037	2,937	459	-	7,240,938	119,731	6,352
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	380	315	35	900	488	-	389	2,507	2,507	-	-	4,726	2,632	-	-	-	637,812	9,495	-
2a.1.3	Main Condensers	-	1,274	160	81	733	419	-	562	3,229	3,229	-	-	7,274	2,145	-	-	-	519,770	32,740	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor	-	308	-	-	-	-	-	46	355	355	-	-	-	-	-	-	-	-	4,509	-
2a.1.4.2	AB - Fw Pump/Switchgear Area	-	20	-	-	-	-	-	3	23	23	-	-	-	-	-	-	-	-	299	-
2a.1.4.3	Auxiliary Building	-	162	-	-	-	-	-	24	187	187	-	-	-	-	-	-	-	-	2,376	-
2a.1.4.4	Containment Mechanical Equipment	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	105	-
2a.1.4.5	Main Steam Doghouses	-	91	-	-	-	-	-	14	104	104	-	-	-	-	-	-	-	-	1,109	-
2a.1.4.6	Turbine Building	-	282	-	-	-	-	-	42	325	325	-	-	-	-	-	-	-	-	4,856	-
2a.1.4.7	Upper Head Injection Tank Building	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	70	-
2a.1.4.8	Fuel Building	-	80	-	-	-	-	-	12	92	92	-	-	-	-	-	-	-	-	1,173	-
2a.1.4	Totals	-	954	-	-	-	-	-	143	1,097	1,097	-	-	-	-	-	-	-	-	14,497	-
Disposal of Plant Systems																					
2a.1.5.1	Aux Bldg Chilled Water	-	80	1	3	99	-	-	36	219	219	-	-	1,094	-	-	-	-	44,411	1,857	-
2a.1.5.2	Auxiliary Feedwater	-	226	12	24	927	-	-	200	1,390	1,390	-	-	10,186	-	-	-	-	413,660	5,480	-
2a.1.5.3	Auxiliary Steam	-	13	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	386	-
2a.1.5.4	Auxiliary Steam RCA	-	96	2	4	133	-	-	45	279	279	-	-	1,467	-	-	-	-	59,568	2,241	-
2a.1.5.5	CCW Intake Screen Backwash	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	144	-
2a.1.5.6	CO2 Gen Purge	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	251	-
2a.1.5.7	Condensate	-	350	-	-	-	-	-	52	402	-	-	402	-	-	-	-	-	-	10,255	-

Table C-1
Catawba Nuclear Station - Unit 1
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(thousands of 2008 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
Disposal of Plant Systems (continued)																					
2a.1.5.8	Condensate Storage	-	61	-	-	-	-	-	9	70	-	-	70	-	-	-	-	-	-	1,737	-
2a.1.5.9	Condenser Cleaning	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	1,125	-
2a.1.5.10	Condenser Steam Air Ejector	-	32	-	-	-	-	-	5	37	-	-	37	-	-	-	-	-	-	988	-
2a.1.5.11	Containment Spray/Valve Inj Water	-	212	4	8	308	-	-	101	634	634	-	-	3,389	-	-	-	-	137,648	4,986	-
2a.1.5.12	Convent LP Service Water	-	90	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	2,691	-
2a.1.5.13	Conventional Chemical Addition	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	238	-
2a.1.5.14	Conventional Chemical Addition RCA	-	13	0	0	10	-	-	5	28	28	-	-	109	-	-	-	-	4,424	284	-
2a.1.5.15	DG Engine Cooling Water	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	542	-
2a.1.5.16	DG Engine Fuel Oil	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,753	-
2a.1.5.17	DG Engine Lube Oil	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	829	-
2a.1.5.18	DG Engine Starting Air	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	1,012	-
2a.1.5.19	DG Room Sump Pump	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	175	-
2a.1.5.20	FDWP Condensate Seal	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	632	-
2a.1.5.21	Feedwater	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	1,525	-
2a.1.5.22	Feedwater Lube & Hydraulic Oil	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	415	-
2a.1.5.23	Feedwater Pump Turbine Steam Seal	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	80	-
2a.1.5.24	Feedwater RCA	-	78	3	7	249	-	-	58	396	396	-	-	2,742	-	-	-	-	111,348	1,945	-
2a.1.5.25	Generator Hydrogen	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	217	-
2a.1.5.26	Generator Seal Oil	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	311	-
2a.1.5.27	Heater Bleed Steam	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	999	-
2a.1.5.28	Heater Drains	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	3,850	-
2a.1.5.29	Heater Relief Valve	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	525	-
2a.1.5.30	Heater Vent	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	559	-
2a.1.5.31	MN Turbine Lube Oil & Purification	-	37	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	1,130	-
2a.1.5.32	Main Steam	-	14	-	-	-	-	-	2	17	-	-	17	-	-	-	-	-	-	450	-
2a.1.5.33	Main Steam Bypass to Condenser	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	784	-
2a.1.5.34	Main Steam Leakoff & Steam Seal	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	249	-
2a.1.5.35	Main Steam RCA	-	26	1	1	54	-	-	15	97	97	-	-	594	-	-	-	-	24,127	601	-
2a.1.5.36	Main Steam Vent	-	119	3	6	230	-	-	65	423	423	-	-	2,525	-	-	-	-	102,559	2,891	-
2a.1.5.37	Miscellaneous Equipment	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
2a.1.5.38	Moisture Separator Reheater Bld Steam	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	156	-
2a.1.5.39	Moisture Separator Reheater Drain	-	144	-	-	-	-	-	22	166	-	-	166	-	-	-	-	-	-	4,233	-
2a.1.5.40	SG Wet Layup Recirculation	-	19	0	0	16	-	-	7	42	42	-	-	174	-	-	-	-	7,060	420	-
2a.1.5.41	SM Supply to Aux Equipment	-	25	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	762	-
2a.1.5.42	SM Supply to Aux Equipment RCA	-	9	0	0	9	-	-	4	22	22	-	-	100	-	-	-	-	4,077	211	-
2a.1.5.43	Standby Shutdown Diesel	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	84	-
2a.1.5.44	Steam Generator Blowdown Recycle	-	280	28	47	573	218	-	220	1,367	1,367	-	-	6,304	1,114	-	-	-	355,792	7,066	-
2a.1.5.45	Steam Supply to FW Pump Turbine	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	743	-
2a.1.5.46	Turbine Crossover	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	102	-
2a.1.5.47	Turbine Exhaust	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	64	-
2a.1.5.48	Turbine Hydraulic Oil	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	298	-
2a.1.5	Totals	-	2,511	55	101	2,609	218	-	959	6,454	4,898	-	1,556	28,685	1,114	-	-	-	1,264,674	68,293	-
2a.1.6	Scaffolding in support of decommissioning	-	761	12	3	70	8	-	204	1,059	1,059	-	-	694	43	-	-	-	35,088	23,823	-
2a.1	Subtotal Period 2a Activity Costs	1,021	16,979	14,435	3,387	9,018	37,270	487	26,719	109,315	107,759	-	1,556	85,410	57,971	2,937	459	-	9,698,283	268,579	6,352
Period 2a Collateral Costs																					
2a.3.1	Process liquid waste	67	-	27	76	-	119	-	77	367	367	-	-	-	458	-	-	-	27,481	89	-
2a.3.2	Small tool allowance	-	194	-	-	-	-	-	29	223	200	-	22	-	-	-	-	-	-	-	-
2a.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	906	136	1,042	-	1,042	-	-	-	-	-	-	-	-	-
2a.3.4	Survey and Release of Scrap Metal	-	-	-	-	-	-	676	101	777	777	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	67	194	27	76	-	119	1,582	344	2,409	1,344	1,042	22	-	458	-	-	-	27,481	89	-

Table C-1
Catawba Nuclear Station - Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2008 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 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	86	-	-	-	-	-	-	21	107	107	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	843	84	927	927	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	8,284	828	9,113	8,202	-	911	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	1,818	-	-	-	-	-	454	2,272	2,272	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,529	-	-	-	-	-	529	4,058	4,058	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	70	13	-	195	-	58	335	335	-	-	-	4,624	-	-	-	92,471	156	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,466	370	2,836	2,836	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	1,073	107	1,180	1,180	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	621	62	683	-	683	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,215	182	1,397	-	1,397	-	-	-	-	-	-	-	-	-
2a.4.11	Radwaste Processing Equipment/Services	-	-	-	-	-	-	306	46	352	352	-	-	-	-	-	-	-	-	-	-
2a.4.12	Indirect Overhead	-	-	-	-	-	-	3,996	599	4,596	4,596	-	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	3,812	572	4,383	4,383	-	-	-	-	-	-	-	-	-	125,800
2a.4.14	Utility Staff Cost	-	-	-	-	-	-	40,348	6,052	46,400	46,400	-	-	-	-	-	-	-	-	-	705,500
2a.4	Subtotal Period 2a Period-Dependent Costs	86	5,346	70	13	-	195	62,963	9,966	78,639	75,647	2,080	911	-	4,624	-	-	-	92,471	156	831,300
2a.0	TOTAL PERIOD 2a COST	1,174	22,519	14,532	3,476	9,018	37,584	65,032	37,029	190,362	184,751	3,122	2,489	85,410	63,052	2,937	459	-	9,818,235	268,825	837,652
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Annulus Ventilation	-	34	2	4	109	9	-	28	188	188	-	-	1,203	48	-	-	-	53,191	811	-
2b.1.1.2	Aux & RB Heating Water	-	429	5	10	362	-	-	164	969	969	-	-	3,980	-	-	-	-	161,630	9,838	-
2b.1.1.3	Aux Bldg Ventilation	-	175	11	20	403	66	-	125	801	801	-	-	4,430	340	-	-	-	210,383	4,312	-
2b.1.1.4	Boron Recycle	362	373	29	39	284	215	-	379	1,681	1,681	-	-	3,121	1,261	-	-	-	225,201	17,220	-
2b.1.1.5	Boron Thermal Regeneration	191	261	24	36	103	223	-	240	1,078	1,078	-	-	1,132	1,143	-	-	-	148,472	9,669	-
2b.1.1.6	Chemical & Volume Control	626	619	119	157	279	1,019	-	800	3,619	3,619	-	-	3,070	5,314	-	-	-	592,074	25,686	-
2b.1.1.7	Component Cooling	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	2,823	-
2b.1.1.8	Component Cooling RCA	-	158	4	8	310	-	-	88	568	568	-	-	3,413	-	-	-	-	138,588	3,583	-
2b.1.1.9	Condenser Circulating Water	-	93	-	-	-	-	-	14	107	-	-	107	-	-	-	-	-	-	2,771	-
2b.1.1.10	Cont Air Release & Addition	-	38	2	3	21	20	-	18	104	104	-	-	235	102	-	-	-	18,645	967	-
2b.1.1.11	Cont Air Return Ex & H2 Skimmer	-	95	6	10	87	53	-	52	303	303	-	-	955	270	-	-	-	63,011	2,421	-
2b.1.1.12	Cont CRD, & ICI Room Vent	-	86	11	20	228	93	-	83	519	519	-	-	2,502	474	-	-	-	144,102	2,170	-
2b.1.1.13	Cont Water Sample & Purge	-	9	0	0	1	2	-	3	15	15	-	-	10	10	-	-	-	1,259	237	-
2b.1.1.14	Containment Chilled Water	-	25	-	-	-	-	-	4	29	-	-	29	-	-	-	-	-	-	712	-
2b.1.1.15	Containment Chilled Water RCA	-	68	2	3	128	-	-	37	238	238	-	-	1,407	-	-	-	-	57,124	1,636	-
2b.1.1.16	Containment Purge Ventilation	-	167	14	27	439	104	-	139	890	890	-	-	4,824	532	-	-	-	243,596	4,226	-
2b.1.1.17	Conventional Sampling	-	332	24	24	41	157	-	134	712	712	-	-	456	803	-	-	-	90,449	8,357	-
2b.1.1.18	Diesel Bldg Ventilation	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	243	-
2b.1.1.19	Electrical (clean)	-	2,300	-	-	-	-	-	345	2,645	-	-	2,645	-	-	-	-	-	-	64,849	-
2b.1.1.20	Electrical (contaminated)	-	656	26	48	290	273	-	286	1,579	1,579	-	-	3,192	1,394	-	-	-	254,729	16,365	-
2b.1.1.21	Electrical (contaminated) RCA	-	4,037	65	129	4,874	-	-	1,766	10,871	10,871	-	-	53,582	-	-	-	-	2,175,984	97,379	-
2b.1.1.22	Equipment Decon	-	31	2	2	23	11	-	14	83	83	-	-	255	58	-	-	-	15,512	769	-
2b.1.1.23	Fire Protection	-	35	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	1,045	-
2b.1.1.24	Fire Protection RCA	-	142	3	7	261	-	-	76	489	489	-	-	2,869	-	-	-	-	116,495	3,458	-
2b.1.1.25	Ice Condenser Refrigeration	-	462	10	20	775	-	-	236	1,504	1,504	-	-	8,522	-	-	-	-	346,098	11,095	-
2b.1.1.26	Instrument Air	-	189	-	-	-	-	-	28	218	-	-	218	-	-	-	-	-	-	6,048	-
2b.1.1.27	Instrument Air RCA	-	649	7	14	515	-	-	242	1,427	1,427	-	-	5,663	-	-	-	-	229,971	14,768	-
2b.1.1.28	Liquid Waste Recycle	669	825	79	105	193	679	-	763	3,313	3,313	-	-	2,118	3,681	-	-	-	397,696	34,293	-
2b.1.1.29	Miscellaneous Ventilation	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	1,466	-
2b.1.1.30	Nuclear Sampling	-	270	17	16	25	107	-	102	539	539	-	-	275	550	-	-	-	60,389	6,926	-
2b.1.1.31	Nuclear Service Water	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,898	-
2b.1.1.32	Nuclear Service Water Pump Vent	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	30	-
2b.1.1.33	Nuclear Service Water RCA	-	473	14	28	1,060	-	-	283	1,857	1,857	-	-	11,651	-	-	-	-	473,134	11,409	-

Table C-1
Catawba Nuclear Station - Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2008 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
Disposal of Plant Systems (continued)																					
2b.1.1.34	Reactor Coolant	-	111	21	38	83	245	-	109	608	608	-	-	915	1,252	-	-	-	149,507	2,867	-
2b.1.1.35	Refueling Water	-	306	14	22	409	80	-	163	993	993	-	-	4,494	443	-	-	-	218,997	7,716	-
2b.1.1.36	Residual Heat Removal	140	140	20	29	44	187	-	164	723	723	-	-	484	956	-	-	-	105,369	4,883	-
2b.1.1.37	Safety Injection	-	390	70	96	420	581	-	327	1,885	1,885	-	-	4,619	3,025	-	-	-	453,936	9,854	-
2b.1.1.38	Turbine Building Ventilation	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	3,003	-
2b.1.1	Totals	1,988	14,282	602	917	11,769	4,124	-	7,264	40,945	37,556	-	3,388	129,375	21,656	-	-	-	7,145,543	397,803	-
2b.1.2	Scaffolding in support of decommissioning	-	951	16	4	87	11	-	256	1,324	1,324	-	-	867	54	-	-	-	43,860	29,778	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor	1,038	811	130	246	864	857	-	1,116	5,062	5,062	-	-	9,498	7,103	-	-	-	1,057,322	42,696	-
2b.1.3.2	Auxiliary Building	496	288	54	112	86	164	-	396	1,596	1,596	-	-	943	3,156	-	-	-	351,577	18,480	-
2b.1.3.3	Containment Mechanical Equipment	22	19	2	5	11	7	-	20	86	86	-	-	122	128	-	-	-	17,327	967	-
2b.1.3.4	Retired Steam Generator Facility	34	4	1	1	-	2	-	18	59	59	-	-	-	36	-	-	-	3,600	959	-
2b.1.3	Totals	1,589	1,123	187	364	961	1,029	-	1,550	6,804	6,804	-	-	10,562	10,423	-	-	-	1,429,825	63,101	-
2b.1	Subtotal Period 2b Activity Costs	3,577	16,356	804	1,285	12,817	5,163	-	9,069	49,072	45,684	-	3,388	140,804	32,133	-	-	-	8,619,228	490,682	-
Period 2b Collateral Costs																					
2b.3.1	Process liquid waste	204	-	191	553	-	1,277	-	523	2,748	2,748	-	-	-	3,282	-	-	-	294,199	640	-
2b.3.2	Small tool allowance	-	333	-	-	-	-	-	50	383	383	-	-	-	-	-	-	-	-	-	-
2b.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,223	183	1,406	-	1,406	-	-	-	-	-	-	-	-	-
2b.3.4	Survey and Release of Scrap Metal	-	-	-	-	-	-	845	127	971	971	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	204	333	191	553	-	1,277	2,067	883	5,508	4,102	1,406	-	-	3,282	-	-	-	294,199	640	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	806	-	-	-	-	-	-	202	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,128	113	1,241	1,241	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	7,851	785	8,636	8,636	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,877	-	-	-	-	-	719	3,597	3,597	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	3,380	-	-	-	-	-	507	3,887	3,887	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	99	18	-	275	-	81	473	473	-	-	-	6,526	-	-	-	130,526	221	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	2,604	391	2,995	2,995	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,435	144	1,579	1,579	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	830	83	913	-	913	-	-	-	-	-	-	-	-	-
2b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,626	244	1,870	-	1,870	-	-	-	-	-	-	-	-	-
2b.4.11	Radwaste Processing Equipment/Services	-	-	-	-	-	-	409	61	470	470	-	-	-	-	-	-	-	-	-	-
2b.4.12	Indirect Overhead	-	-	-	-	-	-	3,800	570	4,371	4,371	-	-	-	-	-	-	-	-	-	-
2b.4.13	Security Staff Cost	-	-	-	-	-	-	5,099	765	5,864	5,864	-	-	-	-	-	-	-	-	-	168,297
2b.4.14	Utility Staff Cost	-	-	-	-	-	-	37,578	5,637	43,215	43,215	-	-	-	-	-	-	-	-	-	670,914
2b.4	Subtotal Period 2b Period-Dependent Costs	806	6,257	99	18	-	275	62,361	10,301	80,118	77,335	2,783	-	-	6,526	-	-	-	130,526	221	839,211
2b.0	TOTAL PERIOD 2b COST	4,588	22,946	1,094	1,855	12,817	6,715	64,429	20,254	134,698	127,121	4,189	3,388	140,804	41,941	-	-	-	9,043,952	491,543	839,211
PERIOD 2c - Delay before Wet Fuel Storage Decontamination																					
Period 2c Direct Decommissioning Activities																					
Period 2c Collateral Costs																					
2c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,847	727	5,574	-	5,574	-	-	-	-	-	-	-	-	-
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	4,847	727	5,574	-	5,574	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	3,350	335	3,684	-	3,684	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	4,527	453	4,980	-	4,980	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	614	-	-	-	-	-	153	767	-	767	-	-	-	-	-	-	-	-	-

Table C-1
Catawba Nuclear Station - Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2008 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 2c Period-Dependent Costs (continued)																					
2c.4.4	Disposal of DAW generated	-	-	12	2	-	34	-	10	59	-	59	-	-	817	-	-	-	16,345	28	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	2,063	309	2,372	-	2,372	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	1,182	118	1,300	-	1,300	-	-	-	-	-	-	-	-	-
2c.4.7	Emergency Planning Fees	-	-	-	-	-	-	2,466	247	2,712	-	2,712	-	-	-	-	-	-	-	-	-
2c.4.8	Spent Fuel Pool O&M	-	-	-	-	-	-	4,828	724	5,552	-	5,552	-	-	-	-	-	-	-	-	-
2c.4.9	Indirect Overhead	-	-	-	-	-	-	2,219	333	2,552	-	2,552	-	-	-	-	-	-	-	-	-
2c.4.10	Security Staff Cost	-	-	-	-	-	-	11,859	1,779	13,638	-	13,638	-	-	-	-	-	-	-	-	395,126
2c.4.11	Utility Staff Cost	-	-	-	-	-	-	21,938	3,291	25,229	-	25,229	-	-	-	-	-	-	-	-	391,749
2c.4	Subtotal Period 2c Period-Dependent Costs	-	614	12	2	-	34	54,431	7,752	62,845	-	62,845	-	-	817	-	-	-	16,345	28	786,874
2c.0	TOTAL PERIOD 2c COST	-	614	12	2	-	34	59,277	8,479	68,419	-	68,419	-	-	817	-	-	-	16,345	28	786,874
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	338	35	130	76	-	518	-	332	1,429	1,429	-	-	-	2,648	-	-	-	237,562	1,033	-
Disposal of Plant Systems																					
2d.1.2.1	FHB Ventilation	-	68	5	10	271	19	-	65	438	438	-	-	2,985	97	-	-	-	129,937	1,630	-
2d.1.2.2	Spent Fuel Cooling	141	195	17	23	64	147	-	171	759	759	-	-	700	754	-	-	-	96,033	7,333	-
2d.1.2	Totals	141	263	22	33	335	166	-	236	1,197	1,197	-	-	3,685	851	-	-	-	225,970	8,963	-
Decontamination of Site Buildings																					
2d.1.3.1	Fuel Building	757	841	17	31	309	49	-	654	2,657	2,657	-	-	3,393	702	-	-	-	206,307	37,679	-
2d.1.3	Totals	757	841	17	31	309	49	-	654	2,657	2,657	-	-	3,393	702	-	-	-	206,307	37,679	-
2d.1.4	Scaffolding in support of decommissioning	-	190	3	1	17	2	-	51	265	265	-	-	173	11	-	-	-	8,772	5,956	-
2d.1	Subtotal Period 2d Activity Costs	1,237	1,330	172	141	661	735	-	1,272	5,548	5,548	-	-	7,251	4,212	-	-	-	678,611	53,630	-
Period 2d Additional Costs																					
2d.2.1	License Termination Survey Program Management	-	-	-	-	-	-	616	185	801	801	-	-	-	-	-	-	-	-	-	6,240
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	616	185	801	801	-	-	-	-	-	-	-	-	-	6,240
Period 2d Collateral Costs																					
2d.3.1	Process liquid waste	159	-	73	210	-	366	-	210	1,020	1,020	-	-	-	1,262	-	-	-	84,432	246	-
2d.3.2	Small tool allowance	-	46	-	-	-	-	-	7	52	52	-	-	-	-	-	-	-	-	-	-
2d.3.3	Decommissioning Equipment Disposition	-	-	107	30	605	73	-	124	940	940	-	-	6,000	373	-	-	-	303,507	88	-
2d.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	205	31	235	-	235	-	-	-	-	-	-	-	-	-
2d.3.5	Survey and Release of Scrap Metal	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	159	46	181	241	605	439	373	397	2,441	2,206	235	-	6,000	1,635	-	-	-	387,939	334	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	149	-	-	-	-	-	-	37	187	187	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	188	19	207	207	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	10	1	11	11	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	352	-	-	-	-	-	88	440	440	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	783	-	-	-	-	-	117	901	901	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	20	4	-	56	-	17	97	97	-	-	-	1,337	-	-	-	26,749	45	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	240	24	264	264	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	139	14	153	-	153	-	-	-	-	-	-	-	-	-
2d.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	137	21	157	157	-	-	-	-	-	-	-	-	-	-
2d.4.11	Indirect Overhead	-	-	-	-	-	-	394	59	453	453	-	-	-	-	-	-	-	-	-	-
2d.4.12	Security Staff Cost	-	-	-	-	-	-	469	70	540	540	-	-	-	-	-	-	-	-	-	13,779
2d.4.13	Utility Staff Cost	-	-	-	-	-	-	3,860	579	4,439	4,439	-	-	-	-	-	-	-	-	-	69,540

Table C-1
Catawba Nuclear Station - Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2008 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
2d.4	Subtotal Period 2d Period-Dependent Costs	149	1,135	20	4	-	56	5,668	1,081	8,114	7,961	153	-	-	1,337	-	-	-	26,749	45	83,319
2d.0	TOTAL PERIOD 2d COST	1,545	2,510	373	385	1,266	1,231	6,658	2,935	16,904	16,516	388	-	13,251	7,184	-	-	-	1,093,299	54,009	89,559
PERIOD 2e - License Termination																					
Period 2e Direct Decommissioning Activities																					
2e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	150	45	195	195	-	-	-	-	-	-	-	-	-	-
2e.1.2	Terminate license									a											
2e.1	Subtotal Period 2e Activity Costs	-	-	-	-	-	-	150	45	195	195	-	-	-	-	-	-	-	-	-	-
Period 2e Additional Costs																					
2e.2.1	License Termination Survey	-	-	-	-	-	-	8,246	2,474	10,720	10,720	-	-	-	-	-	-	-	-	197,878	3,120
2e.2	Subtotal Period 2e Additional Costs	-	-	-	-	-	-	8,246	2,474	10,720	10,720	-	-	-	-	-	-	-	-	197,878	3,120
Period 2e Collateral Costs																					
2e.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	86	13	98	-	98	-	-	-	-	-	-	-	-	-
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	86	13	98	-	98	-	-	-	-	-	-	-	-	-
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance	-	-	-	-	-	-	359	36	395	395	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	20	2	22	22	-	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	1,054	-	-	-	-	-	264	1,318	1,318	-	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	5	1	-	13	-	4	23	23	-	-	-	315	-	-	-	6,299	11	-
2e.4.5	Plant energy budget	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	532	53	585	585	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	38	4	41	-	41	-	-	-	-	-	-	-	-	-
2e.4.8	Indirect Overhead	-	-	-	-	-	-	392	59	450	450	-	-	-	-	-	-	-	-	-	-
2e.4.9	Security Staff Cost	-	-	-	-	-	-	955	143	1,098	1,098	-	-	-	-	-	-	-	-	-	27,893
2e.4.10	Utility Staff Cost	-	-	-	-	-	-	4,060	609	4,669	4,669	-	-	-	-	-	-	-	-	-	69,143
2e.4	Subtotal Period 2e Period-Dependent Costs	-	1,054	5	1	-	13	6,594	1,209	8,877	8,835	41	-	-	315	-	-	-	6,299	11	97,036
2e.0	TOTAL PERIOD 2e COST	-	1,054	5	1	-	13	15,076	3,741	19,889	19,750	140	-	-	315	-	-	-	6,299	197,889	100,156
PERIOD 2 TOTALS		7,306	49,643	16,017	5,720	23,101	45,577	210,472	72,438	430,273	348,138	76,257	5,878	239,465	113,310	2,937	459	-	19,978,130	1,012,293	2,653,452
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor	-	2,781	-	-	-	-	-	417	3,198	-	-	3,198	-	-	-	-	-	-	40,693	-
3b.1.1.2	AB - Fw Pump/Switchgear Area	-	185	-	-	-	-	-	28	212	-	-	212	-	-	-	-	-	-	2,750	-
3b.1.1.3	Auxiliary Building	-	1,468	-	-	-	-	-	220	1,688	-	-	1,688	-	-	-	-	-	-	21,564	-
3b.1.1.4	Containment Mechanical Equipment	-	52	-	-	-	-	-	8	60	-	-	60	-	-	-	-	-	-	1,085	-
3b.1.1.5	Cooling Towers (3)	-	1,988	-	-	-	-	-	298	2,286	-	-	2,286	-	-	-	-	-	-	34,180	-
3b.1.1.6	Diesel Generator Building	-	298	-	-	-	-	-	45	343	-	-	343	-	-	-	-	-	-	4,152	-
3b.1.1.7	Main Steam Doghouses	-	821	-	-	-	-	-	123	944	-	-	944	-	-	-	-	-	-	10,075	-
3b.1.1.8	Retired Steam Generator Facility	-	305	-	-	-	-	-	46	351	-	-	351	-	-	-	-	-	-	4,660	-
3b.1.1.9	Turbine Building	-	2,688	-	-	-	-	-	403	3,091	-	-	3,091	-	-	-	-	-	-	47,939	-
3b.1.1.10	Turbine Pedestal	-	622	-	-	-	-	-	93	716	-	-	716	-	-	-	-	-	-	7,683	-
3b.1.1.11	Upper Head Injection Tank Building	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	633	-
3b.1.1.12	Fuel Building	-	739	-	-	-	-	-	111	850	-	-	850	-	-	-	-	-	-	11,073	-
3b.1.1	Totals	-	11,985	-	-	-	-	-	1,798	13,782	-	-	13,782	-	-	-	-	-	-	186,487	-

Table C-1
Catawba Nuclear Station - Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2008 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
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	110	-	-	-	-	-	16	126	-	-	126	-	-	-	-	-	-	248	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	12,094	-	-	-	-	106	1,830	14,030	121	-	13,908	-	-	-	-	-	-	186,735	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	634	-	-	-	-	3	96	733	-	-	733	-	-	-	-	-	-	3,269	-
3b.2	Subtotal Period 3b Additional Costs	-	634	-	-	-	-	3	96	733	-	-	733	-	-	-	-	-	-	3,269	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	134	-	-	-	-	-	20	154	-	-	154	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	187	28	215	-	215	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	134	-	-	-	-	187	48	368	-	215	154	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	786	79	865	-	778	86	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	43	4	48	-	-	48	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	4,750	-	-	-	-	-	712	5,462	-	-	5,462	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	263	39	302	-	272	30	-	-	-	-	-	-	-	-
3b.4.5	Emergency Planning Fees	-	-	-	-	-	-	82	8	91	-	91	-	-	-	-	-	-	-	-	-
3b.4.6	Indirect Overhead	-	-	-	-	-	-	497	75	571	571	-	-	-	-	-	-	-	-	-	-
3b.4.7	Security Staff Cost	-	-	-	-	-	-	2,010	301	2,311	-	1,618	693	-	-	-	-	-	-	-	58,067
3b.4.8	Utility Staff Cost	-	-	-	-	-	-	4,895	734	5,630	-	5,067	563	-	-	-	-	-	-	-	87,720
3b.4	Subtotal Period 3b Period-Dependent Costs	-	4,750	-	-	-	-	8,576	1,953	15,280	571	7,825	6,883	-	-	-	-	-	-	-	145,787
3b.0	TOTAL PERIOD 3b COST	-	17,612	-	-	-	-	8,872	3,927	30,411	693	8,040	21,678	-	-	-	-	-	-	190,004	147,347
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	625	-	-	14,761	-	2,277	17,663	17,663	-	-	-	-	-	-	666	129,800	-	-
3d.1.1	Totals	-	-	625	-	-	14,761	-	2,277	17,663	17,663	-	-	-	-	-	-	666	129,800	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	625	-	-	14,761	-	2,277	17,663	17,663	-	-	-	-	-	-	666	129,800	-	-
3d.0	TOTAL PERIOD 3d COST	-	-	625	-	-	14,761	-	2,277	17,663	17,663	-	-	-	-	-	-	666	129,800	-	-
PERIOD 3 TOTALS		-	17,612	625	-	-	14,761	8,872	6,204	48,073	18,356	8,040	21,678	-	-	-	-	666	129,800	190,004	147,347
TOTAL COST TO DECOMMISSION		10,126	69,639	16,712	5,882	23,101	62,716	311,368	93,856	593,400	477,834	87,173	28,393	239,465	114,486	3,686	459	666	20,222,360	1,222,681	3,786,376

Table C-1
Catawba Nuclear Station - Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2008 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

TOTAL COST TO DECOMMISSION WITH 18.79% CONTINGENCY:	$593,400	thousands of 2008 dollars
TOTAL NRC LICENSE TERMINATION COST IS 80.52% OR:	$477,834	thousands of 2008 dollars
SPENT FUEL MANAGEMENT COST IS 14.69% OR:	$87,173	thousands of 2008 dollars
NON-NUCLEAR DEMOLITION COST IS 4.78% OR:	$28,393	thousands of 2008 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	118,632	cubic feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	666	cubic feet
TOTAL SCRAP METAL REMOVED:	44,147	tons
TOTAL CRAFT LABOR REQUIREMENTS:	1,222,681	man-hours

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

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	559
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	-	-	-	-	-	-	58	9	67	67	-	-	-	-	-	-	-	-	-	860
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	134	20	154	154	-	-	-	-	-	-	-	-	-	1,978
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
1a.1.10	End product description	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	559
1a.1.12	Define major work sequence	-	-	-	-	-	-	218	33	251	251	-	-	-	-	-	-	-	-	-	3,225
1a.1.13	Perform SER and EA	-	-	-	-	-	-	90	14	104	104	-	-	-	-	-	-	-	-	-	1,333
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	2,150
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	119	18	137	137	-	-	-	-	-	-	-	-	-	1,761
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	143	21	165	148	-	16	-	-	-	-	-	-	-	2,116
1a.1.17.2	Plant systems	-	-	-	-	-	-	121	18	139	125	-	14	-	-	-	-	-	-	-	1,792
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	15	2	17	17	-	-	-	-	-	-	-	-	-	215
1a.1.17.4	Reactor internals	-	-	-	-	-	-	206	31	237	237	-	-	-	-	-	-	-	-	-	3,053
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-	2,795
1a.1.17.6	Biological shield	-	-	-	-	-	-	15	2	17	17	-	-	-	-	-	-	-	-	-	215
1a.1.17.7	Steam generators	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,342
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	47	7	54	27	-	27	-	-	-	-	-	-	-	688
1a.1.17.9	Main Turbine	-	-	-	-	-	-	12	2	13	-	-	13	-	-	-	-	-	-	-	172
1a.1.17.10	Main Condensers	-	-	-	-	-	-	12	2	13	-	-	13	-	-	-	-	-	-	-	172
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	91	14	104	52	-	52	-	-	-	-	-	-	-	1,342
1a.1.17.12	Waste management	-	-	-	-	-	-	134	20	154	154	-	-	-	-	-	-	-	-	-	1,978
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	26	4	30	15	-	15	-	-	-	-	-	-	-	387
1a.1.17	Total	-	-	-	-	-	-	1,100	165	1,265	1,114	-	151	-	-	-	-	-	-	-	16,265
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	70	10	80	80	-	-	-	-	-	-	-	-	-	1,032
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	2,700	405	3,105	3,105	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	602
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,100	315	2,415	2,415	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	36	5	41	41	-	-	-	-	-	-	-	-	-	529
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	6,945	1,042	7,987	7,835	-	151	-	-	-	-	-	-	-	31,714
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,087	163	1,250	-	1,250	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	1,087	163	1,250	-	1,250	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,716	172	1,888	1,888	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	12,938	1,294	14,232	14,232	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	735	-	-	-	-	-	184	919	919	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	453	-	-	-	-	-	68	521	521	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	15	3	-	41	-	12	70	70	-	-	-	967	-	-	-	19,339	33	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,925	289	2,213	2,213	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	952	95	1,048	1,048	-	-	-	-	-	-	-	-	-	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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 1a Period-Dependent Costs (continued)																					
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	770	77	847	-	847	-	-	-	-	-	-	-	-	-
1a.4.9	FEMA Fees	-	-	-	-	-	-	318	48	366	366	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,507	226	1,733	-	1,733	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	220	33	253	-	253	-	-	-	-	-	-	-	-	-
1a.4.12	Indirect Overhead	-	-	-	-	-	-	2,246	337	2,582	2,582	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	1,471	221	1,692	1,692	-	-	-	-	-	-	-	-	-	57,859
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	21,367	3,205	24,572	24,572	-	-	-	-	-	-	-	-	-	396,411
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,188	15	3	-	41	45,430	6,259	52,935	50,102	2,833	-	-	967	-	-	-	19,339	33	454,271
1a.0	TOTAL PERIOD 1a COST	-	1,188	15	3	-	41	53,462	7,464	62,172	57,937	4,083	151	-	967	-	-	-	19,339	33	485,984
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	138	21	158	142	-	16	-	-	-	-	-	-	-	2,035
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
1b.1.1.3	Reactor internals	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	1,075
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	39	6	45	11	-	34	-	-	-	-	-	-	-	581
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,561
1b.1.1.9	Facility closeout	-	-	-	-	-	-	35	5	40	20	-	20	-	-	-	-	-	-	-	516
1b.1.1.10	Missile shields	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	194
1b.1.1.11	Biological shield	-	-	-	-	-	-	35	5	40	40	-	-	-	-	-	-	-	-	-	516
1b.1.1.12	Steam generators	-	-	-	-	-	-	134	20	154	154	-	-	-	-	-	-	-	-	-	1,978
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	29	4	33	17	-	17	-	-	-	-	-	-	-	430
1b.1.1.14	Main Turbine	-	-	-	-	-	-	45	7	52	-	-	52	-	-	-	-	-	-	-	671
1b.1.1.15	Main Condensers	-	-	-	-	-	-	45	7	52	-	-	52	-	-	-	-	-	-	-	671
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	79	12	91	82	-	9	-	-	-	-	-	-	-	1,174
1b.1.1.17	Reactor building	-	-	-	-	-	-	79	12	91	82	-	9	-	-	-	-	-	-	-	1,174
1b.1.1	Total	-	-	-	-	-	-	967	145	1,112	903	-	209	-	-	-	-	-	-	-	14,294
1b.1.2	Decon primary loop	501	-	-	-	-	-	-	250	751	751	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	501	-	-	-	-	-	967	395	1,863	1,654	-	209	-	-	-	-	-	-	1,067	14,294
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	6,272	941	7,212	7,212	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	1,252	376	1,628	1,628	-	-	-	-	-	-	-	-	8,167	3,357
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	7,524	1,316	8,840	8,840	-	-	-	-	-	-	-	-	8,167	3,357
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	862	-	-	-	-	-	-	129	991	991	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	29	-	55	159	-	2,336	-	628	3,206	3,206	-	-	-	189	749	-	-	94,530	183	-
1b.3.3	Small tool allowance	-	1	-	-	-	-	-	0	1	1	-	-	-	-	-	-	-	-	-	-
1b.3.4	Pipe cutting equipment	-	1,000	-	-	-	-	-	150	1,150	1,150	-	-	-	-	-	-	-	-	-	-
1b.3.5	Decon rig	1,400	-	-	-	-	-	-	210	1,610	1,610	-	-	-	-	-	-	-	-	-	-
1b.3.6	Spent Fuel Capital and Transfer	-	-	-	-	-	-	279	42	321	-	321	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,291	1,001	55	159	-	2,336	279	1,159	7,280	6,959	321	-	-	189	749	-	-	94,530	183	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	26	-	-	-	-	-	-	7	33	33	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	258	26	284	284	-	-	-	-	-	-	-	-	-	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1b Period-Dependent Costs (continued)																					
1b.4.3	Property taxes	-	-	-	-	-	-	2,534	253	2,787	2,787	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	227	-	-	-	-	-	57	283	283	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	224	-	-	-	-	-	34	258	258	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	5	1	-	14	-	4	23	23	-	-	-	322	-	-	-	6,449	11	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,588	238	1,826	1,826	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	235	23	258	258	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	190	19	209	-	209	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	372	56	427	-	427	-	-	-	-	-	-	-	-	-
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	54	8	63	-	63	-	-	-	-	-	-	-	-	-
1b.4.12	Indirect Overhead	-	-	-	-	-	-	1,231	185	1,416	1,416	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	1,497	225	1,722	1,722	-	-	-	-	-	-	-	-	-	50,898
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	11,972	1,796	13,768	13,768	-	-	-	-	-	-	-	-	-	217,360
1b.4	Subtotal Period 1b Period-Dependent Costs	26	451	5	1	-	14	19,931	2,930	23,358	22,659	699	-	-	322	-	-	-	6,449	11	268,258
1b.0	TOTAL PERIOD 1b COST	2,818	1,452	59	160	-	2,349	28,701	5,801	41,341	40,112	1,020	209	-	512	749	-	-	100,980	9,428	285,909
PERIOD 1 TOTALS		2,818	2,640	74	162	-	2,390	82,163	13,265	103,512	98,049	5,103	360	-	1,479	749	-	-	120,318	9,460	771,893
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	205	194	21	47	-	334	-	244	1,046	1,046	-	-	-	1,268	-	-	-	153,369	9,274	-
2a.1.1.2	Pressurizer Relief Tank	21	17	5	10	-	66	-	33	151	151	-	-	-	272	-	-	-	30,174	885	-
2a.1.1.3	Reactor Coolant Pumps & Motors	76	69	39	152	143	1,210	-	406	2,094	2,094	-	-	272	4,708	-	-	-	888,360	3,771	-
2a.1.1.4	Pressurizer	39	45	351	129	-	774	-	279	1,617	1,617	-	-	-	2,490	-	-	-	70,079	2,487	-
2a.1.1.5	Steam Generators	329	2,606	2,369	1,038	2,281	8,542	-	3,686	20,850	20,850	-	-	21,655	15,151	-	-	-	2,268,503	23,227	2,125
2a.1.1.6	CRDMs/ICIs/Service Structure Removal	147	82	262	98	-	189	-	182	961	961	-	-	-	3,923	-	-	-	86,603	5,001	-
2a.1.1.7	Reactor Vessel Internals	129	2,647	6,857	412	-	6,291	243	7,049	23,629	23,629	-	-	-	2,754	683	459	-	341,105	30,783	1,363
2a.1.1.8	Reactor Vessel	74	5,439	1,619	243	-	9,388	243	9,312	26,320	26,320	-	-	-	6,320	2,254	-	-	937,367	30,783	1,363
2a.1.1	Totals	1,021	11,098	11,524	2,129	2,424	26,795	487	21,191	76,668	76,668	-	-	21,927	36,886	2,937	459	-	4,775,560	106,211	4,852
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	380	315	35	900	488	-	389	2,507	2,507	-	-	4,726	2,632	-	-	-	637,812	9,495	-
2a.1.3	Main Condensers	-	1,274	160	81	733	419	-	562	3,229	3,229	-	-	7,274	2,145	-	-	-	519,770	32,740	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor	-	463	-	-	-	-	-	69	532	532	-	-	-	-	-	-	-	-	6,763	-
2a.1.4.2	AB - Battery & Cable Room (common)	-	20	-	-	-	-	-	3	23	23	-	-	-	-	-	-	-	-	295	-
2a.1.4.3	AB - FW Pump/Switchgear Area	-	20	-	-	-	-	-	3	23	23	-	-	-	-	-	-	-	-	299	-
2a.1.4.4	Auxiliary Building	-	165	-	-	-	-	-	25	189	189	-	-	-	-	-	-	-	-	2,409	-
2a.1.4.5	Auxiliary Service Building (common)	-	91	-	-	-	-	-	14	104	104	-	-	-	-	-	-	-	-	1,276	-
2a.1.4.6	Containment Mechanical Equipment	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	105	-
2a.1.4.7	Contaminated Materials Warehouse(common)	-	20	-	-	-	-	-	3	23	23	-	-	-	-	-	-	-	-	405	-
2a.1.4.8	Main Steam Doghouses	-	91	-	-	-	-	-	14	104	104	-	-	-	-	-	-	-	-	1,109	-
2a.1.4.9	Service Building (common)	-	87	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	1,607	-
2a.1.4.10	Turbine Building	-	282	-	-	-	-	-	42	325	325	-	-	-	-	-	-	-	-	4,856	-
2a.1.4.11	Upper Head Injection Tank Building	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	70	-
2a.1.4.12	Waste Solidification Facility (common)	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	78	-
2a.1.4.13	Fuel Building	-	80	-	-	-	-	-	12	92	92	-	-	-	-	-	-	-	-	1,173	-
2a.1.4	Totals	-	1,333	-	-	-	-	-	200	1,533	1,533	-	-	-	-	-	-	-	-	20,445	-
Disposal of Plant Systems																					
2a.1.5.1	Aux Bldg Chilled Water	-	80	1	3	99	-	-	36	219	219	-	-	1,094	-	-	-	-	44,411	1,857	-
2a.1.5.2	Aux Bldg Rad Area Chilled Water (shared)	-	106	2	4	151	-	-	50	314	314	-	-	1,663	-	-	-	-	67,525	2,446	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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
Disposal of Plant Systems (continued)																					
2a.1.5.3	Auxiliary Feedwater	-	226	12	24	927	-	-	200	1,390	1,390	-	-	10,186	-	-	-	-	413,660	5,480	-
2a.1.5.4	Auxiliary Steam	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	564	-
2a.1.5.5	Auxiliary Steam RCA	-	77	1	3	107	-	-	36	224	224	-	-	1,180	-	-	-	-	47,930	1,801	-
2a.1.5.6	CCW Intake Screen Backwash	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	142	-
2a.1.5.7	CO2 Gen Purge	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	251	-
2a.1.5.8	Condensate	-	350	-	-	-	-	-	53	403	-	-	403	-	-	-	-	-	-	10,260	-
2a.1.5.9	Condensate Storage	-	71	-	-	-	-	-	11	82	-	-	82	-	-	-	-	-	-	2,003	-
2a.1.5.10	Condenser Cleaning	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	1,125	-
2a.1.5.11	Condenser Steam Air Ejector	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	996	-
2a.1.5.12	Containment Spray/Valve Inj Water	-	212	4	8	308	-	-	101	634	634	-	-	3,389	-	-	-	-	137,648	4,986	-
2a.1.5.13	Convent LP Service Water	-	90	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	2,702	-
2a.1.5.14	Conventional Chemical Addition	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	238	-
2a.1.5.15	Conventional Chemical Addition RCA	-	13	0	0	10	-	-	5	28	28	-	-	109	-	-	-	-	4,424	284	-
2a.1.5.16	Cooling Tower Water Treatment (shared)	-	73	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	2,137	-
2a.1.5.17	DG Engine Cooling Water	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	542	-
2a.1.5.18	DG Engine Fuel Oil	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,753	-
2a.1.5.19	DG Engine Lube Oil	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	998	-
2a.1.5.20	DG Engine Starting Air	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	1,012	-
2a.1.5.21	DG Room Sump Pump	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	175	-
2a.1.5.22	FDWP Condensate Seal	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	632	-
2a.1.5.23	Feedwater	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	1,527	-
2a.1.5.24	Feedwater Lube & Hydraulic Oil	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	417	-
2a.1.5.25	Feedwater Pump Turbine Steam Seal	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	80	-
2a.1.5.26	Feedwater RCA	-	78	3	7	249	-	-	58	396	396	-	-	2,742	-	-	-	-	111,348	1,945	-
2a.1.5.27	Generator Hydrogen	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	217	-
2a.1.5.28	Generator Seal Oil	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	312	-
2a.1.5.29	Heater Bleed Steam	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	1,006	-
2a.1.5.30	Heater Drains	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	3,866	-
2a.1.5.31	Heater Relief Valve	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	525	-
2a.1.5.32	Heater Vent	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	559	-
2a.1.5.33	Hydrogen Blanket & Bulk Storage (shared)	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	436	-
2a.1.5.34	MN Turbine Lube Oil & Purification	-	37	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	1,132	-
2a.1.5.35	Main Steam	-	14	-	-	-	-	-	2	17	-	-	17	-	-	-	-	-	-	450	-
2a.1.5.36	Main Steam Bypass to Condenser	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	784	-
2a.1.5.37	Main Steam Leakoff & Steam Seal	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	249	-
2a.1.5.38	Main Steam RCA	-	26	1	1	54	-	-	15	97	97	-	-	594	-	-	-	-	24,127	601	-
2a.1.5.39	Main Steam Vent	-	119	3	6	230	-	-	65	423	423	-	-	2,525	-	-	-	-	102,559	2,891	-
2a.1.5.40	Main Vacuum (shared)	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	291	-
2a.1.5.41	Makeup Demineralized Water (shared)	-	101	-	-	-	-	-	15	116	-	-	116	-	-	-	-	-	-	3,097	-
2a.1.5.42	Miscellaneous Equipment	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
2a.1.5.43	Moisture Separator Reheater Bld Steam	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	156	-
2a.1.5.44	Moisture Separator Reheater Drain	-	145	-	-	-	-	-	22	166	-	-	166	-	-	-	-	-	-	4,238	-
2a.1.5.45	Nitrogen (shared)	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	402	-
2a.1.5.46	Recirculated Cooling Water (shared)	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	3,964	-
2a.1.5.47	SG Wet Layup Recirculation	-	19	0	0	16	-	-	7	42	42	-	-	174	-	-	-	-	7,060	420	-
2a.1.5.48	SM Supply to Aux Equipment	-	25	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	762	-
2a.1.5.49	SM Supply to Aux Equipment RCA	-	9	0	0	9	-	-	4	22	22	-	-	100	-	-	-	-	4,077	211	-
2a.1.5.50	Standby Shutdown Diesel	-	6	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	158	-
2a.1.5.51	Steam Generator Blowdown Recycle	-	281	28	47	574	218	-	221	1,370	1,370	-	-	6,315	1,116	-	-	-	356,414	7,084	-
2a.1.5.52	Steam Supply to FW Pump Turbine	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	743	-
2a.1.5.53	Turbine Crossover	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	102	-
2a.1.5.54	Turbine Exhaust	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	64	-
2a.1.5.55	Turbine Hydraulic Oil	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	298	-
2a.1.5.56	Vacuum Priming (shared)	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	519	-
2a.1.5	Totals	-	2,983	57	104	2,736	218	-	1,058	7,157	5,160	-	1,997	30,071	1,116	-	-	-	1,321,183	81,910	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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
2a.1.6	Scaffolding in support of decommissioning	-	3,488	16	4	91	11	-	891	4,501	4,501	-	-	901	56	-	-	-	45,598	33,738	-
2a.1	Subtotal Period 2a Activity Costs	1,021	20,558	12,072	2,353	6,884	27,931	487	24,291	95,595	93,598	-	1,997	64,900	42,835	2,937	459	-	7,299,923	284,539	4,852
Period 2a Additional Costs																					
2a.2.1	Misc Waste	-	-	4	6	6	-	-	2	17	17	-	-	37	-	-	-	-	2,652	126	-
2a.2	Subtotal Period 2a Additional Costs	-	-	4	6	6	-	-	2	17	17	-	-	37	-	-	-	-	2,652	126	-
Period 2a Collateral Costs																					
2a.3.1	Process liquid waste	67	-	27	76	-	119	-	77	366	366	-	-	-	458	-	-	-	27,475	89	-
2a.3.2	Small tool allowance	-	212	-	-	-	-	-	32	243	219	-	24	-	-	-	-	-	-	-	-
2a.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	741	111	852	-	852	-	-	-	-	-	-	-	-	-
2a.3.4	Survey and Release of Scrap Metal	-	-	-	-	-	-	676	101	777	777	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	67	212	27	76	-	119	1,417	322	2,239	1,363	852	24	-	458	-	-	-	27,475	89	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	70	-	-	-	-	-	-	17	87	87	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	683	68	751	751	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	6,711	671	7,382	6,644	-	738	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	1,745	-	-	-	-	-	436	2,181	2,181	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	2,858	-	-	-	-	-	429	3,287	3,287	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	67	12	-	186	-	55	321	321	-	-	-	4,429	-	-	-	88,582	150	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	1,998	300	2,297	2,297	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	595	60	655	655	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	503	50	553	-	553	-	-	-	-	-	-	-	-	-
2a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	984	148	1,132	-	1,132	-	-	-	-	-	-	-	-	-
2a.4.11	Radwaste Processing Equipment/Services	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	144	22	166	-	166	-	-	-	-	-	-	-	-	-
2a.4.13	Indirect Overhead	-	-	-	-	-	-	3,214	482	3,696	3,696	-	-	-	-	-	-	-	-	-	131,187
2a.4.14	Security Staff Cost	-	-	-	-	-	-	3,855	578	4,433	4,433	-	-	-	-	-	-	-	-	-	567,383
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	32,374	4,856	37,230	37,230	-	-	-	-	-	-	-	-	-	698,569
2a.4	Subtotal Period 2a Period-Dependent Costs	70	4,603	67	12	-	186	51,308	8,209	64,455	61,866	1,851	738	-	4,429	-	-	-	88,582	150	
2a.0	TOTAL PERIOD 2a COST	1,157	25,372	12,170	2,447	6,890	28,236	53,211	32,824	162,307	156,845	2,703	2,760	64,937	47,722	2,937	459	-	7,418,633	284,904	703,421
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Admin Bldg Chilled Water (shared)	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	416	-
2b.1.1.2	Admin Bldg Ventilation (shared)	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	171	-
2b.1.1.3	Annulus Ventilation	-	34	2	4	109	9	-	28	188	188	-	-	1,203	48	-	-	-	53,191	811	-
2b.1.1.4	Aux & RB Heating Water	-	429	5	10	362	-	-	164	970	970	-	-	3,982	-	-	-	-	161,718	9,843	-
2b.1.1.5	Aux Bldg Ventilation	-	176	11	20	404	67	-	125	803	803	-	-	4,440	341	-	-	-	210,911	4,322	-
2b.1.1.6	Boron Recycle	362	373	29	39	284	215	-	380	1,682	1,682	-	-	3,121	1,262	-	-	-	225,298	17,228	-
2b.1.1.7	Boron Thermal Regeneration	191	261	24	36	103	223	-	240	1,078	1,078	-	-	1,132	1,143	-	-	-	148,472	9,669	-
2b.1.1.8	Breathing Air (shared)	-	135	1	2	94	-	-	48	281	281	-	-	1,037	-	-	-	-	42,110	3,335	-
2b.1.1.9	Chemical & Volume Control	629	623	120	158	282	1,023	-	804	3,640	3,640	-	-	3,103	5,343	-	-	-	595,466	25,861	-
2b.1.1.10	Comp Room Chilled Water (shared)	-	43	-	-	-	-	-	6	50	-	-	50	-	-	-	-	-	-	1,295	-
2b.1.1.11	Component Cooling	-	103	-	-	-	-	-	15	119	-	-	119	-	-	-	-	-	-	3,092	-
2b.1.1.12	Component Cooling RCA	-	141	4	7	279	-	-	78	509	509	-	-	3,066	-	-	-	-	124,493	3,199	-
2b.1.1.13	Computer Air Cond. (shared)	-	24	2	3	118	-	-	24	171	171	-	-	1,296	-	-	-	-	52,647	509	-
2b.1.1.14	Condenser Circulating Water	-	93	-	-	-	-	-	14	107	-	-	107	-	-	-	-	-	-	2,781	-
2b.1.1.15	Cont Air Release & Addition	-	38	2	3	21	20	-	18	104	104	-	-	235	102	-	-	-	18,645	967	-
2b.1.1.16	Cont Air Return Ex & H2 Skimmer	-	95	6	10	87	53	-	52	303	303	-	-	955	270	-	-	-	63,011	2,421	-
2b.1.1.17	Cont CRD, & ICI Room Vent	-	86	11	20	228	93	-	83	519	519	-	-	2,502	474	-	-	-	144,102	2,170	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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
Disposal of Plant Systems (continued)																					
2b.1.1.18	Cont Water Sample & Purge	-	9	0	0	1	2	-	3	15	15	-	-	10	10	-	-	-	1,259	237	-
2b.1.1.19	Containment Chilled Water	-	25	-	-	-	-	-	4	29	-	-	29	-	-	-	-	-	-	712	-
2b.1.1.20	Containment Chilled Water RCA	-	68	2	3	128	-	-	37	238	238	-	-	1,407	-	-	-	-	57,124	1,636	-
2b.1.1.21	Containment Purge Ventilation	-	169	14	27	441	104	-	140	895	895	-	-	4,847	532	-	-	-	244,602	4,262	-
2b.1.1.22	Control Area Chilled Water (shared)	-	284	5	10	361	-	-	127	786	786	-	-	3,969	-	-	-	-	161,176	6,615	-
2b.1.1.23	Control Area HVAC (shared)	-	68	5	9	349	-	-	71	502	502	-	-	3,834	-	-	-	-	155,703	1,654	-
2b.1.1.24	Conventional Sampling	-	332	24	24	41	157	-	134	712	712	-	-	456	803	-	-	-	90,449	8,357	-
2b.1.1.25	Conventional Waste Mont & Treat (shared)	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	2,469	-
2b.1.1.26	Convntl Waste Mont & Treat (shared) RCA	-	207	5	9	355	-	-	107	683	683	-	-	3,901	-	-	-	-	158,411	4,987	-
2b.1.1.27	Diesel Bldg Ventilation	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	243	-
2b.1.1.28	Drinking Water (shared)	-	45	-	-	-	-	-	7	52	-	-	52	-	-	-	-	-	-	1,400	-
2b.1.1.29	Electrical (clean)	-	2,624	-	-	-	-	-	394	3,017	-	-	3,017	-	-	-	-	-	-	73,972	-
2b.1.1.30	Electrical (contaminated)	-	872	34	64	391	362	-	380	2,103	2,103	-	-	4,297	1,852	-	-	-	340,711	21,732	-
2b.1.1.31	Electrical (contaminated) RCA	-	5,354	87	172	6,505	-	-	2,349	14,465	14,465	-	-	71,504	-	-	-	-	2,903,830	129,175	-
2b.1.1.32	Equipment Decon	-	31	2	2	23	11	-	14	83	83	-	-	255	58	-	-	-	15,512	769	-
2b.1.1.33	Filtered Water (shared)	-	65	-	-	-	-	-	10	74	-	-	74	-	-	-	-	-	-	1,811	-
2b.1.1.34	Filtered Water (shared) RCA	-	26	0	1	37	-	-	12	77	77	-	-	412	-	-	-	-	16,721	626	-
2b.1.1.35	Fire Protection	-	42	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	1,274	-
2b.1.1.36	Fire Protection (shared)	-	388	-	-	-	-	-	58	446	-	-	446	-	-	-	-	-	-	11,816	-
2b.1.1.37	Fire Protection RCA	-	118	3	6	217	-	-	63	406	406	-	-	2,383	-	-	-	-	96,755	2,872	-
2b.1.1.38	Gaseous Waste Management (shared)	-	249	21	25	153	145	-	127	721	721	-	-	1,684	815	-	-	-	134,865	6,142	-
2b.1.1.39	Groundwater Drainage (shared)	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	591	-
2b.1.1.40	Heating Boiler Feedwater (shared)	-	49	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	1,454	-
2b.1.1.41	Ice Condenser Refrigeration	-	462	10	20	775	-	-	236	1,504	1,504	-	-	8,522	-	-	-	-	346,098	11,095	-
2b.1.1.42	Instrument Air	-	190	-	-	-	-	-	28	218	-	-	218	-	-	-	-	-	-	6,051	-
2b.1.1.43	Instrument Air RCA	-	649	7	14	515	-	-	242	1,427	1,427	-	-	5,663	-	-	-	-	229,971	14,768	-
2b.1.1.44	Liquid Waste Recycle	669	825	80	105	193	681	-	764	3,316	3,316	-	-	2,119	3,687	-	-	-	398,270	34,303	-
2b.1.1.45	Miscellaneous Ventilation	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	1,466	-
2b.1.1.46	Nuclear Prod Office Chilled Water (shrd)	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	681	-
2b.1.1.47	Nuclear Sampling	-	270	17	16	25	107	-	102	539	539	-	-	275	550	-	-	-	60,389	6,926	-
2b.1.1.48	Nuclear Service Water	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,898	-
2b.1.1.49	Nuclear Service Water Pump Vent	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	30	-
2b.1.1.50	Nuclear Service Water RCA	-	473	14	28	1,061	-	-	283	1,860	1,860	-	-	11,665	-	-	-	-	473,732	11,421	-
2b.1.1.51	Nuclear Solid Waste Disposal (shared)	212	245	26	33	86	211	-	240	1,053	1,053	-	-	940	1,199	-	-	-	134,934	10,876	-
2b.1.1.52	Oxygen (shared)	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	124	-
2b.1.1.53	Reactor Coolant	-	111	21	38	83	245	-	109	608	608	-	-	915	1,252	-	-	-	149,507	2,867	-
2b.1.1.54	Refueling Water	-	306	14	22	409	80	-	163	993	993	-	-	4,494	443	-	-	-	218,997	7,716	-
2b.1.1.55	Residual Heat Removal	140	140	20	29	44	187	-	164	723	723	-	-	484	956	-	-	-	105,369	4,883	-
2b.1.1.56	Safety Injection	-	421	70	94	449	562	-	334	1,931	1,931	-	-	4,938	2,977	-	-	-	458,383	10,638	-
2b.1.1.57	Sanitation & Waste Treatment (shared)	-	29	-	-	-	-	-	4	33	-	-	33	-	-	-	-	-	-	887	-
2b.1.1.58	Service Bldg & Warehouse Vent (shared)	-	46	-	-	-	-	-	7	52	-	-	52	-	-	-	-	-	-	1,457	-
2b.1.1.59	Service Bldg Chilled Water (shared)	-	38	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	1,165	-
2b.1.1.60	Station Air (shared)	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	685	-
2b.1.1.61	Station Air (shared) RCA	-	243	3	5	195	-	-	91	536	536	-	-	2,140	-	-	-	-	86,897	5,487	-
2b.1.1.62	TB & Service Bldg Sump & Drains (shared)	-	43	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	1,261	-
2b.1.1.63	Tech Support Center Vent (shared)	-	5	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	145	-
2b.1.1.64	Turbine Building Ventilation	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	3,003	-
2b.1.1	Totals	2,203	18,553	699	1,071	15,209	4,557	-	8,970	51,263	46,422	-	4,840	167,186	24,118	-	-	-	8,879,730	512,730	-
2b.1.2	Scaffolding in support of decommissioning	-	4,360	20	5	114	14	-	1,113	5,626	5,626	-	-	1,127	70	-	-	-	56,997	42,172	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor	1,038	811	130	246	864	857	-	1,116	5,062	5,062	-	-	9,498	7,103	-	-	-	1,057,313	42,695	-
2b.1.3.2	Auxiliary Building	485	278	54	112	76	163	-	387	1,555	1,555	-	-	833	3,158	-	-	-	347,681	17,958	-
2b.1.3.3	Auxiliary Service Building (common)	30	14	2	3	11	5	-	22	87	87	-	-	126	95	-	-	-	14,015	1,079	-
2b.1.3.4	Containment Mechanical Equipment	22	19	2	5	11	7	-	20	86	86	-	-	122	128	-	-	-	17,327	967	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Decontamination of Site Buildings (continued)																					
2b.1.3.5	Contaminated Materials Warehouse(common)	67	32	8	16	-	23	-	50	195	195	-	-	-	449	-	-	-	44,850	2,305	-
2b.1.3.6	Monitor Tank Building (common)	80	7	1	2	-	3	-	43	137	137	-	-	-	64	-	-	-	6,354	2,263	-
2b.1.3.7	Waste Solidification Facility (common)	13	11	2	3	8	5	-	12	55	55	-	-	93	88	-	-	-	12,151	575	-
2b.1.3	Totals	1,735	1,172	198	388	971	1,063	-	1,650	7,176	7,176	-	-	10,672	11,084	-	-	-	1,499,690	67,843	-
2b.1	Subtotal Period 2b Activity Costs	3,938	24,086	917	1,464	16,293	5,633	-	11,733	64,064	59,224	-	4,840	178,985	35,272	-	-	-	10,436,420	622,745	-
Period 2b Additional Costs																					
2b.2.1	RP Storage Tent Asphalt Disposal	-	6	1	48	-	150	-	46	252	252	-	-	-	2,633	-	-	-	315,900	120	-
2b.2.2	Landfill and Firing Range Closure	-	-	-	-	-	-	818	82	900	-	-	900	-	-	-	-	-	-	-	-
2b.2.3	Pond Closures	-	-	-	-	-	-	348	52	400	-	-	400	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	6	1	48	-	150	1,166	180	1,552	252	-	1,300	-	2,633	-	-	-	315,900	120	-
Period 2b Collateral Costs																					
2b.3.1	Process liquid waste	231	-	205	594	-	1,354	-	564	2,949	2,949	-	-	-	3,528	-	-	-	312,070	688	-
2b.3.2	Small tool allowance	-	420	-	-	-	-	-	63	483	483	-	-	-	-	-	-	-	-	-	-
2b.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,223	183	1,406	-	1,406	-	-	-	-	-	-	-	-	-
2b.3.4	Survey and Release of Scrap Metal	-	-	-	-	-	-	845	127	971	971	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	231	420	205	594	-	1,354	2,067	937	5,809	4,403	1,406	-	-	3,528	-	-	-	312,070	688	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	887	-	-	-	-	-	-	222	1,108	1,108	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,128	113	1,241	1,241	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	6,103	610	6,713	6,713	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	3,494	-	-	-	-	-	874	4,368	4,368	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	3,380	-	-	-	-	-	507	3,887	3,887	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	121	22	-	333	-	99	574	574	-	-	-	7,922	-	-	-	158,432	268	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	2,604	391	2,995	2,995	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	983	98	1,081	1,081	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	830	83	913	-	913	-	-	-	-	-	-	-	-	-
2b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	1,626	244	1,870	-	1,870	-	-	-	-	-	-	-	-	-
2b.4.11	Radwaste Processing Equipment/Services	-	-	-	-	-	-	409	61	470	470	-	-	-	-	-	-	-	-	-	-
2b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	238	36	273	-	273	-	-	-	-	-	-	-	-	-
2b.4.13	Indirect Overhead	-	-	-	-	-	-	5,115	767	5,882	5,882	-	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	5,099	765	5,864	5,864	-	-	-	-	-	-	-	-	-	168,297
2b.4.15	Utility Staff Cost	-	-	-	-	-	-	51,778	7,767	59,545	59,545	-	-	-	-	-	-	-	-	-	902,891
2b.4	Subtotal Period 2b Period-Dependent Costs	887	6,874	121	22	-	333	75,913	12,636	96,785	93,728	3,056	-	-	7,922	-	-	-	158,432	268	1,071,189
2b.0	TOTAL PERIOD 2b COST	5,056	31,386	1,245	2,127	16,293	7,471	79,146	25,486	168,210	157,607	4,462	6,141	178,985	49,354	-	-	-	11,222,820	623,821	1,071,189
PERIOD 2c - Delay before Wet Fuel Storage Decontamination																					
Period 2c Direct Decommissioning Activities																					
Period 2c Additional Costs																					
2c.2.1	Landfill Post Closure Maintenance	-	-	-	-	-	-	239	24	263	-	-	263	-	-	-	-	-	-	-	-
2c.2	Subtotal Period 2c Additional Costs	-	-	-	-	-	-	239	24	263	-	-	263	-	-	-	-	-	-	-	-
Period 2c Collateral Costs																					
2c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,459	669	5,128	-	5,128	-	-	-	-	-	-	-	-	-
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	4,459	669	5,128	-	5,128	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	2,992	299	3,292	-	3,292	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	2,766	277	3,043	-	3,043	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	548	-	-	-	-	-	137	685	-	685	-	-	-	-	-	-	-	-	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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 2c Period-Dependent Costs (continued)																					
2c.4.4	Disposal of DAW generated	-	-	11	2	-	31	-	9	53	-	53	-	-	730	-	-	-	14,602	25	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	1,843	276	2,119	-	2,119	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	987	99	1,086	-	1,086	-	-	-	-	-	-	-	-	-
2c.4.7	Emergency Planning Fees	-	-	-	-	-	-	2,203	220	2,423	-	2,423	-	-	-	-	-	-	-	-	-
2c.4.8	Spent Fuel Pool O&M	-	-	-	-	-	-	4,313	647	4,960	-	4,960	-	-	-	-	-	-	-	-	-
2c.4.9	ISFSI Operating Costs	-	-	-	-	-	-	631	95	725	-	725	-	-	-	-	-	-	-	-	-
2c.4.10	Indirect Overhead	-	-	-	-	-	-	1,983	297	2,280	-	2,280	-	-	-	-	-	-	-	-	-
2c.4.11	Security Staff Cost	-	-	-	-	-	-	10,595	1,589	12,184	-	12,184	-	-	-	-	-	-	-	-	353,006
2c.4.12	Utility Staff Cost	-	-	-	-	-	-	19,599	2,940	22,539	-	22,539	-	-	-	-	-	-	-	-	349,989
2c.4	Subtotal Period 2c Period-Dependent Costs	-	548	11	2	-	31	47,912	6,885	55,389	-	55,389	-	-	730	-	-	-	14,602	25	702,994
2c.0	TOTAL PERIOD 2c COST	-	548	11	2	-	31	52,611	7,578	60,781	-	60,518	263	-	730	-	-	-	14,602	25	702,994
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	338	35	130	76	-	518	-	332	1,429	1,429	-	-	-	2,648	-	-	-	237,562	1,033	-
Disposal of Plant Systems																					
2d.1.2.1	FHB Ventilation	-	68	5	10	271	19	-	65	438	438	-	-	2,985	97	-	-	-	129,937	1,630	-
2d.1.2.2	Spent Fuel Cooling	141	196	17	23	64	148	-	171	759	759	-	-	701	755	-	-	-	96,130	7,341	-
2d.1.2	Totals	141	264	22	33	335	167	-	236	1,198	1,198	-	-	3,685	852	-	-	-	226,067	8,971	-
Decontamination of Site Buildings																					
2d.1.3.1	Fuel Building	757	841	17	31	309	49	-	654	2,657	2,657	-	-	3,393	702	-	-	-	206,307	37,679	-
2d.1.3	Totals	757	841	17	31	309	49	-	654	2,657	2,657	-	-	3,393	702	-	-	-	206,307	37,679	-
2d.1.4	Scaffolding in support of decommissioning	-	872	4	1	23	3	-	223	1,125	1,125	-	-	225	14	-	-	-	11,399	8,434	-
2d.1	Subtotal Period 2d Activity Costs	1,237	2,012	173	141	667	736	-	1,444	6,409	6,409	-	-	7,303	4,216	-	-	-	681,336	56,117	-
Period 2d Additional Costs																					
2d.2.1	License Termination Survey Program Management	-	-	-	-	-	-	616	185	801	801	-	-	-	-	-	-	-	-	-	6,240
2d.2.2	Landfill Post Closure Maintenance	-	-	-	-	-	-	15	2	17	-	-	17	-	-	-	-	-	-	-	-
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	631	186	818	801	-	17	-	-	-	-	-	-	-	6,240
Period 2d Collateral Costs																					
2d.3.1	Process liquid waste	157	-	73	208	-	363	-	208	1,008	1,008	-	-	-	1,247	-	-	-	83,552	243	-
2d.3.2	Small tool allowance	-	47	-	-	-	-	-	7	54	54	-	-	-	-	-	-	-	-	-	-
2d.3.3	Decommissioning Equipment Disposition	-	-	107	30	605	73	-	124	940	940	-	-	6,000	373	-	-	-	303,507	88	-
2d.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	205	31	235	-	235	-	-	-	-	-	-	-	-	-
2d.3.5	Survey and Release of Scrap Metal	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	-
2d.3	Subtotal Period 2d Collateral Costs	157	47	180	238	605	436	373	395	2,431	2,196	235	-	6,000	1,620	-	-	-	387,058	331	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	149	-	-	-	-	-	-	37	187	187	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	188	19	207	207	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	10	1	11	11	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	373	-	-	-	-	-	93	467	467	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	783	-	-	-	-	-	117	901	901	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	23	4	-	64	-	19	110	110	-	-	-	1,517	-	-	-	30,332	51	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	164	16	181	181	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	139	14	153	-	153	-	-	-	-	-	-	-	-	-
2d.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	137	21	157	157	-	-	-	-	-	-	-	-	-	-
2d.4.11	ISFSI Operating Costs	-	-	-	-	-	-	40	6	46	-	46	-	-	-	-	-	-	-	-	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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 Period-Dependent Costs (continued)																					
2d.4.12	Indirect Overhead	-	-	-	-	-	-	588	88	676	676	-	-	-	-	-	-	-	-	-	-
2d.4.13	Security Staff Cost	-	-	-	-	-	-	469	70	540	540	-	-	-	-	-	-	-	-	-	13,779
2d.4.14	Utility Staff Cost	-	-	-	-	-	-	6,138	921	7,059	7,059	-	-	-	-	-	-	-	-	-	103,740
2d.4	Subtotal Period 2d Period-Dependent Costs	149	1,157	23	4	-	64	8,105	1,458	10,959	10,761	198	-	-	1,517	-	-	-	30,332	51	117,519
2d.0	TOTAL PERIOD 2d COST	1,543	3,216	376	384	1,271	1,235	9,110	3,483	20,617	20,167	433	17	13,303	7,353	-	-	-	1,098,726	56,500	123,759
PERIOD 2e - License Termination																					
Period 2e Direct Decommissioning Activities																					
2e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	150	45	195	195	-	-	-	-	-	-	-	-	-	-
2e.1.2	Terminate license									a											
2e.1	Subtotal Period 2e Activity Costs	-	-	-	-	-	-	150	45	195	195	-	-	-	-	-	-	-	-	-	-
Period 2e Additional Costs																					
2e.2.1	License Termination Survey	-	-	-	-	-	-	9,459	2,838	12,296	12,296	-	-	-	-	-	-	-	-	228,376	3,120
2e.2.2	Landfill Post Closure Maintenance	-	-	-	-	-	-	31	3	34	-	-	34	-	-	-	-	-	-	-	-
2e.2	Subtotal Period 2e Additional Costs	-	-	-	-	-	-	9,490	2,841	12,331	12,296	-	34	-	-	-	-	-	-	228,376	3,120
Period 2e Collateral Costs																					
2e.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	86	13	98	-	98	-	-	-	-	-	-	-	-	-
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	86	13	98	-	98	-	-	-	-	-	-	-	-	-
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance	-	-	-	-	-	-	359	36	395	395	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	20	2	22	22	-	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	1,198	-	-	-	-	-	300	1,498	1,498	-	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	5	1	-	15	-	4	25	25	-	-	-	349	-	-	-	6,979	12	-
2e.4.5	Plant energy budget	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	355	35	390	390	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	38	4	41	-	41	-	-	-	-	-	-	-	-	-
2e.4.8	ISFSI Operating Costs	-	-	-	-	-	-	82	12	94	-	94	-	-	-	-	-	-	-	-	-
2e.4.9	Indirect Overhead	-	-	-	-	-	-	725	109	834	834	-	-	-	-	-	-	-	-	-	-
2e.4.10	Security Staff Cost	-	-	-	-	-	-	955	143	1,098	1,098	-	-	-	-	-	-	-	-	-	27,893
2e.4.11	Utility Staff Cost	-	-	-	-	-	-	7,958	1,194	9,152	9,152	-	-	-	-	-	-	-	-	-	128,071
2e.4	Subtotal Period 2e Period-Dependent Costs	-	1,198	5	1	-	15	10,732	1,875	13,826	13,690	136	-	-	349	-	-	-	6,979	12	155,964
2e.0	TOTAL PERIOD 2e COST	-	1,198	5	1	-	15	20,457	4,774	26,450	26,181	234	34	-	349	-	-	-	6,979	228,388	159,084
PERIOD 2 TOTALS		7,756	61,720	13,807	4,961	24,454	36,988	214,535	74,144	438,365	360,800	68,350	9,214	257,225	105,508	2,937	459	-	19,761,760	1,193,637	2,760,447
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor	-	2,627	-	-	-	-	-	394	3,021	-	-	3,021	-	-	-	-	-	-	38,439	-
3b.1.1.2	AB - Battery & Cable Room (common)	-	181	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	2,772	-
3b.1.1.3	AB - FW Pump/Switchgear Area	-	185	-	-	-	-	-	28	212	-	-	212	-	-	-	-	-	-	2,750	-
3b.1.1.4	Administration Building (common)	-	221	-	-	-	-	-	33	254	-	-	254	-	-	-	-	-	-	4,366	-
3b.1.1.5	Auxiliary Building	-	1,508	-	-	-	-	-	226	1,735	-	-	1,735	-	-	-	-	-	-	22,370	-
3b.1.1.6	Auxiliary Service Building (common)	-	826	-	-	-	-	-	124	949	-	-	949	-	-	-	-	-	-	11,789	-
3b.1.1.7	Containment Mechanical Equipment	-	52	-	-	-	-	-	8	60	-	-	60	-	-	-	-	-	-	1,085	-
3b.1.1.8	Contaminated Materials Warehouse(common)	-	237	-	-	-	-	-	36	272	-	-	272	-	-	-	-	-	-	5,478	-
3b.1.1.9	Cooling Towers (3)	-	1,988	-	-	-	-	-	298	2,286	-	-	2,286	-	-	-	-	-	-	34,180	-
3b.1.1.10	Diesel Generator Building	-	298	-	-	-	-	-	45	343	-	-	343	-	-	-	-	-	-	4,152	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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
Demolition of Remaining Site Buildings (continued)																					
3b.1.1.11	Lagoons & Yard Basins (common)	-	180	-	-	-	-	-	27	207	-	-	207	-	-	-	-	-	-	3,401	-
3b.1.1.12	Low Pressure Service Water (common)	-	244	-	-	-	-	-	37	281	-	-	281	-	-	-	-	-	-	3,548	-
3b.1.1.13	Main Steam Doghouses	-	821	-	-	-	-	-	123	944	-	-	944	-	-	-	-	-	-	10,075	-
3b.1.1.14	Miscellaneous Structures (common)	-	4,398	-	-	-	-	-	660	5,057	-	-	5,057	-	-	-	-	-	-	74,828	-
3b.1.1.15	Monitor Tank Building (common)	-	330	-	-	-	-	-	49	379	-	-	379	-	-	-	-	-	-	6,276	-
3b.1.1.16	Nuc.Sevice Water Struct/Piping (common)	-	867	-	-	-	-	-	130	997	-	-	997	-	-	-	-	-	-	7,251	-
3b.1.1.17	Service Building (common)	-	893	-	-	-	-	-	134	1,027	-	-	1,027	-	-	-	-	-	-	18,025	-
3b.1.1.18	Standby Shutdown Facility (common)	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	954	-
3b.1.1.19	Steam Generator Drain Tank Bldg (common)	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	896	-
3b.1.1.20	Turbine Building	-	2,688	-	-	-	-	-	403	3,091	-	-	3,091	-	-	-	-	-	-	47,944	-
3b.1.1.21	Turbine Pedestal	-	622	-	-	-	-	-	93	716	-	-	716	-	-	-	-	-	-	7,683	-
3b.1.1.22	Upper Head Injection Tank Building	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	633	-
3b.1.1.23	Waste Solidification Facility (common)	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	799	-
3b.1.1.24	Fuel Building	-	739	-	-	-	-	-	111	850	-	-	850	-	-	-	-	-	-	11,073	-
3b.1.1	Totals	-	20,088	-	-	-	-	-	3,013	23,101	-	-	23,101	-	-	-	-	-	-	320,764	-
Site Closeout Activities																					
3b.1.2	BackFill Site	-	6,186	-	-	-	-	-	928	7,114	-	-	7,114	-	-	-	-	-	-	23,126	-
3b.1.3	Grade & landscape site	-	110	-	-	-	-	-	16	126	-	-	126	-	-	-	-	-	-	248	-
3b.1.4	Final report to NRC	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	671
3b.1	Subtotal Period 3b Activity Costs	-	26,383	-	-	-	-	45	3,964	30,393	52	-	30,341	-	-	-	-	-	-	344,138	671
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	1,027	-	-	-	-	5	155	1,186	-	-	1,186	-	-	-	-	-	-	5,291	-
3b.2.2	Landfill Post Closure Maintenance	-	-	-	-	-	-	68	7	75	-	-	75	-	-	-	-	-	-	-	-
3b.2	Subtotal Period 3b Additional Costs	-	1,027	-	-	-	-	73	162	1,261	-	-	1,261	-	-	-	-	-	-	5,291	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	242	-	-	-	-	-	36	279	-	-	279	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	217	33	249	-	249	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	242	-	-	-	-	217	69	528	-	249	279	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	786	79	865	-	778	86	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	43	4	48	-	-	48	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	4,750	-	-	-	-	-	712	5,462	-	-	5,462	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	263	39	302	-	272	30	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	615	61	676	-	676	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	82	8	91	-	91	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	180	27	207	-	207	-	-	-	-	-	-	-	-	-
3b.4.8	Indirect Overhead	-	-	-	-	-	-	1,116	167	1,283	1,283	-	-	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	2,010	301	2,311	-	1,618	693	-	-	-	-	-	-	-	58,067
3b.4.10	Utility Staff Cost	-	-	-	-	-	-	11,962	1,794	13,757	-	12,381	1,376	-	-	-	-	-	-	-	196,940
3b.4	Subtotal Period 3b Period-Dependent Costs	-	4,750	-	-	-	-	17,057	3,195	25,001	1,283	16,022	7,696	-	-	-	-	-	-	-	255,007
3b.0	TOTAL PERIOD 3b COST	-	32,402	-	-	-	-	17,392	7,389	57,183	1,335	16,272	39,576	-	-	-	-	-	-	349,429	255,678
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Additional Costs																					
3c.2.1	Landfill Post Closure Maintenance	-	-	-	-	-	-	112	11	123	-	-	123	-	-	-	-	-	-	-	-
3c.2	Subtotal Period 3c Additional Costs	-	-	-	-	-	-	112	11	123	-	-	123	-	-	-	-	-	-	-	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	570	85	655	-	655	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	570	85	655	-	655	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	1,286	129	1,415	-	1,415	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	142	14	156	-	156	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	430	64	494	-	494	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	1,006	101	1,106	-	1,106	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	270	27	297	-	297	-	-	-	-	-	-	-	-	-
3c.4.6	ISFSI Operating Costs	-	-	-	-	-	-	294	44	338	-	338	-	-	-	-	-	-	-	-	-
3c.4.7	Indirect Overhead	-	-	-	-	-	-	215	32	247	-	247	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	5,562	834	6,397	-	6,397	-	-	-	-	-	-	-	-	151,971
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	2,189	328	2,517	-	2,517	-	-	-	-	-	-	-	-	37,993
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	11,394	1,574	12,968	-	12,968	-	-	-	-	-	-	-	-	189,964
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	12,076	1,671	13,746	-	13,624	123	-	-	-	-	-	-	-	189,964
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	625	-	-	14,761	-	2,277	17,663	17,663	-	-	-	-	-	-	666	129,800	-	-
3d.1.1	Totals	-	-	625	-	-	14,761	-	2,277	17,663	17,663	-	-	-	-	-	-	666	129,800	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	625	-	-	14,761	-	2,277	17,663	17,663	-	-	-	-	-	-	666	129,800	-	-
Period 3d Additional Costs																					
3d.2.1	Landfill Post Closure Maintenance	-	-	-	-	-	-	2	0	2	-	-	2	-	-	-	-	-	-	-	-
3d.2	Subtotal Period 3d Additional Costs	-	-	-	-	-	-	2	0	2	-	-	2	-	-	-	-	-	-	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	18	2	20	-	20	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	6	1	7	-	7	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	8	1	8	-	8	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	4	0	4	-	4	-	-	-	-	-	-	-	-	-
3d.4.6	ISFSI Operating Costs	-	-	-	-	-	-	4	1	5	-	5	-	-	-	-	-	-	-	-	-
3d.4.7	Indirect Overhead	-	-	-	-	-	-	3	0	4	-	4	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	79	12	91	-	91	-	-	-	-	-	-	-	-	2,160
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	31	5	36	-	36	-	-	-	-	-	-	-	-	540
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	155	22	177	-	177	-	-	-	-	-	-	-	-	2,700
3d.0	TOTAL PERIOD 3d COST	-	-	625	-	-	14,761	157	2,299	17,841	17,663	177	2	-	-	-	-	666	129,800	-	2,700
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	Landfill Post Closure Maintenance	-	-	-	-	-	-	14	1	15	-	-	15	-	-	-	-	-	-	-	-
3e.2.2	ISFSI License Termination	-	603	3	202	-	269	1,210	430	2,717	-	2,717	-	-	5,247	-	-	-	724,491	13,470	-
3e.2	Subtotal Period 3e Additional Costs	-	603	3	202	-	269	1,224	431	2,732	-	2,717	15	-	5,247	-	-	-	724,491	13,470	-
Period 3e Collateral Costs																					
3e.3.1	Small tool allowance	-	6	-	-	-	-	-	1	7	-	7	-	-	-	-	-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	6	-	-	-	-	-	1	7	-	7	-	-	-	-	-	-	-	-	-

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	161	16	177	-	177	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	18	2	20	-	20	-	-	-	-	-	-	-	-	-
3e.4.3	Heavy equipment rental	-	289	-	-	-	-	-	43	332	-	332	-	-	-	-	-	-	-	-	-
3e.4.4	Plant energy budget	-	-	-	-	-	-	54	8	62	-	62	-	-	-	-	-	-	-	-	-
3e.4.5	NRC ISFSI Fees	-	-	-	-	-	-	66	7	73	-	73	-	-	-	-	-	-	-	-	-
3e.4.6	Indirect Overhead	-	-	-	-	-	-	22	3	25	-	25	-	-	-	-	-	-	-	-	-
3e.4.7	Security Staff Cost	-	-	-	-	-	-	193	29	222	-	222	-	-	-	-	-	-	-	-	5,096
3e.4.8	Utility Staff Cost	-	-	-	-	-	-	227	34	261	-	261	-	-	-	-	-	-	-	-	3,866
3e.4	Subtotal Period 3e Period-Dependent Costs	-	289	-	-	-	-	740	142	1,171	-	1,171	-	-	-	-	-	-	-	-	8,961
3e.0	TOTAL PERIOD 3e COST	-	899	3	202	-	269	1,964	575	3,910	-	3,895	15	-	5,247	-	-	-	724,491	13,470	8,961
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Landfill Maintenance Perpetuity	-	-	-	-	-	-	347	35	382	-	-	382	-	-	-	-	-	-	-	-
3f.2.2	ISFSI Demolition and Restoration	-	1,176	-	-	-	-	43	183	1,401	-	1,401	-	-	-	-	-	-	-	8,708	160
3f.2	Subtotal Period 3f Additional Costs	-	1,176	-	-	-	-	390	217	1,783	-	1,401	382	-	-	-	-	-	-	8,708	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	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	9	1	10	-	10	-	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	95	-	-	-	-	-	14	109	-	109	-	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	27	4	31	-	31	-	-	-	-	-	-	-	-	-
3f.4.5	Indirect Overhead	-	-	-	-	-	-	9	1	10	-	10	-	-	-	-	-	-	-	-	-
3f.4.6	Security Staff Cost	-	-	-	-	-	-	96	14	110	-	110	-	-	-	-	-	-	-	-	2,527
3f.4.7	Utility Staff Cost	-	-	-	-	-	-	95	14	109	-	109	-	-	-	-	-	-	-	-	1,569
3f.4	Subtotal Period 3f Period-Dependent Costs	-	95	-	-	-	-	235	49	379	-	379	-	-	-	-	-	-	-	-	4,096
3f.0	TOTAL PERIOD 3f COST	-	1,277	-	-	-	-	625	267	2,169	-	1,787	382	-	-	-	-	-	-	8,708	4,256
PERIOD 3 TOTALS		-	34,577	628	202	-	15,030	32,213	12,200	94,850	18,998	35,754	40,098	-	5,247	-	-	666	854,291	371,607	461,559
TOTAL COST TO DECOMMISSION		10,574	98,938	14,508	5,325	24,454	54,408	328,910	99,610	636,727	477,846	109,208	49,672	257,225	112,234	3,686	459	666	20,736,370	1,574,704	3,993,900

Table C-2
Catawba Nuclear Station - Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2008 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

TOTAL COST TO DECOMMISSION WITH 18.55% CONTINGENCY:	$636,727	thousands of 2008 dollars
TOTAL NRC LICENSE TERMINATION COST IS 75.0% OR:	$477,846	thousands of 2008 dollars
SPENT FUEL MANAGEMENT COST IS 17.2% OR:	$109,208	thousands of 2008 dollars
NON-NUCLEAR DEMOLITION COST IS 7.8% OR:	$49,672	thousands of 2008 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	116,379	cubic feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	666	cubic feet
TOTAL SCRAP METAL REMOVED:	53,891	tons
TOTAL CRAFT LABOR REQUIREMENTS:	1,574,704	man-hours

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

APPENDIX D

DETAILED COST ANALYSIS

SAFSTOR

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	381	114	495	495	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,300
1a.1.3	Notification of Cessation of Operations									a											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									a											
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	135	20	156	156	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	101	15	117	117	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	210	31	241	241	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	338	51	389	389	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	333	50	383	383	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	282	42	324	324	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	135	20	156	156	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	135	20	156	156	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	1,096	164	1,260	1,260	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	80	12	92	92	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	81	12	93	93	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	7	1	8	8	-	-	-	-	-	-	-	-	-	100
1a.1.19	Drain/de-energize non-cont. systems									a											
1a.1.20	Drain & dry NSSS									a											
1a.1.21	Drain/de-energize contaminated systems									a											
1a.1.22	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	2,808	478	3,286	3,286	-	-	-	-	-	-	-	-	-	35,890
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	529	79	608	-	608	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	529	79	608	-	608	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,184	118	1,303	1,303	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	7,606	761	8,367	8,367	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	443	-	-	-	-	-	111	554	554	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	450	-	-	-	-	-	68	518	518	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	9	2	-	26	-	8	45	45	-	-	-	616	-	-	-	12,311	21	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,592	239	1,831	1,831	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	706	71	776	776	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	381	38	419	-	419	-	-	-	-	-	-	-	-	-
1a.4.9	FEMA Fees	-	-	-	-	-	-	209	31	241	241	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	745	112	857	-	857	-	-	-	-	-	-	-	-	-
1a.4.11	Indirect Overhead	-	-	-	-	-	-	2,457	369	2,826	2,826	-	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	3,002	450	3,453	3,453	-	-	-	-	-	-	-	-	-	102,075

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 1a Period-Dependent Costs (continued)																					
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	23,876	3,581	27,458	27,458	-	-	-	-	-	-	-	-	-	433,829
1a.4	Subtotal Period 1a Period-Dependent Costs	-	894	9	2	-	26	41,760	5,956	48,647	47,371	1,276	-	-	616	-	-	-	12,311	21	535,903
1a.0	TOTAL PERIOD 1a COST	-	894	9	2	-	26	45,097	6,514	52,541	50,657	1,884	-	-	616	-	-	-	12,311	21	571,793
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	901	-	-	-	-	-	-	451	1,352	1,352	-	-	-	-	-	-	-	-	21,905	-
1b.1.1.2	Auxiliary Building	468	-	-	-	-	-	-	234	702	702	-	-	-	-	-	-	-	-	12,347	-
1b.1.1.3	Containment Mechanical Equipment	21	-	-	-	-	-	-	10	31	31	-	-	-	-	-	-	-	-	530	-
1b.1.1.4	Fuel Building	750	-	-	-	-	-	-	375	1,125	1,125	-	-	-	-	-	-	-	-	16,577	-
1b.1.1.5	Retired Steam Generator Facility	29	-	-	-	-	-	-	14	43	43	-	-	-	-	-	-	-	-	750	-
1b.1.1	Totals	2,169	-	-	-	-	-	-	1,084	3,253	3,253	-	-	-	-	-	-	-	-	52,109	-
1b.1	Subtotal Period 1b Activity Costs	2,169	-	-	-	-	-	-	1,084	3,253	3,253	-	-	-	-	-	-	-	-	52,109	-
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	9,407	1,411	10,819	10,819	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	9,407	1,411	10,819	10,819	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	862	-	-	-	-	-	-	129	991	991	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	113	-	45	127	-	200	-	130	614	614	-	-	-	766	-	-	-	45,971	149	-
1b.3.3	Small tool allowance	-	39	-	-	-	-	-	6	45	45	-	-	-	-	-	-	-	-	-	-
1b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	138	21	159	-	159	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	974	39	45	127	-	200	138	286	1,808	1,649	159	-	-	766	-	-	-	45,971	149	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	767	-	-	-	-	-	-	192	958	958	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	298	30	328	328	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,419	142	1,561	1,561	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	325	-	-	-	-	-	81	406	406	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	113	-	-	-	-	-	17	130	130	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	1	-	23	-	7	40	40	-	-	-	548	-	-	-	10,961	19	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	401	60	462	462	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	178	18	196	196	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	96	10	106	-	106	-	-	-	-	-	-	-	-	-
1b.4.10	FEMA Fees	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	188	28	216	-	216	-	-	-	-	-	-	-	-	-
1b.4.12	Indirect Overhead	-	-	-	-	-	-	619	93	712	712	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	757	114	870	870	-	-	-	-	-	-	-	-	-	25,728
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	6,018	903	6,921	6,921	-	-	-	-	-	-	-	-	-	109,349
1b.4	Subtotal Period 1b Period-Dependent Costs	767	438	8	1	-	23	10,028	1,701	12,967	12,645	322	-	-	548	-	-	-	10,961	19	135,077
1b.0	TOTAL PERIOD 1b COST	3,909	477	53	129	-	223	19,574	4,482	28,847	28,366	481	-	-	1,314	-	-	-	56,932	52,277	135,077
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	388	-	-	-	-	-	58	446	446	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	32	-	-	-	-	-	5	36	36	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	14,101	-

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	420	-	-	-	-	772	289	1,481	1,481	-	-	-	-	-	-	-	-	17,801	583
Period 1c Collateral Costs																					
1c.3.1	Process liquid waste	185	-	73	210	-	328	-	213	1,010	1,010	-	-	-	1,261	-	-	-	75,657	246	-
1c.3.2	Small tool allowance	-	3	-	-	-	-	-	0	4	4	-	-	-	-	-	-	-	-	-	-
1c.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	137	21	158	-	158	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	185	3	73	210	-	328	137	235	1,171	1,014	158	-	-	1,261	-	-	-	75,657	246	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	298	30	328	328	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	1,281	128	1,409	1,409	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	185	-	-	-	-	-	46	232	232	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	113	-	-	-	-	-	17	130	130	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	2	0	-	7	-	2	11	11	-	-	-	155	-	-	-	3,103	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	401	60	462	462	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	178	18	196	196	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	96	10	106	-	106	-	-	-	-	-	-	-	-	-
1c.4.9	FEMA Fees	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	188	28	216	-	216	-	-	-	-	-	-	-	-	-
1c.4.11	Indirect Overhead	-	-	-	-	-	-	619	93	712	712	-	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	757	114	870	870	-	-	-	-	-	-	-	-	-	25,728
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	6,018	903	6,921	6,921	-	-	-	-	-	-	-	-	-	109,349
1c.4	Subtotal Period 1c Period-Dependent Costs	-	299	2	0	-	7	9,890	1,456	11,654	11,332	322	-	-	155	-	-	-	3,103	5	135,077
1c.0	TOTAL PERIOD 1c COST	185	722	76	210	-	335	10,799	1,979	14,306	13,826	480	-	-	1,416	-	-	-	78,760	18,052	135,660
PERIOD 1 TOTALS		4,094	2,092	138	341	-	583	75,470	12,975	95,694	92,849	2,845	-	-	3,346	-	-	-	148,002	70,350	842,531
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection									a											
2a.1.2	Semi-annual environmental survey									a											
2a.1.3	Prepare reports									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	360	54	414	414	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	1,295	324	1,619	1,619	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	1,655	378	2,033	2,033	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,998	1,050	8,048	-	8,048	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	6,998	1,050	8,048	-	8,048	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	5,329	533	5,862	5,265	597	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	20,746	2,075	22,820	298	22,522	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	1,052	-	-	-	-	-	263	1,315	1,315	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	65	12	-	179	-	53	308	308	-	-	-	4,251	-	-	-	85,025	144	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	3,281	492	3,774	1,887	1,887	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	2,076	208	2,284	2,284	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,923	392	4,315	-	4,315	-	-	-	-	-	-	-	-	-
2a.4.8	Spent Fuel Pool O&M	-	-	-	-	-	-	7,681	1,152	8,833	-	8,833	-	-	-	-	-	-	-	-	-
2a.4.9	Indirect Overhead	-	-	-	-	-	-	4,809	721	5,530	1,225	4,305	-	-	-	-	-	-	-	-	-
2a.4.10	Security Staff Cost	-	-	-	-	-	-	19,650	2,947	22,597	8,256	14,341	-	-	-	-	-	-	-	-	628,624
2a.4.11	Utility Staff Cost	-	-	-	-	-	-	48,351	7,253	55,604	11,488	44,117	-	-	-	-	-	-	-	-	848,911

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
2a.4	Subtotal Period 2a Period-Dependent Costs	-	1,052	65	12	-	179	115,846	16,089	133,243	32,326	100,917	-	-	4,251	-	-	-	85,025	144	1,477,536
2a.0	TOTAL PERIOD 2a COST	-	1,052	65	12	-	179	124,500	17,517	143,324	34,359	108,965	-	-	4,251	-	-	-	85,025	144	1,477,536
PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection									a											
2b.1.2	Semi-annual environmental survey									a											
2b.1.3	Prepare reports									a											
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	192	29	221	221	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	692	173	865	865	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	884	202	1,086	1,086	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	763	114	878	-	878	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	763	114	878	-	878	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	2,623	262	2,886	2,812	74	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	145	14	159	159	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	471	-	-	-	-	-	118	589	589	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	32	6	-	89	-	26	153	153	-	-	-	2,115	-	-	-	42,302	72	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	876	131	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	1,109	111	1,220	1,220	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	275	28	303	-	303	-	-	-	-	-	-	-	-	-
2b.4.8	Indirect Overhead	-	-	-	-	-	-	1,040	156	1,197	654	542	-	-	-	-	-	-	-	-	-
2b.4.9	Security Staff Cost	-	-	-	-	-	-	5,673	851	6,523	4,410	2,113	-	-	-	-	-	-	-	-	154,980
2b.4.10	Utility Staff Cost	-	-	-	-	-	-	10,097	1,515	11,612	6,136	5,476	-	-	-	-	-	-	-	-	183,680
2b.4	Subtotal Period 2b Period-Dependent Costs	-	471	32	6	-	89	21,839	3,212	25,650	17,143	8,507	-	-	2,115	-	-	-	42,302	72	338,660
2b.0	TOTAL PERIOD 2b COST	-	471	32	6	-	89	23,487	3,529	27,613	18,229	9,385	-	-	2,115	-	-	-	42,302	72	338,660
PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Quarterly Inspection									a											
2c.1.2	Semi-annual environmental survey									a											
2c.1.3	Prepare reports									a											
2c.1.4	Bituminous roof replacement	-	-	-	-	-	-	1,292	194	1,485	1,485	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	4,647	1,162	5,809	5,809	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	5,939	1,356	7,294	7,294	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	17,171	1,717	18,889	18,889	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	973	97	1,071	1,071	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	2,977	-	-	-	-	-	744	3,722	3,722	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	211	38	-	584	-	173	1,006	1,006	-	-	-	13,884	-	-	-	277,673	469	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	5,887	883	6,770	6,770	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	6,746	675	7,421	7,421	-	-	-	-	-	-	-	-	-	-
2c.4.7	Indirect Overhead	-	-	-	-	-	-	3,822	573	4,395	4,395	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	25,759	3,864	29,622	29,622	-	-	-	-	-	-	-	-	-	576,314
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	35,840	5,376	41,216	41,216	-	-	-	-	-	-	-	-	-	674,700
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,977	211	38	-	584	96,198	14,102	114,111	114,111	-	-	-	13,884	-	-	-	277,673	469	1,253,014
2c.0	TOTAL PERIOD 2c COST	-	2,977	211	38	-	584	102,137	15,458	121,405	121,405	-	-	-	13,884	-	-	-	277,673	469	1,253,014

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 2 TOTALS		-	4,501	308	55	-	852	250,123	36,503	292,342	173,993	118,350	-	-	20,250	-	-	-	404,999	685	3,069,210
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	311	47	358	358	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	68	10	78	78	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	507	76	583	583	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	210	31	241	241	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	338	51	389	389	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	277	42	319	319	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	498	75	573	516	-	57	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	282	42	324	292	-	32	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	480	72	552	552	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	440	66	506	506	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	34	5	39	39	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	108	16	124	62	-	62	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	27	4	31	-	-	31	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	27	4	31	-	-	31	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	211	32	243	121	-	121	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	311	47	358	358	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	61	9	70	35	-	35	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	2,690	404	3,094	2,723	-	370	-	-	-	-	-	-	-	39,777
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	162	24	187	187	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,700	405	3,105	3,105	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	95	14	109	109	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,100	315	2,415	2,415	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	83	12	96	96	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	9,717	1,458	11,174	10,804	-	370	-	-	-	-	-	-	-	72,703
Period 3a Additional Costs																					
3a.2.1	Site Characterization	-	-	-	-	-	-	2,927	878	3,805	3,805	-	-	-	-	-	-	-	-	19,100	7,852
3a.2	Subtotal Period 3a Additional Costs	-	-	-	-	-	-	2,927	878	3,805	3,805	-	-	-	-	-	-	-	-	19,100	7,852
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	464	46	511	511	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	26	3	29	29	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	385	-	-	-	-	-	96	481	481	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	450	-	-	-	-	-	68	518	518	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	8	1	-	22	-	6	37	37	-	-	-	514	-	-	-	10,287	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,592	239	1,831	1,831	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	249	25	274	274	-	-	-	-	-	-	-	-	-	-
3a.4.8	Indirect Overhead	-	-	-	-	-	-	1,465	220	1,685	1,685	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	1,232	185	1,417	1,417	-	-	-	-	-	-	-	-	-	35,728
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	14,419	2,163	16,582	16,582	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	835	8	1	-	22	19,448	3,050	23,364	23,364	-	-	-	514	-	-	-	10,287	17	294,357

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
3a.0	TOTAL PERIOD 3a COST	-	835	8	1	-	22	32,092	5,386	38,344	37,973	-	370	-	514	-	-	-	10,287	19,117	374,912
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	431	65	496	446	-	50	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	228	34	262	262	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	123	18	141	35	-	106	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	91	14	105	105	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	91	14	105	105	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	91	14	105	105	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	331	50	380	380	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	109	16	126	63	-	63	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	109	16	126	126	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	419	63	482	482	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	91	14	105	52	-	52	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	142	21	163	-	-	163	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	142	21	163	-	-	163	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	249	37	286	257	-	29	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	249	37	286	257	-	29	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	2,938	441	3,379	2,724	-	655	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	2,938	441	3,379	2,724	-	655	-	-	-	-	-	-	-	32,243
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	862	-	-	-	-	-	-	129	991	991	-	-	-	-	-	-	-	-	-	-
3b.3.2	Pipe cutting equipment	-	1,000	-	-	-	-	-	150	1,150	1,150	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	862	1,000	-	-	-	-	-	279	2,141	2,141	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	264	26	290	290	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	13	1	15	15	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	213	-	-	-	-	-	53	266	266	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	229	-	-	-	-	-	34	264	264	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	4	1	-	12	-	4	21	21	-	-	-	292	-	-	-	5,831	10	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	811	122	933	933	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	127	13	140	140	-	-	-	-	-	-	-	-	-	-
3b.4.9	Indirect Overhead	-	-	-	-	-	-	1,036	155	1,191	1,191	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	628	94	722	722	-	-	-	-	-	-	-	-	-	18,207
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	10,415	1,562	11,978	11,978	-	-	-	-	-	-	-	-	-	182,811
3b.4	Subtotal Period 3b Period-Dependent Costs	27	443	4	1	-	12	13,294	2,072	15,853	15,853	-	-	-	292	-	-	-	5,831	10	201,018
3b.0	TOTAL PERIOD 3b COST	888	1,443	4	1	-	12	16,232	2,792	21,373	20,718	-	655	-	292	-	-	-	5,831	10	233,261
PERIOD 3 TOTALS		888	2,277	12	2	-	34	48,325	8,178	59,717	58,691	-	1,026	-	806	-	-	-	16,119	19,127	608,173
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	37	173	21	21	158	167	-	132	710	710	-	-	634	634	-	-	-	147,070	5,201	-
4a.1.1.2	Pressurizer Relief Tank	4	15	5	5	34	33	-	20	115	115	-	-	136	136	-	-	-	30,174	482	-

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
Nuclear Steam Supply System Removal (continued)																					
4a.1.1.3	Reactor Coolant Pumps & Motors	15	69	39	152	143	1,210	-	376	2,004	2,004	-	-	272	4,708	-	-	-	888,360	3,463	-
4a.1.1.4	Pressurizer	7	45	351	129	-	774	-	263	1,569	1,569	-	-	-	2,490	-	-	-	70,079	1,824	-
4a.1.1.5	Steam Generators	287	2,606	2,369	1,038	2,281	8,542	-	3,665	20,788	20,788	-	-	21,655	15,151	-	-	-	2,268,503	23,227	2,125
4a.1.1.6	Retired Steam Generator Units	-	-	2,369	1,038	2,281	8,542	-	2,870	17,100	17,100	-	-	22,105	15,151	-	-	-	2,465,378	13,520	1,500
4a.1.1.7	CRDMs/ICIs/Service Structure Removal	26	81	260	73	33	151	-	113	738	738	-	-	401	3,425	-	-	-	84,283	2,488	-
4a.1.1.8	Reactor Vessel Internals	86	1,921	4,768	312	-	4,543	193	5,054	16,877	16,877	-	-	-	3,618	125	470	-	342,705	23,700	1,080
4a.1.1.9	Vessel & Internals GTCC Disposal	-	-	-	-	-	14,761	-	2,214	16,975	16,975	-	-	-	-	-	-	666	129,800	-	-
4a.1.1.10	Reactor Vessel	-	3,845	1,157	91	-	6,560	193	6,505	18,350	18,350	-	-	-	6,290	2,955	-	-	943,207	23,700	1,080
4a.1.1	Totals	462	8,756	11,338	2,859	4,930	45,284	386	21,213	95,227	95,227	-	-	45,203	51,604	3,080	470	666	7,369,558	97,605	5,785
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	326	213	25	947	-	-	249	1,760	1,760	-	-	4,974	-	-	-	-	422,828	8,121	-
4a.1.3	Main Condensers	-	1,112	160	81	733	419	-	521	3,027	3,027	-	-	7,274	2,145	-	-	-	519,770	28,459	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	308	-	-	-	-	-	46	355	355	-	-	-	-	-	-	-	-	4,509	-
4a.1.4.2	AB - Fw Pump/Switchgear Area	-	20	-	-	-	-	-	3	23	23	-	-	-	-	-	-	-	-	299	-
4a.1.4.3	Auxiliary Building	-	162	-	-	-	-	-	24	187	187	-	-	-	-	-	-	-	-	2,376	-
4a.1.4.4	Containment Mechanical Equipment	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	105	-
4a.1.4.5	Fuel Building	-	80	-	-	-	-	-	12	92	92	-	-	-	-	-	-	-	-	1,173	-
4a.1.4.6	Main Steam Doghouses	-	91	-	-	-	-	-	14	104	104	-	-	-	-	-	-	-	-	1,109	-
4a.1.4.7	Turbine Building	-	282	-	-	-	-	-	42	325	325	-	-	-	-	-	-	-	-	4,856	-
4a.1.4.8	Upper Head Injection Tank Building	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	70	-
4a.1.4	Totals	-	954	-	-	-	-	-	143	1,097	1,097	-	-	-	-	-	-	-	-	14,497	-
Disposal of Plant Systems																					
4a.1.5.1	Aux Bldg Chilled Water	-	80	1	3	99	-	-	36	219	219	-	-	1,094	-	-	-	-	44,411	1,857	-
4a.1.5.2	Auxiliary Feedwater	-	226	12	24	927	-	-	200	1,390	1,390	-	-	10,186	-	-	-	-	413,660	5,480	-
4a.1.5.3	Auxiliary Steam	-	13	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	386	-
4a.1.5.4	Auxiliary Steam RCA	-	96	2	4	133	-	-	45	279	279	-	-	1,467	-	-	-	-	59,568	2,241	-
4a.1.5.5	CCW Intake Screen Backwash	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	144	-
4a.1.5.6	CO2 Gen Purge	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	251	-
4a.1.5.7	Condensate	-	350	-	-	-	-	-	52	402	-	-	402	-	-	-	-	-	-	10,255	-
4a.1.5.8	Condensate Storage	-	61	-	-	-	-	-	9	70	-	-	70	-	-	-	-	-	-	1,737	-
4a.1.5.9	Condenser Cleaning	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	1,125	-
4a.1.5.10	Condenser Steam Air Ejector	-	32	-	-	-	-	-	5	37	-	-	37	-	-	-	-	-	-	988	-
4a.1.5.11	Containment Spray/Valve Inj Water	-	212	4	8	308	-	-	101	634	634	-	-	3,389	-	-	-	-	137,648	4,986	-
4a.1.5.12	Convent LP Service Water	-	90	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	2,691	-
4a.1.5.13	Conventional Chemical Addition	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	238	-
4a.1.5.14	Conventional Chemical Addition RCA	-	13	0	0	10	-	-	5	28	28	-	-	109	-	-	-	-	4,424	284	-
4a.1.5.15	DG Engine Cooling Water	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	542	-
4a.1.5.16	DG Engine Fuel Oil	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,753	-
4a.1.5.17	DG Engine Lube Oil	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	829	-
4a.1.5.18	DG Engine Starting Air	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	1,012	-
4a.1.5.19	DG Room Sump Pump	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	175	-
4a.1.5.20	FDWP Condensate Seal	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	632	-
4a.1.5.21	Feedwater	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	1,525	-
4a.1.5.22	Feedwater Lube & Hydraulic Oil	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	415	-
4a.1.5.23	Feedwater Pump Turbine Steam Seal	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	80	-
4a.1.5.24	Feedwater RCA	-	78	3	7	249	-	-	58	396	396	-	-	2,742	-	-	-	-	111,348	1,945	-
4a.1.5.25	Generator Hydrogen	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	217	-
4a.1.5.26	Generator Seal Oil	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	311	-
4a.1.5.27	Heater Bleed Steam	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	999	-
4a.1.5.28	Heater Drains	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	3,850	-
4a.1.5.29	Heater Relief Valve	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	525	-
4a.1.5.30	Heater Vent	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	559	-

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
Disposal of Plant Systems (continued)																					
4a.1.5.31	MN Turbine Lube Oil & Purification	-	37	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	1,130	-
4a.1.5.32	Main Steam	-	14	-	-	-	-	-	2	17	-	-	17	-	-	-	-	-	-	450	-
4a.1.5.33	Main Steam Bypass to Condenser	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	784	-
4a.1.5.34	Main Steam Leakoff & Steam Seal	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	249	-
4a.1.5.35	Main Steam RCA	-	26	1	1	54	-	-	15	97	97	-	-	594	-	-	-	-	24,127	601	-
4a.1.5.36	Main Steam Vent	-	119	3	6	230	-	-	65	423	423	-	-	2,525	-	-	-	-	102,559	2,891	-
4a.1.5.37	Miscellaneous Equipment	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
4a.1.5.38	Moisture Separator Reheater Bld Steam	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	156	-
4a.1.5.39	Moisture Separator Reheater Drain	-	144	-	-	-	-	-	22	166	-	-	166	-	-	-	-	-	-	4,233	-
4a.1.5.40	SG Wet Layup Recirculation	-	19	0	0	16	-	-	7	42	42	-	-	174	-	-	-	-	7,060	420	-
4a.1.5.41	SM Supply to Aux Equipment	-	25	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	762	-
4a.1.5.42	SM Supply to Aux Equipment RCA	-	9	0	0	9	-	-	4	22	22	-	-	100	-	-	-	-	4,077	211	-
4a.1.5.43	Standby Shutdown Diesel	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	84	-
4a.1.5.44	Steam Generator Blowdown Recycle	-	247	10	20	773	-	-	182	1,232	1,232	-	-	8,495	-	-	-	-	345,002	6,086	-
4a.1.5.45	Steam Supply to FW Pump Turbine	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	743	-
4a.1.5.46	Turbine Crossover	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	102	-
4a.1.5.47	Turbine Exhaust	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	64	-
4a.1.5.48	Turbine Hydraulic Oil	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	298	-
4a.1.5	Totals	-	2,478	37	74	2,809	-	-	920	6,318	4,762	-	1,556	30,876	-	-	-	-	1,253,884	67,313	-
4a.1.6	Scaffolding in support of decommissioning	-	685	12	3	70	8	-	186	965	965	-	-	694	43	-	-	-	35,088	21,589	-
4a.1	Subtotal Period 4a Activity Costs	462	14,311	11,760	3,042	9,489	45,712	386	23,231	108,393	106,837	-	1,556	89,021	53,791	3,080	470	666	9,601,128	237,584	5,785
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	19	-	9	25	-	39	-	23	114	114	-	-	-	148	-	-	-	8,885	29	-
4a.3.2	Small tool allowance	-	164	-	-	-	-	-	25	189	170	-	19	-	-	-	-	-	-	-	-
4a.3.3	Survey and Release of Scrap Metal	-	-	-	-	-	-	676	101	777	777	-	-	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	19	164	9	25	-	39	676	149	1,079	1,061	-	19	-	148	-	-	-	8,885	29	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	71	-	-	-	-	-	-	18	89	89	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	700	70	770	770	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	36	4	39	35	-	4	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,545	-	-	-	-	-	386	1,931	1,931	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,930	-	-	-	-	-	439	3,369	3,369	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	56	10	-	155	-	46	267	267	-	-	-	3,691	-	-	-	73,827	125	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,047	307	2,354	2,354	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	891	89	980	980	-	-	-	-	-	-	-	-	-	-
4a.4.9	Radwaste Processing Equipment/Services	-	-	-	-	-	-	508	76	584	584	-	-	-	-	-	-	-	-	-	-
4a.4.10	Indirect Overhead	-	-	-	-	-	-	2,926	439	3,365	3,365	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	1,960	294	2,254	2,254	-	-	-	-	-	-	-	-	-	59,280
4a.4.12	Utility Staff Cost	-	-	-	-	-	-	29,383	4,407	33,790	33,790	-	-	-	-	-	-	-	-	-	516,583
4a.4	Subtotal Period 4a Period-Dependent Costs	71	4,475	56	10	-	155	38,450	6,576	49,793	49,789	-	4	-	3,691	-	-	-	73,827	125	575,863
4a.0	TOTAL PERIOD 4a COST	552	18,949	11,825	3,077	9,489	45,906	39,511	29,956	159,266	157,687	-	1,579	89,021	57,631	3,080	470	666	9,683,840	237,737	581,648
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	300	35	130	76	-	518	-	313	1,372	1,372	-	-	-	2,648	-	-	-	237,562	1,033	-
Disposal of Plant Systems																					
4b.1.2.1	Annulus Ventilation	-	30	2	3	118	-	-	26	179	179	-	-	1,299	-	-	-	-	52,733	700	-
4b.1.2.2	Aux & RB Heating Water	-	429	5	10	362	-	-	164	969	969	-	-	3,980	-	-	-	-	161,630	9,838	-
4b.1.2.3	Aux Bldg Ventilation	-	153	6	12	464	-	-	110	746	746	-	-	5,100	-	-	-	-	207,126	3,719	-

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
Disposal of Plant Systems (continued)																					
4b.1.2.4	Boron Recycle	-	330	18	26	378	112	-	173	1,038	1,038	-	-	4,160	604	-	-	-	220,166	8,129	-
4b.1.2.5	Boron Thermal Regeneration	-	230	17	26	177	143	-	125	717	717	-	-	1,946	729	-	-	-	144,428	5,671	-
4b.1.2.6	Chemical & Volume Control	-	548	96	131	469	811	-	439	2,495	2,495	-	-	5,153	4,200	-	-	-	581,314	13,529	-
4b.1.2.7	Component Cooling	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	2,823	-
4b.1.2.8	Component Cooling RCA	-	158	4	8	310	-	-	88	568	568	-	-	3,413	-	-	-	-	138,588	3,583	-
4b.1.2.9	Condenser Circulating Water	-	93	-	-	-	-	-	14	107	-	-	107	-	-	-	-	-	-	2,771	-
4b.1.2.10	Cont Air Release & Addition	-	34	1	1	40	-	-	15	89	89	-	-	435	-	-	-	-	17,669	836	-
4b.1.2.11	Cont Air Return Ex & H2 Skimmer	-	84	2	4	135	-	-	42	266	266	-	-	1,488	-	-	-	-	60,418	2,087	-
4b.1.2.12	Cont CRD, & ICI Room Vent	-	75	6	11	290	25	-	71	478	478	-	-	3,184	129	-	-	-	140,856	1,880	-
4b.1.2.13	Cont Water Sample & Purge	-	8	0	0	3	-	-	2	13	13	-	-	28	-	-	-	-	1,154	206	-
4b.1.2.14	Containment Chilled Water	-	25	-	-	-	-	-	4	29	-	-	29	-	-	-	-	-	-	712	-
4b.1.2.15	Containment Chilled Water RCA	-	68	2	3	128	-	-	37	238	238	-	-	1,407	-	-	-	-	57,124	1,636	-
4b.1.2.16	Containment Purge Ventilation	-	146	7	14	534	-	-	120	821	821	-	-	5,875	-	-	-	-	238,572	3,648	-
4b.1.2.17	Conventional Sampling	-	294	20	21	68	128	-	121	650	650	-	-	745	654	-	-	-	88,847	7,247	-
4b.1.2.18	Diesel Bldg Ventilation	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	243	-
4b.1.2.19	Electrical (clean)	-	2,300	-	-	-	-	-	345	2,645	-	-	2,645	-	-	-	-	-	-	64,849	-
4b.1.2.20	Electrical (contaminated)	-	575	9	18	514	29	-	232	1,377	1,377	-	-	5,653	150	-	-	-	243,050	14,164	-
4b.1.2.21	Electrical (contaminated) RCA	-	4,037	65	129	4,874	-	-	1,766	10,871	10,871	-	-	53,582	-	-	-	-	2,175,984	97,379	-
4b.1.2.22	Equipment Decon	-	27	0	1	33	-	-	12	74	74	-	-	368	-	-	-	-	14,936	667	-
4b.1.2.23	FHB Ventilation	-	60	4	8	289	-	-	60	420	420	-	-	3,177	-	-	-	-	129,020	1,411	-
4b.1.2.24	Fire Protection	-	35	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	1,045	-
4b.1.2.25	Fire Protection RCA	-	142	3	7	261	-	-	76	489	489	-	-	2,869	-	-	-	-	116,495	3,458	-
4b.1.2.26	Ice Condenser Refrigeration	-	462	10	20	775	-	-	236	1,504	1,504	-	-	8,522	-	-	-	-	346,098	11,095	-
4b.1.2.27	Instrument Air	-	189	-	-	-	-	-	28	218	-	-	218	-	-	-	-	-	-	6,048	-
4b.1.2.28	Instrument Air RCA	-	649	7	14	515	-	-	242	1,427	1,427	-	-	5,663	-	-	-	-	229,971	14,768	-
4b.1.2.29	Liquid Waste Recycle	-	730	65	87	325	535	-	385	2,127	2,127	-	-	3,572	2,841	-	-	-	390,551	17,837	-
4b.1.2.30	Miscellaneous Ventilation	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	1,466	-
4b.1.2.31	Nuclear Sampling	-	240	15	14	41	90	-	92	491	491	-	-	450	459	-	-	-	59,408	6,021	-
4b.1.2.32	Nuclear Service Water	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,898	-
4b.1.2.33	Nuclear Service Water Pump Vent	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	30	-
4b.1.2.34	Nuclear Service Water RCA	-	473	14	28	1,060	-	-	283	1,857	1,857	-	-	11,651	-	-	-	-	473,134	11,409	-
4b.1.2.35	Reactor Coolant	-	96	17	30	141	182	-	97	563	563	-	-	1,550	931	-	-	-	146,488	2,451	-
4b.1.2.36	Refueling Water	-	270	6	13	482	-	-	142	913	913	-	-	5,296	-	-	-	-	215,058	6,731	-
4b.1.2.37	Residual Heat Removal	-	123	17	24	75	153	-	86	477	477	-	-	824	783	-	-	-	103,675	3,049	-
4b.1.2.38	Safety Injection	-	345	35	54	738	233	-	267	1,671	1,671	-	-	8,112	1,202	-	-	-	436,194	8,513	-
4b.1.2.39	Spent Fuel Cooling	-	172	11	16	117	89	-	86	492	492	-	-	1,286	455	-	-	-	93,076	4,238	-
4b.1.2.40	Turbine Building Ventilation	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	3,003	-
4b.1.2	Totals	-	13,933	462	734	13,717	2,529	-	6,035	37,410	34,022	-	3,388	150,785	13,138	-	-	-	7,283,762	350,788	-
4b.1.3	Scaffolding in support of decommissioning	-	1,028	19	5	105	13	-	278	1,447	1,447	-	-	1,040	65	-	-	-	52,632	32,384	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	924	656	121	227	864	829	-	1,009	4,630	4,630	-	-	9,498	6,561	-	-	-	1,003,094	36,522	-
4b.1.4.2	Auxiliary Building	427	156	28	57	86	84	-	298	1,136	1,136	-	-	943	1,601	-	-	-	196,074	14,125	-
4b.1.4.3	Containment Mechanical Equipment	19	13	1	2	11	4	-	16	66	66	-	-	122	67	-	-	-	11,287	764	-
4b.1.4.4	Fuel Building	659	706	12	20	309	33	-	565	2,304	2,304	-	-	3,393	401	-	-	-	176,182	32,243	-
4b.1.4.5	Retired Steam Generator Facility	29	2	0	1	-	1	-	15	48	48	-	-	-	18	-	-	-	1,800	791	-
4b.1.4	Totals	2,058	1,532	162	308	1,269	951	-	1,903	8,185	8,185	-	-	13,955	8,648	-	-	-	1,388,437	84,444	-
4b.1	Subtotal Period 4b Activity Costs	2,358	16,529	773	1,123	15,091	4,011	-	8,529	48,414	45,026	-	3,388	165,780	24,499	-	-	-	8,962,394	468,649	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Program Management	-	-	-	-	-	-	616	185	801	801	-	-	-	-	-	-	-	-	-	6,240
4b.2	Subtotal Period 4b Additional Costs	-	-	-	-	-	-	616	185	801	801	-	-	-	-	-	-	-	-	-	6,240

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 4b Collateral Costs																					
4b.3.1	Process liquid waste	74	-	35	99	-	155	-	94	458	458	-	-	-	597	-	-	-	35,808	116	-
4b.3.2	Small tool allowance	-	324	-	-	-	-	-	49	372	372	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	107	30	605	73	-	124	940	940	-	-	6,000	373	-	-	-	303,507	88	-
4b.3.4	Survey and Release of Scrap Metal	-	-	-	-	-	-	1,014	152	1,166	1,166	-	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	74	324	142	129	605	228	1,014	419	2,935	2,935	-	-	6,000	970	-	-	-	339,315	204	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	821	-	-	-	-	-	-	205	1,027	1,027	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	669	67	736	736	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	34	3	37	37	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,409	-	-	-	-	-	602	3,011	3,011	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	2,779	-	-	-	-	-	417	3,196	3,196	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	91	16	-	252	-	74	433	433	-	-	-	5,980	-	-	-	119,607	202	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,544	232	1,776	1,776	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	851	85	936	936	-	-	-	-	-	-	-	-	-	-
4b.4.9	Radwaste Processing Equipment/Services	-	-	-	-	-	-	485	73	558	558	-	-	-	-	-	-	-	-	-	-
4b.4.10	Indirect Overhead	-	-	-	-	-	-	1,895	284	2,179	2,179	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,872	281	2,153	2,153	-	-	-	-	-	-	-	-	-	56,640
4b.4.12	Utility Staff Cost	-	-	-	-	-	-	18,532	2,780	21,311	21,311	-	-	-	-	-	-	-	-	-	334,446
4b.4	Subtotal Period 4b Period-Dependent Costs	821	5,188	91	16	-	252	25,882	5,103	37,353	37,353	-	-	-	5,980	-	-	-	119,607	202	391,086
4b.0	TOTAL PERIOD 4b COST	3,254	22,040	1,006	1,269	15,696	4,492	27,512	14,237	89,504	86,116	-	3,388	171,780	31,449	-	-	-	9,421,315	469,056	397,326
PERIOD 4d - Delay before License Termination																					
Period 4d Direct Decommissioning Activities																					
Period 4d Period-Dependent Costs																					
4d.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4d.4.2	Property taxes	-	-	-	-	-	-	22	2	25	25	-	-	-	-	-	-	-	-	-	-
4d.4.3	Health physics supplies	-	67	-	-	-	-	-	17	84	84	-	-	-	-	-	-	-	-	-	-
4d.4.4	Disposal of DAW generated	-	-	1	0	-	4	-	1	6	6	-	-	-	85	-	-	-	1,693	3	-
4d.4.5	Plant energy budget	-	-	-	-	-	-	270	41	311	311	-	-	-	-	-	-	-	-	-	-
4d.4.6	NRC Fees	-	-	-	-	-	-	155	15	170	170	-	-	-	-	-	-	-	-	-	-
4d.4.7	Indirect Overhead	-	-	-	-	-	-	70	11	81	81	-	-	-	-	-	-	-	-	-	-
4d.4.8	Security Staff Cost	-	-	-	-	-	-	3	0	4	4	-	-	-	-	-	-	-	-	-	2,657
4d.4.9	Utility Staff Cost	-	-	-	-	-	-	604	91	694	694	-	-	-	-	-	-	-	-	-	12,400
4d.4	Subtotal Period 4d Period-Dependent Costs	-	67	1	0	-	4	1,125	178	1,375	1,375	-	-	-	85	-	-	-	1,693	3	15,057
4d.0	TOTAL PERIOD 4d COST	-	67	1	0	-	4	1,125	178	1,375	1,375	-	-	-	85	-	-	-	1,693	3	15,057
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	150	45	195	195	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	150	45	195	195	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	License Termination Survey	-	-	-	-	-	-	8,246	2,474	10,720	10,720	-	-	-	-	-	-	-	-	197,878	3,120
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	8,246	2,474	10,720	10,720	-	-	-	-	-	-	-	-	197,878	3,120
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	20	2	22	22	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	1,054	-	-	-	-	-	264	1,318	1,318	-	-	-	-	-	-	-	-	-	-

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 4e Period-Dependent Costs (continued)																					
4e.4.4	Disposal of DAW generated	-	-	5	1	-	13	-	4	23	23	-	-	-	315	-	-	-	6,299	11	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	532	53	585	585	-	-	-	-	-	-	-	-	-	-
4e.4.7	Indirect Overhead	-	-	-	-	-	-	392	59	450	450	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	429	64	494	494	-	-	-	-	-	-	-	-	-	11,786
4e.4.9	Utility Staff Cost	-	-	-	-	-	-	4,060	609	4,669	4,669	-	-	-	-	-	-	-	-	-	69,143
4e.4	Subtotal Period 4e Period-Dependent Costs	-	1,054	5	1	-	13	5,672	1,091	7,836	7,836	-	-	-	315	-	-	-	6,299	11	80,929
4e.0	TOTAL PERIOD 4e COST	-	1,054	5	1	-	13	14,068	3,609	18,750	18,750	-	-	-	315	-	-	-	6,299	197,889	84,049
PERIOD 4 TOTALS		3,806	42,111	12,837	4,347	25,185	50,414	82,216	47,980	268,895	263,928	-	4,967	260,802	89,480	3,080	470	666	19,113,150	904,684	1,078,079
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	2,781	-	-	-	-	-	417	3,198	-	-	3,198	-	-	-	-	-	-	40,693	-
5b.1.1.2	AB - Fw Pump/Switchgear Area	-	185	-	-	-	-	-	28	212	-	-	212	-	-	-	-	-	-	2,750	-
5b.1.1.3	Auxiliary Building	-	1,468	-	-	-	-	-	220	1,688	-	-	1,688	-	-	-	-	-	-	21,564	-
5b.1.1.4	Containment Mechanical Equipment	-	52	-	-	-	-	-	8	60	-	-	60	-	-	-	-	-	-	1,085	-
5b.1.1.5	Cooling Towers (3)	-	1,988	-	-	-	-	-	298	2,286	-	-	2,286	-	-	-	-	-	-	34,180	-
5b.1.1.6	Diesel Generator Building	-	298	-	-	-	-	-	45	343	-	-	343	-	-	-	-	-	-	4,152	-
5b.1.1.7	Fuel Building	-	739	-	-	-	-	-	111	850	-	-	850	-	-	-	-	-	-	11,073	-
5b.1.1.8	Main Steam Doghouses	-	821	-	-	-	-	-	123	944	-	-	944	-	-	-	-	-	-	10,075	-
5b.1.1.9	Retired Steam Generator Facility	-	305	-	-	-	-	-	46	351	-	-	351	-	-	-	-	-	-	4,660	-
5b.1.1.10	Turbine Building	-	2,688	-	-	-	-	-	403	3,091	-	-	3,091	-	-	-	-	-	-	47,939	-
5b.1.1.11	Turbine Pedestal	-	622	-	-	-	-	-	93	716	-	-	716	-	-	-	-	-	-	7,683	-
5b.1.1.12	Upper Head Injection Tank Building	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	633	-
5b.1.1	Totals	-	11,985	-	-	-	-	-	1,798	13,782	-	-	13,782	-	-	-	-	-	-	186,487	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	110	-	-	-	-	-	16	126	-	-	126	-	-	-	-	-	-	248	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	142	21	163	163	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	12,094	-	-	-	-	142	1,835	14,072	163	-	13,908	-	-	-	-	-	-	186,735	1,560
Period 5b Additional Costs																					
5b.2.1	Concrete Crushing	-	634	-	-	-	-	3	96	733	-	-	733	-	-	-	-	-	-	3,269	-
5b.2	Subtotal Period 5b Additional Costs	-	634	-	-	-	-	3	96	733	-	-	733	-	-	-	-	-	-	3,269	-
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	134	-	-	-	-	-	20	154	-	-	154	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	134	-	-	-	-	-	20	154	-	-	154	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	44	4	48	-	-	48	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,781	-	-	-	-	-	717	5,499	-	-	5,499	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	264	40	304	-	-	304	-	-	-	-	-	-	-	-
5b.4.5	Indirect Overhead	-	-	-	-	-	-	745	112	857	857	-	-	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	865	130	995	-	-	995	-	-	-	-	-	-	-	22,959
5b.4.7	Utility Staff Cost	-	-	-	-	-	-	7,811	1,172	8,983	-	-	8,983	-	-	-	-	-	-	-	131,589
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,781	-	-	-	-	9,730	2,174	16,686	857	-	15,828	-	-	-	-	-	-	-	154,547
5b.0	TOTAL PERIOD 5b COST	-	17,644	-	-	-	-	9,875	4,126	31,644	1,021	-	30,624	-	-	-	-	-	-	190,004	156,107

Table D-1
Catawba Nuclear Station - Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 5 TOTALS		-	17,644	-	-	-	-	9,875	4,126	31,644	1,021	-	30,624	-	-	-	-	-	-	190,004	156,107
TOTAL COST TO DECOMMISSION		8,789	68,625	13,295	4,745	25,185	51,883	466,008	109,762	748,292	590,482	121,194	36,616	260,802	113,881	3,080	470	666	19,682,270	1,184,850	5,754,100

TOTAL COST TO DECOMMISSION WITH 17.19% CONTINGENCY:	**$748,292**	**thousands of 2008 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 78.91% OR:	**$590,482**	**thousands of 2008 dollars**
SPENT FUEL MANAGEMENT COST IS 16.2% OR:	**$121,194**	**thousands of 2008 dollars**
NON-NUCLEAR DEMOLITION COST IS 4.89% OR:	**$36,616**	**thousands of 2008 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**117,431**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**666**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**44,137**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,165,750**	**man-hours**

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

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	381	114	495	495	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	559
1a.1.3	Notification of Cessation of Operations									a											
1a.1.4	Remove fuel & source material									n/a											
1a.1.5	Notification of Permanent Defueling									a											
1a.1.6	Deactivate plant systems & process waste									a											
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	58	9	67	67	-	-	-	-	-	-	-	-	-	860
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	559
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
1a.1.11	End product description	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	44	7	50	50	-	-	-	-	-	-	-	-	-	645
1a.1.13	Define major work sequence	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
1a.1.14	Perform SER and EA	-	-	-	-	-	-	90	14	104	104	-	-	-	-	-	-	-	-	-	1,333
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	2,150
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	143	21	165	165	-	-	-	-	-	-	-	-	-	2,116
1a.1.16.2	Plant systems	-	-	-	-	-	-	121	18	139	139	-	-	-	-	-	-	-	-	-	1,792
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,342
1a.1.16.4	Waste management	-	-	-	-	-	-	58	9	67	67	-	-	-	-	-	-	-	-	-	860
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	58	9	67	67	-	-	-	-	-	-	-	-	-	860
1a.1.16	Total	-	-	-	-	-	-	471	71	542	542	-	-	-	-	-	-	-	-	-	6,969
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	34	5	40	40	-	-	-	-	-	-	-	-	-	509
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	35	5	40	40	-	-	-	-	-	-	-	-	-	516
1a.1.17	Total	-	-	-	-	-	-	69	10	80	80	-	-	-	-	-	-	-	-	-	1,025
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	3	0	3	3	-	-	-	-	-	-	-	-	-	43
1a.1.19	Drain/de-energize non-cont. systems									a											
1a.1.20	Drain & dry NSSS									a											
1a.1.21	Drain/de-energize contaminated systems									a											
1a.1.22	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	1,424	271	1,695	1,695	-	-	-	-	-	-	-	-	-	15,433
Period 1a Additional Costs																					
1a.2.1	Landfill and Firing Range Closure	-	-	-	-	-	-	818	82	900	-	-	900	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	818	82	900	-	-	900	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	529	79	608	-	608	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	529	79	608	-	608	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,184	118	1,303	1,303	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	7,606	761	8,367	8,367	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	418	-	-	-	-	-	104	522	522	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	450	-	-	-	-	-	68	518	518	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	9	2	-	24	-	7	41	41	-	-	-	571	-	-	-	11,419	19	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,592	239	1,831	1,831	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	471	47	518	518	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	381	38	419	-	419	-	-	-	-	-	-	-	-	-

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 1a Period-Dependent Costs (continued)																					
1a.4.9	FEMA Fees	-	-	-	-	-	-	209	31	241	241	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	745	112	857	-	857	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	109	16	125	-	125	-	-	-	-	-	-	-	-	-
1a.4.12	Indirect Overhead	-	-	-	-	-	-	2,020	303	2,323	2,323	-	-	-	-	-	-	-	-	-	-
1a.4.13	Security Staff Cost	-	-	-	-	-	-	3,002	450	3,453	3,453	-	-	-	-	-	-	-	-	-	102,075
1a.4.14	Utility Staff Cost	-	-	-	-	-	-	19,239	2,886	22,125	22,125	-	-	-	-	-	-	-	-	-	356,657
1a.4	Subtotal Period 1a Period-Dependent Costs	-	868	9	2	-	24	36,560	5,181	42,643	41,241	1,401	-	-	571	-	-	-	11,419	19	458,732
1a.0	TOTAL PERIOD 1a COST	-	868	9	2	-	24	39,332	5,613	45,846	42,936	2,010	900	-	571	-	-	-	11,419	19	474,165
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	901	-	-	-	-	-	-	451	1,352	1,352	-	-	-	-	-	-	-	-	21,904	-
1b.1.1.2	Auxiliary Building	457	-	-	-	-	-	-	228	685	685	-	-	-	-	-	-	-	-	12,088	-
1b.1.1.3	Auxiliary Service Building (common)	29	-	-	-	-	-	-	15	44	44	-	-	-	-	-	-	-	-	771	-
1b.1.1.4	Containment Mechanical Equipment	21	-	-	-	-	-	-	10	31	31	-	-	-	-	-	-	-	-	530	-
1b.1.1.5	Contaminated Materials Warehouse(common)	55	-	-	-	-	-	-	28	83	83	-	-	-	-	-	-	-	-	1,438	-
1b.1.1.6	Monitor Tank Building (common)	70	-	-	-	-	-	-	35	105	105	-	-	-	-	-	-	-	-	1,830	-
1b.1.1.7	Waste Solidification Facility (common)	11	-	-	-	-	-	-	5	16	16	-	-	-	-	-	-	-	-	285	-
1b.1.1.8	Fuel Building	656	-	-	-	-	-	-	328	984	984	-	-	-	-	-	-	-	-	14,482	-
1b.1.1	Totals	2,200	-	-	-	-	-	-	1,100	3,300	3,300	-	-	-	-	-	-	-	-	53,328	-
1b.1	Subtotal Period 1b Activity Costs	2,200	-	-	-	-	-	-	1,100	3,300	3,300	-	-	-	-	-	-	-	-	53,328	-
Period 1b Additional Costs																					
1b.2.1	Misc Waste	-	-	4	6	6	-	-	2	17	17	-	-	37	-	-	-	-	2,652	126	-
1b.2.2	Spent Fuel Pool Isolation	-	-	-	-	-	-	6,272	941	7,212	7,212	-	-	-	-	-	-	-	-	-	-
1b.2.3	Landfill Post Closure Maintenance	-	-	-	-	-	-	10	1	11	-	-	11	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	4	6	6	-	6,282	944	7,241	7,230	-	11	37	-	-	-	-	2,652	126	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	862	-	-	-	-	-	-	129	991	991	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	115	-	45	130	-	203	-	132	625	625	-	-	-	781	-	-	-	46,846	152	-
1b.3.3	Small tool allowance	-	39	-	-	-	-	-	6	45	45	-	-	-	-	-	-	-	-	-	-
1b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	138	21	159	-	159	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	976	39	45	130	-	203	138	288	1,820	1,661	159	-	-	781	-	-	-	46,846	152	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	838	-	-	-	-	-	-	210	1,048	1,048	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	298	30	328	328	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	1,419	142	1,561	1,561	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	324	-	-	-	-	-	81	405	405	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	113	-	-	-	-	-	17	130	130	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	9	2	-	24	-	7	42	42	-	-	-	582	-	-	-	11,633	20	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	401	60	462	462	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	119	12	131	131	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	96	10	106	-	106	-	-	-	-	-	-	-	-	-
1b.4.10	FEMA Fees	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	188	28	216	-	216	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	27	4	32	-	32	-	-	-	-	-	-	-	-	-
1b.4.13	Indirect Overhead	-	-	-	-	-	-	509	76	586	586	-	-	-	-	-	-	-	-	-	-
1b.4.14	Security Staff Cost	-	-	-	-	-	-	757	114	870	870	-	-	-	-	-	-	-	-	-	25,728
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	4,849	727	5,577	5,577	-	-	-	-	-	-	-	-	-	89,897

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
1b.4	Subtotal Period 1b Period-Dependent Costs	838	437	9	2	-	24	8,717	1,526	11,553	11,200	353	-	-	582	-	-	-	11,633	20	115,626
1b.0	TOTAL PERIOD 1b COST	4,015	476	58	137	6	228	15,137	3,858	23,915	23,391	512	11	37	1,362	-	-	-	61,131	53,626	115,626
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	388	-	-	-	-	-	58	446	446	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	32	-	-	-	-	-	5	36	36	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	14,101	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	17	3	20	20	-	-	-	-	-	-	-	-	-	251
1c.1	Subtotal Period 1c Activity Costs	-	420	-	-	-	-	750	285	1,455	1,455	-	-	-	-	-	-	-	-	17,801	251
Period 1c Additional Costs																					
1c.2.1	Landfill Post Closure Maintenance	-	-	-	-	-	-	10	1	11	-	-	11	-	-	-	-	-	-	-	-
1c.2	Subtotal Period 1c Additional Costs	-	-	-	-	-	-	10	1	11	-	-	11	-	-	-	-	-	-	-	-
Period 1c Collateral Costs																					
1c.3.1	Process liquid waste	185	-	73	210	-	328	-	213	1,010	1,010	-	-	-	1,261	-	-	-	75,657	246	-
1c.3.2	Small tool allowance	-	3	-	-	-	-	-	0	4	4	-	-	-	-	-	-	-	-	-	-
1c.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	137	21	158	-	158	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	185	3	73	210	-	328	137	235	1,171	1,014	158	-	-	1,261	-	-	-	75,657	246	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	298	30	328	328	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	1,281	128	1,409	1,409	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	179	-	-	-	-	-	45	224	224	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	113	-	-	-	-	-	17	130	130	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	2	0	-	6	-	2	10	10	-	-	-	144	-	-	-	2,878	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	401	60	462	462	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	119	12	131	131	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	96	10	106	-	106	-	-	-	-	-	-	-	-	-
1c.4.9	FEMA Fees	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	188	28	216	-	216	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	27	4	32	-	32	-	-	-	-	-	-	-	-	-
1c.4.12	Indirect Overhead	-	-	-	-	-	-	509	76	586	586	-	-	-	-	-	-	-	-	-	-
1c.4.13	Security Staff Cost	-	-	-	-	-	-	757	114	870	870	-	-	-	-	-	-	-	-	-	25,728
1c.4.14	Utility Staff Cost	-	-	-	-	-	-	4,849	727	5,577	5,577	-	-	-	-	-	-	-	-	-	89,897
1c.4	Subtotal Period 1c Period-Dependent Costs	-	292	2	0	-	6	8,579	1,261	10,140	9,787	353	-	-	144	-	-	-	2,878	5	115,626
1c.0	TOTAL PERIOD 1c COST	185	715	76	210	-	334	9,477	1,782	12,778	12,256	511	11	-	1,405	-	-	-	78,535	18,052	115,876
PERIOD 1 TOTALS		4,200	2,059	142	349	6	586	63,946	11,252	82,540	78,583	3,033	923	37	3,338	-	-	-	151,086	71,697	705,667
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection									a											
2a.1.2	Semi-annual environmental survey									a											
2a.1.3	Prepare reports									a											
2a.1.4	Bituminous roof replacement	-	-	-	-	-	-	929	139	1,068	1,068	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	1,295	324	1,619	1,619	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	2,224	463	2,688	2,688	-	-	-	-	-	-	-	-	-	-

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 2a Additional Costs																					
2a.2.1	Landfill Post Closure Maintenance	-	-	-	-	-	-	250	25	275	-	-	275	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	250	25	275	-	-	275	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,998	1,050	8,048	-	8,048	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	6,998	1,050	8,048	-	8,048	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	5,329	533	5,862	5,265	597	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	20,746	2,075	22,820	298	22,522	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	900	-	-	-	-	-	225	1,125	1,125	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	61	11	-	168	-	50	289	289	-	-	-	3,991	-	-	-	79,812	135	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	3,281	492	3,774	1,887	1,887	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	1,842	184	2,026	2,026	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,923	392	4,315	-	4,315	-	-	-	-	-	-	-	-	-
2a.4.8	Spent Fuel Pool O&M	-	-	-	-	-	-	7,681	1,152	8,833	-	8,833	-	-	-	-	-	-	-	-	-
2a.4.9	ISFSI Operating Costs	-	-	-	-	-	-	1,123	168	1,292	-	1,292	-	-	-	-	-	-	-	-	-
2a.4.10	Indirect Overhead	-	-	-	-	-	-	2,252	338	2,590	560	2,030	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	19,650	2,947	22,597	8,256	14,341	-	-	-	-	-	-	-	-	628,624
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	21,457	3,218	24,675	4,654	20,021	-	-	-	-	-	-	-	-	397,591
2a.4	Subtotal Period 2a Period-Dependent Costs	-	900	61	11	-	168	87,283	11,775	100,198	24,360	75,838	-	-	3,991	-	-	-	79,812	135	1,026,216
2a.0	TOTAL PERIOD 2a COST	-	900	61	11	-	168	96,756	13,313	111,209	27,048	83,886	275	-	3,991	-	-	-	79,812	135	1,026,216
PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly Inspection									a											
2b.1.2	Semi-annual environmental survey									a											
2b.1.3	Prepare reports									a											
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	496	74	571	571	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	692	173	865	865	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	1,188	247	1,436	1,436	-	-	-	-	-	-	-	-	-	-
Period 2b Additional Costs																					
2b.2.1	Landfill Maintenance Perpetuity	-	-	-	-	-	-	557	56	612	-	-	612	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	-	-	-	-	-	557	56	612	-	-	612	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	763	114	878	-	878	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	763	114	878	-	878	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	2,623	262	2,886	2,812	74	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	145	14	159	159	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	425	-	-	-	-	-	106	531	531	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	31	6	-	86	-	25	147	147	-	-	-	2,036	-	-	-	40,710	69	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	876	131	1,008	1,008	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	984	98	1,082	1,082	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	275	28	303	-	303	-	-	-	-	-	-	-	-	-
2b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	600	90	690	-	690	-	-	-	-	-	-	-	-	-
2b.4.9	Indirect Overhead	-	-	-	-	-	-	260	39	299	299	-	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	5,673	851	6,523	4,410	2,113	-	-	-	-	-	-	-	-	154,980
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	2,162	324	2,486	2,486	-	-	-	-	-	-	-	-	-	45,920
2b.4	Subtotal Period 2b Period-Dependent Costs	-	425	31	6	-	86	13,598	1,970	16,115	12,935	3,179	-	-	2,036	-	-	-	40,710	69	200,900

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
2b.0	TOTAL PERIOD 2b COST	-	425	31	6	-	86	16,106	2,387	19,040	14,371	4,057	612	-	2,036	-	-	-	40,710	69	200,900
PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Quarterly Inspection									a											
2c.1.2	Semi-annual environmental survey									a											
2c.1.3	Prepare reports									a											
2c.1.4	Bituminous roof replacement	-	-	-	-	-	-	3,438	516	3,953	3,953	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	4,792	1,198	5,991	5,991	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	8,230	1,714	9,944	9,944	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	17,708	1,771	19,479	19,479	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	1,004	100	1,104	1,104	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	2,943	-	-	-	-	-	736	3,679	3,679	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	214	38	-	593	-	176	1,022	1,022	-	-	-	14,100	-	-	-	281,994	477	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	6,071	911	6,981	6,981	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	6,504	650	7,154	7,154	-	-	-	-	-	-	-	-	-	-
2c.4.7	Indirect Overhead	-	-	-	-	-	-	1,802	270	2,072	2,072	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	26,564	3,985	30,549	30,549	-	-	-	-	-	-	-	-	-	596,400
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	14,974	2,246	17,220	17,220	-	-	-	-	-	-	-	-	-	318,080
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,943	214	38	-	593	74,626	10,845	89,260	89,260	-	-	-	14,100	-	-	-	281,994	477	914,480
2c.0	TOTAL PERIOD 2c COST	-	2,943	214	38	-	593	82,857	12,558	99,204	99,204	-	-	-	14,100	-	-	-	281,994	477	914,480
PERIOD 2 TOTALS		-	4,269	306	55	-	847	195,718	28,259	229,453	140,623	87,943	888	-	20,126	-	-	-	402,516	680	2,141,596
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	559
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	134	20	154	154	-	-	-	-	-	-	-	-	-	1,978
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	430
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	559
3a.1.6	Define major work sequence	-	-	-	-	-	-	218	33	251	251	-	-	-	-	-	-	-	-	-	3,225
3a.1.7	Perform SER and EA	-	-	-	-	-	-	90	14	104	104	-	-	-	-	-	-	-	-	-	1,333
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	2,150
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	119	18	137	137	-	-	-	-	-	-	-	-	-	1,761
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	214	32	246	222	-	25	-	-	-	-	-	-	-	3,169
3a.1.11.2	Plant systems	-	-	-	-	-	-	121	18	139	125	-	14	-	-	-	-	-	-	-	1,792
3a.1.11.3	Reactor internals	-	-	-	-	-	-	206	31	237	237	-	-	-	-	-	-	-	-	-	3,053
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	189	28	217	217	-	-	-	-	-	-	-	-	-	2,795
3a.1.11.5	Biological shield	-	-	-	-	-	-	15	2	17	17	-	-	-	-	-	-	-	-	-	215
3a.1.11.6	Steam generators	-	-	-	-	-	-	91	14	104	104	-	-	-	-	-	-	-	-	-	1,342
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	47	7	54	27	-	27	-	-	-	-	-	-	-	688
3a.1.11.8	Main Turbine	-	-	-	-	-	-	12	2	13	-	-	13	-	-	-	-	-	-	-	172
3a.1.11.9	Main Condensers	-	-	-	-	-	-	12	2	13	-	-	13	-	-	-	-	-	-	-	172
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	91	14	104	52	-	52	-	-	-	-	-	-	-	1,342
3a.1.11.11	Waste management	-	-	-	-	-	-	134	20	154	154	-	-	-	-	-	-	-	-	-	1,978
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	26	4	30	15	-	15	-	-	-	-	-	-	-	387
3a.1.11	Total	-	-	-	-	-	-	1,157	174	1,330	1,171	-	159	-	-	-	-	-	-	-	17,104

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	70	10	80	80	-	-	-	-	-	-	-	-	-	1,032
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,700	405	3,105	3,105	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	602
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,100	315	2,415	2,415	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	36	5	41	41	-	-	-	-	-	-	-	-	-	529
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	6,914	1,037	7,951	7,792	-	159	-	-	-	-	-	-	-	31,262
Period 3a Additional Costs																					
3a.2.1	Site Characterization	-	-	-	-	-	-	1,252	376	1,628	1,628	-	-	-	-	-	-	-	-	8,167	3,357
3a.2	Subtotal Period 3a Additional Costs	-	-	-	-	-	-	1,252	376	1,628	1,628	-	-	-	-	-	-	-	-	8,167	3,357
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	464	46	511	511	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	26	3	29	29	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	365	-	-	-	-	-	91	456	456	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	450	-	-	-	-	-	68	518	518	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	7	1	-	20	-	6	35	35	-	-	-	481	-	-	-	9,613	16	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,592	239	1,831	1,831	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	214	21	236	236	-	-	-	-	-	-	-	-	-	-
3a.4.8	Indirect Overhead	-	-	-	-	-	-	1,134	170	1,304	1,304	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	1,232	185	1,417	1,417	-	-	-	-	-	-	-	-	-	-
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	10,709	1,606	12,315	12,315	-	-	-	-	-	-	-	-	-	35,728
3a.4	Subtotal Period 3a Period-Dependent Costs	-	815	7	1	-	20	15,373	2,435	18,652	18,652	-	-	-	481	-	-	-	9,613	16	200,229
3a.0	TOTAL PERIOD 3a COST	-	815	7	1	-	20	23,539	3,848	28,231	28,072	-	159	-	481	-	-	-	9,613	8,183	235,957
PERIOD 3b - Decommissioning Preparations																					270,576
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	185	28	213	192	-	21	-	-	-	-	-	-	-	2,035
3b.1.1.2	Reactor internals	-	-	-	-	-	-	98	15	113	113	-	-	-	-	-	-	-	-	-	1,075
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	53	8	61	15	-	46	-	-	-	-	-	-	-	581
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	430
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	430
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	39	6	45	45	-	-	-	-	-	-	-	-	-	430
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	142	21	164	164	-	-	-	-	-	-	-	-	-	1,561
3b.1.1.8	Facility closeout	-	-	-	-	-	-	47	7	54	27	-	27	-	-	-	-	-	-	-	516
3b.1.1.9	Missile shields	-	-	-	-	-	-	18	3	20	20	-	-	-	-	-	-	-	-	-	194
3b.1.1.10	Biological shield	-	-	-	-	-	-	47	7	54	54	-	-	-	-	-	-	-	-	-	516
3b.1.1.11	Steam generators	-	-	-	-	-	-	180	27	207	207	-	-	-	-	-	-	-	-	-	1,978
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	39	6	45	23	-	23	-	-	-	-	-	-	-	430
3b.1.1.13	Main Turbine	-	-	-	-	-	-	61	9	70	-	-	70	-	-	-	-	-	-	-	671
3b.1.1.14	Main Condensers	-	-	-	-	-	-	61	9	70	-	-	70	-	-	-	-	-	-	-	671
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	107	16	123	111	-	12	-	-	-	-	-	-	-	1,174
3b.1.1.16	Reactor building	-	-	-	-	-	-	107	16	123	111	-	12	-	-	-	-	-	-	-	1,174
3b.1.1	Total	-	-	-	-	-	-	1,263	190	1,453	1,171	-	282	-	-	-	-	-	-	-	13,864
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,263	190	1,453	1,171	-	282	-	-	-	-	-	-	-	13,864
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	862	-	-	-	-	-	-	129	991	991	-	-	-	-	-	-	-	-	-	-
3b.3.2	Pipe cutting equipment	-	1,000	-	-	-	-	-	150	1,150	1,150	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	862	1,000	-	-	-	-	-	279	2,141	2,141	-	-	-	-	-	-	-	-	-	-

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	264	26	290	290	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	13	1	15	15	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	198	-	-	-	-	-	50	248	248	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	229	-	-	-	-	-	34	264	264	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	4	1	-	11	-	3	19	19	-	-	-	266	-	-	-	5,328	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	811	122	933	933	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	109	11	120	120	-	-	-	-	-	-	-	-	-	-
3b.4.9	Indirect Overhead	-	-	-	-	-	-	789	118	907	907	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	628	94	722	722	-	-	-	-	-	-	-	-	-	18,207
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	7,683	1,152	8,836	8,836	-	-	-	-	-	-	-	-	-	139,234
3b.4	Subtotal Period 3b Period-Dependent Costs	27	428	4	1	-	11	10,297	1,619	12,387	12,387	-	-	-	266	-	-	-	5,328	9	157,441
3b.0	TOTAL PERIOD 3b COST	888	1,428	4	1	-	11	11,561	2,088	15,981	15,700	-	282	-	266	-	-	-	5,328	9	171,306
PERIOD 3 TOTALS		888	2,243	11	2	-	31	35,100	5,936	44,212	43,771	-	441	-	747	-	-	-	14,941	8,192	441,882
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	37	173	21	21	158	167	-	132	710	710	-	-	634	634	-	-	-	147,070	5,201	-
4a.1.1.2	Pressurizer Relief Tank	4	15	5	5	34	33	-	20	115	115	-	-	136	136	-	-	-	30,174	482	-
4a.1.1.3	Reactor Coolant Pumps & Motors	15	69	39	152	143	1,210	-	376	2,004	2,004	-	-	272	4,708	-	-	-	888,360	3,463	-
4a.1.1.4	Pressurizer	7	45	351	129	-	774	-	263	1,569	1,569	-	-	-	2,490	-	-	-	70,079	1,824	-
4a.1.1.5	Steam Generators	287	2,606	2,369	1,038	2,281	8,542	-	3,665	20,788	20,788	-	-	21,655	15,151	-	-	-	2,268,503	23,227	2,125
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	26	81	260	73	33	151	-	113	738	738	-	-	401	3,425	-	-	-	84,283	2,488	-
4a.1.1.7	Reactor Vessel Internals	86	1,921	4,768	312	-	4,541	193	5,053	16,874	16,874	-	-	-	3,618	125	470	-	342,705	23,700	1,080
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	14,761	-	2,214	16,975	16,975	-	-	-	-	-	-	666	129,800	-	-
4a.1.1.9	Reactor Vessel	-	3,845	1,157	91	-	6,559	193	6,504	18,348	18,348	-	-	-	6,290	2,955	-	-	943,207	23,700	1,080
4a.1.1	Totals	462	8,756	8,969	1,820	2,649	36,739	386	18,341	78,121	78,121	-	-	23,098	36,453	3,080	470	666	4,904,180	84,085	4,285
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	326	315	35	900	488	-	375	2,438	2,438	-	-	4,726	2,632	-	-	-	637,812	8,121	-
4a.1.3	Main Condensers	-	1,112	160	81	733	419	-	521	3,027	3,027	-	-	7,274	2,145	-	-	-	519,770	28,459	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	463	-	-	-	-	-	69	532	532	-	-	-	-	-	-	-	-	6,763	-
4a.1.4.2	AB - Battery & Cable Room (common)	-	20	-	-	-	-	-	3	23	23	-	-	-	-	-	-	-	-	295	-
4a.1.4.3	AB - FW Pump/Switchgear Area	-	20	-	-	-	-	-	3	23	23	-	-	-	-	-	-	-	-	299	-
4a.1.4.4	Auxiliary Building	-	165	-	-	-	-	-	25	189	189	-	-	-	-	-	-	-	-	2,409	-
4a.1.4.5	Auxiliary Service Building (common)	-	91	-	-	-	-	-	14	104	104	-	-	-	-	-	-	-	-	1,276	-
4a.1.4.6	Containment Mechanical Equipment	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	105	-
4a.1.4.7	Contaminated Materials Warehouse(common)	-	20	-	-	-	-	-	3	23	23	-	-	-	-	-	-	-	-	405	-
4a.1.4.8	Main Steam Doghouses	-	91	-	-	-	-	-	14	104	104	-	-	-	-	-	-	-	-	1,109	-
4a.1.4.9	Service Building (common)	-	87	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	1,607	-
4a.1.4.10	Turbine Building	-	282	-	-	-	-	-	42	325	325	-	-	-	-	-	-	-	-	4,856	-
4a.1.4.11	Upper Head Injection Tank Building	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	70	-
4a.1.4.12	Waste Solidification Facility (common)	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	78	-
4a.1.4.13	Fuel Building	-	80	-	-	-	-	-	12	92	92	-	-	-	-	-	-	-	-	1,173	-
4a.1.4	Totals	-	1,333	-	-	-	-	-	200	1,533	1,533	-	-	-	-	-	-	-	-	20,445	-
Disposal of Plant Systems																					
4a.1.5.1	Aux Bldg Chilled Water	-	80	1	3	99	-	-	36	219	219	-	-	1,094	-	-	-	-	44,411	1,857	-
4a.1.5.2	Aux Bldg Rad Area Chilled Water (shared)	-	106	2	4	151	-	-	50	314	314	-	-	1,663	-	-	-	-	67,525	2,446	-

Table D-2
Catawba Nuclear Station - Unit 2
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(thousands of 2008 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
Disposal of Plant Systems (continued)																					
4a.1.5.3	Auxiliary Feedwater	-	226	12	24	927	-	-	200	1,390	1,390	-	-	10,186	-	-	-	-	413,660	5,480	-
4a.1.5.4	Auxiliary Steam	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	564	-
4a.1.5.5	Auxiliary Steam RCA	-	77	1	3	107	-	-	36	224	224	-	-	1,160	-	-	-	-	47,930	1,801	-
4a.1.5.6	CCW Intake Screen Backwash	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	142	-
4a.1.5.7	CO2 Gen Purge	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	251	-
4a.1.5.8	Condensate	-	350	-	-	-	-	-	53	403	-	-	403	-	-	-	-	-	-	10,260	-
4a.1.5.9	Condensate Storage	-	71	-	-	-	-	-	11	82	-	-	82	-	-	-	-	-	-	2,003	-
4a.1.5.10	Condenser Cleaning	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	1,125	-
4a.1.5.11	Condenser Steam Air Ejector	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	996	-
4a.1.5.12	Containment Spray/Valve Inj Water	-	212	4	8	308	-	-	101	634	634	-	-	3,389	-	-	-	-	137,648	4,986	-
4a.1.5.13	Convent LP Service Water	-	90	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	2,702	-
4a.1.5.14	Conventional Chemical Addition	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	238	-
4a.1.5.15	Conventional Chemical Addition RCA	-	13	0	0	10	-	-	5	28	28	-	-	109	-	-	-	-	4,424	284	-
4a.1.5.16	Cooling Tower Water Treatment (shared)	-	73	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	2,137	-
4a.1.5.17	DG Engine Cooling Water	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	542	-
4a.1.5.18	DG Engine Fuel Oil	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,753	-
4a.1.5.19	DG Engine Lube Oil	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	998	-
4a.1.5.20	DG Engine Starting Air	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	1,012	-
4a.1.5.21	DG Room Sump Pump	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	175	-
4a.1.5.22	FDWP Condensate Seal	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	632	-
4a.1.5.23	Feedwater	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	1,527	-
4a.1.5.24	Feedwater Lube & Hydraulic Oil	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	417	-
4a.1.5.25	Feedwater Pump Turbine Steam Seal	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	80	-
4a.1.5.26	Feedwater RCA	-	78	3	7	249	-	-	58	396	396	-	-	2,742	-	-	-	-	111,348	1,945	-
4a.1.5.27	Generator Hydrogen	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	217	-
4a.1.5.28	Generator Seal Oil	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	312	-
4a.1.5.29	Heater Bleed Steam	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	1,006	-
4a.1.5.30	Heater Drains	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	3,866	-
4a.1.5.31	Heater Relief Valve	-	19	-	-	-	-	-	3	22	-	-	22	-	-	-	-	-	-	525	-
4a.1.5.32	Heater Vent	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	559	-
4a.1.5.33	Hydrogen Blanket & Bulk Storage (shared)	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	436	-
4a.1.5.34	MN Turbine Lube Oil & Purification	-	37	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	1,132	-
4a.1.5.35	Main Steam	-	14	-	-	-	-	-	2	17	-	-	17	-	-	-	-	-	-	450	-
4a.1.5.36	Main Steam Bypass to Condenser	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	784	-
4a.1.5.37	Main Steam Leakoff & Steam Seal	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	249	-
4a.1.5.38	Main Steam RCA	-	26	1	1	54	-	-	15	97	97	-	-	594	-	-	-	-	24,127	601	-
4a.1.5.39	Main Steam Vent	-	119	3	6	230	-	-	65	423	423	-	-	2,525	-	-	-	-	102,559	2,891	-
4a.1.5.40	Main Vacuum (shared)	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	291	-
4a.1.5.41	Makeup Demineralized Water (shared)	-	101	-	-	-	-	-	15	116	-	-	116	-	-	-	-	-	-	3,097	-
4a.1.5.42	Miscellaneous Equipment	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
4a.1.5.43	Moisture Separator Reheater Bld Steam	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	156	-
4a.1.5.44	Moisture Separator Reheater Drain	-	145	-	-	-	-	-	22	166	-	-	166	-	-	-	-	-	-	4,238	-
4a.1.5.45	Nitrogen (shared)	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	402	-
4a.1.5.46	Recirculated Cooling Water (shared)	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	3,964	-
4a.1.5.47	SG Wet Layup Recirculation	-	19	0	0	16	-	-	7	42	42	-	-	174	-	-	-	-	7,060	420	-
4a.1.5.48	SM Supply to Aux Equipment	-	25	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	762	-
4a.1.5.49	SM Supply to Aux Equipment RCA	-	9	0	0	9	-	-	4	22	22	-	-	100	-	-	-	-	4,077	211	-
4a.1.5.50	Standby Shutdown Diesel	-	6	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	158	-
4a.1.5.51	Steam Generator Blowdown Recycle	-	247	10	20	774	-	-	182	1,234	1,234	-	-	8,510	-	-	-	-	345,600	6,101	-
4a.1.5.52	Steam Supply to FW Pump Turbine	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	743	-
4a.1.5.53	Turbine Crossover	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	102	-
4a.1.5.54	Turbine Exhaust	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	64	-
4a.1.5.55	Turbine Hydraulic Oil	-	10	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	298	-
4a.1.5.56	Vacuum Priming (shared)	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	519	-
4a.1.5	Totals	-	2,950	39	78	2,935	-	-	1,020	7,021	5,024	-	1,997	32,267	-	-	-	-	1,310,369	80,927	-

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
4a.1.6	Scaffolding in support of decommissioning	-	3,390	16	4	91	11	-	866	4,379	4,379	-	-	901	56	-	-	-	45,598	30,835	-
4a.1	Subtotal Period 4a Activity Costs	462	17,867	9,499	2,018	7,308	37,657	386	21,323	96,519	94,522	-	1,997	68,266	41,285	3,080	470	666	7,417,729	252,872	4,285
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	19	-	9	25	-	39	-	23	114	114	-	-	-	148	-	-	-	8,882	29	-
4a.3.2	Small tool allowance	-	182	-	-	-	-	-	27	209	188	-	21	-	-	-	-	-	-	-	-
4a.3.3	Survey and Release of Scrap Metal	-	-	-	-	-	-	676	101	777	777	-	-	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	19	182	9	25	-	39	676	152	1,100	1,079	-	21	-	148	-	-	-	8,882	29	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	55	-	-	-	-	-	-	14	69	69	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	541	54	595	595	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	28	3	30	27	-	3	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,473	-	-	-	-	-	368	1,841	1,841	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,265	-	-	-	-	-	340	2,605	2,605	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	53	9	-	146	-	43	252	252	-	-	-	3,480	-	-	-	69,606	118	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,583	237	1,821	1,821	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	472	47	519	519	-	-	-	-	-	-	-	-	-	-
4a.4.9	Radwaste Processing Equipment/Services	-	-	-	-	-	-	393	59	451	451	-	-	-	-	-	-	-	-	-	-
4a.4.10	Indirect Overhead	-	-	-	-	-	-	2,201	330	2,531	2,531	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	1,655	248	1,904	1,904	-	-	-	-	-	-	-	-	-	45,840
4a.4.12	Utility Staff Cost	-	-	-	-	-	-	21,859	3,279	25,138	25,138	-	-	-	-	-	-	-	-	-	388,549
4a.4	Subtotal Period 4a Period-Dependent Costs	55	3,738	53	9	-	146	28,731	5,023	37,757	37,754	-	3	-	3,480	-	-	-	69,606	118	434,389
4a.0	TOTAL PERIOD 4a COST	535	21,787	9,561	2,052	7,308	37,842	29,793	26,498	135,375	133,354	-	2,021	68,266	44,913	3,080	470	666	7,496,218	253,019	438,674
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	300	35	130	76	-	518	-	313	1,372	1,372	-	-	-	2,648	-	-	-	237,562	1,033	-
Disposal of Plant Systems																					
4b.1.2.1	Admin Bldg Chilled Water (shared)	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	416	-
4b.1.2.2	Admin Bldg Ventilation (shared)	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	171	-
4b.1.2.3	Annulus Ventilation	-	30	2	3	118	-	-	26	179	179	-	-	1,299	-	-	-	-	52,733	700	-
4b.1.2.4	Aux & RB Heating Water	-	429	5	10	362	-	-	164	970	970	-	-	3,982	-	-	-	-	161,718	9,843	-
4b.1.2.5	Aux Bldg Ventilation	-	154	6	12	465	-	-	111	748	748	-	-	5,113	-	-	-	-	207,636	3,728	-
4b.1.2.6	Boron Recycle	-	331	18	26	378	112	-	173	1,039	1,039	-	-	4,161	605	-	-	-	220,260	8,136	-
4b.1.2.7	Boron Thermal Regeneration	-	230	24	36	103	223	-	136	752	752	-	-	1,132	1,143	-	-	-	148,472	5,685	-
4b.1.2.8	Breathing Air (shared)	-	135	1	2	94	-	-	48	281	281	-	-	1,037	-	-	-	-	42,110	3,335	-
4b.1.2.9	Chemical & Volume Control	-	552	97	132	473	814	-	442	2,509	2,509	-	-	5,204	4,217	-	-	-	584,618	13,616	-
4b.1.2.10	Comp Room Chilled Water (shared)	-	43	-	-	-	-	-	6	50	-	-	50	-	-	-	-	-	-	1,295	-
4b.1.2.11	Component Cooling	-	103	-	-	-	-	-	15	119	-	-	119	-	-	-	-	-	-	3,092	-
4b.1.2.12	Component Cooling RCA	-	141	4	7	279	-	-	78	509	509	-	-	3,066	-	-	-	-	124,493	3,199	-
4b.1.2.13	Computer Air Cond. (shared)	-	24	2	3	118	-	-	24	171	171	-	-	1,296	-	-	-	-	52,647	509	-
4b.1.2.14	Condenser Circulating Water	-	93	-	-	-	-	-	14	107	-	-	107	-	-	-	-	-	-	2,781	-
4b.1.2.15	Cont Air Release & Addition	-	34	1	1	40	-	-	15	89	89	-	-	435	-	-	-	-	17,669	836	-
4b.1.2.16	Cont Air Return Ex & H2 Skimmer	-	84	2	4	135	-	-	42	266	266	-	-	1,488	-	-	-	-	60,418	2,087	-
4b.1.2.17	Cont CRD, & ICI Room Vent	-	75	6	11	290	25	-	71	478	478	-	-	3,184	129	-	-	-	140,856	1,880	-
4b.1.2.18	Cont Water Sample & Purge	-	8	0	0	3	-	-	2	13	13	-	-	28	-	-	-	-	1,154	206	-
4b.1.2.19	Containment Chilled Water	-	25	-	-	-	-	-	4	29	-	-	29	-	-	-	-	-	-	712	-
4b.1.2.20	Containment Chilled Water RCA	-	68	2	3	128	-	-	37	238	238	-	-	1,407	-	-	-	-	57,124	1,636	-
4b.1.2.21	Containment Purge Ventilation	-	148	7	14	537	-	-	120	826	826	-	-	5,899	-	-	-	-	239,572	3,679	-
4b.1.2.22	Control Area Chilled Water (shared)	-	284	5	10	361	-	-	127	786	786	-	-	3,969	-	-	-	-	161,176	6,615	-
4b.1.2.23	Control Area HVAC (shared)	-	68	5	9	349	-	-	71	502	502	-	-	3,834	-	-	-	-	155,703	1,654	-
4b.1.2.24	Conventional Sampling	-	294	20	21	68	128	-	121	650	650	-	-	745	654	-	-	-	88,847	7,247	-

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Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
Disposal of Plant Systems (continued)																					
4b.1.2.25	Conventional Waste Mont & Treat (shared)	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	2,469	-
4b.1.2.26	Convntl Waste Mont & Treat (shared) RCA	-	207	5	9	355	-	-	107	683	683	-	-	3,901	-	-	-	-	158,411	4,987	-
4b.1.2.27	Diesel Bldg Ventilation	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	243	-
4b.1.2.28	Drinking Water (shared)	-	45	-	-	-	-	-	7	52	-	-	52	-	-	-	-	-	-	1,400	-
4b.1.2.29	Electrical (clean)	-	2,624	-	-	-	-	-	394	3,017	-	-	3,017	-	-	-	-	-	-	73,972	-
4b.1.2.30	Electrical (contaminated)	-	763	12	24	688	39	-	309	1,835	1,835	-	-	7,563	201	-	-	-	325,208	18,807	-
4b.1.2.31	Electrical (contaminated) RCA	-	5,354	87	172	6,505	-	-	2,349	14,465	14,465	-	-	71,504	-	-	-	-	2,903,830	129,175	-
4b.1.2.32	Equipment Decon	-	27	0	1	33	-	-	12	74	74	-	-	368	-	-	-	-	14,936	667	-
4b.1.2.33	FHB Ventilation	-	60	4	8	289	-	-	60	420	420	-	-	3,177	-	-	-	-	129,020	1,411	-
4b.1.2.34	Filtered Water (shared)	-	65	-	-	-	-	-	10	74	-	-	74	-	-	-	-	-	-	1,811	-
4b.1.2.35	Filtered Water (shared) RCA	-	26	0	1	37	-	-	12	77	77	-	-	412	-	-	-	-	16,721	626	-
4b.1.2.36	Fire Protection	-	42	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	1,274	-
4b.1.2.37	Fire Protection (shared)	-	388	-	-	-	-	-	58	446	-	-	446	-	-	-	-	-	-	11,816	-
4b.1.2.38	Fire Protection RCA	-	118	3	6	217	-	-	63	406	406	-	-	2,383	-	-	-	-	96,755	2,872	-
4b.1.2.39	Gaseous Waste Management (shared)	-	221	15	18	208	85	-	112	659	659	-	-	2,285	451	-	-	-	131,899	5,353	-
4b.1.2.40	Groundwater Drainage (shared)	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	591	-
4b.1.2.41	Heating Boiler Feedwater (shared)	-	49	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	1,454	-
4b.1.2.42	Ice Condenser Refrigeration	-	462	10	20	775	-	-	236	1,504	1,504	-	-	8,522	-	-	-	-	346,098	11,095	-
4b.1.2.43	Instrument Air	-	190	-	-	-	-	-	28	218	-	-	218	-	-	-	-	-	-	6,051	-
4b.1.2.44	Instrument Air RCA	-	649	7	14	515	-	-	242	1,427	1,427	-	-	5,663	-	-	-	-	229,971	14,768	-
4b.1.2.45	Liquid Waste Recycle	-	731	65	87	325	536	-	385	2,130	2,130	-	-	3,575	2,846	-	-	-	391,114	17,845	-
4b.1.2.46	Miscellaneous Ventilation	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	1,466	-
4b.1.2.47	Nuclear Prod Office Chilled Water (shrd)	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	681	-
4b.1.2.48	Nuclear Sampling	-	240	15	14	41	90	-	92	491	491	-	-	450	459	-	-	-	59,408	6,021	-
4b.1.2.49	Nuclear Service Water	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,898	-
4b.1.2.50	Nuclear Service Water Pump Vent	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	30	-
4b.1.2.51	Nuclear Service Water RCA	-	473	14	28	1,061	-	-	283	1,860	1,860	-	-	11,665	-	-	-	-	473,732	11,421	-
4b.1.2.52	Nuclear Solid Waste Disposal (shared)	-	217	20	26	140	151	-	119	674	674	-	-	1,542	834	-	-	-	132,019	5,284	-
4b.1.2.53	Oxygen (shared)	-	4	-	-	-	-	-	1	4	-	-	4	-	-	-	-	-	-	124	-
4b.1.2.54	Reactor Coolant	-	96	17	30	141	182	-	97	563	563	-	-	1,550	931	-	-	-	146,488	2,451	-
4b.1.2.55	Refueling Water	-	270	6	13	482	-	-	142	913	913	-	-	5,296	-	-	-	-	215,058	6,731	-
4b.1.2.56	Residual Heat Removal	-	123	17	24	75	153	-	86	477	477	-	-	824	783	-	-	-	103,675	3,049	-
4b.1.2.57	Safety Injection	-	386	36	57	826	238	-	292	1,834	1,834	-	-	9,075	1,237	-	-	-	477,592	9,533	-
4b.1.2.58	Sanitation & Waste Treatment (shared)	-	29	-	-	-	-	-	4	33	-	-	33	-	-	-	-	-	-	887	-
4b.1.2.59	Service Bldg & Warehouse Vent (shared)	-	46	-	-	-	-	-	7	52	-	-	52	-	-	-	-	-	-	1,457	-
4b.1.2.60	Service Bldg Chilled Water (shared)	-	38	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	1,165	-
4b.1.2.61	Spent Fuel Cooling	-	173	11	16	117	89	-	87	493	493	-	-	1,287	456	-	-	-	93,170	4,246	-
4b.1.2.62	Station Air (shared)	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	685	-
4b.1.2.63	Station Air (shared) RCA	-	243	3	5	195	-	-	91	536	536	-	-	2,140	-	-	-	-	86,897	5,487	-
4b.1.2.64	TB & Service Bldg Sump & Drains (shared)	-	43	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	1,261	-
4b.1.2.65	Tech Support Center Vent (shared)	-	5	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	145	-
4b.1.2.66	Turbine Building Ventilation	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	3,003	-
4b.1.2	Totals	-	18,132	550	879	17,326	2,866	-	7,614	47,367	42,526	-	4,840	190,459	14,946	-	-	-	9,049,210	458,771	-
4b.1.3	Scaffolding in support of decommissioning	-	5,086	24	6	136	16	-	1,299	6,568	6,568	-	-	1,352	84	-	-	-	68,397	46,253	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	924	656	121	227	864	829	-	1,009	4,630	4,630	-	-	9,498	6,561	-	-	-	1,003,086	36,521	-
4b.1.4.2	Auxiliary Building	418	146	28	57	76	84	-	289	1,098	1,098	-	-	833	1,599	-	-	-	191,766	13,665	-
4b.1.4.3	Auxiliary Service Building (common)	26	9	1	2	11	3	-	18	71	71	-	-	126	52	-	-	-	9,732	887	-
4b.1.4.4	Containment Mechanical Equipment	19	13	1	2	11	4	-	16	66	66	-	-	122	67	-	-	-	11,287	764	-
4b.1.4.5	Contaminated Materials Warehouse(common)	57	14	4	8	-	11	-	36	130	130	-	-	-	224	-	-	-	22,428	1,716	-
4b.1.4.6	Monitor Tank Building (common)	71	3	1	1	-	2	-	37	113	113	-	-	-	32	-	-	-	3,180	1,903	-
4b.1.4.7	Waste Solidification Facility (common)	11	7	1	2	8	3	-	10	42	42	-	-	93	47	-	-	-	8,097	449	-
4b.1.4.8	Fuel Building	659	706	12	20	309	33	-	565	2,304	2,304	-	-	3,393	401	-	-	-	176,182	32,243	-
4b.1.4	Totals	2,184	1,555	168	320	1,279	969	-	1,980	8,455	8,455	-	-	14,065	8,983	-	-	-	1,425,758	88,148	-

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
4b.1	Subtotal Period 4b Activity Costs	2,485	24,807	872	1,281	18,741	4,369	-	11,206	63,761	58,921	-	4,840	205,876	26,661	-	-	-	10,780,930	594,205	-
Period 4b Additional Costs																					
4b.2.1	RP Storage Tent Asphalt Disposal	-	6	1	48	-	150	-	46	252	252	-	-	-	2,633	-	-	-	315,900	120	-
4b.2.2	ISFSI License Termination	-	603	3	202	-	269	1,210	430	2,717	-	2,717	-	-	5,247	-	-	-	724,491	13,470	-
4b.2.3	Pond Closures	-	-	-	-	-	-	348	52	400	-	-	400	-	-	-	-	-	-	-	-
4b.2.4	License Termination Survey Program Management	-	-	-	-	-	-	616	185	801	801	-	-	-	-	-	-	-	-	-	6,240
4b.2	Subtotal Period 4b Additional Costs	-	609	4	250	-	419	2,174	713	4,170	1,053	2,717	400	-	7,880	-	-	-	1,040,391	13,590	6,240
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	76	-	35	101	-	159	-	96	468	468	-	-	-	610	-	-	-	36,597	119	-
4b.3.2	Small tool allowance	-	412	-	-	-	-	-	62	474	474	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	107	30	605	73	-	124	940	940	-	-	6,000	373	-	-	-	303,507	88	-
4b.3.4	Survey and Release of Scrap Metal	-	-	-	-	-	-	1,014	152	1,166	1,166	-	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	76	412	143	132	605	232	1,014	434	3,047	3,047	-	-	6,000	983	-	-	-	340,103	207	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	893	-	-	-	-	-	-	223	1,116	1,116	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	669	67	736	736	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	34	3	37	37	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	3,011	-	-	-	-	-	753	3,763	3,763	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	2,779	-	-	-	-	-	417	3,196	3,196	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	110	20	-	304	-	90	524	524	-	-	-	7,230	-	-	-	144,602	244	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,544	232	1,776	1,776	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	583	58	641	641	-	-	-	-	-	-	-	-	-	-
4b.4.9	Radwaste Processing Equipment/Services	-	-	-	-	-	-	485	73	558	558	-	-	-	-	-	-	-	-	-	-
4b.4.10	Indirect Overhead	-	-	-	-	-	-	2,658	399	3,057	3,057	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,872	281	2,153	2,153	-	-	-	-	-	-	-	-	-	-
4b.4.12	Utility Staff Cost	-	-	-	-	-	-	26,871	4,031	30,902	30,902	-	-	-	-	-	-	-	-	-	56,640
4b.4	Subtotal Period 4b Period-Dependent Costs	893	5,790	110	20	-	304	34,717	6,626	48,460	48,460	-	-	-	7,230	-	-	-	144,602	244	469,303
4b.0	TOTAL PERIOD 4b COST	3,454	31,618	1,129	1,682	19,346	5,324	37,905	18,980	119,438	111,481	2,717	5,240	211,876	42,754	-	-	-	12,306,020	608,247	532,183
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	150	45	195	195	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license									a											
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	150	45	195	195	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	License Termination Survey	-	-	-	-	-	-	9,459	2,838	12,296	12,296	-	-	-	-	-	-	-	-	228,376	3,120
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	9,459	2,838	12,296	12,296	-	-	-	-	-	-	-	-	228,376	3,120
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	20	2	22	22	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	1,196	-	-	-	-	-	299	1,495	1,495	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	5	1	-	15	-	4	25	25	-	-	-	-	-	-	-	-	-	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	240	36	276	276	-	-	-	345	-	-	-	6,907	12	-
4e.4.6	NRC Fees	-	-	-	-	-	-	355	35	390	390	-	-	-	-	-	-	-	-	-	-
4e.4.7	Indirect Overhead	-	-	-	-	-	-	690	103	793	793	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	429	64	494	494	-	-	-	-	-	-	-	-	-	-
4e.4.9	Utility Staff Cost	-	-	-	-	-	-	7,607	1,141	8,748	8,748	-	-	-	-	-	-	-	-	-	11,786
4e.4	Subtotal Period 4e Period-Dependent Costs	-	1,196	5	1	-	15	9,341	1,686	12,244	12,244	-	-	-	345	-	-	-	6,907	12	121,786
4e.0	TOTAL PERIOD 4e COST	-	1,196	5	1	-	15	18,950	4,568	24,735	24,735	-	-	-	345	-	-	-	6,907	228,388	136,691

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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 4 TOTALS		3,989	54,601	10,695	3,735	26,654	43,180	86,647	50,046	279,548	269,570	2,717	7,261	280,143	88,013	3,080	470	666	19,809,150	1,089,653	1,107,548
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	2,627	-	-	-	-	-	394	3,021	-	-	3,021	-	-	-	-	-	-	38,439	-
5b.1.1.2	AB - Battery & Cable Room (common)	-	181	-	-	-	-	-	27	209	-	-	209	-	-	-	-	-	-	2,772	-
5b.1.1.3	AB - FW Pump/Switchgear Area	-	185	-	-	-	-	-	28	212	-	-	212	-	-	-	-	-	-	2,750	-
5b.1.1.4	Administration Building (common)	-	221	-	-	-	-	-	33	254	-	-	254	-	-	-	-	-	-	4,366	-
5b.1.1.5	Auxiliary Building	-	1,508	-	-	-	-	-	226	1,735	-	-	1,735	-	-	-	-	-	-	22,370	-
5b.1.1.6	Auxiliary Service Building (common)	-	826	-	-	-	-	-	124	949	-	-	949	-	-	-	-	-	-	11,789	-
5b.1.1.7	Containment Mechanical Equipment	-	52	-	-	-	-	-	8	60	-	-	60	-	-	-	-	-	-	1,085	-
5b.1.1.8	Contaminated Materials Warehouse(common)	-	237	-	-	-	-	-	36	272	-	-	272	-	-	-	-	-	-	5,478	-
5b.1.1.9	Cooling Towers (3)	-	1,988	-	-	-	-	-	298	2,286	-	-	2,286	-	-	-	-	-	-	34,180	-
5b.1.1.10	Diesel Generator Building	-	298	-	-	-	-	-	45	343	-	-	343	-	-	-	-	-	-	4,152	-
5b.1.1.11	Lagoons & Yard Basins (common)	-	180	-	-	-	-	-	27	207	-	-	207	-	-	-	-	-	-	3,401	-
5b.1.1.12	Low Pressure Service Water (common)	-	244	-	-	-	-	-	37	281	-	-	281	-	-	-	-	-	-	3,548	-
5b.1.1.13	Main Steam Doghouses	-	821	-	-	-	-	-	123	944	-	-	944	-	-	-	-	-	-	10,075	-
5b.1.1.14	Miscellaneous Structures (common)	-	4,398	-	-	-	-	-	660	5,057	-	-	5,057	-	-	-	-	-	-	74,828	-
5b.1.1.15	Monitor Tank Building (common)	-	330	-	-	-	-	-	49	379	-	-	379	-	-	-	-	-	-	6,276	-
5b.1.1.16	Nuc.Sevice Water Struct/Piping (common)	-	867	-	-	-	-	-	130	997	-	-	997	-	-	-	-	-	-	7,251	-
5b.1.1.17	Service Building (common)	-	893	-	-	-	-	-	134	1,027	-	-	1,027	-	-	-	-	-	-	18,025	-
5b.1.1.18	Standby Shutdown Facility (common)	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	954	-
5b.1.1.19	Steam Generator Drain Tank Bldg (common)	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	896	-
5b.1.1.20	Turbine Building	-	2,688	-	-	-	-	-	403	3,091	-	-	3,091	-	-	-	-	-	-	47,944	-
5b.1.1.21	Turbine Pedestal	-	622	-	-	-	-	-	93	716	-	-	716	-	-	-	-	-	-	7,683	-
5b.1.1.22	Upper Head Injection Tank Building	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	633	-
5b.1.1.23	Waste Solidification Facility (common)	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	799	-
5b.1.1.24	Fuel Building	-	739	-	-	-	-	-	111	850	-	-	850	-	-	-	-	-	-	11,073	-
5b.1.1	Totals	-	20,088	-	-	-	-	-	3,013	23,101	-	-	23,101	-	-	-	-	-	-	320,764	-
Site Closeout Activities																					
5b.1.2	BackFill Site	-	6,186	-	-	-	-	-	928	7,114	-	-	7,114	-	-	-	-	-	-	23,126	-
5b.1.3	Grade & landscape site	-	110	-	-	-	-	-	16	126	-	-	126	-	-	-	-	-	-	248	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	61	9	70	70	-	-	-	-	-	-	-	-	-	671
5b.1	Subtotal Period 5b Activity Costs	-	26,383	-	-	-	-	61	3,967	30,411	70	-	30,341	-	-	-	-	-	-	344,138	671
Period 5b Additional Costs																					
5b.2.1	Concrete Crushing	-	1,027	-	-	-	-	5	155	1,186	-	-	1,186	-	-	-	-	-	-	5,291	-
5b.2.2	ISFSI Demolition and Restoration	-	1,176	-	-	-	-	43	183	1,401	-	1,401	-	-	-	-	-	-	-	8,708	160
5b.2	Subtotal Period 5b Additional Costs	-	2,202	-	-	-	-	48	338	2,588	-	1,401	1,186	-	-	-	-	-	-	13,999	160
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	248	-	-	-	-	-	37	286	-	-	286	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	248	-	-	-	-	-	37	286	-	-	286	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	44	4	48	-	-	48	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,781	-	-	-	-	-	717	5,499	-	-	5,499	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	264	40	304	-	-	304	-	-	-	-	-	-	-	-
5b.4.5	Indirect Overhead	-	-	-	-	-	-	745	112	857	857	-	-	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	865	130	995	-	-	995	-	-	-	-	-	-	-	-
5b.4.7	Utility Staff Cost	-	-	-	-	-	-	7,811	1,172	8,983	-	-	8,983	-	-	-	-	-	-	-	22,959
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,781	-	-	-	-	9,730	2,174	16,686	857	-	15,828	-	-	-	-	-	-	-	131,589
																				-	154,547

Table D-2
Catawba Nuclear Station - Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2008 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
5b.0	TOTAL PERIOD 5b COST	-	33,616	-	-	-	-	9,839	6,516	49,970	928	1,401	47,641	-	-	-	-	-	-	358,137	155,378
PERIOD 5 TOTALS		-	33,616	-	-	-	-	9,839	6,516	49,970	928	1,401	47,641	-	-	-	-	-	-	358,137	155,378
TOTAL COST TO DECOMMISSION		9,077	96,787	11,155	4,141	26,660	44,644	391,250	102,009	685,723	533,475	95,094	57,155	280,180	112,224	3,080	470	666	20,377,690	1,528,360	4,552,070

TOTAL COST TO DECOMMISSION WITH 17.48% CONTINGENCY:	**$685,723**	**thousands of 2008 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 77.8% OR:	**$533,475**	**thousands of 2008 dollars**
SPENT FUEL MANAGEMENT COST IS 13.87% OR:	**$95,094**	**thousands of 2008 dollars**
NON-NUCLEAR DEMOLITION COST IS 8.33% OR:	**$57,155**	**thousands of 2008 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**115,773**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**666**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**53,891**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,517,633**	**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